Watershed Restoration and Enhancement Plan - WRIA 7 – Snohomish Watershed

Final Draft Plan
January 2021

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State of Washington

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Acronyms

Acronym	Definition
AE	Application Efficiency
AFY	Acre-Feet per Year
CFS	Cubic Feet per Second
CU	Consumptive Use
CUF	Consumptive Use Factor
GPD	Gallons per Day
GIS	Geographic Information System
IR	Irrigation Requirements
LID	Low Impact Development
LIO	Local Integrating Organization
MAR	Managed Aquifer Recharge
NEB	Net Ecological Benefit
PE	Permit-Exempt
RCW	Revised Code of Washington
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRE	Watershed Restoration and Enhancement
WRIA	Water Resource Inventory Area
WWT	Washington Water Trust

Acknowledgements

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Executive Summary

In January 2018, the Washington State Legislature passed the Streamflow Restoration law (RCW 90.94). The law clarifies how local governments issue building permits for homes intending to use a permit-exempt (PE) well for their domestic water supply and requires local watershed planning in 15 water resource inventory areas (WRIAs), including the Snohomish (WRIA 7).

The law directs the Department of Ecology to lead Watershed Restoration and Enhancement Committees to develop Watershed Restoration and Enhancement Plans (watershed plans). Watershed plans must estimate the potential consumptive impacts of new permit-exempt domestic groundwater withdrawals on instream flows over 20 years (2018-2038), identify projects and actions to offset those impacts, and provide a net ecological benefit (NEB) to the WRIA. This Watershed Restoration and Enhancement Plan meets the requirements of the law.

The Department of Ecology (Ecology) established the Snohomish (WRIA 7) Watershed Restoration and Enhancement Committee (Committee) in October 2018 and invited tribal governments, county governments, city governments, Department of Fish and Wildlife, the largest non-municipal water purveyor, and interest groups. The WRIA 7 Committee met for over two years to develop a watershed plan.

Ecology also issued Final Guidance on Determining Net Ecological Benefit (Final NEB Guidance) (Ecology 2019) to ensure consistency, conformity with state law, and transparency in implementing RCW 90.94. The Final NEB Guidance describes the minimum planning requirements: include clear and Systematic Logic, delineate Subbasins, estimate new consumptive water use, evaluate impacts of new consumptive water use, and describe and evaluate projects and actions for their offset potential.

The WRIA 7 Committee divided the watershed into 16 subbasins, as shown in Figure ES.1. The Committee projects that a total of 3,389 new PE wells will be installed within WRIA 7 during the 20-year planning horizon. The Committee used this 20-year PE well projection to estimate 797.4 acre-feet per year (AFY) (1.1 cubic feet per second) of new consumptive water use in WRIA 7 that this watershed plan must address and offset.

The watershed plan includes six water rights acquisitions projects, two lake level management projects, one streamflow augmentation project, one managed aquifer recharge project, and one surface water storage project to offset consumptive use. If implemented, these 11 water offset projects will provide an estimated offset of 1,373.4 AFY.

A total of 27 habitat projects are included in the plan. Ecological benefits associated with these projects vary and include floodplain restoration, wetland reconnection, availability of off-channel habitat for juvenile salmonids, reduction of peak flow during storm events, increase in groundwater levels and baseflow, and increase in channel complexity. The ecological and streamflow benefits from the project portfolio in this plan contribute to achieving NEB.

The WRIA 7 Committee also included what they have termed “policy and regulatory recommendations” in the plan to show support for programs, policies, and regulatory actions that would contribute to the goal of streamflow restoration.

The Committee recommended adaptive management measures in the plan for the purpose of addressing uncertainty in plan implementation. Adaptive management measures include funding for adaptive management, additional funding for project implementation, adding projects to the plan, implementing a process and program for tracking PE wells and project implementation, continuing monitoring of streamflow and groundwater levels, continuing studies that improve understanding of WRIA 7 hydrology, and monitoring projects for effectiveness. These measures, in addition to the project portfolio described above, provide reasonable assurance that the plan will adequately offset new consumptive use from PE wells anticipated during the planning horizon.

Based on the information and analyses summarized in this plan, the WRIA 7 Committee finds that this plan, if implemented, can achieve NEB, as required by RCW 90.94.030 and defined by the Final NEB Guidance (Ecology 2019).

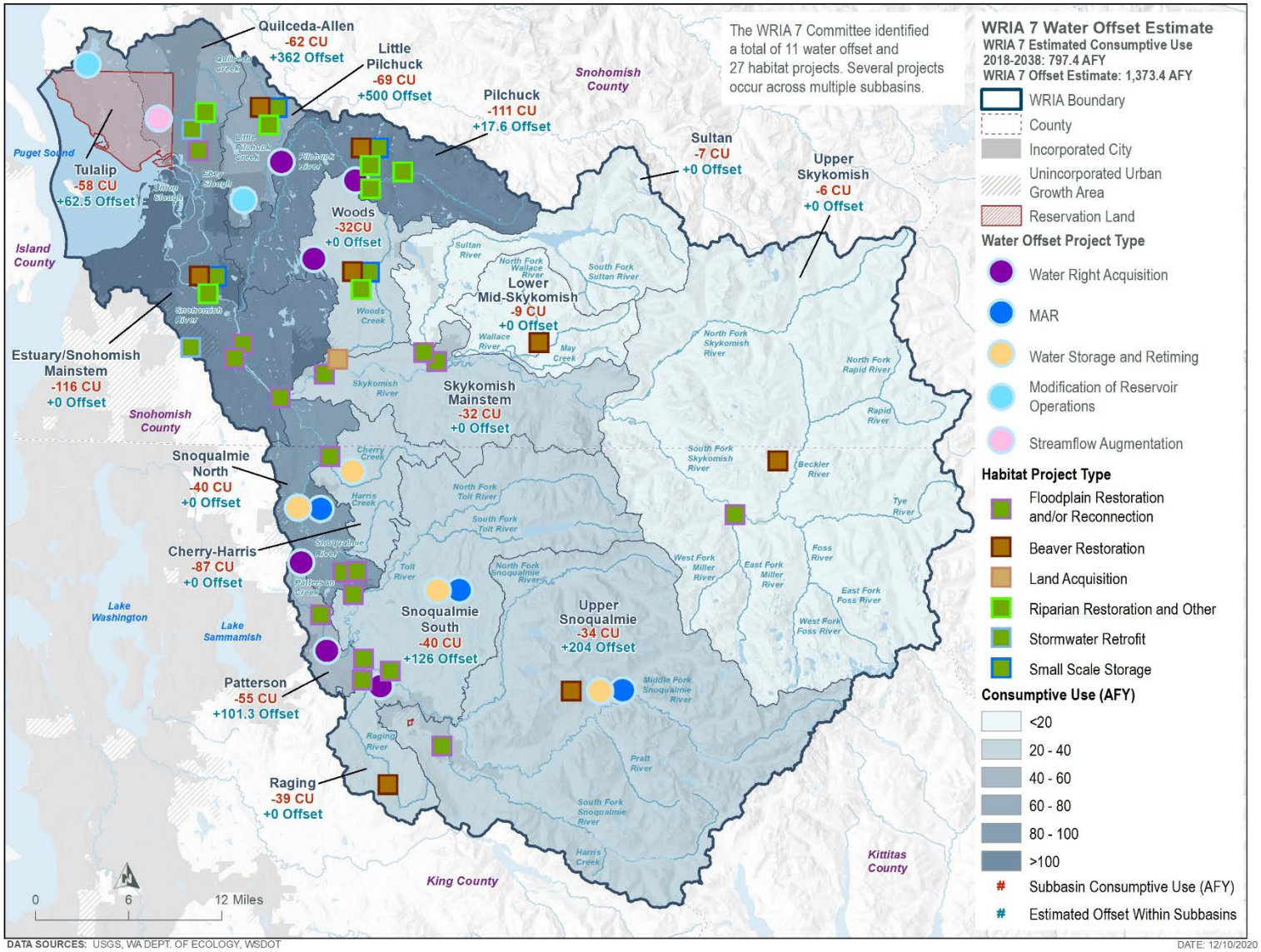


Figure E S1: WRIA 7 Estimated Consumptive Use and Projects by Subbasin

Chapter One: Plan Overview

1.1 Plan Purpose and Structure

The purpose of the Water Resource Inventory Area (WRIA) 7 Watershed Restoration and Enhancement Plan (watershed plan) is to offset the impacts of new domestic permit-exempt (PE) wells to streamflows. The watershed restoration and enhancement plan is one requirement of RCW 90.94.030. The law clarifies how local jurisdictions issue building permits for homes that use a permit-exempt well for a water source.

Watershed plans must identify projects to offset the projected consumptive impacts of new permit-exempt domestic groundwater withdrawals on instream flows over 20 years (2018-2038) and provide a net ecological benefit (NEB) to the WRIA. The WRIA 7 watershed plan considers priorities for salmon recovery and watershed recovery, while ensuring it meets the intent of the law.

Pumping from wells can reduce groundwater discharge to springs and streams by capturing water that would otherwise have discharged naturally, reducing flows (Barlow and Leake 2012). Consumptive water use (that portion not returned to the aquifer) reduces streamflow, both seasonally and as average annual recharge. A well pumping from an aquifer connected to a surface water body can either reduce the quantity of water discharging to the river or increase the quantity of water leaking out of the river (Barlow and Leake 2012). Projects that offset consumptive use associated with PE domestic water use help minimize future impacts to instream flows and restore streamflow.

[COMMENT: Language to be included if the Committee approved the plan: This watershed plan is narrow in scope and is not intended to address all water uses or related issues within the watershed. Competing water uses in the Snohomish Basin, including municipal, agricultural, and instream uses face challenges meeting their needs. Municipalities and agricultural users face challenges securing water supply and instream flows are frequently not met in the watershed. The WRIA 7 Watershed Restoration and Enhancement Committee (Committee) has successfully developed this watershed plan to address new domestic permit-exempt wells over the 20-year planning horizon. However, approval of this watershed plan by the Committee does not signal that all water supply challenges in WRIA 7 are resolved. This plan does not address supply issues facing municipalities and agriculture, and it does not ensure minimum instream flows are met. This plan also does not address new domestic permit-exempt wells beyond January 18, 2038. The Committee believes that, were a similar planning approach adopted in the future to address new domestic permit-exempt wells, it may be increasingly difficult to identify water offsets.

While this plan does not resolve all water needs in WRIA 7, successful completion of the watershed plan by the Committee represents a noteworthy achievement regarding a technically and politically complex issue. This Committee's achievement could indicate that more comprehensive, improved coordination of water resources for both instream and out of

stream uses—and resultant improvements in overall watershed health in WRIA 7—are also achievable.

This watershed plan consists of seven chapters:

- Plan overview.
- Overview of the watershed's salmon and limiting factors, hydrology, hydrogeology, and streamflow;
- Summary of the subbasins,
- Permit-exempt well projections and consumptive use estimates;
- Description of the recommended projects and actions identified to offset the future permit-exempt domestic water use in WRIA 7;
- Explanation of recommended policy, adaptive management and implementation measures; and
- Evaluation and consideration of the net ecological benefits.

1.1.1 Legal and Regulatory Background for the WRIA 7 Watershed Restoration and Enhancement Plan

In January 2018, the Washington State Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 (session law 2018 c 1). This law was enacted in response to the State Supreme Court's 2016 decision in Whatcom County vs. Hirst, Futurewise, et al. (commonly referred to as the "Hirst decision"). As it relates to this Committee's work, the law, now primarily codified as RCW 90.94, clarifies how local governments can issue building permits for homes intending to use a permit-exempt well for their domestic water supply. The law also requires local watershed planning in 15 WRIAs, including WRIA 7.

1.1.2 Domestic Permit-Exempt Wells

This watershed restoration and enhancement plan, the law that calls for it, and the Hirst decision are all concerned with the effects of new domestic permit-exempt water use on streamflows. Several laws pertain to the management of groundwater permit-exempt wells in WRIA 7 and are summarized in brief here for the purpose of providing context for the WRIA 7 watershed plan.

First and foremost, RCW 90.44.050, commonly referred to as "the Groundwater Permit Exemption," establishes that certain small withdrawals of groundwater are exempt from the state's water right permitting requirements, including small indoor and outdoor water use associated with homes. It is important to note that although these withdrawals do not require a state water right permit, the water right is still legally established by the beneficial use.

Even though a water right permit is not required for small domestic uses under RCW 90.44.050, there is still regulatory oversight, including from local jurisdictions. Specifically, in order for an applicant to receive a building permit from their local government for a new home, the applicant must satisfy the provisions of RCW 19.27.097 for what constitutes evidence of an adequate water supply.

RCW 90.94.030 adds to the management regime for new homes using domestic permit-exempt well withdrawals in WRIA 7 and elsewhere. For example, local governments must, among other responsibilities relating to new permit-exempt domestic wells, collect a $500 fee for each building permit and record withdrawal restrictions on the title of the affected properties. Additionally, this law restricts new permit-exempt domestic withdrawals in WRIA 7 to a maximum annual average of up to 950 gallons per days per connection, subject to the five thousand gallons per day and ½-acre outdoor irrigation of non-commercial lawn/garden limits established in RCW 90.44.050.

Ecology has published its interpretation and implementation of RCW 19.27.097 and RCW 90.94 in Water Resources POL 2094 (Ecology 2019a). The WRIA 7 Committee directs readers to those laws and policy for comprehensive details and agency interpretations.

1.1.3 RCW 90.94.030 Planning Requirements

While supplementing the local building permit requirements, RCW 90.94.030(3) goes on to establish the planning criteria for WRIA 7. In doing so, it sets the minimum standard of Ecology's collaboration with the WRIA 7 Committee in the preparation of this watershed plan. In practice, the process of plan development was one of integration, collectively shared work, and a striving for consensus described in the Committee's adopted operating principles, which are further discussed below and in Appendix D – Operating Principles.

In addition to these procedural requirements, the law and consequently this watershed plan, is concerned with the identification of projects and actions intended to offset the anticipated impacts from new permit-exempt domestic groundwater withdrawals over the next 20 years and provide a net ecological benefit. In establishing the primary purpose of this watershed plan, RCW 90.94.030 (3) also details both the required and recommended plan elements.

Regarding the WRIA 7 Committee's approach to selecting projects and actions, the law also speaks to "high and lower priority projects." The Committee understands that, as provided in the Final Guidance on Determining Net Ecological Benefit (Ecology 2019), "use of these terms is not the sole critical factor in determining whether a plan achieves a NEB… and that plan development should be focused on developing projects that provide the most benefits… regardless of how they align with [these] labels" (page 12). It is the perspective of the Committee that this locally approved plan satisfies the requirements of RCW 90.94.030.

1.2 Requirements of the Watershed Restoration and Enhancement Plan

RCW 90.94.030 of the Streamflow Restoration law directs Ecology to establish a Watershed Restoration and Enhancement Committee in the Snohomish watershed and develop a watershed restoration and enhancement plan (watershed plan) in collaboration with the WRIA 7 Committee. Ecology determined that the intent was best served through collective development of the watershed plan, using an open and transparent setting and process that builds on local needs.

At a minimum, the watershed plan must include projects and actions necessary to offset projected consumptive impacts of new permit-exempt domestic groundwater withdrawals on streamflows and provide a net ecological benefit (NEB) to the WRIA.

Ecology issued the "Streamflow Restoration Policy and Interpretive Statement" (POL 2094) and "Final Guidance on Determining Net Ecological Benefit" (GUID 2094) in July 2019 to ensure consistency, conformity with state law, and transparency in implementing chapter 90.94 RCW. The "Final Guidance on Determining Net Ecological Benefit" (hereafter referred to as Final NEB Guidance) establishes Ecology's interpretation of the term "net ecological benefit." It also informs planning groups on the standards Ecology will apply when reviewing a watershed plan completed under RCW 90.94.020 or RCW 90.94.030. The minimum planning requirements identified in the Final NEB Guidance include the following (pages 7-8):

1. Clear and Systematic Logic. Watershed plans must be prepared with implementation in mind.
2. Delineate Subbasins. [The Committee] must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets.
3. Estimate New Consumptive Water Uses. Watershed plans much include a new consumptive water use estimate for each subbasin, and the technical basis for such estimate.
4. Evaluate Impacts from New Consumptive Water use. Watershed plans must consider both the estimated quantity of new consumptive water use from new domestic permit-exempt wells initiated within the planning horizon and how those impacts will be distributed.
5. Describe and Evaluate Projects and Actions for their Offset Potential. Watershed plans must, at a minimum, identify projects and actions intended to offset impacts associated with new consumptive water use.

The law requires that all members of the WRIA 7 Committee approve the plan prior to submission to Ecology for review. Ecology must then determine that the plan's recommended streamflow restoration projects and actions will result in a NEB to instream resources within the WRIA after accounting for projected use of new permit-exempt domestic wells over the 20-year period of 2018-2038.

1.3 Overview of the WRIA 7 Committee

1.3.1 Formation

The Streamflow Restoration law instructed Ecology to chair the WRIA 7 Committee and invite representatives from the following entities in the watershed to participate:

- Each federally recognized tribal government with reservation land or usual and accustomed harvest area within the WRIA.
- Each county government within the WRIA.

- Each city government within the WRIA.
- Washington State Department of Fish and Wildlife.
- The largest publicly owned water purveyor providing water within the WRIA that is not a municipality.
- The largest irrigation district within the WRIA.

Ecology sent invitation letters to each of the entities named in the law in September 2018.

The law also required Ecology to invite local organizations representing agricultural interests, environmental interests, and the residential construction industry. Businesses, environmental groups, agricultural organizations, conservation districts, and local governments nominated interest group representatives. Local governments on the WRIA 7 Committee voted on the nominees in order to select local organizations to represent agricultural interests, environmental interests, and the residential construction industry. Ecology invited the selected entities to participate on the Committee.

The WRIA 7 Committee members are included in Table 1.1. This list includes all of the members identified by the Legislature that agreed to participate on the Committee.[1]

Table 1.1: WRIA 7 Committee Participating Entities

Entity Name	**Representing**
City of Arlington	City government
City of Carnation	City government
City of Duvall	City government
City of Everett	City government
City of Gold Bar	City government
City of Lake Stevens	City government
City of Marysville	City government
City of Monroe	City government
City of North Bend	City government
City of Snohomish	City government
City of Snoqualmie	City government
King County	County government
Snohomish County	County government
Washington Water Trust	Environmental interest group
Snohomish Conservation District	Agricultural interest group
Snoqualmie Valley Watershed Improvement District	Irrigation district
Master Builders Association of King and Snohomish Counties	Residential construction industry
Town of Index	City government

[1]The law did not require invited entities to participate, and some chose not to participate on the Committee. Listed entities committed to participate in the process and designated representatives and alternates.

Entity Name	Representing
Washington State Department of Ecology	State agency
Washington Department of Fish and Wildlife	State agency
Tulalip Tribes	Tribal government
Snoqualmie Indian Tribe	Tribal government
Snohomish PUD	Water utility

Roster with names and alternates is available in Appendix C – Committee Roster.

The WRIA 7 Committee also invited the Snohomish Basin Salmon Recovery Forum, the Snoqualmie Watershed Forum, and the City of Seattle to participate as "ex-officio" members. Although not identified in the law, the ex-officio members provide valuable information and perspective as subject matter experts. The ex-officio members are active but non-voting participants of the WRIA 7 Committee.

1.3.2 Committee Structure and Decision Making

The WRIA 7 Committee held its first meeting in October 2018. Between October 2018 and January 2021 [UDATE LAST MEETING DATE, IF NEEDED], the Committee held [ADD NUMBER] meetings open to the public. The Committee typically met once a month, and as needed to meet deadlines.

The Committee spent two and a half years planning, which consisted of training, research, and developing plan components. Committee members had varying degrees of understanding concerning hydrogeology, water law, salmon recovery, and residential development. Ecology technical staff, WRIA 7 Committee members, and partners presented on topics to provide context for components of the plan.

In addition to playing the role of WRIA 7 Committee chair, Ecology staff provided administrative support and technical assistance, and contracted with consultants to provide facilitation and technical support for the Committee. The facilitator supported the Committee's discussions and decision-making and coordinated recommendations for policy change and adaptive management. The technical consultants developed products that informed Committee decisions and development of the plan. Examples include working with counties on growth projections, calculating consumptive use, preparing maps and other tools to support decisions, and researching project ideas. The technical consultants also developed all of the technical memorandums referenced throughout this plan.

The WRIA 7 Committee established two workgroups to support planning and to complete specific tasks. The Technical Workgroup focused on developing growth projections, subbasin delineations, and consumptive use estimates. The Project Subgroup focused on developing and prioritizing projects for the plan and also supported coordination with salmon recovery planning. The workgroups were open to all Committee members as well as non-Committee members that brought additional capacity or expertise to support the Committee. The workgroups made no binding decisions but presented information to the Committee as either

recommendations or findings. The WRIA 7 Committee acted on workgroup recommendations, as it deemed appropriate.

During the initial WRIA 7 Committee meetings, members developed and agreed to operating principles, which are included in Appendix D – Operating Principles. The operating principles established processes and procedures for meetings, voting, and communication, while outlining participation expectations, the structure of the WRIA 7 Committee, and other needs in order to support the WRIA 7 Committee in reaching agreement on a final plan.

By statutory design, this planning process brought a diversity of perspectives to the table. Therefore, it was important for the Committee to establish a clear decision-making process. The Committee strived for consensus, and when consensus could not be reached, the chair and facilitator documented agreement and dissenting opinions. The authorizing legislation requires that the final plan be approved by all members of the Committee prior to Ecology's review (RCW 90.94.030[3] "...all members of a watershed restoration and enhancement Committee must approve the plan prior to adoption"). As such, consensus during the foundational votes or decisions about plan development served as the best indicators of the Committee's progress toward an approved plan.

The WRIA 7 operating principles recognize that consensus can be difficult to achieve—and in some cases, decisions need be made quickly to stay on track to meet the watershed plan deadline. The operating principles allow for decisions leading up to the plan (e.g., growth scenarios, inclusion of individual projects, etc.) to be approved by a two-thirds majority of the Committee members in attendance.

Once planning was underway, the WRIA 7 Committee and facilitator limited the number of formal decisions held in order to prioritize reaching consensus on foundational components of the watershed plan. Consensus was reached on all interim decisions. The chair and facilitator documented agreement and dissenting opinions, as outlined in the Committee's operating principles. The Committee did not make any decisions by two-thirds majority.

The WRIA 7 Committee reviewed components of the watershed plan and the draft plan as a whole and on an iterative basis. [COMMENT: The following is language to include if the Committee votes to approve the final plan]: After reaching initial agreement on the final watershed plan, Committee members circulated the plan for broader local review and approval by the entities they represent. The WRIA 7 Committee reached final agreement on the Watershed Restoration and Enhancement Plan on [THIS DATE] 2021.

Chapter Two: Watershed Overview

2.1 Brief Introduction to WRIA 7

Water Resource Inventory Area (WRIA) 7 (the Snohomish River Watershed) is one of the 62 designated major watersheds in Washington State, formed as a result of the Water Resources Act of 1971. The Snohomish River Watershed is approximately 1,856 square miles in area and includes all the lands drained by the Snohomish, Snoqualmie, and Skykomish Rivers, including marine nearshore areas that drain directly to Puget Sound and Quilceda Creek on the Tulalip Plateau.

Approximately half of the watershed is located within King County and the other half is located within Snohomish County. It is the second largest watershed (behind the Skagit River watershed) that drains to Puget Sound (Snohomish County 2005). WRIA 7 is bounded on the north by WRIA 4 (Upper Skagit) and WRIA 5 (Stillaguamish), on the west by Puget Sound, on the south by WRIA 8 (Cedar-Sammamish), and on the east by WRIA 39 (Upper Yakima) and WRIA 45 (Wenatchee) (Ecology 2020).

The Snohomish River has two main tributaries: the Snoqualmie and the Skykomish Rivers. The Snoqualmie River originates in the western Cascade Range near Snoqualmie Pass and flows in a generally northwest direction for approximately 45 miles before combining with the Skykomish River near the City of Monroe. The Skykomish River originates in the western Cascade Range near Stevens Pass and flows in a generally westward direction for approximately 29 miles before its confluence with the Snoqualmie River. The Snohomish River originates at the confluence of the Snoqualmie and Skykomish Rivers and flows northwest for approximately 20 miles before discharging to Possession Sound just north of the City of Everett (Earth Point 2020). Major tributaries within the system include the Tolt River, the Sultan River, and the Pilchuck River (Ecology 1995).

The watershed also contains the Tolt Reservoir and Spada Lake, which are operated for municipal water supply by the Cities of Seattle and Everett, respectively. The Snohomish Public Utility District (PUD) generates hydropower with water from the Spada Lake that flows through a pipeline to a powerhouse on the Sultan River (Snohomish County PUD 2020). The City of Seattle generates hydropower with water from the Tolt Reservoir, conveying it through a penstock approximately six miles downstream of the Tolt Dam to a powerhouse on the South Fork Tolt River (Seattle City Light 2020). The lower portion of the watershed contains Lake Stevens and Lake Goodwin. Numerous smaller lakes, ponds, and wetlands are present throughout the watershed.

2.1.1 Land Use in WRIA 7

The Snohomish watershed supports a variety of stakeholders vying for limited surface water and groundwater supplies. The stakeholders include:

- Industrial and commercial facilities

- Agriculture
- Municipal water supply
- PE well water supply
- Minimum instream flows associated with aquatic habitat and fish requirements

Out of stream uses compete with instream water needs, including providing water for salmon and other aquatic resources. There is not sufficient water available to meet all of these uses year-round in the basin. The Instream Resources Protection Program for the Snohomish River Basin (WAC 173-507) has established minimum instream flows and closed specific watershed streams to appropriation, as described in Section 2.3.3 of this plan. The instream flow rule was adopted in 1979 and is junior to many water rights in WRIA 7. Minimum instream flows in WRIA 7 are frequently not met for portions of the year.

The eastern or upland portion of the watershed generally consists of commercial forest land and public forest land associated with the Mt. Baker-Snoqualmie National Forest. Land uses shift to rural developments and small urban centers in the foothills of the Cascade Mountains. Agricultural development is widespread within the lower portion of the Skykomish River valley and the Snoqualmie and Snohomish River valleys. Extending from the City of Snohomish, the western portion of WRIA 7 is urbanizing and characterized by a combination of residential, industrial, commercial, transportation, communication, and utility land covers (See Figure 2.1). The most populated cities in the watershed are all within Snohomish County, including Everett, Marysville, Lake Stevens, Arlington, and Monroe (OFM 2020). The terminus of the watershed is located north of the urbanized and highly industrialized Port of Everett where the Snohomish River discharges to Possession Sound.

Many aquifers in WRIA 7 are connected to surface water. Groundwater pumping may diminish surface water flows by capturing water that would otherwise have discharged to springs and streams. Consumptive water use (that portion not returned to the aquifer) reduces streamflow, both seasonally and as average annual recharge. A well drawing from an aquifer connected to a surface water body either directly or through an overlying aquifer can either reduce the quantity of water discharging to the river or increase the quantity of water leaking out of the river (Ecology 1995). This watershed plan addresses impacts on groundwater discharge to streams due to withdrawals from permit-exempt (PE) wells for domestic use. Projects to offset consumptive use associated with PE domestic water use have become a focus to minimize future impacts to instream flows and restore streamflow.

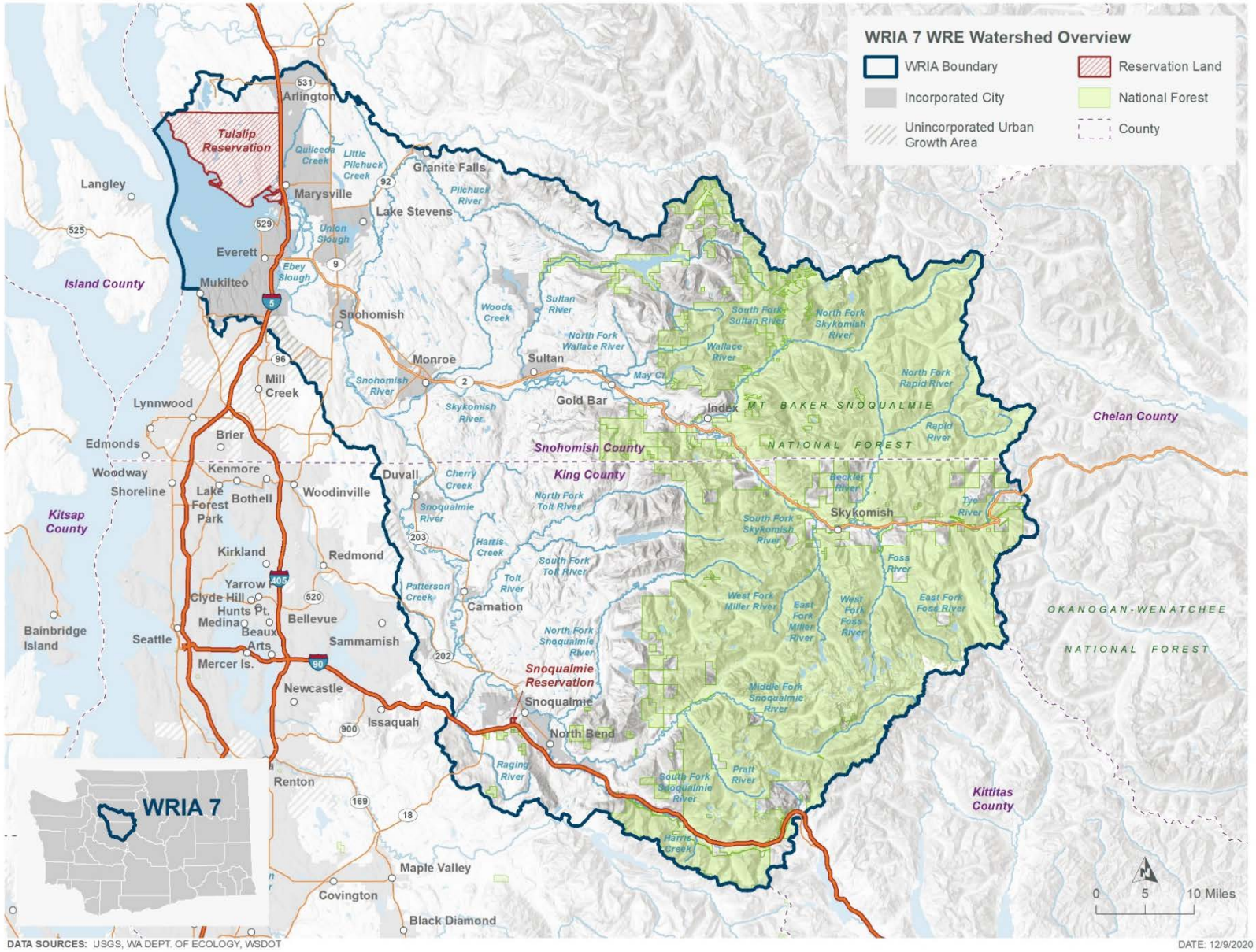


Figure 2.1: WRIA 7 Watershed Overview

2.1.2 Tribal Reservations and Usual and Accustomed Fishing Areas

Indian people have always relied on the natural resources of this land. Their personal, cultural, and spiritual survival depends on the ability to fish, hunt, and gather the bountiful natural resources that once blessed this country (NWIFC 2014). Salmon are one of those resources that is critical to the cultural, spiritual and economic wellbeing of tribes. Tribes depend upon salmon that originate from the waters found in the Snohomish River and its tributaries.

Both the Snoqualmie Indian Tribe (Snoqualmie Tribe) and Tulalip Tribes of Washington (Tulalip Tribes) have reservation lands in WRIA 7. The Snoqualmie Tribe reservation is located in the upper Snoqualmie Valley near Snoqualmie Falls and the Tulalip Tribes reservation is located on the Tulalip Plateau, north of the Snohomish River.

2.1.3 Salmonids in WRIA 7

Salmon Presence (Fish Population and Life Histories)

The Snohomish River Watershed has anadromous salmonid runs that include five Pacific salmon species that migrate in and out of the Snohomish watershed from Puget Sound (SWIFD 2020):

- Chinook (Oncorhynchus tshawytscha)
- Coho (Oncorhynchus kisutch)
- Chum (Oncorhynchus keta)
- Sockeye (Oncorhynchus nerka)
- Pink salmon (Oncorhynchus gorbuscha)

Steelhead trout (Oncorhynchus mykiss), coastal cutthroat trout (Oncorhynchus clarki clarki), rainbow trout (Oncorhynchus mykiss), and bull trout (Salvelinus confluentus) also inhabit the watershed. There are two distinct Chinook salmon populations: the Skykomish population and the Snoqualmie population and both populations are thought to be at less than 10 percent of historic levels. There are four bull trout populations and five steelhead populations (Snohomish County 2019). WDFW also plants hatchery-produced Kokanee (Onchorynchus nerka), resident Sockeye, in Lake Stevens.

Three species are currently protected under the Endangered Species Act (ESA): Chinook salmon, steelhead, and bull trout. Coho salmon are listed as a species of concern. Table 2.1 lists the species present in the Snohomish watershed and their regulatory status. Further detail is provided below:

- The Puget Sound evolutionarily significant unit (ESU) of Chinook salmon was designated as threatened under the ESA on May 24, 1999 (64 FR 14308-14328). Critical habitat for Chinook salmon was designated in 2005 and includes select marine nearshore and freshwater habitats within WRIA 7 (70 FR 37159-37204).
- The Puget Sound distinct population segment (DPS) of steelhead trout was designated as threatened under ESA on May 11, 2007 (72 FR 26722-26735). Designated critical habitat (DCH) for Puget Sound steelhead was finalized in 2016 and includes freshwater

tributaries to and estuarine habitat in Puget Sound, Washington (81 FR 9251-9325) including select areas within WRIA 7.

- The Coastal-Puget Sound Distinct Population Segment (DPS) of Bull Trout was designated as threatened under ESA on December 1, 1999 (64 FR 58910-58933). Critical habitat has been designated for Bull Trout and includes both select freshwater and saltwater aquatic habitat within WRIA 7 (75 FR 63898-64070).

Table 2.1: Salmonids Present Within the Snohomish Watershed

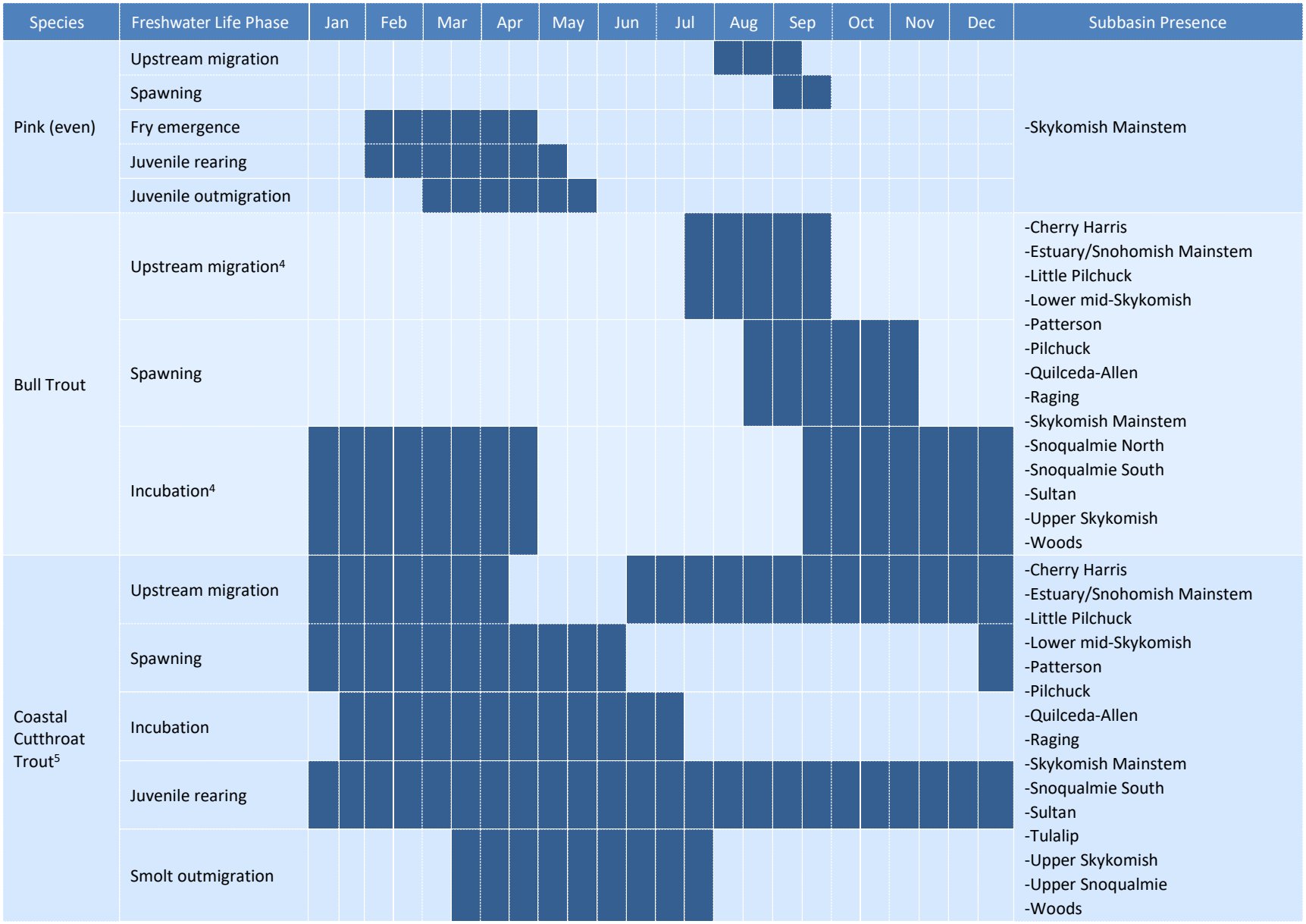
Common Name	**Scientific Name**	**Evolutionary Significant Unit**	**Designated Critical Habitat**	**Regulatory Agency Status**
Chinook Salmon	*Oncorhynchus tshawytscha*	Puget Sound Chinook	Yes	NMFS/Threatened/ 1999
Chum Salmon	*Oncoryhnchus keta*	Puget Sound Chum	No	No listing
Coho Salmon	*Oncorhynchus kisutch*	Puget Sound/Strait of Georgia Coho	No	NMFS/Species of Concern/1997
Pink Salmon	*Oncorhynchus gorbuscha*	No listing	No listing	No listing
Sockeye Salmon	*Oncorhynchus nerka*	No listing	No listing	No listing
Steelhead Trout	*Oncorhynchus mykiss*	Puget Sound Steelhead	Yes	NMFS/Threatened/ 2007
Bull Trout	*Salvelinus confluentus*	Puget Sound Dolly Varden/Bull Trout	Yes	USFWS/Threatened/ 1999
Coastal Cutthroat Trout	*Oncorhynchus clarkii clarkii*	No listing	No listing	No listing

Table 2.2 below lists the run timing and life stages of anadromous salmon and trout present throughout the watershed. Table 2.2's species list was derived from data downloaded from the Statewide Washington Integrated Fish Distribution database. Watershed specific data concerning salmonid life history and timing was summarized from the 2002 Washington State Conservation Commission Salmonid Habitat Limiting Factors Analysis (Haring 2002).

Table 2.2: Salmonid Life History Patterns within the Snohomish Watershed

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subbasin Presence
Sockeye[1]	Upstream migration						■	■	■	■	■			-Estuary/Snohomish Mainstem -Pilchuck -Quilceda-Allen
	Spawning									■	■	■	■	
	Fry emergence	■	■	■	■	■	■							
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration				■	■	■	■						
Chinook (fall)[2]	Upstream migration								■	■	■			-Cherry Harris -Estuary/Snohomish Mainstem -Lower mid-Skykomish -Patterson -Pilchuck -Quilceda-Allen -Raging -Skykomish Mainstem -Snoqualmie North -Snoqualmie South -Sultan -Upper Skykomish -Woods
	Spawning									■	■	■	■	
	Incubation	■	■	■	■	■				■	■	■	■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile outmigration	■	■	■	■	■	■	■	■					
Chinook (summer)[2]	Upstream migration								■	■				-Estuary/Snohomish Mainstem -Lower mid-Skykomish -Pilchuck -Quilceda-Allen -Skykomish Mainstem -Sultan -Woods
	Spawning									■	■			
	Incubation	■	■	■	■	■				■	■	■	■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile outmigration	■	■	■	■	■	■	■	■					
Coho	Upstream migration									■	■			-Cherry Harris -Estuary/Snohomish Mainstem -Little Pilchuck -Lower mid-Skykomish -Patterson
	Spawning	■	■								■	■	■	

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subbasin Presence
	Incubation[3]	■	■	■	■	■						■	■	-Pilchuck -Quilceda-Allen -Raging
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	-Skykomish Mainstem -Snoqualmie North -Snoqualmie South
	Smolt outmigration[3]			■	■	■	■	■						-Sultan -Tulalip -Upper Skykomish -Woods
Chum	Upstream migration										■	■	■	-Cherry Harris -Estuary/Snohomish Mainstem
	Spawning											■	■	-Lower mid-Skykomish -Patterson -Pilchuck
	Fry emergence			■	■									-Quilceda-Allen -Raging
	Juvenile rearing				■	■								-Skykomish Mainstem -Snoqualmie North -Snoqualmie South
	Juvenile outmigration				■	■								-Sultan -Upper Skykomish -Woods
Pink (odd)	Upstream migration								■	■				-Cherry Harris -Estuary/Snohomish Mainstem
	Spawning									■	■			-Lower mid-Skykomish -Patterson -Pilchuck
	Fry emergence		■	■	■									-Quilceda-Allen -Raging
	Juvenile rearing		■	■	■	■								-Skykomish Mainstem -Snoqualmie North -Snoqualmie South
	Juvenile outmigration			■	■	■								-Sultan -Upper Skykomish -Woods


Species
Freshwater Life Phase
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Subbasin Presence
Pink (even)
Upstream migration
Spawning
Fry emergence
Juvenile rearing
Juvenile outmigration
-Skykomish Mainstem
Bull Trout
Upstream migration[4]
Spawning
Incubation[4]
-Cherry Harris
-Estuary/Snohomish Mainstem
-Little Pilchuck
-Lower mid-Skykomish
-Patterson
-Pilchuck
-Quilceda-Allen
-Raging
-Skykomish Mainstem
-Snoqualmie North
-Snoqualmie South
-Sultan
-Upper Skykomish
-Woods
Coastal Cutthroat Trout[5]
Upstream migration
Spawning
Incubation
Juvenile rearing
Smolt outmigration
-Cherry Harris
-Estuary/Snohomish Mainstem
-Little Pilchuck
-Lower mid-Skykomish
-Patterson
-Pilchuck
-Quilceda-Allen
-Raging
-Skykomish Mainstem
-Snoqualmie South
-Sultan
-Tulalip
-Upper Skykomish
-Upper Snoqualmie
-Woods

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subbasin Presence
Steelhead Trout (winter)	Upstream migration	■	■	■	■	■	■	■				■	■	-Cherry Harris -Estuary/Snohomish Mainstem -Little Pilchuck -Lower mid-Skykomish -Patterson -Pilchuck -Quilceda-Allen -Raging -Skykomish Mainstem -Snoqualmie North -Snoqualmie South -Sultan -Upper Skykomish -Woods
	Spawning			■	■	■	■							
	Incubation[6]				■	■	■	■						
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration[6]			■	■	■	■							
Steelhead Trout (summer)	Upstream migration					■	■	■	■	■	■			-Cherry Harris -Estuary/Snohomish Mainstem -Little Pilchuck -Lower mid-Skykomish -Patterson -Pilchuck -Quilceda-Allen -Raging -Skykomish Mainstem -Snoqualmie North -Snoqualmie South -Sultan -Upper Skykomish -Woods
	Spawning			■	■	■	■							
	Incubation[6]				■	■	■	■						
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration[6]			■	■	■	■							
Rainbow Trout[7]	Spawning				■	■	■							-Lower mid-Skykomish -Pilchuck -Skykomish Mainstem -Snoqualmie South -Sultan -Tulalip -Upper Skykomish -Upper Snoqualmie
	Incubation				■	■	■	■						

NOTES:

1. Observed sockeye are likely stray adults per the habitat limiting factors report. Information on sockeye life history specifically within the Snohomish watershed is either unavailable or extremely limited. Sockeye life history patterns for the Puget Sound Region were used within this report (Gustafson et al. 1997).

2. Snohomish watershed has individuals that rear within the basin for a full year (Haring 2002)

3. Information on Coho incubation and outmigration timing specifically within the Snohomish watershed is unavailable. Coho incubation and outmigration timing for the adjacent WRIA 8 Region were used within this report (Kerwin 2001)

4. Information on bull trout incubation and migration timing specifically within the Snohomish watershed is either unavailable or extremely limited. Bull trout life history patterns for the Puget Sound Region were used within this report (King County 2000).

5. Information on coastal cutthroat trout life history specifically within the Snohomish watershed is either unavailable or extremely limited. Coastal cutthroat trout life history patterns for the Puget Sound Region were used within this report (Johnson et al. 1999).

6. Information on steelhead incubation and migration timing specifically within the Snohomish watershed is unavailable. Steelhead incubation and out-migration timing for the Puget Sound Region were used within this report (Blanton et al. 2011).

7. Information on rainbow trout life history specifically with the Snohomish watershed is unavailable. Rainbow trout life history patterns for the Puget Sound Region were used within this report (Blanton et al. 2011).

Limiting Factors for Salmon

Streams in WRIA 7 provide spawning and rearing habitat for salmon species unless they are blocked to migration. Salmon bearing streams throughout the Snohomish basin that provide spawning and rearing habitat for salmonids often experience low streamflows during critical migration and spawning times. In addition, levees, dams and other flood control measures have further limited habitat along primary watershed rivers and tributaries. The quality and quantity of spawning and rearing habitat, water quality, including water temperature, adult fish passage barriers, low streamflows, hatchery management, and harvest all affect local salmon populations (Snohomish County 2005). Species interactions like predation may also have significant effects on salmonid populations, and help shape the Pacific Northwest aquatic and upland landscapes (Cederholm et al. 2000).

Habitat conditions within WRIA 7 were abstracted from the 2002 Washington State Conservation Commission Salmonid Habitat Limiting Factors Analysis (Haring 2002). WRIA 7 includes approximately 25 miles of marine shorelines and 720 miles of streams that support anadromous salmon and trout populations. Stream systems within WRIA 7 range from pristine to highly degraded aquatic habitat. The watershed is characterized by a wide range of activities and impacts including residential development, commercial forestry, agriculture, wilderness, and urbanization. The Salmonid Habitat Limiting Factors Analysis (Haring 2002) identifies the following habitat limiting factors within WRIA 7:

- Fish habitat access
- Floodplain modifications
- Channel conditions
- Substrate conditions
- Riparian conditions
- Water quality
- Water quantity
- Lakes
- Biological processes

The Snohomish River Basin Salmon Conservation Plan (Snohomish County 2005) also identifies rearing habitat as a limiting factor for Chinook juveniles.

2.2 Watershed Planning in WRIA 7

Citizens and local, state, federal, and tribal governments have collaborated on watershed and water resource management issues in WRIA 7 for decades. Section 2.2.1 provides a brief summary of broad watershed planning efforts as they relate to the past, present, and future water availability in the Snohomish Watershed.

2.2.1 Other Planning Efforts in WRIA 7

The history of collaborative planning and shared priorities has supported the success of watershed plan development in WRIA 7. This watershed plan builds on many past efforts to further develop comprehensive plans for the entire watershed.

For example, the **Snohomish-Stillaguamish Local Integrating Organization (LIO)** developed an ecosystem recovery plan as part of the Action Agenda for Puget Sound Recovery. The ecosystem recovery planning process is community based, with engagement from local, state and federal agencies. The approach is holistic—addressing needs from salmon and orca recovery, to stormwater runoff, to farmland and forest conservation. The Snohomish-Stillaguamish LIO has engaged the community in a collaborative planning process to help understand ecosystem recovery priorities and support the health and sustainability of the watershed.

In the Snohomish watershed, **Snohomish County** performs the administrative process and lead functions of the lead entity. The **Snohomish Basin Salmon Recovery Forum (Snohomish Forum)** leads the overall salmon recovery efforts in WRIA 7, including habitat protection and restoration. The Snohomish Forum works in partnership with the co-managers (Washington Department of Fish and Wildlife and Tulalip Tribes) in harvest and hatchery management. The Snohomish Forum acts under a board of directors type model, where the Technical and Policy Development Committees vet and bring forward options for decision-making.

In 2005, the Snohomish Forum developed the *Snohomish River Basin Salmon Conservation Plan* (Salmon Plan) (Snohomish County 2005). The Snohomish Basin Salmon Recovery Forum also developed the *Snohomish Basin Protection Plan* in 2015 to identify protection strategies that prevent the degradation of hydrologic processes that support salmon or salmon habitat. Appendix B of the Protection Plan is an adopted addendum to the 2005 Salmon Plan (Snohomish Basin Salmon Recovery Forum 2015). The Snohomish Forum is currently planning a chapter update to the Salmon Plan.

The **Snoqualmie Watershed Forum** also coordinates among stakeholders and tribes to support implementation of the Salmon Plan. The Snoqualmie Watershed Forum was formed in 1998 and is a partnership between the Snoqualmie Tribe, the Tulalip Tribes, King County, the Cities of Duvall, Carnation, North Bend, and Snoqualmie, and the Town of Skykomish. These entities have an interlocal agreement to work together on watershed issues and coordinate implementation of water resource and habitat projects in the Snoqualmie and South Fork Skykomish watersheds (King County 2020).

Puget Sound Partnership (the Partnership) is the state agency leading the region's collective effort to restore and protect Puget Sound. In 2018, the Partnership issued its *State of the Salmon in Watersheds* report. The PSP identified three key findings from its report:

- Puget Sound is home to 59 populations of Chinook salmon, steelhead, and bull trout—all ESA-listed, most of which continue to decline.
- Our greatest challenge is balancing the needs of the more than 4 million people living in the Puget Sound region, while also protecting critical salmon habitat.

- While always learning, we know what needs to be done to recover our salmon as well as ensure a thriving and sustainable Puget Sound environment. The investment so far has been a fraction of what is needed to reach recovery goals (PSP 2018).

The *Snohomish River Basin Salmon Conservation Plan Status and Trends Report* (2019 Status and Trends Report) provides additional information about the status on implementation of the Snohomish River Basin Salmon Conservation Plan (Snohomish County 2019).

There are several collaborative processes in WRIA 7 working to balance the needs of agriculture, streamflow, and communities. Among these are the Sustainable Lands Strategy in Snohomish County, the Snoqualmie Fish Farm Flood Advisory Committee, and the Agriculture Resilience Plan developed by the Snohomish Conservation District.

- **Sustainable Lands Strategy (SLS):** The SLS was convened in 2010 by Snohomish County, Tulalip and Stillaguamish Tribes, state and federal agencies, and agricultural and environmental stakeholders to improve coordination and generate progress for fish, farm, and flood management interests. Snohomish County is the facilitator of the SLS and provides forum where agencies and stakeholders can bring technical information, design support, and other resources to coordinate priorities and implement projects. SLS' mission is to generate net gains in agricultural, tribal culture, and ecological productivity (Snohomish County 2020).

- **Fish Farm Flood (FFF):** The 2012 King County Comprehensive Plan directed the Department of Natural Resources and Parks to create a collaborative, grass-roots effort to determine how to move forward toward achieving the goals of these sometimes competing priorities. In 2017, the FFF Advisory Committee transmitted a set of recommended actions to the County Executive and Council and the FFF Implementation Oversight Committee (IOC) was created to ensure balanced implementation of those actions. The FFF recommendations are intended to assist the Executive and Council to advance and balance three important county goals of restoring habitat to aid salmon recovery, supporting farmers and preserving farmland, and reducing flood risk for farmers and other Snoqualmie Valley residents (King County 2019).

- **Agriculture Resilience Plan:** Snohomish Conservation District, in collaboration with farmers representing various types, sizes, and locations of farms in Snohomish County to develop the Agriculture Resilience Plan, finished at the end of 2019. The Agriculture Resilience Plan was developed to help farmers in Snohomish County plan for future changes and risk, and build a resilient agricultural community into the future through a combination of information gathering and sharing, creation of online planning tools, project scoping and design, project implementation, and farmland protection. It identifies priority needs for farmers in Snohomish County and actions to address those needs (SCD 2019).

Coordinated Water System Plans (CWSPs) are mandated by the Public Water System Coordination Act of 1977. King County passed ordinances ratifying four CWSPs (East King

County, Skyway, South King County, and Vashon). Water purveyors within northern and eastern Snohomish County updated their CWSP in 2010. These plans ensure that water system service areas are consistent with local growth management plans and development policies. The location of new homes in relation to and within designated retail water system service areas and related policies determine if connection to a water system is available, or the new homes will need to rely on an alternative water source, most likely a new permit-exempt domestic well. Within their designated retail service area(s), water purveyors are given first right of refusal for new connections. The purveyor may decline to provide service if water cannot be made available in a 'reasonable and timely' manner. However, it can be the case that a new permit-exempt well is drilled without making any inquiries with the county or with the local water system.

2.2.2 Coordination with Existing Plans

Throughout the development of this watershed plan, Ecology streamflow restoration staff have engaged with staff from the Snohomish-Stillaguamish LIO, the Snohomish Forum, the Snoqualmie Watershed Forum, and the Partnership, providing briefings on the Streamflow Restoration law, scope of the watershed plan, and plan development status updates. Throughout the planning process, the WRIA 7 Committee coordinated closely with the Snohomish Forum and the Snoqualmie Watershed Forum. Both entities actively participated in the WRIA 7 Committee as ex-officio members and identified opportunities to align the Committee's project list with the Salmon Plan and the *Snohomish Basin Protection Plan*.

Snohomish and King County planning staff helped ensure consistency with Comprehensive Plans. County Comprehensive Plans set policy for development, housing, public services and facilities, and environmentally sensitive areas, among other topics. The Comprehensive Plans identify Snohomish and King Counties' urban growth areas, set forth standards for urban and rural development, and provide the basis for zoning districts.

2.3 Description of the Watershed – Geology, Hydrogeology, Hydrology, and Streamflow

2.3.1 Geologic Setting

Understanding the geologic setting of WRIA 7 facilitates characterization of surface and groundwater flow through the watershed. The relationships between surface water flow and deeper groundwater are important to understanding how to manage surface water resources and can be helpful in identifying strategies to offset the impacts of pumping from PE wells.

Within WRIA 7, bedrock forms mountain ranges and uplands and generally consists of igneous and sedimentary rocks. Within drainages and lowland areas, bedrock is overlain by glacial and alluvial sediments. A minimum of four major glaciations covered the lower portion of the watershed during the Pleistocene Epoch (about 11,700 years to 2.5 MA), the most recent occurrence being the Vashon Stade of the Frasier Glaciation (Jones 1952). The advance and retreat of the Vashon ice sheet shaped the present topography and drainage network in WRIA

7. These processes resulted in glacially-derived ridges and lakes linked by drainage channels (Booth and Goldstein 1994).

Pleistocene-age glacial and interglacial processes resulted in the deposition of a complex assemblage of sedimentary deposits in lowland areas. These glacial deposits consist of glacial till, recessional and advance outwash, and glaciolacustrine deposits. Glacial till deposits generally consist of dense, silty sand with gravel and silt lenses. Outwash deposits generally consist of sand and gravel with locally abundant wood debris and peat. Glaciolacustrine deposits generally consist of silt and clay. This sequence of glacial deposits exceeds 1,500 feet in thickness within the lower portions of the watershed (Vaccaro, Hansen, and Jones 1998).

Recent alluvial deposits are generally associated with channel and overbank deposits from the modern Snoqualmie, Skykomish, and Snohomish Rivers and their tributaries. These sediments generally consist of stratified silt, sand, gravel, with minor clay (DNR 2020).

2.3.2 Hydrogeologic Setting

Groundwater within WRIA 7 primarily occurs within: (1) relatively coarse-grained glacial and alluvial aquifers overlying bedrock; and (2) primary and secondary porosity within bedrock aquifers. The U.S. Geological Survey (USGS) identified six hydrogeologic units within the sequence of Puget Sound glacial and alluvial sediments in WRIA 7. The hydrogeologic units typically alternate between aquifer units and semi-confining to confining layers (aquitards which lack sufficiently permeability to form aquifers) (Vaccaro, Hansen, and Jones 1998).

Within the upper portion of the watershed, glacial and alluvial sediments occur within the Snohomish River and Skykomish River valleys and drainages associated with area tributaries (DNR 2020). Glacial and alluvial sediments are widespread within the lower portion of the watershed.

Glacial and alluvial aquifers are generally unconfined (under water-table conditions) except where overlain by low permeability confining layers (generally till or glaciolacustrine deposits) (Vaccaro, Hansen, and Jones 1998). Transmissivity (a hydraulic property related to the rate of groundwater flow through an aquifer) and storativity (a hydraulic property related to the ability of an aquifer to store/release water) of these aquifers vary significantly with depositional environment and are generally the highest in outwash sands and gravels and lowest in fine-grained alluvial deposits (Vaccaro, Hansen, and Jones 1998). Glacial and alluvial aquifers are characterized by a shallow depth to the groundwater table and, where applicable, a direct hydraulic connection with adjacent surface water (Vaccaro, Hansen, and Jones 1998).

Bedrock aquifers underly the entire watershed. However, within the lower portions of the watershed, glacial and alluvial sediments are frequently hundreds of feet thick and bedrock aquifers are seldom targeted by water supply wells. Thickness of the glacial and alluvial hydrogeologic units described above are generally thin to the east within WRIA 7. Much of the watershed southeast of Monroe is underlain by relatively shallow and frequently outcropping

bedrock. Therefore, bedrock aquifers increase in importance, from a water supply perspective, within the upper portions of the watershed.

Bedrock aquifers are of relatively low transmissivity and storativity. Wells completed within bedrock aquifers typically do not have high enough capacities for municipal use. However, they can be valuable aquifers for residential water uses, and in specific areas are an important target aquifer for PE wells.

Recharge to glacial, alluvial, and bedrock aquifers within WRIA 7 is primarily associated with precipitation, applied irrigation, septic systems, leakage from surface water within losing reaches (where streamflow infiltrates to groundwater), and through leakage from adjacent aquifers. Watershed aquifers discharge to water supply wells, adjacent aquifers, gaining reaches of streams, and Puget Sound. Summer base flows in WRIA 7 rivers and tributaries are sustained by groundwater (baseflow) on most of the lower-elevation tributaries.

Regionally, groundwater flow direction within watershed aquifers largely parallels the westerly slope of the Cascade Range, although groundwater flow in shallow aquifers is generally influenced by surface topography and streamflow within the watershed and is directed to the northwest. This groundwater flow paradigm is complicated throughout the watershed by aquifer boundaries, aquifer heterogeneities, topography, the influence of gaining and losing stream reaches, well pumping, and other factors.

2.3.3 Hydrology and Streamflow

Most WRIA 7 rivers and tributaries are located in a snowmelt transition region where the rivers are fed by both snowmelt and rainfall; however, a few streams in the lower portions of the watershed are predominantly rain-fed. Within low elevation portions of the watershed, mean annual precipitation ranges from about 30 to 40 inches per year. Mean annual precipitation increases with topographic elevation and can exceed 120 inches within the Cascade Range (Western Regional Climate Center 2020). Most precipitation occurs during the late fall and winter. Precipitation is lowest during the summer when water demands are highest. During these low-flow periods, streamflow is highly dependent upon groundwater inflow (baseflow).

Anticipated future climate impacts within the watershed include rising temperatures, changes in precipitation, and continued loss of snow and glacial volumes in the Cascade Range. Earlier spring snowmelt, lower snowpack, increased evaporative losses, and warmer and drier summer conditions will intensify summer drought conditions and low flow issues in WRIA 7. These climate impacts are expected to drive changes in seasonal streamflows, increasing winter flooding, while intensifying summer low flow conditions:

- **Skykomish River:** Climate modeling predicts average minimum flows to be 18 percent lower (range: -22 to -8 percent) by the 2080s for a moderate warming scenario, relative to 1970 to 1999 (Mauger et al. 2015).

- **Snohomish River**: Climate modeling predicts average minimum flows to be 26 percent lower (range: -33 to -17 percent) by the 2080s for a moderate warming scenario, relative to 1970 to 1999 (Mauger et al. 2015).
- **Snoqualmie River**: Climate modeling predicts that mean monthly mainstem streamflow during summer months can be expected to decrease by as much one-half to two-thirds in the future as compared to historic period (Historical period: 1993–2005. Future period: 2087–2099) under RCP8.5, a moderate warming scenario (Yan et al. forthcoming).

Streamflow conditions within primary WRIA 7 rivers are summarized by the following 90% exceedance flows, which can be used to represent base flows (USGS 2020):

- USGS stream gage 12150800 (Snohomish River near Monroe): 90% exceedance flows in the second half of August are approximately 1,422 cfs for the period of record from 1964 - 2016.
- USGS stream gage 12149000 (Snoqualmie River near Carnation): 90% exceedance flows in the second half of August are approximately 532 cfs for the period of record from 1930 – 2016.
- USGS stream gage 12134500 (Skykomish River near Gold Bar): 90% exceedance flows in the second half of August are approximately 561 cfs for the period of record from 1929 – 2018.

These amounts are typically below the instream flows established in WAC-173-507 for the same time period at their respective gages.

Several factors contribute to streamflow: snowpack and rate of melt, rainfall, surface water runoff, and groundwater discharge. In addition to environmental factors, surface water withdrawals and groundwater pumping from wells in hydraulic continuity with surface water affect streamflow. Water use from new PE domestic wells represents only a very small portion of all water use and factors affecting streamflow in the watershed.

Rules associated with the Instream Resources Protection Program (IRPP) for the Snohomish River Basin are promulgated in WAC 173-507. The intent of the regulation is to protect streams within the watershed to protect flow levels and minimize impacts resulting from future water appropriations.

WAC 173-507-020 sets minimum instream flows within reaches for 11 stream management units. Minimum instream flows within the following 11 stream management units vary as a function of basin size:

- South Fork Skykomish
- Skykomish
- North Fork Snoqualmie
- Snoqualmie
- Tolt

- Pilchuck
- Snohomish Rivers

WAC 173-507-030 sets low flow limitations on 21 other streams within the watershed. Streams subject to low flow limitations include:

- Evans Creek
- Foye Creek
- French Creek
- Langlois Creek
- Tate Creek
- Tulalip Creek
- Wood Creek
- Woods Creek
- Unnamed streams tributary to Pilchuck River, Cherry Creek, McCoy Creek, Snoqualmie River, and an unnamed lake tributary to Horseshoe Lake

WAC 173-507-030 also closes eight streams and their tributaries to further appropriation of surface water. Streams closed to further appropriation of surface water include:

- Griffin Creek
- Harris Creek
- Little Pilchuck Creek
- May Creek
- Patterson Creek
- Quilceda Creek
- Raging River
- An unnamed stream tributary to Pilchuck River (Bodell Creek)

WAC 173-507-040 specifies that future permitting actions relating to groundwater withdrawals shall fully consider the natural interrelationship between surface and groundwaters to assure compliance with the meaning and intent of the IRPP.

Chapter Three: Subbasin Delineation

3.1 Introduction

Water Resource Inventory Areas (WRIAs) are large watershed areas formalized under the Washington Administrative Code for the purpose of administrative management and planning. WRIAs encompass multiple landscapes, hydrogeologic regimes, levels of development, and variable natural resources.

To allow meaningful analysis of the relationship between new consumptive use and offsets per Ecology's Final NEB Guidance,[2] the WRIA 7 Committee divided WRIA 7 into suitably sized subbasins. These delineations were helpful in describing the location and timing of projected new consumptive water use, the location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. In some instances, subbasins may not correspond with hydrologic or geologic basin delineations (e.g., watershed divides) (Ecology 2019).

3.2 Approach to Develop Subbasins

Consistent with the Final NEB Guidance, which defines subbasins as geographic subareas within a WRIA, equivalent to the words "same basin or tributary" as used in RCW 90.94.020(4)(b) and RCW 90.94.030 (3)(b), the WRIA 7 Committee divided WRIA 7 into 16 subbasins for purposes of assessing consumptive use and project offsets.[3] The Committee based subbasin delineations on existing subwatershed units and the interim growth projections Snohomish County and King County developed. The Committee then applied the following guiding principles to delineate subbasins:

- Use U.S. Geological Survey (USGS) hydrologic unit code subwatershed (HUC-12) boundaries in the Snohomish County portion of the watershed (USGS 2013, 2016);
- Use King County drainage basin boundaries in the King County portion of the watershed (King County 2018);
- Combine HUC-12s and King County drainage basins with lower projected growth of new homes using permit-exempt (PE) wells;

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[2] "Planning groups must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets. Subbasins will help the planning groups understand and describe location and timing of projected new consumptive water use, location, and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. Planning at the subbasin scale will also allow planning groups to consider specific reaches in terms of documented presence (e.g., spawning and rearing) of salmonid species listed under the federal Endangered Species Act." (Ecology 2019).

[3] Consistent with Final NEB Guidance that defines subbasins as a geographic subarea within a WRIA. A subbasin is equivalent to the words "same basin or tributary" as used in RCW 90.94.020(4)(b) and RCW 90.94.030 (3)(b).

- Keep distinct subbasins for HUC-12s and King County drainage basins with higher projected growth of new homes using PE wells;
- Align subbasins as closely as possible with Protection Planning Units identified in the Snohomish Basin Protection Plan (Snohomish Basin Salmon Recovery Forum 2015);
- Consider important salmon habitat and potential location of offset projects and actions;
- Consider streams with known low flow issues; and
- Consider streams with year-round closures.[4]

Section 3.3 describes how the Committee divided WRIA 17 into 16 subbasins. Appendix E – Subbasin Delineation Memo provides a more detailed description of the subbasin delineation. This technical memo also describes a few other adjustments the WRIA 7 Committee made to align the subbasins with relevant planning boundaries.

3.3 WRIA 7 Subbasins

Table 3.1 summarizes the WRIA 7 subbasin delineations shown in Figure 3.1.

Table 3.1: WRIA 7 Subbasins

Subbasin Name	Primary Rivers and Tributaries	County
Tulalip *	Streams draining directly to Puget Sound, including Tulalip Creek	Snohomish County
Quilceda-Allen †	Allen Creek and Quilceda Creek	Snohomish County
Estuary/Snohomish Mainstem *	Snohomish River, Evans Creek, French Creek, and streams draining directly to Puget Sound between the City of Mukilteo and the City of Everett	Snohomish County
Little Pilchuck †	Little Pilchuck Creek	Snohomish County
Pilchuck *	Upper and Lower Pilchuck River	Snohomish County
Woods *	Woods Creek	Snohomish County
Sultan	Upper, Middle and Lower Sultan River	Snohomish County
Lower Mid-Skykomish †	Wallace River and Olney Creek	Snohomish County
Skykomish Mainstem *	Skykomish River	Snohomish and King Counties
Upper Skykomish *	South Fork and North Fork Skykomish River tributaries, including Foss River, Miller River, Tye River, South Fork Skykomish	Snohomish and King Counties

[4] Streams closed year-round to further consumptive appropriation as identified in WAC 173-507-030 (2).

Subbasin Name	Primary Rivers and Tributaries	County
	River, Beckler River, Rapid River, Upper Beckler River, Lower South Fork Skykomish River, Lower North Fork Skykomish River, Middle North Fork Skykomish River, and Upper North Fork Skykomish River	
Cherry-Harris *,†	Cherry Creek and Harris Creek	Snohomish and King Counties
Snoqualmie North *	Northern half of the Snoqualmie River Mainstem drainage basin, Tuck Creek, Cathcart drainages, and Ames Lake	Snohomish and King Counties
Snoqualmie South *,†	South Fork Tolt, North Fork Tolt, and Lower Tolt River tributaries, Tokul Creek, Griffin Creek, and the southern half of the Snoqualmie River Mainstem drainage basin	Snohomish and King Counties
Patterson †	Patterson Creek	King County
Raging †	Raging River	King County
Upper Snoqualmie *	North, Middle, and South Fork Snoqualmie River	King County

Note: * designates subbasins containing streams with known low flow issues (i.e., contains streams with minimum instream flows and/or low flow limitations set by state rule); † designates subbasins containing streams with year round closures set by state rule.

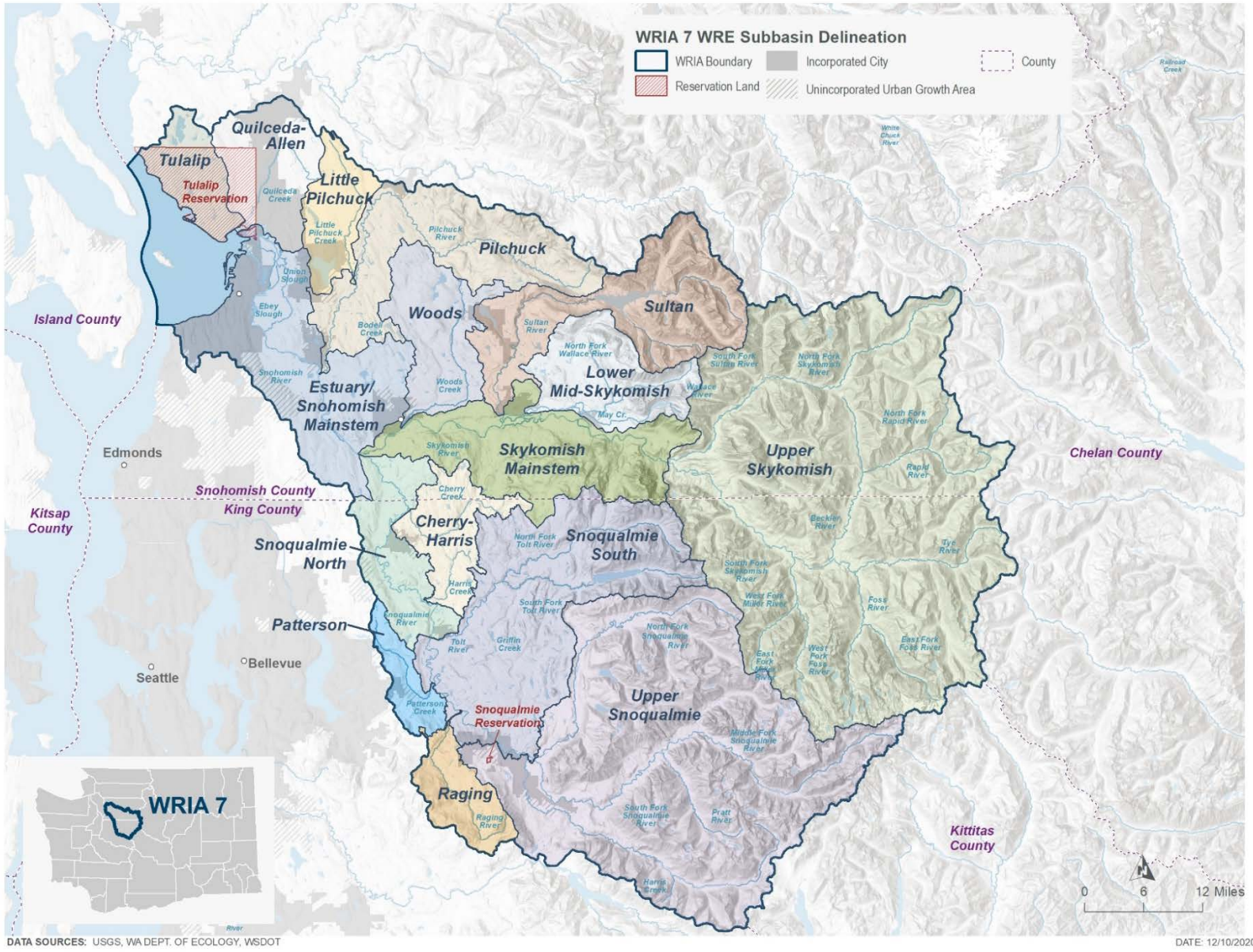


Figure 3.1: WRIA 7 Subbasin Delineation

Chapter Four: New Consumptive Water Use Impacts

4.1 Introduction to Consumptive Use

The Streamflow Restoration law requires watershed plans to include "estimates of the cumulative consumptive water use impacts over the subsequent 20 years, including withdrawals exempt from permitting under RCW 90.44.050" (RCW 90.94.030(3)(e)). The Final NEB Guidance states that, "watershed plans must include a new consumptive water use estimate for each subbasin, and the technical basis for such estimate" (pg. 7). This chapter provides the WRIA 7 Committee's projections of new domestic permit exempt (PE) well connections (hereafter referred to as PE wells) and their associated consumptive use for the 20-year planning horizon. [5] This chapter summarizes information from the technical memos (Appendices F and G) prepared for, and reviewed by, the WRIA 7 Committee.

4.2 Projection of Permit-Exempt Well Connections (2018 – 2038)

The WRIA 7 Committee projects 3,389 new PE wells over the planning horizon. Most of these wells are likely to be installed in the following subbasins: Tulalip, Quilceda-Allen, Estuary/Snohomish Mainstem, and Snoqualmie North.

The Committee developed a method to (1) project the number of new PE wells over the planning horizon in WRIA 7; and (2) estimate new consumptive water use. This method, referred to as the PE well projection method, is based on recommendations from Appendix A of Ecology's Final NEB Guidance (Ecology 2019). The following sections provide the 20-year projections of new PE wells for each subbasin within WRIA 7, the methods used to develop the projections (PE well projection method), and uncertainties associated with the projections.

4.2.1 Permit-Exempt Well Connections Projection by Subbasin

This watershed plan compiles the Snohomish County and King County PE well projection data at both the WRIA scale and by subbasin. Table 4.1 and Figure 4.1 show projections for new PE wells in WRIA 7 by subbasin.

[5] New consumptive water use in this document is from projected new homes connected to PE domestic wells associated with building permits issued during the planning horizon. Generally, new homes will be associated with wells drilled during the planning horizon. However, new uses could occur where new homes are added to existing wells serving group systems under RCW 90.44.050. In this document the well use discussed refers to both these types of new well use. PE wells may be used to supply houses, and in some cases other Equivalent Residential Units (ERUs) such as small apartments. For the purposes of this document, the terms "house" or "home" refer to any PE domestic groundwater use, including other ERUs.

Table 4.1: Number of PE Wells Projected between 2018 and 2038 for the WRIA 7 Subbasins

Subbasins	King County	Snohomish County	UGAs	Total PE Wells per Subbasin
Tulalip	--	468	0	468
Quilceda-Allen	--	330	8	338
Estuary/Snohomish Mainstem	--	322	9	331
Little Pilchuck	--	289	5	294
Pilchuck	--	278	2	280
Woods	--	224	0	224
Sultan	--	53	2	55
Lower Mid-Skykomish	--	60	0	60
Skykomish Mainstem	0	183	2	185
Upper Skykomish	48	53	2	103
Cherry-Harris	200	11	3	214
Snoqualmie North	240	98	0	338
Snoqualmie South	169	0	0	169
Patterson	104	--	0	104
Raging	73	--	2	75
Upper Snoqualmie	146	--	5	151
Totals	**980**	**2,369**	**40**	**3,389**

The total projection for WRIA 7 is 3,389 new PE wells. King County projects approximately 980 new PE wells over the planning horizon within WRIA 7 portions of unincorporated King County. Snohomish County projects approximately 2,369 new PE wells over the planning horizon within WRIA 7 portions of unincorporated Snohomish County (including a projection of 35 PE wells on tribal owned lands provided by Tulalip Tribes). The King and Snohomish County methods do not account for potential PE wells in cities or Urban Growth Areas (UGAs) so the WRIA 7 Committee completed an analysis of potential new PE wells within the UGAs and projected 40 new PE wells (UGA Well Log Spot Check).

4.2.2 Methodology

The WRIA 7 Committee gave deference to each County in identifying the most appropriate method for projecting PE wells within their jurisdiction. The WRIA 7 PE well projection method used King and Snohomish Counties' historical building data to predict potential PE well growth, assuming the rate and general location of past growth will continue over the 20-year planning

horizon. Using past building permits to predict future growth is one of Ecology's recommended methods (Ecology 2019).

Due to data availability, which differed for the two counties, King and Snohomish County used different methods to estimate the number of homes that would be served by community water systems and municipalities and remove those from the PE well growth estimates. Snohomish County considered distance to existing water lines, whereas King County considered historical rates of connection to water service within water service area boundaries.[6] King and Snohomish Counties completed their analyses in-house and the methods are described in detail in Appendix F – PE Well Projections Memo.

King County completed a PE Well Potential Assessment which identified potential parcels where development could occur within rural King County. Snohomish County completed a similar assessment which they have referred to as a Rural Capacity Analysis. The PE Well Potential Assessment and Rural Capacity Analysis results were used to assess whether a subbasin (as identified by the Committee) has the capacity to accommodate the number of PE wells projected over the 20-year planning horizon.

The WRIA 7 Committee evaluated potential PE wells within UGAs using data from Ecology's Well Report Viewer database. All methods are summarized in the sections below. The WRIA 7 Growth Projections Technical Memorandum provides a more detailed description of the analysis and methods used by both counties (Appendix F –PE Well Projections Memo).

King County Permit-Exempt Well Projection Methodology

King County used historical residential building permit and parcel data from 2000 through 2017 to project the number of new PE wells for the planning horizon in unincorporated King County (referred to as the past trends analysis). This data set considers economic and building trends over an 18-year period and the method assumes that past trends will continue.

King County followed the steps below to estimate the number of new PE wells over the planning horizon:

1. Gathered historical building permit and parcel data (2000–2017) for new residential structures.[7]
2. Assessed the total number of permits and average number of permits per year for WRIA 7.

[6] Water service area boundaries include areas currently served by existing water lines and may also include areas not yet served by water lines. King County used historic rates of connection to water service to predict future rates of connection because King County does not have county-wide information on the location of water lines.

[7] King County selected the time period 2000-2017 based on data availability. The building permit data for 2000-2017 includes both periods of high growth and periods of low growth. After comparing the permit data to the Vision 2040 regional plan and population data, King County is confident in using the average over this time period to project into the future.

3. Linked building permit and parcel data to determine water source for each building permit/parcel and separate into public, private, and other water source categories. Consider a building permit with water source listed as "private" as a PE well.
4. Calculated the number and percentage of building permits for each type of water source (public, private, or other) inside and outside water services areas, by subbasin and for the WRIA overall.

Using the King County past trends analysis, the WRIA 7 Committee followed the steps below to develop PE well projections by subbasin:

1. Calculated the projected number of PE wells per year for each subbasin by multiplying the average number of building permits per year by the percentage of building permits per subbasin, and percentage of building permits using a private water source (well) per subbasin.
2. Multiplied the projected number of PE wells per year per subbasin by 20 to calculate the total of PE wells projected over the 20-year planning horizon for each subbasin.
3. Added 6% to 20-year PE well projection per subbasin to account for gaps in the building permit and parcel data (6% error is based on the percentage of building permits with "other" as the water source).
4. Tabulated the total PE wells projected over the 20-year planning horizon, including the 6% error, for each subbasin and sum to get the total of PE wells projected over the 20-year planning horizon in rural unincorporated King County.

Snohomish County Permit-Exempt Well Projection Methodology

Snohomish County developed three PE well projection scenarios based on development trends and population projections, described in Appendix F – PE Well Projections Memo. The WRIA 7 Committee chose to use the scenario that reviewed past development trends within WRIA 7 to estimate the number and location of potential new homes over the planning horizon (referred to as the past trends analysis). Snohomish County's past trends analysis methodology differed from King County's.

Snohomish County used a Geographic Information System (GIS) model to identify areas where homes are likely to connect to water service, based on proximity to existing water distribution lines (referred to as public water service areas). Areas that were not proximal to existing water distribution lines were assumed to be served by a PE well (referred to as PE well areas).[8] Snohomish County used this spatial model, in combination with analysis of year-built data from 2008-2018 for recently built single-family residences, to develop PE well projections. The method assumes that past trends will continue, that existing water lines are representative of future

[8] PE well areas are more than 100' from a water main for homes that are not part of a subdivision and more than ¼ mile from a water main for homes that are part of a subdivision. See Snohomish County Growth Projections and Rural Capacity Analysis Methods in Appendix F for additional information.

water lines, and that homes built proximal to existing water lines will connect to public water service, not PE wells.

Snohomish County followed the steps below to estimate the number of new PE wells over the planning horizon:

1. Gathered year-built data for single-family residences (i.e., housing units or "HU"s) built between 2008–2018.
2. Assigned HUs to "public water service areas" or "PE well areas" based on the distance to existing water mains. Assume HUs in "PE well areas" will use a PE well for the water source.
3. Estimated the number of HUs per subbasin for each type of water source (public water service or PE well) and calculate the percentage of HUs per subbasin for each type of water source.
4. Calculated the average number of HUs per year (2008-2018) and multiply by 20 to calculate the estimated total of HUs projected over the 20-year planning horizon for rural unincorporated Snohomish County.
5. Applied HU projections to WRIA 7 subbasins based on the past percentage of growth per subbasin and past percentage of HU for each type of water source per subbasin.
6. Tabulated the total PE wells projected over the 20-year planning horizon for each subbasin and sum to get the total of PE wells projected over the 20-year planning horizon in rural unincorporated Snohomish County.

Urban Growth Area Permit-Exempt Well Projection Methodology

The King County and Snohomish County PE well projection methods do not account for potential PE wells within cities or UGAs. However, early in the PE well projection planning process, the WRIA 7 Committee recommended looking at the potential for PE well growth within the incorporated and unincorporated UGAs using data from Ecology's Well Report Viewer database (referred to as the UGA well log spot check).

The general method included using Ecology's Well Report Viewer database (1998–2018) to query water wells with characteristics of a domestic well[9] within UGAs. The Committee randomly reviewed a subset of the water well reports and calculated the number and percentage of each type of well (domestic, irrigation, other and incorrect) located within the UGAs. They then multiplied the percentage of wells identified as domestic (assumed to be PE wells) by the total number of wells located within UGAs to estimate the number of PE wells installed over the past 20-year period. The Committee also cross-checked the physical address of the wells with the UGA boundaries to determine which subbasin the domestic wells were

[9] Ecology's complete Well Report Viewer database was filtered for water wells 6 to 8 inches in diameter and greater than 30 feet deep, which are typical dimensions and depths for domestic wells. Ecology does not have the ability to filter for permit-exempt domestic wells.

located in. The Committee used the total number of domestic wells per subbasin over the past 20 years to project the number of PE wells located within the UGAs over the planning horizon for each WRIA 7 subbasin. A more detailed methodology is included in Appendix F – PE Well Projections Memo.

King County Permit-Exempt Well Potential Assessment

King County assessed parcels available for future residential development in unincorporated King County (referred to as the PE well potential assessment).

King County used screening criteria to identify parcels with potential for future residential development by subbasin. The total number of parcels and dwelling units[10] (DUs) per subbasin were determined and labeled as inside or outside the water district service boundaries. King County then projected the water source for each parcel (public water or PE well) based on historic rates of connection to water service because the County does not have county-wide information on the location of water lines. The WRIA 7 Committee compared the 20-year PE well projection to the PE well potential assessment. In areas where the number of projected PE wells exceeded the potential parcels available, the Committee reallocated those PE wells to the nearest subbasin with parcel capacity and similar growth patterns. The Committee reallocated 22 projected PE wells from the Upper Snoqualmie subbasin to the Snoqualmie South subbasin in the King County portion of WRIA 7. A more detailed methodology and list of assumptions is included in Appendix F – PE Well Projections Memo.

Snohomish County Rural Capacity Analysis

In 2011, Snohomish County completed a Rural Capacity Analysis and assigned future residential development capacity to each parcel in the rural area. Snohomish County updated their 2011 analysis to determine capacity to accommodate the 20-year PE well projection at the WRIA and subbasin level.

Snohomish County used screening criteria to identify parcels with potential for future residential development by subbasin. For each parcel, Snohomish County calculated residential development capacity based on development status, parcel size, density, and other attributes. The County assigned parcels to “public water service areas” or “PE well areas” per the past trends analysis method and aggregated the residential development capacity by subbasin and water source. Snohomish County compared the 20-year PE well projection with the rural capacity analysis and calculated the shortfall or surplus of available parcels to be sourced by PE wells. Snohomish County did not identify any areas where the number of projected PE wells exceeded the potential parcels available. A more detailed methodology and list of assumptions is included in Appendix F – PE Well Projections Memo.

[10] A dwelling unit is a rough estimate of subdivision potential based on parcel size and zoning (e.g. a 22-acre parcel zoned RA-5 is assumed to have 4 dwelling units).

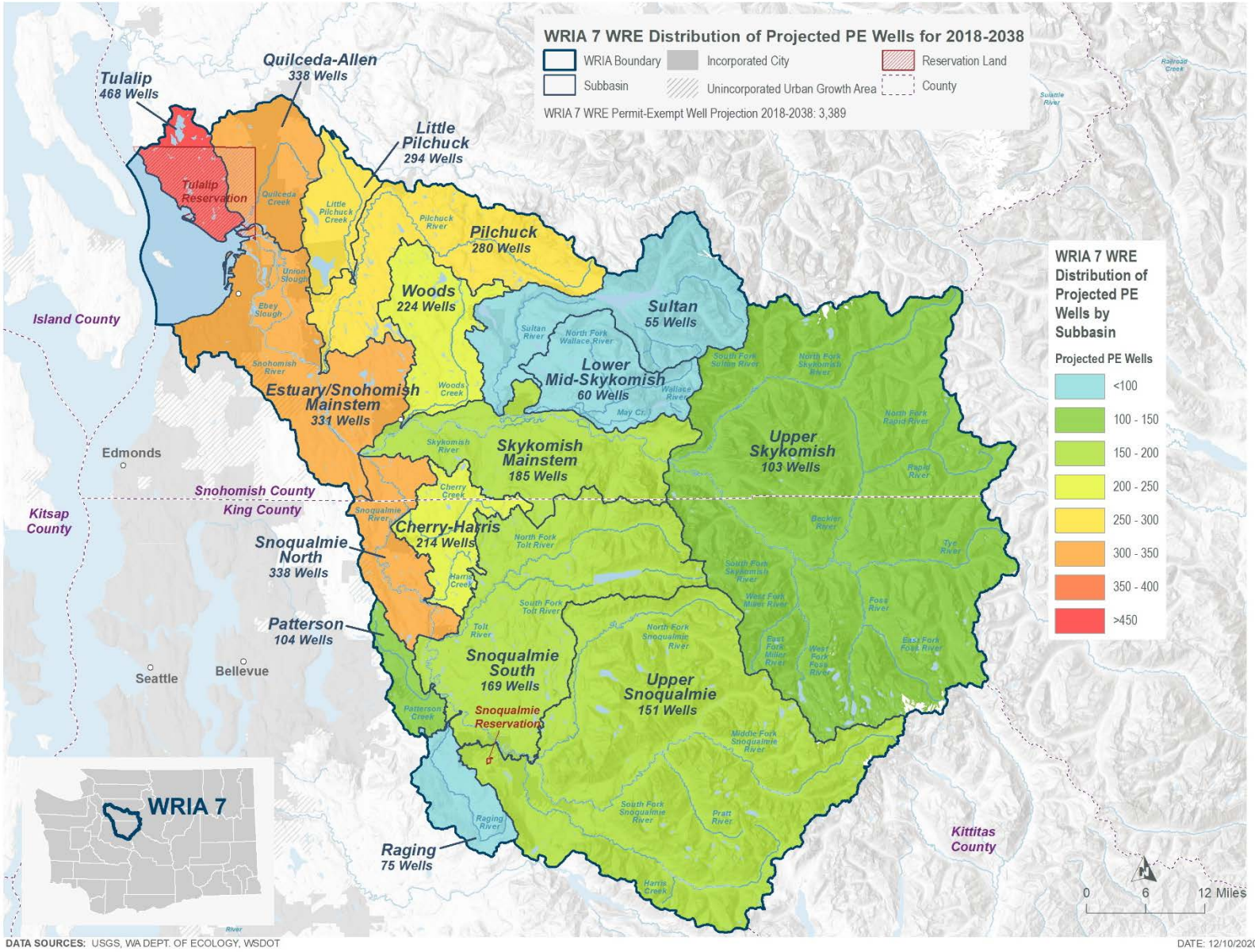


Figure 4.1: WRIA 7 Distribution of Projected PE Wells for 2018 – 2038

4.3 Impacts of New Consumptive Water Use

The WRIA 7 Committee used the 20-year projection of new PE wells for WRIA 7 (3,389) to estimate the consumptive water use that this watershed plan must address and offset. The Committee estimates 797.4 acre-feet per year (AFY) (1.10 cubic feet per second) of new consumptive water use in WRIA 7.

This section provides an overview of the methods the Committee used to estimate new consumptive water use (consumptive use) and an overview of the anticipated impacts of new consumptive use in WRIA 7 over the planning horizon. The WRIA 7 Consumptive Use Estimates Technical Memorandum provides a more detailed description of the analysis and alternative scenarios considered (Appendix G – Consumptive Use Memo).

4.3.1 Methods to Estimate Indoor and Outdoor Consumptive Water Use

Indoor water use patterns differ from outdoor water use. Indoor use is generally constant throughout the year, while outdoor use occurs primarily in the summer months. The portion of water that is consumptive varies for indoor and outdoor water use. Appendix A of the Final NEB Guidance describes a method (referred to as the Irrigated Area Method) which assumes average indoor use per person per day and reviews aerial imagery to provide a basis to estimate irrigated area of outdoor lawn and garden areas. The Irrigated Area Method accounts for indoor and outdoor consumptive use variances by using separate approaches to estimate indoor and outdoor consumptive use.

To develop the consumptive use estimate, the WRIA 7 Committee used the Irrigated Area Method and relied on assumptions for indoor use and outdoor use from Appendix A of the Final NEB Guidance (Ecology 2019). This chapter provides a summary of the technical memo which is available in Appendix G – Consumptive Use Memo.

Consistent with the Final NEB Guidance (Appendix B, pg. 25), for the purposes of calculating an estimate of consumptive use, the Committee assumed impacts from consumptive use on surface water are steady-state, meaning impacts to the stream from pumping do not change over time. This assumption is based on the wide distribution of future well locations and depths across varying hydrogeological conditions, and because empirical data to support the assumption is not locally available. The Committee discussed that assuming steady-state may underestimate the estimated consumptive use impact during the base flow season, but agreed the methods in the NEB Guidance were sufficiently protective of the resource.

The WRIA 7 Committee considered other methods for estimating consumptive use, including (1) assuming one home with the legal maximum 0.5-acre irrigated lawn area per PE well and (2) the legal withdrawal limit of 950 gallons of water per day.[11] While the Committee assumed that

[11] Legal withdrawal limits from PE wells in WRIA 7 are defined in RCW: "an applicant may obtain approval for a withdrawal exempt from permitting under RCW 90.44.050 for domestic use only, with a maximum annual average withdrawal of nine hundred fifty gallons per day per connection" RCW 90.94.030(4)(a)(vi)(B)

neither method is likely to provide an accurate depiction of future water use in the watershed, the scenarios were used as points of comparison to what was projected as described above. The results are provided in the technical memo in Appendix G – Consumptive Use Memo.

New Indoor Consumptive Water Use

Indoor water use refers to the water that households use in kitchens, bathrooms, and laundry (USGS, 2012). The WRIA 7 Committee used the Irrigated Area Method and Ecology's recommended assumptions for indoor daily water use per person, local data to estimate the average number of people per household, and applied Ecology's recommended consumptive use factor to estimate new indoor consumptive water use (Ecology 2019). The assumptions the WRIA 7 Committee used to estimate household consumptive indoor water use are:

- 60 gallons per day (gpd) per person.
- 2.73 and 2.75 persons per household assumed for rural portions of King and Snohomish County, respectively. For areas spanning both counties, a weighted value was estimated based on the number of projected PE wells in each County.
- 10% of indoor use is consumptively used (or a consumptive use factor (CUF) of 0.10), based on the assumption that homes on PE wells are served by onsite sewage systems. Onsite sewage systems return most wastewater back to the immediate water environment; a fraction of that water is lost to the atmosphere through evaporation in the drainfield.

The equation used to estimate household consumptive indoor water use is:

60 gpd x 2.73 to 2.75 people per house x 365 days x .10 CUF

This results in an annual aggregated average of 0.0184 AF[12] (0.000025 cfs[13]) indoor consumptive water use per day per well.

New Outdoor Consumptive Water Use

Most outdoor water is used to irrigate lawns, gardens, and landscaping. To a lesser extent, households use outdoor water for car and pet washing, exterior home maintenance, pools, and other water-based activities. Water from outdoor use does not enter onsite sewage systems; instead, it typically infiltrates into the ground or is lost to the atmosphere through evapotranspiration (Ecology 2019).

The Committee used aerial imagery to measure the irrigated areas of 393 randomly selected parcels in the 16 WRIA 7 subbasins to develop an average outdoor irrigated area per subbasin.

[12] Acre-foot is a unit of volume for water equal to (1) a sheet of water one acre in area and one foot in depth and (2) 325,851 gallons of water. 1 acre-foot per year is equal to 893 gallons per day.

[13] Cubic feet per second (CFS) is a rate of the flow in streams and rivers. It is equal to a volume of water one foot high and one foot wide flowing a distance of one foot in one second. 1 cubic foot per second is equal to 646,317 gallons per day.

The Committee selected these parcels based on recent (2006-2017) building permits for new single-family residential homes not served by public water. Nearly 1,600 permits in WRIA 7 met this criteria. The Committee targeted a minimum 20-parcel sample per subbasin as a statistically representative sample size to ensure the sample mean is representative of the WRIA. The average irrigated area for the 393 randomly selected parcels, when aggregated across the 16 subbasins, was 0.20 acres per parcel.

The WRIA 7 Committee used the following assumptions, as recommended in Appendix A of the NEB Guidance, to estimate outdoor consumptive water use:

- The amount of water needed to maintain a lawn varies by subbasin due to varying temperature and precipitation across the watershed. The Committee used Washington Irrigation Guide (WAIG) (NRCS-USDA 1997) stations in Everett, Monroe, and Snoqualmie Falls to develop a weighted average crop irrigation requirement (IR) for turf grass in each subbasin (the WRIA average IR is 10.66 inches). This value represents the amount of water needed to maintain a green lawn.
- The irrigation application efficiency (AE) used for WRIA 7 was the Ecology-recommended value of 75%. This increases the amount of water used to meet the crop's irrigation requirement.
- Consumptive use factor (CUF) of 0.8, reflecting 80% consumption for outdoor use. This means 20% of outdoor water is returned to the immediate water environment.
- Outdoor irrigated area per subbasin based on the irrigated footprint analysis: 0.20 acres per PE well.

  10.66 IR (inches) ÷ 12 (inches per foot) ÷ 0.75 AE x 0.20 (acres) x 0.80 CUF

First, water loss is accounted for by multiplying the crop irrigation requirement by the application efficiency. Next, the total water depth used to maintain turf is multiplied by the area which is irrigated. Finally, the volume of water is multiplied by 80 percent to produce the outdoor consumptive water use. To convert the equation from inches to acre-feet, divide the result by 12.

The outdoor consumptive use varies by subbasin due to different irrigation requirements across the watershed. The WRIA's average annual consumptive water use per PE well is 0.24 AFY (0.000331 cfs). This is an average for the year; however, the Committee expects that more water use will occur in the summer than in the other months.

4.4 Summary of WRIA 7 Consumptive Use Estimate

The total consumptive use estimate for WRIA 7 is 797.4 AFY (1.10 cfs). The total consumptive use estimate for WRIA 7 is the number of PE wells projected by subbasin (see section 4.2) multiplied by the total indoor and outdoor consumptive use per PE well.

Table 4.2 summarizes the estimated indoor and outdoor consumptive use by subbasin, per the irrigated area method. The highest consumptive use is expected to occur in the subbasin with the

largest irrigated area per PE well and the most anticipated new PE wells, as presented in Figure 4.2.

Table 4.2: Estimated Indoor and Outdoor Consumptive Use by Subbasin

Subbasin	Projected PE wells	Average lawn size (acres)	Indoor CU per well (AFY)	Outdoor CU per well (AFY)	Total CU/year per well (AFY)	Total CU 2018-2038 (AFY)
Tulalip	468	0.09	0.0185	0.11	0.12	58.1
Quilceda-Allen	338	0.15	0.0185	0.17	0.18	62.1
Estuary/Snohomish Mainstem	331	0.29	0.0185	0.33	0.35	115.8
Little Pilchuck	294	0.2	0.0185	0.22	0.24	69.5
Pilchuck	280	0.37	0.0185	0.38	0.40	111.0
Woods	224	0.12	0.0185	0.12	0.14	31.5
Sultan	55	0.11	0.0185	0.10	0.12	6.5
Lower Mid-Skykomish	60	0.14	0.0185	0.13	0.15	8.8
Skykomish Mainstem	185	0.16	0.0185	0.16	0.17	32.1
Upper Skykomish	103	0.05	0.0184	0.04	0.06	6.0
Cherry-Harris	214	0.16	0.0184	0.17	0.19	40.4
Snoqualmie North	338	0.21	0.0184	0.24	0.26	87.4
Snoqualmie South	169	0.21	0.0183	0.22	0.24	40.3
Patterson	104	0.41	0.0183	0.51	0.53	55.0
Raging	75	0.43	0.0183	0.50	0.52	38.8
Upper Snoqualmie	151	0.23	0.0183	0.21	0.23	34.2
WRIA 7 Aggregated	**3,389**	**0.20**	**0.00184**	**0.22**	**0.24**	**797.4**

Note: Values in table have been rounded.

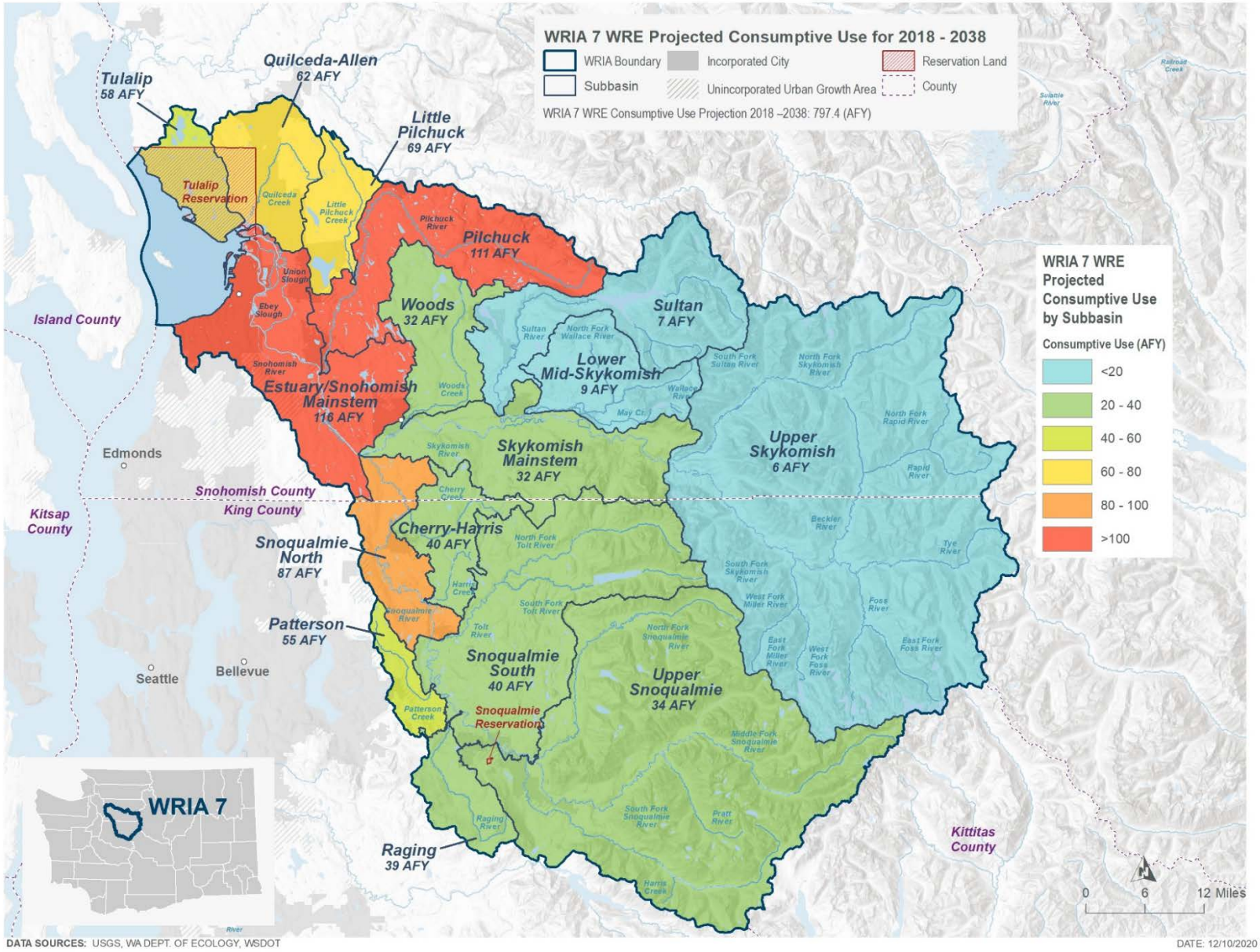


Figure 4.2: WRIA 7 Projected Consumptive Use for 2018 - 2038

4.5 Summary of Uncertainties

The WRIA 7 Committee identified a number of uncertainties in the methods described in Section 4.2 for projecting new PE wells. The Committee recognized uncertainties as inherent to the planning process and addressed them where feasible. The uncertainties are shared here to provide transparency in the planning process and deliberations of the Committee, and to provide context for monitoring and adaptive management.

Historical data on the number and location of PE wells within WRIA 7 was unavailable to inform PE well projections. As a result, the Committee relied on building permit data, and agreed on assumptions about the water source, in order to estimate the numbers of past and future PE wells. Snohomish County projections assume that single-family homes built within 100 feet of an existing distribution line will connect to public water service (proposed county code) and subdivisions within ¼ mile of an existing distribution line will connect to public water service (existing county code requirements). Uncertainty as to whether the proposed county code will pass remains. These assumptions were not ground-truthed and may have yielded imprecise and/or inaccurate results.

Another example of uncertainty is that the counties projected new PE wells within unincorporated areas and omitted PE wells installed within city limits, including PE wells installed for lawn watering purposes. Although most cities require new homes to connect to water systems, some allow exceptions if a connection is not available in a timely and reasonable manner (for instance, if a home is more than 200 feet from a water line). The WRIA 7 Committee attempted to address this uncertainty by including a projection for new PE wells within the UGAs that was based on PE well construction rates derived from available data for the period from 1998 to 2018.

Both counties relied on historical data, assuming these trends will continue into the future. However, future building trends may not mirror historical building trends as water service areas and water lines are expected to continue to grow and expand at an unknown rate and in unknown conditions. Water line data was not readily available in King County, so the WRIA 7 Committee was unable to compare actual water lines with the historical data to see if and how the water service has expanded.

The ability of water purveyors to serve new customers in the future is an additional element of uncertainty in this plan. In many cases, it is extremely challenging for water purveyors to change their existing water rights or acquire new water rights to meet the needs of new customers year-round. When this occurs, new PE wells may be constructed instead of homes connecting to public water. One example of this is the Seven Lakes Water Association in the Tulalip and Quilceda subbasins. The Committee realized that it generally favors the avoidance of PE well impacts by facilitating connections to publicly owned and regulated water utilities (see policy recommendation in Chapter 6). In searching for a resolution to this conflict, the Committee recognized that the conflict originated between laws at the statute level, and were beyond the scope and authority of the Committee to correct it. Accordingly, the Committee resigned the

notion of a legislative fix, and sought to craft a sound and implementable plan that successfully fulfills all objectives the Legislature assigned to the Committee.

Counties and cities generally enact policies intended to direct growth to urban areas (with access to public water service) to preserve rural and resource lands and protect critical areas; however, private property rights continue to allow landowners to build homes in rural areas. Additionally, uncertain economic and social factors—including the COVID-19 pandemic and associated increasing ability to telework, as well as climate migration—will affect the Committee's predictions in unknown ways and may result in greater rural growth than predicted based on past trends.

RCW 90.94 requires counties to collect fees for new homes that rely on PE wells and provide a report and portion of those fees to Ecology. King and Snohomish Counties shared information on the fees collected since those requirements went into effect in January of 2018; the number of new wells reported by King and Snohomish Counties average 46 new PE wells per year compared to 169 PE wells per year projected by the WRIA 7 Committee. King County reported 20 building permits with PE wells identified as the water source within the WRIA 7 portion of unincorporated King County between January 2018 and June 2020. Snohomish County reported 94 building permits with PE wells identified as the water source within the WRIA 7 portion of unincorporated Snohomish County between January 2018 and June 2020.

The methods described in section 4.3.1 contain a number of uncertainties and limitations. Measurement of consumptive water use in any setting is difficult, and it is virtually impossible for residential groundwater use, which must account for both indoor and outdoor use. PE wells are generally unmetered,[14] so supply to each home is usually unknown, let alone the amount that is consumed versus infiltrated to the groundwater system. Therefore, the WRIA 7 Committee was limited to estimating consumptive use based on projections of future growth, local patterns and trends in water use, and generally accepted and reasonable assumptions.

The WRIA 7 Committee discussed these uncertainties and limitations and recognized that water use ranges across the watershed and among individual PE well owners. The Committee assumed that the estimates produced by the methods described above resulted in a reasonable projected consumptive water use for the WRIA.

The outdoor consumptive use calculation contains a high level of uncertainty. In aerial photos used to calculate average irrigated area, many parcels did not demonstrate a clear-cut distinction between irrigated and non-irrigated lawns and other landscaped areas. It appears that many homeowners may irrigate enough to keep lawns alive, but not lush (or comparable to commercial turf grass/golf course green). The WRIA 7 Committee attempted to address uncertainty and ensured consistency by applying conservative methods that err on the side of a higher irrigated area and having one GIS analyst evaluate all of the selected parcels in the

[14] The Committee has included a policy recommendation in Chapter 6, which recommends implementation of a voluntary metering pilot program. Such a program would allow for monitoring a subset of PE wells to increase understanding of actual water use.

WRIA. Assumptions for the aerial imagery analysis are described in detail in Appendix G – Consumptive Use Memo.

Other factors of uncertainty in the outdoor consumptive use calculation are the assumptions about irrigation amounts and irrigation efficiencies. The calculation assumes that homeowners water their lawns and gardens at the rate needed for commercial turf grass (e.g., watering at rates that meet crop irrigation requirements per the WAIG). The irrigated area analysis demonstrated that many homeowners may irrigate their lawns enough to keep the grass alive through the dry summers, but not at the levels that commercial turf grass requires.

The method also assumes that residential pop-up sprinkler systems irrigate the lawns with an efficiency of 75%. In reality, households apply water to their lawns and gardens in many different ways, some more or less efficient than pop-up sprinklers. The Committee discussed these uncertainties and scenarios and recognized that there is a range of water use across the watershed and individual PE well owners.

The consumptive use estimate assumes that current rural residential landscaping practices and outdoor water use will continue over the 20-year planning horizon. Because of uncertainty inherent in estimating growth patterns, domestic PE well pumping rates, and potential changes in outdoor watering practices (potentially related to climate change), the WRIA 7 Committee determined that the conservative assumptions used to estimate consumptive use based on the Irrigated Area Method, and assumptions for outdoor water use in particular, are justified.

To further address uncertainty and establish a point of comparison, the Committee developed two additional consumptive use scenarios. One additional scenario assumed one home with the legal maximum 0.5-acre irrigated lawn area per PE well and the second additional scenario assumed each PE well withdrew the legal limit of 950 gallons per day. The Committee also compared the Irrigated Area method to local water purveyor data, taking into consideration several assumptions: customers connected to public water supply are incentivized to conserve water, in order to reduce their water bill, and purveyor data represents total water use (not consumptive use) and does not separate indoor and outdoor water use to account for different consumptive use factors, and water purveyors serve areas that are more dense and urban, with smaller lots and smaller irrigated footprints, on average, than rural areas where most new PE wells are expected to be constructed. These analyses can be found in Appendix G – Consumptive Use Memo.

The WRIA 7 Committee also included plan implementation and adaptive management recommendations to address uncertainties related to the consumptive use estimate and project implementation (see Chapter Six).

Chapter Five: Projects and Actions

5.1 Approach to Identify and Select Projects

Watershed plans must identify projects that offset the potential impacts future permit-exempt (PE) wells will have on streamflows and provide a net ecological benefit (NEB) to the WRIA. This chapter provides recommendations from the WRIA 7 Committee for projects and actions to offset consumptive use and meet NEB. This chapter categorizes projects as either a "water offset" or "habitat" projects:

- **Water offset projects** have a quantified streamflow benefit and are projected to contribute to offsetting consumptive use.
- **Habitat projects** are projected to contribute to achieving NEB by focusing on actions that improve the ecosystem function and resilience of aquatic systems, support the recovery of threatened or endangered salmonids, and protect instream resources including important native aquatic species. Habitat projects may also result in an increase in streamflow, but the water offset benefits for these projects is difficult to quantify with a high degree of certainty. After much discussion about the potential water offset benefits of habitat project types, the Committee did not rely on habitat projects to contribute toward offsetting consumptive use, however recognized they can still contribute significantly to NEB and therefore should be included in the plan.

The WRIA 7 Committee identified priorities for project types and locations to guide decisions on which projects to include in the plan. The Committee prioritized water right acquisition opportunities in the following subbasins with higher projected PE wells, higher projected consumptive use, and greater potential for water right acquisition: Pilchuck (focus on lower Pilchuck), Patterson, Quilceda-Allen, Little Pilchuck, and Raging. The Committee prioritized:

- Projects with streamflow benefits (including habitat projects with unquantified streamflow benefits).
- Projects that provide streamflow benefit during the critical flow period.
- Projects expected to have near-term and reliable benefits.

The Committee categorized habitat projects as follows:

- Beaver reintroduction/beaver dam analogs (BDAs) [high priority]
- Floodplain reconnection [high priority]
- Forest or upland protection/management [high priority]
- Riparian enhancement [medium priority]
- Estuary restoration [low priority; not included in plan]
- Fish passage [low priority; not included in plan]

The Committee considered *Snohomish Basin Salmon Recovery Plan* (Salmon Plan) and *Snohomish Basin Protection Plan* (Protection Plan) priority project types when identifying

habitat projects for inclusion in the watershed plan. To consider salmon recovery priorities, the Snoqualmie Watershed Forum reviewed priority project types in the Salmon Plan and Protection Plan, as well as Tulalip Tribes' beaver relocation priority areas to identify how these priorities overlap with WRIA 7 Committee subbasins. The Committee considered priority project types for each subbasin when selecting habitat projects for inclusion in the Plan—focusing on floodplain projects in headwater subbasins that provide downstream benefits.

To identify the projects summarized in this chapter, the WRIA 7 Committee assembled a project inventory to capture and track all project ideas throughout the planning process. The project inventory consisted of hundreds of previously proposed projects as well as new project concepts and ideas, including project lists developed by the Snohomish Basin Salmon Recovery Forum (Snohomish Forum) and the Snoqualmie Watershed Forum and their partners, and the 2018 WRIA 7 Near-Term Actions related to habitat.

Technical consultants supported the Committee's development of projects described in this chapter by researching project concepts, analyzing estimated water offset for projects, contacting project sponsors, and developing project descriptions. Initially, Washington Water Trust identified projects with potential streamflow benefit from the WRIA 7 salmon recovery lead entity four-year work plans, habitat restoration plans, streamflow restoration grant applications, and other ongoing planning efforts. The WRIA 7 Committee and the Snohomish Forum also distributed a "Call for Projects" to request information on water offset and habitat projects at all stages of development from Committee members and partners in WRIA 7.

The Committee assigned projects in the inventory to a project type, consistent with the three project type examples listed in the Final NEB Guidance (Ecology 2019). These project types included: (a) water right acquisition offset projects; (b) non-acquisition water offset projects[15]; and (c) habitat and other related projects. As described above, the Committee categorized habitat and other related projects into sub-categories to assist with project prioritization.

Non-acquisition water offset projects were underrepresented within the WRIA 7 project inventory, which consisted largely of habitat and other related projects. The Committee discussed actions identified in the Protection Plan, but determined that these actions did not provide sufficient certainty and long-term reliability to include as water offset projects.

Development of new non-acquisition water offset projects with quantifiable streamflow benefits became necessary in order for the plan to achieve the consumptive use offset. These projects are largely centered on changes in how and when water is diverted, withdrawn, conveyed, or used to benefit streamflow and instream resources. Examples include streamflow augmentation and managed aquifer recharge projects.

Some Committee members maintained a distinction between water right acquisition projects in the plan and non-acquisition water offset projects, such that they believed non-acquisition offset projects do not provide the same value as acquisition projects, since they typically re-

[15] Non-acquisition water offset projects will typically involve retiming high flow season surface waters. Examples include managed aquifer recharge, streamflow augmentation, off-channel storage, and source switches.

time flows within the basin, rather than preserving streamflow or actually reducing consumptive use. This was addressed in the plan through the adoption of the NEB standard in Chapter Seven.

Non-acquisition water offset project development consisted of three main phases:

1. Initial identification through brainstorming sessions during project subgroup and Committee meetings.
2. Prioritization and further analysis.
3. Development of project descriptions for projects included in the plan.

Project progression from one phase to the next occurred after the Committee agreed to move the project to the next phase.

Section 5.2.1 describes the acquisition and non-acquisition water offset projects that the Committee selected for the plan.

Ecology contracted with Washington Water Trust (WWT) to identify opportunities for water right acquisition water offset projects within WRIA 7. In coordination with the WRIA 7 Committee, WWT developed a water right selection criterion based on the unique local nature of water rights and water use in WRIA 7. The water rights assessment consisted of four categories of potential projects: irrigation water rights in priority subbasins, irrigation water rights near existing reclaimed water infrastructure, water rights in the Trust Water Rights Program as a temporary donation, and specific water right acquisition opportunities identified by the Committee.

WWT developed 15 water right acquisition project opportunity profiles for Committee consideration. The water rights acquisitions projects that the Committee selected for the plan are described in Section 5.2.1. The Committee's analysis to identify potential water right acquisitions in the priority subbasins yielded a strikingly low number of potential water acquisition projects. There are multiple demands for water in the basin and instream flows are not met year-round in portions of the basin, especially during low flow periods.

The Committee developed the list of habitat projects by reviewing projects recommended by Committee members and projects identified by project subgroup members based on priorities for project types and locations, as described above. Committee members, project subgroup members, and other experts participated in a series of meetings to discuss priority habitat projects by subbasin. Project subgroup members completed a survey to review and rank the habitat projects identified during these meetings to finalize the habitat project list.

Water offset and habitat projects that the Committee selected to offset consumptive use and achieve NEB are summarized in Section 5.2.1 and 5.2.2. Detailed project descriptions and project profiles are included in Appendix H – Projects. In addition to the water offset and habitat projects listed below, Section 5.2.3 describes the types of projects that the Committee supports for further development and implementation in the future.

5.2 Projects and Actions

The projects outlined in Table 5.1 have water offset and/or ecological benefits; the WRIA 7 Committee identified these projects as contributing toward offsetting consumptive use and achieving NEB. The WRIA 7 Committee recommends implementation of all projects included in this chapter.

5.2.1 Water Offset Projects

Table 5.1 provides a summary of the 11 water offset projects identified by the WRIA 7 Committee to offset consumptive use and contribute toward NEB. The total offset potential of these 11 projects for WRIA 7 is 1,373.4 acre-feet per year (AFY). Offset benefits are anticipated in the subbasins listed in Table 5.1 as well as downstream of the respective project locations. The watershed map in Figure 5.1 shows the location of the water offset projects listed in Table 5.1, while the watershed map in Figure 5.2 shows the location of the habitat projects listed in Table 5.2.

The Committee recommends that managed aquifer recharge (MAR) projects that collect high flow water shall be done using buried horizontal water perforated culvert intake structure designed to avoid instream structures.

For the water right acquisition projects included in this watershed plan, the Committee supports the acquisition of the valid quantity of water. However, to estimate the offset potential for each water right acquisition project, the Committee used the estimate generated by WWT for the consumptively used portion of the water right. The estimated return flow portion of the water right is not counted as an offset as that portion of water returns to groundwater.

Before water rights are acquired and put into Ecology's Trust Water Rights Program, Ecology will conduct a full extent and validity analysis to determine the actual quantity of water available for acquisition and the consumptive use component. Since this analysis generally happens after the water right holder has agreed to sell, the Committee relied on the WWT evaluations to estimate the offset volumes listed in Table 5.1. Planning level cost estimates provided in Table 7 for water offset projects included in the plan may not reflect real costs. See Section 5.3.2 for more detail on cost estimates.

A summary description for each project is provided below. More detailed water offset project descriptions are provided in Appendix H – Projects.

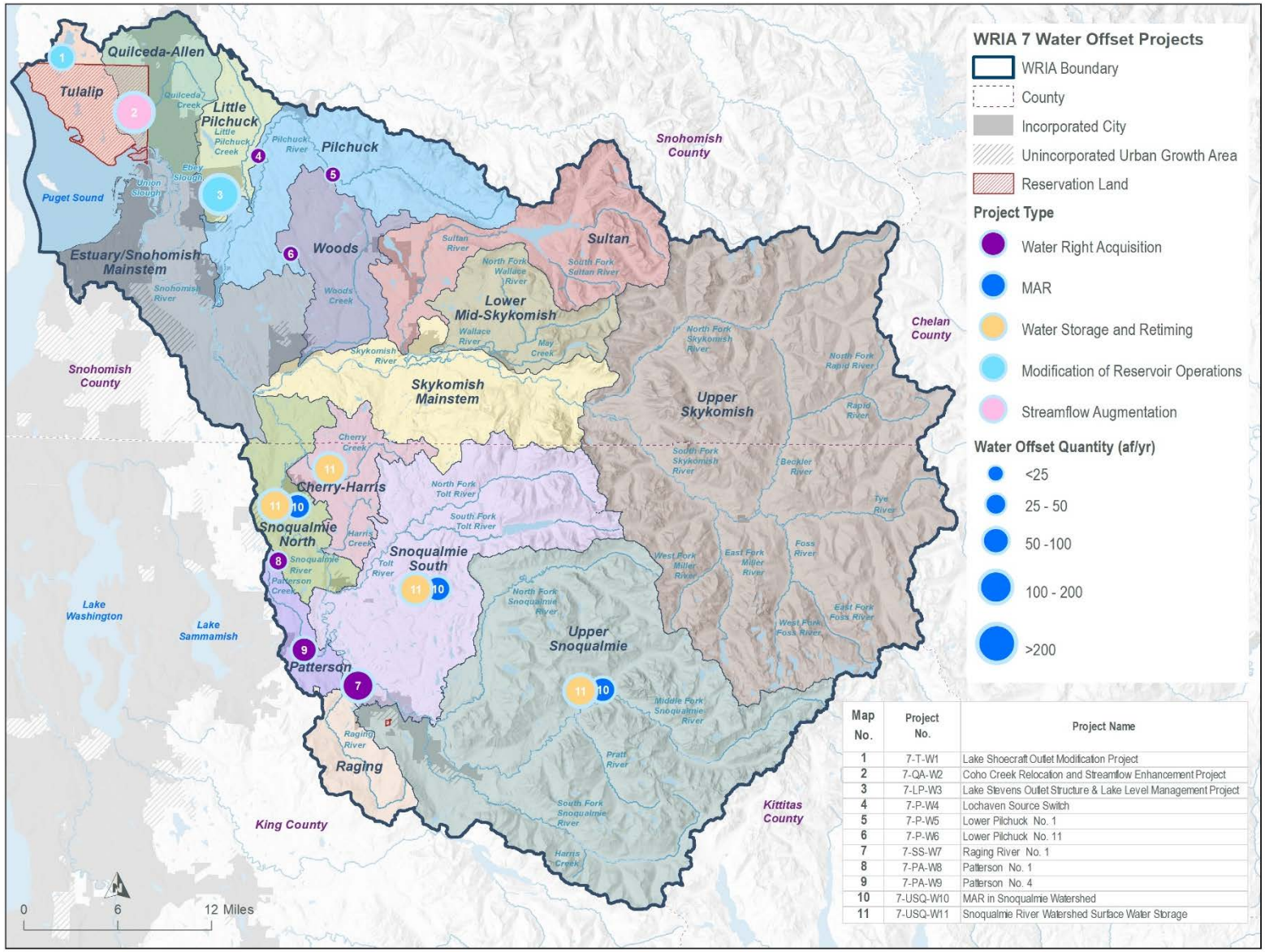
Table 5.1: WRIA 7 Water Offset Projects[16]

Project Number	Project Name	Project type	Subbasin(s)	Water Offset (AFY)	Project Sponsor	Estimated project cost
7-T-W1	Lake Shoecraft Outlet Modification Project	Modification of reservoir operations	Tulalip	62.5	Tulalip Tribes and WDFW	Design, permitting and construction = $175,000 (Feasibility funding secured) O&M = $7,000/year
Tulalip Subbasin Subtotal				**62.5**		
7-QA-W2	Coho Creek Relocation and Streamflow Enhancement Project	Streamflow augmentation and floodplain restoration	Quilceda-Allen	362	Tulalip Tribes	Design, permitting, and construction = $950,000 (Feasibility funding secured) O&M = $10,000/year
Quilceda-Allen Subbasin Subtotal				**362**		
7-LP-W3	Lake Stevens Outlet Structure & Lake Level Management Project	Water storage and retiming	Little Pilchuck	500	City of Lake Stevens	Design, permitting and construction = $1.4 million O&M = $7,000/year
Little Pilchuck Subbasin Subtotal				**500**		
7-P-W4	Lochaven Source Switch	Water right acquisition	Pilchuck	12.7	Snohomish PUD	Water right purchase = $108,000 Water system transfer and upgrades = $400,000 to $1.6 million

[16] All project cost estimates are planning level cost estimates and may not reflect real costs.

Project Number	Project Name	Project type	Subbasin(s)	Water Offset (AFY)	Project Sponsor	Estimated project cost
7-P-W5	Lower Pilchuck No. 1	Water right acquisition	Pilchuck	2.8	Snohomish PUD	Water right purchase = $14,000
7-P-W6	Lower Pilchuck No. 11	Water right acquisition	Pilchuck	2.1	Washington Water Trust	Water right purchase = $5,000
Pilchuck Subbasin Subtotal				**17.6**		
7-SS-W7	Raging River No. 1	Water right acquisition	Snoqualmie South	126	Washington Water Trust	Water right purchase = $324,000
Snoqualmie South Subbasin Subtotal				**126**		
7-PA-W8	Patterson No. 1	Water right acquisition	Patterson	29.7	Washington Water Trust	Water right purchase = $72,000
7-PA-W9	Patterson No. 4	Water right acquisition	Patterson	71.6	Washington Water Trust	Water right purchase = $184,000
Patterson Subbasin Subtotal				**101.3**		

Project Number	Project Name	Project type	Subbasin(s)	Water Offset (AFY)	Project Sponsor	Estimated project cost
7-USQ-W10	MAR in Snoqualmie Watershed; Potential Sites: North Bend, Three Forks, NF 5700	Water storage and retiming – MAR	Upper Snoqualmie, Snoqualmie North, Snoqualmie South	100	Washington Water Trust	Feasibility, design, permitting and construction = $1.1 million O&M = $10,000/year
7- USQ-W11	Snoqualmie River Watershed Surface Water Storage	Water storage and retiming	Upper Snoqualmie; Snoqualmie South, Cherry/Harris, Snoqualmie North	104-3,311	SVWID	Feasibility, design, permitting and construction = $3.5 million to $112 million (Site identification and initial feasibility funding secured)
Upper Snoqualmie Subbasin Subtotal				**204**		
WRIA 7 Total Water Offset (Cumulative from Above)				**1,373.4**		
WRIA 7 Consumptive Use Estimate				**797.4**		



Map No.	Project No.	Project Name
1	7-T-W1	Lake Shoecraft Outlet Modification Project
2	7-QA-W2	Coho Creek Relocation and Streamflow Enhancement Project
3	7-LP-W3	Lake Stevens Outlet Structure & Lake Level Management Project
4	7-P-W4	Lochaven Source Switch
5	7-P-W5	Lower Pilchuck No. 1
6	7-P-W6	Lower Pilchuck No. 11
7	7-SS-W7	Raging River No. 1
8	7-PA-W8	Patterson No. 1
9	7-PA-W9	Patterson No. 4
10	7-USQ-W10	MAR in Snoqualmie Watershed
11	7-USQ-W11	Snoqualmie River Watershed Surface Water Storage

Figure 5.1: WRIA 7 Water Offset Projects

Tulalip Subbasin

Project Name: Lake Shoecraft Outlet Modification Project [7-T-W1]

Project Description: Lake Shoecraft is a 133-acre lake located in the Tulalip Plateau west of Arlington. The lake outlet is currently controlled by a weir with removable stop logs (eight-inch height per log). Boards are removed in the winter to pass higher flows and prevent flooding and installed in the summer to increase storage and maintain lake levels.

The Lake Shoecraft Outlet Modification project proposes replacing the existing stop log control structure with an adjustable slide-gate weir to add more flexibility in outlet control. This modification would benefit the downstream Bernie Kai-Kai Gobin Hatchery by targeting higher releases to align with hatchery needs, which vary year over year. Spring and summer releases could be more tightly controlled to maintain higher lake levels and allow more consistent streamflow releases through the summer.

Although a feasibility analysis has not yet been conducted for this project, initial calculations indicate the Lake Shoecraft project could provide a 62.5 AFY increase in summer storage. Additional information is included in the project description in Appendix H – Projects.

Quilceda-Allen Subbasin

Project Name: Coho Creek Relocation and Streamflow Enhancement Project [7-QA-W2]

Project Description: This project includes restoration of fish habitat within Coho Creek, a Type 3 tributary to Quilceda Creek, located on the Tulalip Reservation. Tulalip Tribes proposes this work to relocate and restore stream habitat conditions within Coho Creek and to augment summer low flows using effluent from a Membrane Bioreactor (MBR) Wastewater Treatment Plant adjacent to Coho Creek.

In 1999, a culvert that blocked fish passage just below the project area was replaced, improving fish access to over two miles of ditch and stream channels. This current project proposes restoring a ditched section of the stream system with a natural channel configuration and reusing water from the Tribe's MBR plant to increase Coho and Chum salmon production within the stream system.

This project will include restoration of up to 1,300 feet of Coho Creek. In addition to channel restoration, this project will augment flows year-round, including during the summer low flow period, by an estimated 0.5 cubic feet per second (cfs) for a total of 362 AFY. Additional information is included in the project description in Appendix H – Projects.

Little Pilchuck Subbasin

Project Name: Lake Stevens Outlet Structure & Lake Level Management [7-LP-W3]

Project Description: This project would replace an outdated weir structure in the Lake Stevens outlet channel that manages the elevation in Lake Stevens to maximize flood storage availability

in the winter and maintain summer flows in the channel while keeping lake elevations high for summer recreation. The replacement weir would allow for more precise management of lake levels, resulting in increased lake levels and increased streamflow coming out of the lake during the summer and early fall months into Catherine Creek.

Based on preliminary modeling, modification of the weir structure and operations could increase summer (July through October) lake levels by nearly half a foot. This would provide approximately 500 AFY of additional summer storage and increased streamflow releases for the 1,000-acre lake. Additional information is included in the project profile in Appendix H – Projects.

Pilchuck Subbasin

Project Name: Lochaven Source Switch [7-P-W4]

Project Description: The Lochaven Estates Community (Lochaven) is located approximately two miles northeast of the City of Lake Stevens. The 83-home community is situated between State Route 92 (Granite Falls Highway) and the Pilchuck River. Lochaven's water source is a shallow (23 feet deep) dug groundwater production well. The shallow completion depth suggests hydraulic connection with the Pilchuck River is possible.

This project would involve retirement of the water right associated with the Lochaven Water System as a basis for increasing flows within the Pilchuck River and downstream areas. Water supply for this community would be transitioned to the Snohomish Public Utility District (PUD) system and Lochaven's existing water right would be protected instream through Ecology's Trust Water Rights Program. The Lochaven water right certificate authorizes year-round use of up to 42 AFY for community domestic supply. The Committee estimated the water offset based on the estimated consumptively used portion of Lochaven's water right. The estimated project offset to the Pilchuck River is 12.7 AFY.

Snohomish PUD and Lochaven Water System representatives have discussed the source switch, and the Lochaven Water System supports further conversations about making the water rights available for transfer into the Trust Water Rights Program for permanent streamflow benefit. Additional information is included in the project profile in Appendix H – Projects.

Project Name: Lower Pilchuck No. 1 [7-P-W5]

Project Description: The Lower Pilchuck No. 1 water right acquisition project proposes acquiring one groundwater right in the Pilchuck subbasin for an estimated 2.8 AFY of consumptively used water. The water right certificate authorizes year-round use of up to 5.4 AFY for multiple domestic supply. This water right previously supplied water to nine homes until the domestic water needs covered under this water right were transferred to Snohomish PUD in 2011. Snohomish PUD has temporarily donated the water right to the Trust Water Rights Program, which expires in 2023.

The Lower Pilchuck 1 water right has a priority date of 11/14/1991, which is junior to the establishment of the Snohomish Basin Instream Resources Protection Program (Instream Flow

Rule) in 1979. However, this water right does not have instream flow provisions included in the ROE. WWT identified that the water rights appear to have been put to continuous beneficial use. The consumptive use estimate is 2.8 AFY. WWT has had initial phone conversations with the water right holder. Snohomish PUD has expressed interest in selling if offered fair market value and transaction costs were covered.

Project Name: Lower Pilchuck No. 11 [7-P-W6]

Project Description: The Lower Pilchuck No. 11 water right acquisition project proposes acquiring one groundwater right in the Pilchuck subbasin for an estimated 2.1 AFY of consumptively used water. The water right certificate authorizes year-round use of up to 2.6 AFY for irrigation.

The land, and underlying water right, was previously used for a golf course which closed in 2013. The parcels that comprise the property have been under the same family ownership since 1946. Since the golf course closed, Ecology has received metering records that indicate water use on the property has continued although the purpose is unknown.

WWT estimated consumptive water use based on consumptive use derived from aerial imagery estimates of the size of irrigated area and assumed water application efficiency and return flow. The total consumptive use estimate is 2.1 AFY. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

The Lower Pilchuck 11 water right has a priority date of 7/23/1947, which is senior to the establishment of the Snohomish Basin Instream Resources Protection Program (Instream Flow Rule) in 1979. This water right does not have instream flow provisions included in the ROE.

Snoqualmie South Subbasin

Project Name: Raging River No. 1 [7-SS-W7]

Project Description: The Raging River No. 1 water right acquisition project proposes acquiring two water rights in the Raging River subbasin for up to 126 AFY of consumptively used water. While the water rights are located in the Raging River subbasin, the Committee anticipates the offset will occur primarily in the Snoqualmie South subbasin and lists the project in Snoqualmie South.

The water right certificate authorizes up to 60 AFY for irrigation during irrigation season. The water right claim listed year-round use of up to 60 AFY for domestic, commercial-campground, and stock water uses. The land, and underlying water rights, were previously used to support irrigation, domestic supply, commercial-campground, and stock watering. According to online sources, the campground has been recently closed.

The Raging River 1 water rights have listed priority dates of 1/1/1910 (claimed) and 1/22/1992 (certificated) which are respectively senior and junior to the establishment of the Snohomish Basin Instream Resources Protection Program (Instream Flow Rule) in 1979. The certificate related to Raging River 1 does have instream flow provisions included in the ROE.

WWT estimated consumptive water use based on consumptive use derived from aerial imagery estimates of the size of irrigated area and assumed water application efficiency and return flow. The total consumptive use estimate is 126 AFY. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

Patterson Subbasin

Project Name: Patterson No. 1 [7-PA-W8]

Project Description: The Patterson No. 1 water right acquisition project proposes acquiring two groundwater rights (one certificate and one claim) in the Patterson subbasin for an estimated 29.7 AFY of consumptively used water. The water right certificate authorizes year-round use of up to 64 AFY for fish propagation. The water right claim authorizes use of up to 110 AFY for domestic, stock, and irrigation uses. The land, and underlying water rights, were previously used to support fish propagation, domestic water supply, stock watering, and irrigation.

The Patterson 1 water right has priority dates of 4/6/1942 (claimed) and 5/11/1964 (certificated), which are both senior to the establishment of the Snohomish Basin Instream Resources Protection Program (Instream Flow Rule) in 1979. This water right certificate does not have instream flow provisions included in the ROE.

WWT estimated consumptive water use based on consumptive use derived from aerial imagery estimates of the size of irrigated area and assumed water application efficiency and return flow. The total consumptive use estimate is 29.7 AFY. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

Project Name: Patterson No. 4 [7-PA-W9]

Project Description: The Patterson No. 4 water right acquisition project proposes acquiring three groundwater rights in the Patterson subbasin for an estimated 71.6 AFY of consumptively used water. The water right certificates authorize up to 86.8 AFY for irrigation during irrigation season. The land, and underlying water rights, were previously used to support a farm and then later a golf course.

The Patterson 4 water rights have priority dates of 11/8/1946, 7/14/1939, and 7/31/1939—all senior to the establishment of the Snohomish Basin Instream Resources Protection Program (Instream Flow Rule) in 1979. These water rights do not have instream flow provisions included in their ROEs.

WWT estimated consumptive water use based on consumptive use derived from aerial imagery estimates of the size of irrigated area and assumed water application efficiency and return flow. The total consumptive use estimate is 71.6 AFY. An extent and validity determination by Ecology would be required to determine the actual quantity available for acquisition.

Upper Snoqualmie Subbasin

Project Name: Snoqualmie River Watershed Surface Water Storage Project [7-US-10]

Project Description: The Snoqualmie Valley Watershed Improvement District (SVWID) proposes developing surface water storage projects in the Upper Snoqualmie, Snoqualmie South, Cherry-Harris and/or Snoqualmie North Subbasins. The SVWID has completed a comprehensive storage study to assess the potential for a wide range of surface water storage projects, including small to large storage opportunities, throughout the watershed.

The screening analysis identified and evaluated 20 potential water storage projects which range in capacity from 22 to 3,311 AFY. The sites include off-channel storage reservoirs, on-channel storage reservoirs, and projects that would result in raising the level of an existing lake to create additional storage capacity. Water would be released during critical low-flow periods to sustain streamflows in critical reaches of the Snoqualmie River and its tributaries and offset future domestic water uses.

For the purpose of streamflow restoration planning, this project is defined as one or more surface water storage reservoirs that will collectively result in the potential to store and release at least 104 AFY, which is the median capacity of the 20 storage projects identified to date, and up to 3,311 AFY, which is the estimated maximum storage capacity of the largest project identified. The Committee estimates 104 AFY of water offset, assuming at least one of these projects will be constructed in WRIA 7. Additional analysis of the most highly ranked sites is planned, including landowner outreach and more detailed analysis of hydrology and capacity. Additional information on the 20 potential storage sites is included in the project description in Appendix H – Projects.

Project Name: Snoqualmie Watershed MAR [7-US-11]

Project Description: WWT proposes pursuing feasibility studies and construction of one or more MAR facilities in the Snoqualmie Watershed. The Snoqualmie Watershed MAR project concept includes diverting surface water annually from the Snoqualmie River or tributary in the Snoqualmie North, Snoqualmie South or Upper Snoqualmie subbasins. Water would be diverted annually between approximately November and May when water may be available to divert without causing significant ecological harm.

Diverted water would be conveyed through a collector well adjacent to the river (e.g., Ranney Collector well) or through an instream surface water intake and piped to a constructed MAR facility. This diverted surface water infiltrates into the shallow aquifer, is transported down-gradient, and ultimately discharges back to surface water as re-timed groundwater baseflow. The goal of the project is to increase baseflow to the Snoqualmie River or tributaries nearest to the project location by recharging the aquifer adjacent to the river and providing additional groundwater discharge to the river through MAR. Any new diversion of surface water will be junior to the instream flow rule.

The Committee identified four potential sites for a future MAR facility and recognizes there may be additional potential sites that have not yet been identified. Additional feasibility studies are required to verify site feasibility and the amount and timing of streamflow benefits. The project should be specifically designed to enhance streamflows and to avoid negative impacts to ecological functions and/or critical habitat needed to sustain threatened or endangered salmonids. The project should not be located in an area that impacts floodplain connectivity and river migration processes.

Future work to score, rank, and prioritize sites for implementation will carry forward through an engagement process with tribes and stakeholders, including agricultural interests. MAR sites should avoid or minimize loss of agricultural soils within the zoned Agricultural Production District (APD), regardless of current property ownership.

The Committee analyzed the timing of streamflow augmentation for the potential MAR sites and developed the 100 AFY offset estimate based on the anticipated "non-diversion" streamflow augmentation quantities projected for the low flow period from July through September for the potential sites, assuming two sites are developed and the estimated streamflow augmentation aligns with the Committee's analysis.

Additional information on these potential sites is included in the Three Forks MAR, Middle Fork MAR, North Bend MAR, and NF-5700 MAR project descriptions in Appendix H – Projects.

5.2.2 Habitat Projects

The Committee identified the 27 habitat projects summarized in Table 5.2 to provide ecological benefits to WRIA 7. This list also includes projects that and are expected to have ecological benefits from improvements to stormwater management and infiltration.

Several habitat projects identified by the WRIA 7 Committee are located in the Snoqualmie Agricultural Production District (Snoqualmie APD). King County, and other partners in the watershed, are signatory to the Fish, Farm, & Flood Agreement, which identifies recommendations to assist the King County Executive and Council to advance and balance three important county goals at a watershed scale: restoring habitat to aid salmon recovery, supporting farmers and preserving farmland, and reducing flood risk for farmers and other Snoqualmie Valley residents. The WRIA 7 Committee encourages coordination with the Fish Farm, & Flood Advisory Committee for King County projects, or other sponsors' projects identified in this plan and located in the Snoqualmie APD.

To ensure that all instream and floodplain management habitat projects meet hydrological performance standards, a Beaver Management Plan should be included, when appropriate. A Beaver Management Plan should identify key flood levels (long- and short-term allowable flooding elevations and onsite/offsite key protected infrastructure flood level elevations) and standards for when, where, and what methods of beaver deterrence should be used, comply with state and county requirements.

In areas where multiple projects are proposed, the benefit of funding multiple projects to maximize biological benefit should be addressed. Although many of these projects have potential streamflow benefits, the Committee has elected not to quantify water offsets from habitat projects. More detailed habitat project descriptions are provided in Appendix H – Projects.

Table 5.2: WRIA 7 Habitat Projects

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-QA-H1	Jones Creek Relocation and Wetland Enhancement	Channel creation, installation of LWD and riparian reforestation, and wetland depression restoration	Quilceda-Allen	Fish refuge, higher quality fish and macroinvertebrate habitat, more resilient channel to handle effects of urbanization, increase hyporheic interaction	City of Marysville, Sound Salmon Solutions, and Adopt-A-Stream Foundation	$769,044
7-QA-H2	Marysville Stormwater Retrofits (Quilceda Stormwater Project)	Green stormwater infrastructure, retrofits of stormwater ponds, rainfall capture, & outreach and education	Quilceda-Allen	Enhanced infiltration will return stormwater runoff to the ground, improve water quality, and increase groundwater discharge to streams	Snohomish Conservation District	$426,000
7-QA-H3	Quilceda 8 Restoration & Potential Water Right Acquisition	Property acquisition	Quilceda-Allen	Acquisition will facilitate future restoration actions	Tulalip Tribes	Unknown

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-ES-H4	Silver Firs Stormwater Pond Retrofits (Little Bear Stormwater)	Expand existing stormwater ponds by deepening and increasing pond infiltration capacity	Estuary/Snohomish Mainstem	Enhanced infiltration will return stormwater runoff to the ground, improve water quality, and increase groundwater discharge to streams	Snohomish County	Design and Construction = $1.4 million for CIP Sites 10 and 16 (Feasibility funding secured)
7-ES-H5	Thomas' Eddy Hydraulic Reconnection	Levee and revetment removal, floodplain restoration and riparian planting	Estuary/Snohomish Mainstem	Off-channel habitat for salmon and improvement of floodplain connection and riverine processes	Snohomish County	Design, permitting, & construction = $3.5 million
7-P-H6	Snohomish Floodplain Acquisitions Phase 1 (Lund Acquisition)	Acquisition of up to 57 acres and 1.43 miles of riparian and floodplain property adjacent to the Pilchuck River	Pilchuck	Acquisition will facilitate future restoration actions	Tulalip Tribes	Acquisition = $900,000 Restoration = $300,000

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-P-H7	Pilchuck River Armoring Removal	Removal or "softening" of approximately 2,000 linear feet of bank armoring within the Middle Pilchuck subbasin	Pilchuck	Armoring removal will improve floodplain/riparian function, in-stream habitat, and water quality for adult and juvenile salmon	Tulalip Tribes	Planning = $200,000 Restoration = $500,000
7-P-H8	Living with Beavers Program	Outreach to educate landowners and encourage them to allow beavers to remain on the landscape.	Multiple (Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck)	Increased water storage, groundwater recharge, summer flows and climate change resiliency; decreased surface water temperatures	Snohomish Conservation District	Implementation: $100,296 (secured)
7-P-H9	Small Farm Storage Initiative	Capture and store stormwater runoff in manufactured landscapes, wetlands, or other storage features	Multiple (Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck)	Decrease flashy runoff events, provide seasonal habitat for amphibians, birds and insects, enhance infiltration, and recharge streams	Snohomish Conservation District	Construction = $20,000 per lined ¼-acre pond ($120,640 secured)

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-P-H10	Wetland Restoration	Complete eighteen acres of wetland restoration planting on degraded wetlands on privately owned land with the goal of improving water storage and groundwater recharge	Multiple (Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck)	Improved surface water storage, increased groundwater recharge, summer streamflows, and resilience to climate change; decreased surface water runoff	Snohomish Conservation District	Planning, design, and construction: $220,240 (secured)
7-W-H11	Woods Creek Riparian Restoration Partnership	Plant native trees and shrubs 45 acres of riparian forest along the mainstem of Woods Creek and correct between 3 and 5 fish passage barriers to improve juvenile and adult access to spawning and rearing habitat	Woods	Increased shade, decreased water temperatures, improved habitat for juvenile salmonids	Snohomish Conservation District	$650,000 (secured through DOE/NOAA and SRFB). Planting, LWD installation, & Barrier Removal = $950,000

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-S-H12	Expansion of Sultan River Side Channel Network (Sultan River Floodplain Activation)	Expansion of an existing side channel network to provide structural complexity and hydraulic diversity in the main channel	Sultan	Increased diversity in spawning habitat important for building resiliency in existing and future salmonid populations	Snohomish PUD	Design, permitting and construction = $1.1 million Maintenance and monitoring for first 5 years = $10,000/year
7-SM-H13	Haskel Slough Connectivity	Modifying the inlet dike to enhance juvenile salmon rearing and flood refuge in Haskel Slough	Skykomish Mainstem	Floodplain water storage, increase salmonid rearing habitat, and provide flood refuge habitat in a key area of the Snohomish River Basin	Tulalip Tribes	Outreach/preliminary-final designs: $400,000 Planning costs Implementation cost = $3 million

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-SM-H14	East Monroe Heritage Site Acquisition	Land acquisition along the main stem of the Skykomish River to preserve as an open space and use the site for flood water storage and displacement	Skykomish Mainstem	Acquisition of the property would sustain critical surface water and groundwater networks from being endangered or depleted. This project also protects off-channel habitats not currently protected	City of Monroe	Acquisition of 5 parcels = $3 million
7-SM-H15	Shinglebolt Slough	Reconnect the eastern, filled upstream section of Shingle Bolt Slough, remove riprap and berm along Skykomish River and create side channel habitat accessible during spring out-migration flows, install log wood jams and riparian vegetation	Skykomish Mainstem	Increase flood storage more frequently across 15 acres of floodplain. Floodplain side channels and ponded off-channel habitat areas will provide rearing habitat for salmon	Snohomish County	Design and Construction = $3,234,544 O&M = $250,000

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-SM-H16	Snohomish Confluence Project + Left Bank Floodplain reconnection at RM 1.5	Planning and property acquisition request to restore and enhance floodplain connection, abandoned side channels and connections to Riley Slough just upstream of junction of Skykomish and Snoqualmie Rivers	Skykomish Mainstem	Future opportunity to increase rearing and spawning habitat for salmon	Tulalip Tribes	Design, permit and construct = $900,000

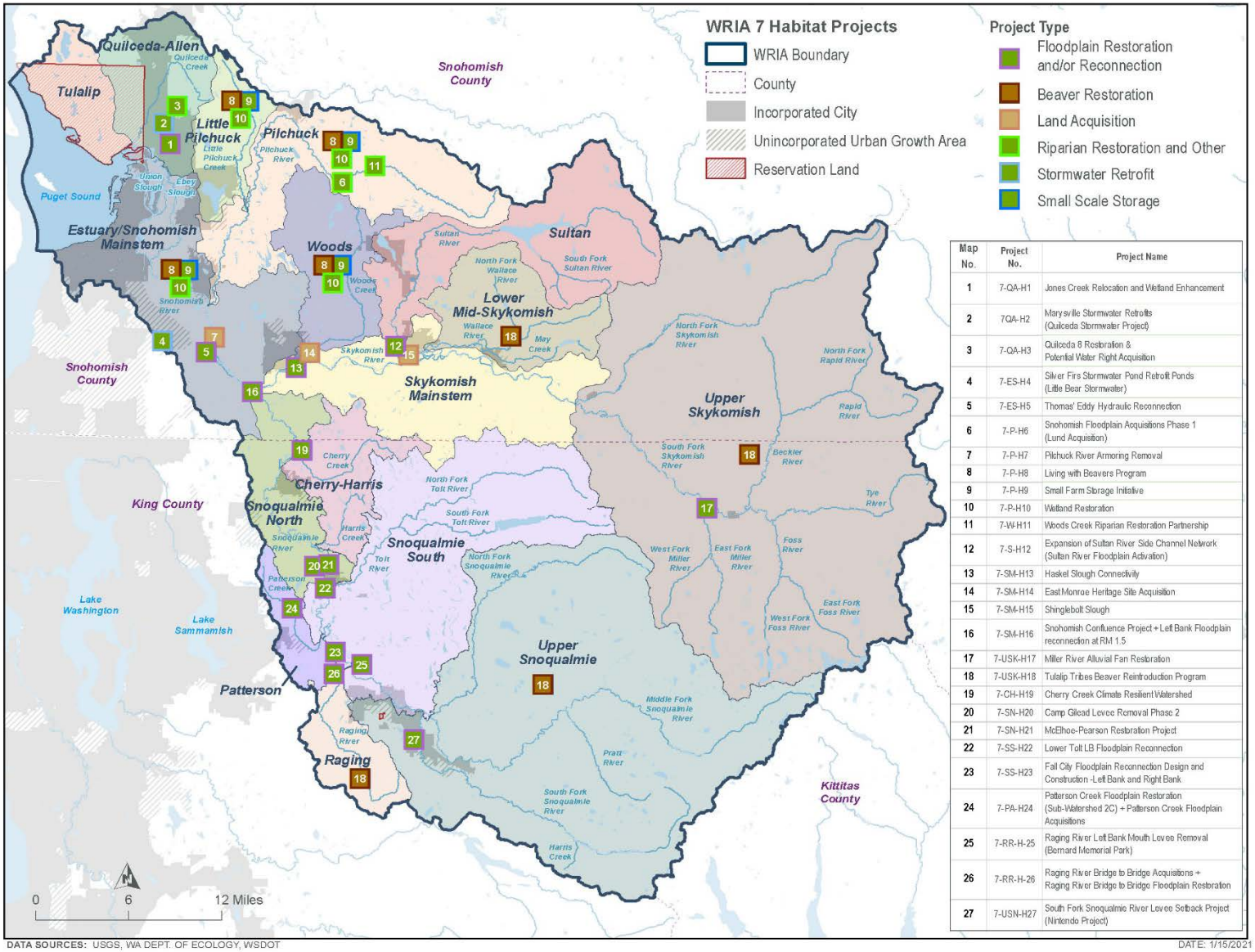
Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-USK-H17	Miller River Alluvial Fan Restoration	Riprap removal, floodplain reconnection, side channel reactivation	Upper Skykomish	Additional annual storage through floodplain reconnection, improve overall watershed hydrology which will restore habitat forming hydrologic processes for salmon downstream	King County	Three phases of design and construction = $4.6 million Fourth phase (revetment removal, revetment setback and side channel reactivation) = $2.6 million in construction costs
7-USK-H18	Tulalip Tribes Beaver Reintroduction Program	Protect hydrologic processes and function through relocation of beavers to improve fish rearing habitat and freshwater storage	Multiple (Lower Mid-Skykomish, Upper Skykomish, Raging, Upper Snoqualmie	Increase instream and riparian habitat, improve stream temperature, reduce bank erosion, improve bank and floodplain connectivity	Tulalip Tribes	$80,000 annually (secured through 2021)

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-CH-H19	Cherry Creek Climate Resilient Watershed	Suite of actions in Cherry Valley including removal of bank armoring, riparian restoration, levee improvements and levee setbacks, culvert replacements, LWD placement, side channel excavation, and small-scale storage sites.	Cherry-Harris	Floodplain reconnection, restoration of riparian areas.	Snoqualmie Valley Watershed Improvement District	Total cost unknown (Feasibility and design funding secured for small-scale storage)
7-SN-H20	Camp Gilead Levee Removal Phase 2	Levee removal on the left bank of the Snoqualmie River to reconnect floodplain habitat.	Snoqualmie North	Floodplain reconnection, restoration of riparian areas and providing additional rearing and spawning habitat.	King County	Design, permit, construct and monitor = $1.5 million

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-SN-H21	McElhoe-Pearson Restoration Project	Removal of the McElhoe Pearson levee or creation of a flow through channel to improve habitat connectivity.	Snoqualmie North	Floodplain reconnection, restoration of riparian areas and providing additional rearing and spawning habitat.	King County	$918,000
7-SS-H22	Lower Tolt LB Floodplain Reconnection (SR 203 to Confluence)	Feasibility study to determine options for fully or partially removing existing levee/revetment to improve floodplain connection.	Snoqualmie South	Future restoration actions will provide salmon access to off channel habitat.	Snoqualmie Tribe	Feasibility = $250,000
7-SS-H23	Fall City Floodplain Reconnection Design and Construction – Left Bank and Right Bank	Project includes 2 adjacent floodplain reconnection projects: Barfuse Project and Hafner Project.	Snoqualmie South	Floodplain restoration will improve juvenile rearing and adult spawning habitat.	King County	$15,250,000 ($550,000 secured)

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-PA-H24	Patterson Creek Floodplain Restoration (Sub-Watershed 2C) + Patterson Creek Floodplain Acquisitions	Property acquisition to perform floodplain restoration through riparian restoration and channel complexity.	Patterson	Floodplain restoration will improve juvenile rearing and adult spawning habitat.	King County Department of Natural Resources	Acquire parcels and perform restoration actions = $1,625,000
7-RR-H-25	Raging River Left Bank Mouth Levee Removal (Bernard Memorial Park)	Levee removal at Bernard Memorial Park and reconnect 6 acres of floodplain habitat.	Raging	Floodplain restoration will improve juvenile rearing and adult spawning habitat.	Mountains to Sound Greenway Trust	Design, permitting, and construction = $3.5 million
7-RR-H-26	Raging River Bridge to Bridge Acquisitions + Raging River Bridge to Bridge Floodplain Restoration	Property acquisitions for future floodplain restoration projects. Proposed restoration actions include removal and setback of levee along right bank of Raging River.	Raging	Floodplain restoration will improve juvenile rearing and adult spawning habitat.	King County Department of Natural Resources	$15.5 million

Project Number	Project Name	Project Description	Subbasin(s)	Anticipated Ecological Benefits	Project Sponsor	Estimated Cost
7-USN-H27	South Fork Snoqualmie River Levee Setback Project (Nintendo Project)	Levee setback and creation of floodplain and riparian habitat.	Upper Snoqualmie	Improve watershed hydrology to benefit downstream water quality, summer flows, water temperature, etc.	City of North Bend	$8.6 million



Map No.	Project No.	Project Name
1	7-QA-H1	Jones Creek Relocation and Wetland Enhancement
2	7QA-H2	Marysville Stormwater Retrofits (Quilceda Stormwater Project)
3	7-QA-H3	Quilceda 8 Restoration & Potential Water Right Acquisition
4	7-ES-H4	Silver Firs Stormwater Pond Retrofit Ponds (Little Bear Stormwater)
5	7-ES-H5	Thomas' Eddy Hydraulic Reconnection
6	7-P-H6	Snohomish Floodplain Acquisitions Phase 1 (Lund Acquisition)
7	7-P-H7	Pilchuck River Armoring Removal
8	7-P-H8	Living with Beavers Program
9	7-P-H9	Small Farm Storage Initiative
10	7-P-H10	Wetland Restoration
11	7-W-H11	Woods Creek Riparian Restoration Partnership
12	7-S-H12	Expansion of Sultan River Side Channel Network (Sultan River Floodplain Activation)
13	7-SM-H13	Haskel Slough Connectivity
14	7-SM-H14	East Monroe Heritage Site Acquisition
15	7-SM-H15	Shinglebolt Slough
16	7-SM-H16	Snohomish Confluence Project + Left Bank Floodplain reconnection at RM 1.5
17	7-USK-H17	Miller River Alluvial Fan Restoration
18	7-USK-H18	Tulalip Tribes Beaver Reintroduction Program
19	7-CH-H19	Cherry Creek Climate Resilient Watershed
20	7-SN-H20	Camp Gilead Levee Removal Phase 2
21	7-SN-H21	McElhoe-Pearson Restoration Project
22	7-SS-H22	Lower Tolt LB Floodplain Reconnection
23	7-SS-H23	Fall City Floodplain Reconnection Design and Construction -Left Bank and Right Bank
24	7-PA-H24	Patterson Creek Floodplain Restoration (Sub-Watershed 2C) + Patterson Creek Floodplain Acquisitions
25	7-RR-H-25	Raging River Left Bank Mouth Levee Removal (Bernard Memorial Park)
26	7-RR-H-26	Raging River Bridge to Bridge Acquisitions + Raging River Bridge to Bridge Floodplain Restoration
27	7-USN-H27	South Fork Snoqualmie River Levee Setback Project (Nintendo Project)

Figure 5.2: WRIA 7 Habitat Projects

5.2.3 Prospective Projects and Actions

In addition to the projects described in this chapter, the WRIA 7 Committee supports projects and actions that achieve the following goals:

- **Acquisitions of water rights to increase streamflow and offset the impacts of PE wells**. Water rights should be permanently and legally held by Ecology in the Trust Water Rights Program to ensure that the benefits to instream resources are permanent. The WRIA 7 Committee acknowledges that all water rights transactions rely on willing sellers and willing buyers. The Committee supports retirement of agricultural/irrigation water rights for the benefit of instream flows that do not currently or potentially serve agricultural lands of long-term commercial significance consistent with the Growth Management Act (GMA) (Snoqualmie APD in King County and prioritized agricultural lands in Snohomish County). The Committee supports the acquisition of municipal and industrial water rights to increase streamflows and offset the impacts of PE wells where the current withdrawal impacts surface water or groundwater in direct hydraulic continuity to surface water. Prior to purchase, a water purveyor with a more efficient distribution system (with limited to no impact to streams that frequently experience critical low flows) would be identified.
- **Projects or programs that support improved lake level management to reduce flood risk and increase streamflow during low flow periods**. Projects would improve existing lake outlet structures and management of existing outlet structures to benefit instream resources.
- **Projects shown to have direct improvements to benefit streamflow above and beyond existing requirements.** For example, develop new stormwater infiltration facilities, upgrade existing stormwater retention facilities to provide infiltration, remove impervious surfaces (de-pave projects), and encourage rainwater catchment and storage to help manage runoff from impervious surfaces. The Committee also supports the expansion of voluntary programs that provide rebates or incentives to cover most or all of the cost of installing cisterns and rain gardens at private residences. Cisterns can benefit water quality by helping to control stormwater and reduce sewer overflow events during high flows.
- **MAR projects that offset the impacts of PE wells and improve streamflow during critical low flow periods**. The Committee supports managed aquifer recharge projects when (1) feasibility studies ensure site conditions and project benefits are understood with best available information prior to construction and (2) projects will not preclude or counteract ecological process-based stream restoration and floodplain connection efforts, or cause other unintended negative ecological consequences, at the expense of re-timing streamflows.
- **Projects or programs that support connections of existing homes on PE wells to public water systems, without impacting critical areas or indirectly encouraging development outside of UGAs**. Projects could provide financial incentives for homes using PE wells to connect to public water service and decommission the well and/or provide financial support for water purveyors to extend water distribution systems further into their

individual service areas, particularly where PE wells are concentrated or rapid rural growth is anticipated. The purveyor will need to demonstrate how they plan to connect PE well users to the extended line. The purveyor will need to forgo the consolidation of the groundwater right(s) exempt from the permit requirement under RCW 90.44.050 (the groundwater right associated with the formerly exempt well) through the RCW 90.44.105 process.

- **Projects or programs that provide outreach and incentives to rural landowners with PE wells to lower indoor and outdoor water use through water conservation best practices, and comply with drought and other water use restrictions**. Programs would encourage the following types of water conservation strategies and best practices: natural lawn care; irrigation efficiency; rainwater catchment and storage; drought resistant and native landscaping; smaller lawn sizes; forest, meadow, and wetland conservation; indoor water conservation; and voluntary metering. Conservation and water use efficiency projects that involve water rights that are intended to provide water offset for the purposes of this plan should permanently convey the saved water to Ecology to be held in the Trust Water Rights Program for instream flow purposes. The Committee encourages these projects or programs to monitor effectiveness in reducing water use.
- **Studies, monitoring, and long-term forest management projects that improve the ability of forests to benefit streamflow** by protecting and improving hydrological processes, including reducing runoff and improving the retention of snow on the landscape. As an example, the Committee supports the Snoqualmie Indian Tribe's study to model the interaction of riparian management strategies and climate projections on Snoqualmie River hydrology and water temperature, including modeling the ability of canopy gaps to affect snow recruitment and storage (extend the melt-off period later in the season) in the Snoqualmie watershed. The Committee supports forest management projects that manage for tree stand age and extended harvest rotation to improve streamflow during low flow periods. The U.S. Environmental Protection Agency's (EPA) Visualizing Ecosystem Land Management Assessments (VELMA) modeling tool may help identify targeted forest management practices to improve streamflow.
- **Projects that beneficially switch the source of withdrawal from surface to groundwater, or other beneficial source exchanges such as a source switch to recycled water**. The benefits of a source exchange project may depend on the connection between the sources, benefits to instream resources (e.g., a surface to groundwater source switch may have negative impacts on fish if the groundwater derived base flow provides flow and or temperature refuge in streams with high water temperature issues). Source switches should consider the potential consequences of unsustainable withdrawals from the affected aquifer. Additionally, the impacts to streamflow (particularly baseflow) would need to be assessed. Specifically, source switches should take into consideration that existing recycled water facilities in WRIA 7, discharging to the river and other uses, do not represent a new source of water.

- **Projects that provide streamflow and habitat benefits by returning stream habitat to a more natural state**, such as through levee setback or removal, river-floodplain restoration, instream habitat restoration, and beaver restoration.

5.3 Project Implementation Summary

5.3.1 Summary of Projects and Benefits

Per RCW 90.94.030(3), this watershed plan must include actions necessary to offset potential impacts to instream flows associated with new PE well water use and result in a NEB to instream resources within the WRIA.

As specified in Chapter Four, the Committee estimated 797.4 acre-feet per year (AFY) of consumptive use from new PE wells over the planning horizon. The projects included in Table 5.1 provide an estimated offset of 1,373.4 AFY and exceed the consumptive use estimate.

The Committee identified a total of 27 habitat projects, included in Table 5.2. Ecological benefits associated with these projects are myriad and include floodplain restoration, wetland reconnection, availability of off-channel habitat for juvenile salmonids, reduction of peak flow during storm events, increase in groundwater levels and baseflow, and increase in channel complexity. These habitat projects will contribute to addressing limiting factors for salmonids in WRIA 7 by returning floodplain, riparian, and wetland areas to a more natural state. Floodplain reconnection and beaver restoration projects will also contribute to restoring hydrologic processes.

While many of these projects have potential streamflow benefits, water offset from habitat projects are not accounted for in this plan. The ecological and streamflow benefits from habitat projects are supplemental to the quantified water offsets.

As stated in Chapter Six, the WRIA 7 Committee encourages monitoring projects to improve understanding of outcomes. Specifically, the Committee encourages project sponsors to monitor (1) water offset projects to ensure they provide anticipated offset benefits and (2) habitat projects to ensure they achieve anticipated ecological benefits and to improve understanding of their streamflow benefits.

5.3.2 Cost Estimate for Offsetting New Domestic Water Use Over 20 Year Planning Horizon

Per RCW 90.94.030(3)(d), this watershed plan must include an evaluation or estimation of the cost of offsetting new domestic water uses over the subsequent 20 years. To satisfy this requirement, the Committee developed planning-level cost estimates for each of the water offset projects listed in Table 5.1. The Committee also included costs estimates for habitat projects in Table 5.2 when that information was readily available.

Cost estimates for water offset projects included in the plan are planning level only:

- The cost estimate for the Snoqualmie Watershed MAR project is based on estimated cost per acre-foot and the Committee's offset estimate of 100 AFY. Cost may vary for each of the potential MAR sites and will depend on the number of MAR projects developed.
- Cost estimates for water right acquisitions are also based on estimated cost per acre-foot and the Committee's offset estimate (irrigation water rights) or authorized volume (municipal water rights). Costs range widely for water right acquisitions; these estimates may not reflect actual costs. For all water right acquisitions, an extent and validity determination will need to be completed to establish how much water can be permanently protected before transferring the water right into Ecology's trust water resources program. Costs for these water right acquisitions will be negotiated between the willing seller and the willing buyer.

For water offset projects, Ecology used costs from recently completed water right acquisitions or recent grant applications for similar projects types that have come through the streamflow restoration grants program as a funding template. Project costs for other water offset project types will be further developed once the project sponsors begin to seek funding and prepare grant applications. The estimated cost for implementing individual water offset projects range from $5,000 for the Lower Pilchuck No. 11 water right acquisition project to $3.5 million for the SVWID surface water storage project. The total estimated cost for implementing the water offset projects listed and described in this chapter is approximately $9 million.

Most of the cost estimates for habitat projects included in the plan were developed by the project sponsor as they have previously sought funding for their respective projects. The estimated cost for implementing individual habitat projects range from $20,000 (per lined storage pond) for the Snohomish Conservation District Small Farm Storage Initiative project to $15.5 million for the Raging River Bridge to Bridge Acquisitions + Raging River Bridge to Bridge Floodplain Restoration project.

5.3.3 Certainty of Implementation

Certainty of implementation depends on many factors, including identification and support of project sponsors, readiness to proceed/implement the project, and identification of potential barriers to completion. Each of the WRIA 7 water offset projects listed in Table 5.1 have project sponsors who are ready to proceed with project development. The City of Lake Stevens is pursuing the Lake Stevens outlet structure and lake level management project and has already conducted preliminary engineering studies. Tulalip Tribes is sponsoring the Coho Creek streamflow enhancement project and has been restoring Coho Creek flows and habitat since 2001. The SVWID is sponsoring the Snoqualmie Valley storage project, funded in part by a 2019 Ecology grant. WWT is sponsoring the MAR and water right acquisition projects to pursue implementation. This increases certainty of implementation of these projects.

One of the largest barriers or challenges to implementation is funding. Willingness of landowners to sell existing water rights is one very uncertain component of this plan. Other significant potential barriers include land ownership and willingness to sell or allow development of project footprints, technical feasibility (e.g. amenable soil characteristics for MAR or water storage

projects), and legal feasibility (e.g., ability to acquire new water rights for MAR and water storage; land use permitting to construct in floodplains, wetlands, or other critical areas).

Many of the projects identified by the Committee have not yet secured landowner approval. While landowner acknowledgement and approval is not required for projects to be included in this watershed plan, some projects will need landowner approval prior to construction.

In some circumstances, there are inherent uncertainties in protecting offset water once it has been secured for streamflow enhancement purposes, partially given that WRIA 7 remains un-adjudicated. Although there is uncertainty, the types of water offset projects proposed in this plan have been successfully implemented within Washington State and the technology to implement these types of projects is established. Purchasing existing water rights for incorporation into the Trust Water Rights Program has been occurring throughout the state since the early 1990s.

The WRIA 7 Committee recommends projects that infiltrate water (e.g., MAR projects and stormwater projects) include estimated operations and maintenance costs in applications for streamflow restoration funding.

All 27 of the habitat projects listed in this watershed plan have project sponsors who have developed their respective projects over the years and are dedicated to seeing these projects implemented to improve the instream resources of the salmonid species in their project areas. The habitat projects listed in this plan are similar to projects being implemented throughout the state to help restore and enhance instream resources within their respective watersheds. Having sponsors who will advocate for these projects helps provide reasonable assurance that this plan can be implemented.

It is important for the water offset benefits implemented under this watershed plan to last as long as the new consumptive uses. The water offset projects identified in this plan should provide offset benefits well into the future. Once lake outlet structures are replaced and lake management operational procedures are implemented, those offset benefits will persist. The source water for the Coho Creek enhancement project will be generated indefinitely as it comes from regional growth served by a reclaimed water facility. Once water rights are transferred into the Trust Water Rights Program, those benefits will persist in perpetuity. Water storage and retiming projects are expected to provide long-term benefits. This gives the Committee reasonable assurances that the water offset benefits will persist for as long as the new uses.

The WRIA 7 Committee developed adaptive management recommendations in Chapter Six of this plan to increase reasonable assurance that the projects and actions in the plan will be implemented.

Chapter Six: Policy, Implementation, and Adaptive Management Recommendations

6.1 Policy Recommendations

The Streamflow Restoration law lists optional elements Committees may consider including in the watershed plan to manage water resources for the WRIA or a portion of the WRIA (RCW 90.94.030(3)(f)).

The WRIA 7 Committee included what they have termed "policy and regulatory recommendations" in this watershed plan to show support for programs, policies, and regulatory actions that would contribute to the goal of streamflow restoration. When similar concepts arose from multiple Watershed Restoration and Enhancement Committees, the WRIA 7 Committee coordinated with those other Committees to put forward common language for inclusion in the watershed plans, as appropriate. Coordination also occurred for jurisdictions that cross multiple watersheds. All projects and actions the Committee intended to count toward the required consumptive use offset or Net Ecological Benefit (NEB) are included in Chapter Five: Projects and Actions.[17]

As required by the Final NEB Guidance, the Committee prepared the watershed plan with implementation in mind. However, as articulated in the Streamflow Restoration Policy and Interpretive Statement (POL 2094), "RCW 90.94.020 and 90.94.030 do not create an obligation on any party to ensure that plans, or projects and actions in those plans or associated with rulemaking, are implemented."

The Committee initially identified a list of potential policy and regulatory recommendations. After iterative rounds of discussion, the Committee narrowed the recommendations in this section to those that both supported the goal of streamflow restoration and had full support from the Committee. Committee members identified as the implementing entity for each recommendation are committed to investigating the feasibility of the recommendation. The identification and listing of these policy and regulatory recommendations is directly from the WRIA 7 Committee members and is not endorsed or opposed by Ecology.

The WRIA 7 Committee supports the following recommendations:

[17] "New regulations or amendments to existing regulations adopted after January 19, 2018, enacted to contribute to the restoration or enhancement of streamflows may count towards the required consumptive use offset and/or providing NEB." Streamflow Restoration Policy and Interpretive Statement, POL-2094

6.1.1 Well Reporting Upgrades

Proposed implementing entity: Ecology

Recommendation:

Change the Ecology well tracking system in the following ways, in order to efficiently and transparently track the number and location of permit-exempt wells in use:

- Implement a web-based well report form that mimics the current well report forms, and that uploads directly to Ecology's database with Ecology verification;
- Require coordinates (latitude and longitude) of wells on well report forms, and implement an intuitive web tool for well drillers which automatically provides the Public Lands Survey (PLS) location and coordinates for a new well;
- Identify permit-exempt wells on well report forms; and
- Provide Well ID Tag numbers to older wells, and associate well decommissioning, replacement, or other well activities with the Well ID Tag.

Purpose:

Directly and efficiently address identified shortcomings in Ecology's existing well tracking database and reporting protocols. Accurate tracking of the locations and features of PE wells will support the WRIA 7 Committee's desire to engage in monitoring and adaptive management after adoption of the watershed plan.

Funding Sources:

Leverage existing resources and efforts currently underway through the Ecology Well Construction Technical Advisory Group (TAG) and other departmental means. Additional funding from the Washington State Legislature or existing local permitting fees to increase capacity for Ecology to verify well reports may aid in implementing this recommendation in a timely manner.

Additional information or resources: Well Report Location Accuracy Study; Mason County Well Report Location Accuracy Study[18]

6.1.2 Encourage Conservation Through Connections to Public Water

Proposed implementing entities: County and city planning departments; public utilities and other water purveyors; Ecology; Department of Health.

Recommendation:

[18] Supplemental resources are available online: https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Policy%20Supplemental%20Materials.pdf

- Adopt and implement consistent and coordinated policies that reduce dependence on water use from PE wells and promote timely and reasonable connections to municipal and regional water supplies.
- Water purveyors and county/city land use planners explore opportunities to extend water distribution systems further into their individual service areas, particularly where rapid rural growth is anticipated.
- Develop cost-benefit analysis and environmental and fiscal implications to (1) fund programs to support connections to public water systems and (2) gain political support.

Purpose:

Reduce uncertainty about future streamflow and aquifer impacts from PE wells. Encourage state/local policies and funding to support streamflow objectives within the watershed plan. Demonstrate the WRIA 7 Committee's endorsement of encouraging conservation through promoting connections to public water systems, provided that all provisions of GMA continue to be followed.

Funding Sources:

Existing fees collected through local permitting processes; pass-through fees associated with well maintenance services collected by service providers; state or local rate increases or taxes.

Additional information or resources: Average Water Use Data[19]

On average, public water users consume less per capita than WRIA 7 PE well estimates.

6.1.3 Development and Use of Reclaimed Water to Address the Impact of PE Wells

Proposed implementing entities: Washington State Legislature; Ecology.

Recommendation:

Enact and promulgate state laws, rules, and regulations that encourage the development and use of reclaimed water, for the purpose of:

- Offsetting the impact of or providing an alternative to PE wells using reclaimed water;
- Facilitating enhanced reclaimed water treatment to enable its use for streamflow restoration projects;
- Facilitating the development of streamflow restoration projects that use appropriately treated reclaimed water;

[19] Supplemental resources are available online: https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Policy%20Supplemental%20Materials.pdf

- Encouraging developers to integrate rainwater and/or reclaimed water into their projects for the purpose of avoiding or limiting use of a PE well;
- Encouraging partnership with the local water purveyors, where appropriate.

Purpose:

Offset water that would otherwise be diverted from the finite supply in rivers and streams due to PE wells. Reduce the amount of treated wastewater discharged into receiving water bodies. Create water supply options as an alternative to or to offset PE wells, while enhancing resiliency against drought and climate change.

Funding Sources:

If Ecology does not have capacity to support the work to integrate this proposal into the RCW and WAC with existing staffing and resources, the WRIA 7 Committee recommends the Washington State Legislature provide funding for this purpose.

6.1.4 Voluntary Domestic PE Well Metering Program

Proposed implementing entities: Ecology; King County; King and/or Snohomish Conservation Districts.

Recommendation:

Pilot a voluntary five-year program in one or more WRIA 7 subbasins to meter domestic PE wells (indoor and outdoor residential use). Supplement the voluntary metering program with a robust education and community engagement program about water consumption and conservation.

Purpose:

Increase confidence in assumptions regarding the average individual PE well water use to inform the adaptive management process and future water management and planning efforts. Data could inform (1) growth policies and patterns, (2) where to target incentives and education/outreach programs, and (3) where to place resources across subbasins to help improve streamflow, water levels, and temperature.

Funding Sources:

General operation or appropriated funds from (1) the state, (2) counties, and/or (3) conservation districts related to water, habitat restoration (salmon recovery), or housing. Environmental grants.

6.1.5 Water Conservation Education & Incentives Program

Proposed implementing entities: Ecology and counties; with support from conservation districts and non-governmental organizations.

Recommendation:

Ecology partners with counties and conservation districts to develop and implement outreach and incentives programs that encourage rural landowners with domestic PE wells to (1) reduce

their indoor and outdoor water use through water conservation best practices; and (2) comply with drought and other water use restrictions.

Purpose:

Raise awareness of the impacts domestic PE well water usage has on (1) groundwater levels and (2) the connection to streams and rivers. Supplement water offset and restoration projects, especially in subbasins critical for fish and where water offsets were difficult to find.

Funding Sources:

Potential funding sources could include new funding from Washington State Legislature; grants (e.g., Ecology's Streamflow Restoration Grant Program); allocation of Ecology resources; existing fees associated with new domestic PE wells; contributions from local governments and tribes; and/or part of county or conservation district ongoing education, outreach, and incentive programs.

6.1.6 Statewide Mandatory Water Conservation Measures in Unincorporated Areas of the State During Drought

Proposed implementing entities: Washington State Legislature, Ecology.

Recommendation:

Consider implementing mandatory water conservation measures for PE well users in unincorporated areas of the state during drought conditions, as defined by WAC 173-166. Measures would focus on limiting outdoor water use, with exemptions for growing food, watering stock, or for those participating in a Fire Adapted Community program.

The Washington State Legislature could require Ecology or counties to implement water conservation policies. Ecology could write a rule to require water conservation measures. County councils could pass legislation encouraging or requiring water conservation to the extent such mandates are lawful and enforceable or implementable.

Purpose:

Reduce water usage from PE well users during drought. Reduce impacts on streamflows from PE well users and contribute to net ecological benefit. Increase climate change resilience.

Funding Sources:

Potential funding sources could include new funding from Washington State Legislature; allocation of existing Ecology resources; and/or existing fees associated with new domestic PE wells.

Additional Information or Resources:

https://www.nfpa.org/-/media/Files/Public-Education/Resources/Safety-tip-sheets/WildfireRiskReductionSafetyTips.pdf

6.2 Implementation and Adaptive Management Recommendations

The Committee supports an adaptive management process for implementing the WRIA 7 watershed plan. Adaptive management is defined in the NEB Guidance as "an interactive and systematic decision-making process that aims to reduce uncertainty over time and help meet project, action, and plan performance goals by learning from the implementation and outcomes of projects and actions," (Ecology 2009). The WRIA 7 Committee believes that adaptive management requires the ability to make adjustments, if needed.

Adaptive management will help address uncertainty and increase assurance of achieving plan objectives by identifying and integrating additional information, data, and research—including related climate change impacts on hydrology—that may assist with future design and implementation of projects. It will also support the improved coordination of water resources noted in Section 1.1. To the extent possible, each of the recommendations put forth by the Committee includes a funding mechanism. Some of the adaptive management recommendations included in this section are policy recommendations that the WRIA 7 Committee believes will specifically support adaptive management of the watershed plan.

6.2.1 Existing Challenges

The Committee Identified the following challenges:

- Our global climate is changing. While the effects of climate change over the 20-year life of this watershed plan cannot be precisely known, shifts in climatic conditions will influence the hydrologic regime in the watershed and will impact instream flows. Rainfall, snowmelt, and evapotranspiration have been identified as the primary mechanisms driving changes in groundwater storage. These mechanisms will be affected by a changing climate. Air and water temperatures will increase and summer streamflows will be reduced. Groundwater pumping and indirect effects of irrigation and land use changes associated with new PE wells will impact groundwater resources and the availability for future water supply and instream flows. The Committee recognizes that there is no statutory mechanism to ensure that the goals of this plan, to offset PE wells and achieve NEB, will be met under future climatic conditions.
- Projects identified in this plan are expected to increase groundwater storage and augment instream flows as they are implemented and provide aquatic habitat benefits. However, without significant investment in further detailed feasibility studies and identification of project sponsors, many projects remain highly conceptual.
- There is some uncertainty that offset and habitat projects will continue to function as designed, and generate streamflow benefit to offset PE well consumptive use and NEB under a changing climate.
- The adaptive management provisions of this plan should assist with identifying the importance of monitoring and assessing the validity of the estimated offset projections as the plan is implemented to determine whether projects are functioning as

designed—and as hydrologic conditions change over time, allow for course corrections where needed. However, current policy does not allow for projects to be added after the plan is finalized and approved, nor is it clear who "owns" the implementation and adaptive management of the plan. It is also unclear who pays for or ensures that projects are implemented if projects are not funded through the competitive funding source allocated by the State.

- The Committee identified uncertainties associated with the PE well projection. One of these uncertainties is that the methods used to generate the PE well projections assumes that in the 2018-2038 period, growth and irrigation practices will mirror past trends and practices. New PE wells and irrigation patterns require monitoring to determine whether the number of new PE wells and associated consumptive use exceeds the volume that was forecast for purposes of this plan.
- The Committee identified lack of (1) clear implementation obligations or responsibilities applicable to plan participants or other state or local authorities, (2) integration of plan commitments to existing systems governing land and water uses, and (3) adequate funding as additional challenges that may increase uncertainty in plan outcomes.
- This watershed plan is narrow in scope and is not intended to address all water uses or related issues within the watershed. This plan does not address potential impacts to streamflow and habitat as a result of watershed activities beyond new PE wells. For example, this plan does not address potential impacts to streamflow from new permitted withdrawals of surface and groundwater and this plan does not address the needs of all current and future water users in the watershed.
- The Committee has engaged in collective learning about water resources through this planning effort. This collective knowledge could be applied through a broader regional water supply planning effort. If a more comprehensive approach is developed to improve coordination of water resources for both instream and out of stream uses that result in improvements in WRIA 7 watershed health, the Committee will support development of a similarly collaborative and comprehensive planning process. It is expected that the planning process would need to expand to include representatives of all relevant entities in order to address all water resource needs, ensure sustained cooperation, and ultimately improved streamflow.

To address some of the above challenges, the WRIA 7 Committee recommends the following implementation, monitoring, and adaptive management strategies, and proposes an implementing entity, roles and responsibilities, funding mechanisms, and resulting actions for each.

6.2.2 Implementation Recommendations[20]

[20] These recommendations are provided by the WRIA 7 Committee for Ecology's consideration in developing an efficient and effective implementation and adaptive management program.

The WRIA 7 Committee developed the following implementation recommendations to address some of the challenges identified above. The recommendations in this section have the full support of the Committee. Committee members who have been designated as implementing entities have committed to investigating the feasibility of the recommendation. The WRIA 7 Committee supports:

Funding for Adaptive Management

The Committee recommends that the Legislature provide funding and a structure to monitor plan implementation (including tracking of new PE wells and project implementation by subbasin) and develop a process to adaptively manage implementation if offsets and NEB are not being met as envisioned by this watershed plan. The legislature should also provide funding to support the participation of entities on the Committee, a needed.

Additional Funding for Project Implementation

The Committee recommends that Ecology:

- Track Streamflow Restoration Grant Program funds requested against available capital funding, by WRIA and across the state;
- Revises grant guidance to prioritize projects in approved watershed plans; and/or
- Requests additional funds from the Legislature, if needed, to fully implement the offset and NEB projects identified in each watershed plan or rulemaking process under RCW 90.94.020 and RCW 90.94.030.

Adding Projects to the Plan

The Committee recommends that the Legislature allow Ecology to accept, review, and approve the addition of projects to this watershed plan, such as the prospective projects and actions identified in Chapter Five which may be further developed during the 20-year planning horizon. As described in Section 6.2.3, Ecology should consider the Committee's recommendations to adjust projects and actions.

The Committee supports continued coordination with salmon recovery efforts across the basin as adaptive management is implemented and new projects are added. In keeping with the Committee's commitment to strive for offset projects in all subbasins with consumptive use impacts, the Committee recommends that new projects may be considered for addition to this plan. If habitat projects emerge in the Tulalip subbasin that are appropriate and consistent with the type and nature of projects already on the project list, the Committee recommends these be considered for addition to this watershed plan.

If water offset projects emerge in subbasins that do not currently have water offsets and these projects are appropriate and consistent with the type and nature of projects already on the project list, the Committee recommends these be considered for addition to this watershed plan. If any of the 38 projects identified in this plan are not able to be implemented due to feasibility

limitations or other reasons, the Committee intends to adaptively manage the project list to identify replacement projects with similar benefits.

If any of the 38 projects identified in this plan are not able to be implemented due to feasibility limitations or other reasons, the Committee intends to adaptively manage the project list to identify replacement projects with similar benefits.

Implement a Process and Program for Tracking PE Wells and Project Implementation

The Committee has identified the need to track streamflow restoration projects and new domestic PE wells in order to:

- Improve the capacity to conduct implementation monitoring of streamflow restoration projects and actions.
- Develop grant funding opportunities and track associated costs.
- Provide a template for adaptively managing emergent streamflow restoration needs.

The Committee recommends piloting the Salmon Recovery Portal (https://srp.rco.wa.gov/about), managed by the Recreation and Conservation Office (RCO), for satisfying these needs. The implementation of project tracking through a pilot program using the Salmon Recovery Portal will be coordinated by the Washington Department of Fish & Wildlife (WDFW) in collaboration with Ecology, and RCO. To improve harmonization of streamflow restoration with ongoing salmon recovery efforts, local salmon recovery Lead Entity (LE) Coordinators shall be consulted prior to initial data uploads. While input and oversight is welcomed, no commitment of additional work is required from LE Coordinators. University of Washington (UW) data stewards will be employed to conduct data entry, quality assurance, and quality control (see supplemental document: project tracking). The Committee recommends that tracking and reporting be completed by Ecology and WDFW biennially.

Additional Information or Resources: WDFW Proposed Project Tracking Supplement[21]

Continue Monitoring of Streamflow and Groundwater Levels

This watershed plan is one of many water resource management efforts underway in WRIA 7. Understanding the status and trends of streamflows in the basin will assist with adaptively managing this plan. The Committee understands that neither the impact of individual projects nor new PE wells would be tracked through monitoring streamflow or groundwater levels, but the Committee believes that monitoring assists with an overall understanding of the hydrology in the basin.

[21] Supplemental resources are available online: https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Policy%20Supplemental%20Materials.pdf

As such, the Committee recommends that agencies with current or planned gauging stations and groundwater monitoring programs continue funding and/or seek supplemental funding sources to ensure that monitoring continues and the data is publicly available. This group includes counties, Ecology, USGS, and other relevant entities. The Committee would support the development of a shared clearinghouse so that external reports, data, and links to hydrological and hydrogeological data are easier to find and use. The development of widespread groundwater elevation tracking across the WRIA would help monitor trends.

Additional Information or Resources: Existing Streamflow and Groundwater Monitoring[22]

Continue Studies that Improve Understanding of WRIA 7 Hydrology

The Committee supports the continuation or initiation of research, models, and additional datasets that provide regional, basin-wide, and site-specific information to better understand the hydrology of WRIA 7 and inform the adaptive management of this plan. Examples could include the recent Snoqualmie Indian Tribe's forest gap study, UW Climate Impacts Group Research, Snoqualmie Indian Tribe/EPA VELMA modeling, National Marine Fisheries Service/National Oceanic and Atmospheric Administration monitoring and hydrology-fish life cycle modeling, King County water quality monitoring, and others).

Monitor Projects for Effectiveness

The Committee recommends that Ecology require effectiveness monitoring for projects funded by the Streamflow Restoration Grant Program to ensure that projects continue to function as designed and generate streamflow benefit to offset PE well consumptive use under a changing climate. The Committee also supports project sponsors using best available science to monitor project effectiveness and incorporating monitoring into the cost and implementation of offset projects.

Through development of the project list, the Committee discussed streamflow benefits from habitat projects, such as levee setbacks and floodplain reconnection projects. Due to uncertainty, the Committee did not count the water offset from these projects, although the Committee believes these projects can provide streamflow benefit. The Committee supports monitoring habitat projects to better understand their streamflow benefits. Monitoring pre- and post-project groundwater levels, streamflow, conducting aquifer testing (transmissivity, hydraulic conductivity, and storage properties), groundwater/surface water modeling, and completing performance monitoring can help improve understanding of streamflow benefits from habitat projects.

[22] Supplemental resources are available online: https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Policy%20Supplemental%20Materials.pdf

Table 6.1: Recommended Implementation Actions

Action	Responsible Entity/Frequency	Funding Considerations
Track building permits issued with PE wells, implemented projects and a summary of each by subbasin	Counties/annually WDFW, Ecology /biennially	The number of building permits and associated fees are transmitted to Ecology annually. No additional funding is needed. County costs funded by existing fees for new PE wells[23] ECY and WDFW may need additional funding to maintain the Salmon Recovery Portal and report to Committee
Monitor streamflow and groundwater levels	Various (USGS, Ecology, Counties, etc.)	External entities fund and implement these programs. Committee support may be helpful in communicating the importance and ensuring continuation of these efforts.
Continue studies that improve understanding of WRIA 7 hydrology	Various (University of Washington, Counties, Tribes, NGOs, etc.)	These studies will require additional and new funding outside the Streamflow Grant process. Committee support may be helpful in securing outside funds.
Monitor projects to determine effectiveness of streamflow benefits	Project sponsors	Most projects in Chapter Five do not include effectiveness monitoring details or associated costs. As projects are proposed, sponsors should build effectiveness monitoring into the design and budget requests of projects – particularly for certain offset projects, such as MAR or new reservoir creation that have not been implemented in WRIA 7 for streamflow benefits in the past.

6.2.3 Adaptive Management Recommendations[24]

Reconvening the WRIA 7 Committee

[23] RCW 90.94.030 (4)(a)(A) requires that, "an applicant shall pay a fee of five hundred dollars to the permitting authority," and RCW 90.94.030(4)(a)(iv) requires that local jurisdictions "Annually transmit to the department three hundred fifty dollars of each fee collected under this subsection."

[24] These recommendations are provided by the WRIA 7 Committee for Ecology's consideration in developing an efficient and effective implementation and adaptive management program.

The WRIA 7 Committee recommends that Ecology reconvene the Committee under the following circumstances:

- April 2026, 2032, and 2038;
- If after 2026, at the time of developing the biennial report (see watershed plan implementation reports below), Ecology identifies that the adopted goals of the watershed plan are not on track to be met in the plan's 20-year timeframe;
- If after 2026, a Committee member identifies, after reviewing the watershed plan implementation report described below, that the adopted goals of this watershed plan are not on track to be met in this plan's 20-year timeframe.

Ecology should invite all members of the WRIA 7 Committee, including ex-officio members, to reconvene. The WRIA 7 Committee as a whole will reconvene if at least one entity representing each of the following groups agrees to participate:

- Snoqualmie Indian Tribe
- Tulalip Tribes of Washington
- Each county within the WRIA
- A city government within the WRIA
- Washington State Department of Fish and Wildlife
- Washington State Department of Ecology
- The largest publicly owned water purveyor that is not a municipality
- An organization representing agricultural interests
- An organization representing environmental interests
- An organization representing the residential construction industry
- The largest irrigation district within the WRIA

If no representative is available from the same government or organization that participated in the WRIA 7 Committee at the time of plan approval, the Committee member may propose an alternate entity to represent the same interest on the Committee. At the time that Ecology reconvenes the Committee, the Committee may choose to reconvene a workgroup to report back recommendations to the full Committee. A subgroup of Committee members may convene, but representation from all of the following groups is needed to represent the entire Committee.

Watershed Plan Implementation Reports

The WRIA 7 Committee recommends that Ecology consider the following process for reporting on the status of the watershed plan.

The Committee recommends Ecology issue watershed plan implementation reports biennially (every two years) detailing the successes, challenges, and gaps related to implementation of the watershed plan. Each report should cover the two-year period occurring immediately prior to the

year of issuance, as well as cumulative reporting from any previous reporting periods. The first report should be issued two years after the plan is adopted by Ecology and include:

- Information on whether the watershed plan is on track to achieve the expected NEB and water offsets.
- Streamflow conditions, including identifying subbasins with known impacts that have not yet implemented water offset or habitat projects.
- Number and location (by subbasin) of new PE wells and projects.
- Information on any discretionary programs that were implemented. For example, water conservation education and outreach, incentives for public water service connections, voluntary PE well metering, and legislative updates.

If a project sponsor identifies that proposed water offset from the project are not able to be met after studying feasibility of the project, the Committee recommends that they report this to Ecology. The report should be sent to all members of the WRIA 7 Committee, King and Snohomish County Councils, all local jurisdictions within the watershed, and any additional stakeholders identified at the time of reporting. All Committee members should have 45 days to review the report and submit comments to Ecology. Following the 45-day Committee comment period, Ecology should issue its responses and findings to the Committee. Ecology should attempt to address comments received from the WRIA 7 Committee.

During any comment period after 2026, any member of the WRIA 7 Committee may request that Ecology reconvene the Committee to review recommendations to adjust the projects and actions. Following the issuance of Ecology's responses to Committee comments, the Committee should have an additional 14 days to offer additional comments to Ecology. At the end of the full 60-day Committee comment period, if any adjustments or amendments to the plan are recommended, they shall be at the sole discretion of Ecology. Ecology should issue its final findings within 30 days from the close of the full 60 day Committee comment period. Ecology will have sole discretion to make the amendments.

If Ecology reconvenes the Committee during the comment period for the watershed plan implementation report, amendments to the plan may be delayed to allow for additional Committee discussion. At the time of reconvening, the WRIA 7 Committee may develop recommendations to Ecology to adjust the projects and actions. Ecology should review and consider recommendations developed by the Committee. Ecology should develop and send a report to all members of the Committee with Ecology’s response to the Committee’s recommendations following the review and comment process described in watershed plan implementation reports above.

The WRIA 7 Committee also anticipates discussing:

- Status of policy recommendations;
- Status of requests to the legislature;

- Cumulative number of PE wells in relation to the status of projects implemented in WRIA 7 (the Committee understands that this plan must offset consumptive use and meet NEB at the WRIA-scale; the purpose of evaluating at a subbasin scale is to identify whether the Committee recommends the addition of projects in any given subbasin);
- Expanding or focusing conservation and outreach programs in subbasins where no water offset projects have been identified or implemented;
- Contacting project sponsors to encourage project development and implementation in subbasins with the most need;
- Seeking outside funding for project implementation;
- Drafting letters of support for Streamflow Grant proposals;
- Identifying additional offset projects for Streamflow grant program;
- Suggesting revisions to Stream Restoration Grant Guidance.

Reporting on Streamflow Restoration Grant Program

The Committee recommends that Ecology develop a report of projects that applied for streamflow restoration funding, noting which projects are included in this watershed plan, within two weeks of the close of each grant application period and distribute the report to the WRIA 7 Committee. The Committee also recommends that Ecology develops a report of projects that did and did not receive funding within two weeks of contacting applicants with funding offers. The report should be cumulative, including summary information from previous streamflow restoration grant rounds.

Committee members can request additional information from Ecology, if the report does not provide sufficient detail to enable the Committee to understand implementation progress as it is occurring.

Table 6.2: Recommended Adaptive Management Process

Action	Entity or Entities Responsible	Committee Role	Funding Considerations
Develop and distribute watershed plan implementation report, including any recommended adjustments to projects and actions.	Ecology	Review report	Ecology may need additional funding to support development of the report.
Support reconvening of the WRIA 7 Committee in 2026, 2032, 2038, and as requested by Committee at other dates, if needed.	Ecology	Committee reviews report, status of PE wells, status of projects; presentations on projects, effectiveness monitoring, new science, and research in basin; develop recommendations for projects in response.	Ecology staff time will be required. Ecology may need additional support from RCO, WDFW and project sponsors to develop summary report and distribute or convene a meeting if the Committee deems it necessary. Ecology may need additional funding to support reconvening.

Chapter Seven: Net Ecological Benefit

7.1 Introduction to NEB

Watershed Restoration and Enhancement Plans (watershed plans) must identify projects and actions to offset the potential consumptive impacts of new permit-exempt (PE) domestic groundwater withdrawals on instream flows over 20 years (2018-2038), and provide a net ecological benefit (NEB) to the WRIA.

The Final NEB Guidance establishes Ecology's interpretation of the term "net ecological benefit" as "the outcome that is anticipated to occur through implementation of projects and actions in a [watershed] plan to yield offsets that exceed impacts within: a) the planning horizon; and, b) the relevant WRIA boundary" (Ecology 2019).

The Final NEB Guidance sets Ecology's expectation for the NEB evaluation:

- "Planning groups are expected to include a clearly and systematically articulated NEB evaluation in the watershed plan" (Ecology 2019).
- "A watershed plan that includes a NEB evaluation based on this [Final NEB] guidance significantly contributes to the reasonable assurances that the offsets and NEB within the plan will occur. Ecology will review any such [watershed] plan with considerable deference in light of the knowledge, insights, and expertise of the partners and stakeholders who influenced the preparation of their [watershed] plan. Ecology will make the NEB determination as part of this review" (Ecology 2019).

The WRIA 7 Committee completed a NEB evaluation for this watershed plan; the results of that evaluation are included in this chapter.

7.2 Offsets

The Committee projects a total of 3,389 new PE wells will be installed within WRIA 7 during the planning horizon. The Committee used this 20-year PE well projection to estimate 797.4 acre-feet per year (AFY) of new consumptive water use in WRIA 7 (described in Chapter Four).

The WRIA 7 Committee projects a total water offset of 1,373.4 AFY from 11 water offset projects (described in Chapter Five and listed in Table 7.1 below). While this portfolio of projects exceeds the consumptive use estimate by 576 AFY, the project benefits described are anticipated benefits, as none of these projects have been implemented.

The Committee has struggled with the uncertainties inherent in a planning process tasked with estimating future conditions and developing a portfolio of projects to offset those future impacts. Absent an integrated and robust adaptive management program that can monitor progress and make course corrections as conditions change, the Committee found it challenging to anticipate all potential contingencies at the front end of a 20-year planning horizon. At the time of plan drafting and adoption, it is unknown whether the legislature and Ecology will fund and

implement robust adaptive management that will address Committee members' current and future concerns.

Furthermore, despite an exhaustive search, sufficient water right acquisition projects to fully offset consumptive use were not able to be identified, and the remaining deficit was filled with non-acquisition water offset projects including flow re-timing projects. This was a concern for some Committee members, who pointed out that re-timing projects do not fully protect or replace consumptively used water in the same manner that water right acquisitions do.[25] Additionally, Committee members identified considerable uncertainty relating to whether identified water rights holders will be willing sellers, noted that some subbasins have offset deficits as related to projects identified in the plan, and that in order to achieve NEB, the Committee would also like the plan to compensate for impacts ancillary to those of new PE wells. For these reasons, the Committee felt that it was important to look at the water offset projects and habitat projects portfolio as presented in this plan as a whole when evaluating whether the plan achieves a NEB. The Committee's approach has been to develop a list of potential offset projects that exceeds the anticipated impacts by a margin large enough to give reasonable assurance that this plan will be successful as events unfold over the planning timeline. The WRIA 7 Committee determined that this water offset project portfolio, if implemented, can succeed in offsetting consumptive use impacts at the WRIA scale.

[25] RCW 90.94.30 (3)(a) clarifies that re-timing project can provide water offset: "…plan recommendations may include, but are not limited to, acquiring senior water rights, water conservation, water reuse, stream gaging, groundwater monitoring, and developing natural and constructed infrastructure, which includes but is not limited to such projects as floodplain restoration, off-channel storage, and aquifer recharge. Qualifying projects must be specifically designed to enhance streamflows and not result in negative impacts to ecological functions or critical habitat," (RCW 90.94.030 (3)(a)).

Table 7.1: Summary of WRIA 7 Water Offset Projects

Project Number	Project Name	Project Short Description	Subbasin	Timing of benefits[1,2]	Estimated Offset Benefits (AFY)
7-T-W1	Lake Shoecraft Outlet Modification Project	Replacement of the existing stop log control structure with an adjustable slide-gate weir to allow more consistent streamflow releases during summer	Tulalip	Low flow period	62.5
7-QA-W2	Coho Creek Relocation and Streamflow Enhancement Project	Restoration of stream habitat conditions within Coho Creek and augmentation of summer low flows using effluent from an MBR Wastewater Treatment Plant adjacent to Coho Creek	Quilceda-Allen	Year-round	362
7-LP-W3	Lake Stevens Outlet Structure & Lake Level Management Project	Replacement of an outdated weir structure in the Lake Stevens outlet channel that manages the elevation in Lake Stevens to maximize flood storage availability in the winter and maintain summer flows in the channel	Little Pilchuck	Low flow period	500
7-P-W4	Lochaven Source Switch	Retirement of the water right associated with the Lochaven Water System as a basis for increasing flows within the Pilchuck River and downstream areas	Pilchuck	Year-round	12.7
7-P-W5	Lower Pilchuck No. 1	Acquisition of one groundwater right previously used for domestic supply	Pilchuck	Year-round	2.8
7-P-W6	Lower Pilchuck No. 11	Acquisition of one groundwater right previously used for golf course irrigation	Pilchuck	Year-round	2.1
7-SS-W7	Raging River No. 1	Acquisition of two water rights used for irrigation, domestic supply, commercial-campground, and stock watering	Snoqualmie South	Irrigation season & Year-round	126
7-P-W8	Patterson No. 1	Acquisition of two groundwater rights previously used to support fish propagation, domestic supply, stock watering, and irrigation	Patterson	Year-round	29.7
7-P-W9	Patterson No. 4	Acquisition of three groundwater rights previously used to support a farm and, subsequently, a golf course	Patterson	Year-round	71.6

Project Number	Project Name	Project Short Description	Subbasin	Timing of benefits[1,2]	Estimated Offset Benefits (AFY)
7-USQ-W10	MAR in Snoqualmie Watershed; Potential Sites: North Bend, Three Forks, NF 5700	Diversion of streamflow from the Snoqualmie River or tributary for infiltration at a constructed MAR facility	Upper Snoqualmie, Snoqualmie South, Snoqualmie North	Low flow period	100
7- USQ-W11	Snoqualmie River Watershed Surface Water Storage	Diversion of streamflow from the Snoqualmie River or tributary for detention at a surface water storage reservoir for later release to the subject stream	Upper Snoqualmie; Snoqualmie South, Cherry/Harris	Low flow period	104-3,311 [3]
			Total		**1,373.4**

Note:

[1] The water right information gathered indicates the period of use associated with the water right. For water rights that rely on surface water, the timing of benefit is assumed to be the same as the period of use. For water rights that rely on groundwater, the timing of benefit is assumed to be year-round, due to the lag time between well pumping and streamflow impact. Irrigation season is typically April through October, but the specific period of use is different for each water right.

[2] Managed aquifer recharge (MAR) projects can provide streamflow augmentation year-round. Streamflow augmentation may continue to discharge to the river after each year's storage window closes because of the lag time of water moving through an aquifer and the distance of the flow path to the river. The temporal distribution and absolute value of groundwater discharge will be estimated during the feasibility study that has to be conducted before a MAR project can proceed to construction and operation.

[3] A range of 104 to 3,311 AFY is provided for this project in Chapter Five. The low end of the range (104 AFY) was used to develop the total estimated offset benefit.

Table 7.2 compares consumptive use and water offsets at the subbasin scale:

Estimated water offset exceeds the estimated consumptive use in a total of six subbasins (Tulalip, Quilceda-Allen, Little Pilchuck, Snoqualmie South, Patterson, and Upper Snoqualmie), ranging from 4.9 AFY in the Tulalip subbasin to 430.5 AFY in the Little Pilchuck subbasin. Estimated water offset is less than the estimated consumptive use in a total of ten subbasins (Estuary/Snohomish Mainstem, Pilchuck, Woods, Sultan, Lower Mid-Skykomish, Skykomish Mainstem, Upper Skykomish, Cherry-Harris, Snoqualmie North, and Raging), ranging from 6.0 AFY in the Upper Skykomish subbasin to 115.8 AFY in the Estuary/Snohomish Mainstem subbasin.

While the Estuary/Snohomish Mainstem subbasin has no offset projects within its boundary, it is located downstream of all the other subbasins in the WRIA (with the exception of Tulalip subbasin and Quilceda Creek subbasin) and flows in the mainstem will benefit from offset projects that occur higher in the watershed. Two of the water offset projects (MAR in Snoqualmie Watershed and Snoqualmie River Watershed Surface Water Storage) are mapped to the Upper Snoqualmie subbasin; however, there are potential MAR and surface water storage sites in several subbasins (see Table 5.1).

Table 7.2: Subbasin Water Offset Estimate Compared to Permit-Exempt Well Consumptive Use Estimate

Subbasin	Offset Project Totals (AFY)	Permit-Exempt Well Consumptive Use (AFY)[1]	Difference (AFY)[2]
Tulalip	62.5	58.1	+4.4
Quilceda-Allen	362	62.1	+299.9
Estuary/Snohomish Mainstem	0	115.8	-115.8
Little Pilchuck	500	69.5	+430.5
Pilchuck	17.6	111.0	-93.4
Woods	0	31.5	-31.5
Sultan	0	6.5	-6.5
Lower Mid-Skykomish	0	8.8	-8.8
Skykomish Mainstem	0	32.1	-32.1
Upper Skykomish	0	6.0	-6.0
Cherry-Harris	0	40.4	-40.4
Snoqualmie North	0	87.4	-87.4
Snoqualmie South	126	40.3	+85.7
Patterson	101.3	55.0	+46.3
Raging	0	38.8	-38.8
Upper Snoqualmie	204	34.2	+169.8
WRIA 7 Total	**1,373.4**	**797.4**	**+576**

Notes:

[1] Totals may differ due to rounding.

[2] Surplus water offset is designated by a positive value. A deficit in water offset is designated by a negative value.

In addition to the water offset projects discussed in section 7.2, a total of 27 habitat improvement projects are included in this plan, as summarized in Chapter Five and Table 5.2.

Habitat improvement actions associated with these projects include a combination of land acquisition, creek relocation, wetland enhancement, floodplain restoration, floodplain reconnection, aquatic habitat restoration, riparian vegetation plantings, levee and/or bank armoring removal, levee setback, large woody debris (LWD) installation, beaver management, beaver colonization, small-scale water storage, side channel reconnection/expansion, inlet dike modification, and stormwater management. Many of the habitat improvement projects include more than one of these elements.

As noted in Chapter Five, habitat projects may also result in an increase in streamflow; however, the water offset benefits for these projects is difficult to quantify with a high degree of certainty. The WRIA 7 Committee was also concerned that the timing and reliability of water offset benefits associated with habitat projects would not be comparable to other water offset project types. For these reasons, habitat projects were excluded from project water offset accounting.

7.3 Project Portfolio Benefits

The WRIA 7 Committee considers consumptive water use impacts from new PE wells to be one of several potential impacts to surface water resulting from rural development associated with new PE wells. Other potential impacts include increased impervious surfaces that can result in surface water runoff and water quality impacts. While the primary purpose of this plan is not aimed at addressing these other impacts, the project portfolio provides ecological benefits that partially offset them.

The Committee developed a portfolio of water offset and habitat projects with benefits distributed across the WRIA. Table 7.3 summarizes anticipated benefits from the project portfolio. See Figure 7.1 for a map of WRIA 7 offset projects by subbasin (Table 7.4 accompanies Figure 7.1). Spatial distribution of projects and the streams that benefit from them are summarized as follows:

- One project (7-T-W1) within the Tulalip subbasin, benefitting West Fork Tulalip Creek. This project also adds more flexibility in outlet control, which would benefit the downstream Bernie Kai-Kai Gobin Hatchery by allowing greater control of releases from the lake to align with hatchery needs.
- Four projects (7-QA-W2 and 7-QA-H1 through 7-QA-H3) within the Quilceda-Allen subbasin, benefitting Coho, Quilceda and/or Allen Creeks.
- Two projects (7-ES-H4 and 7-ES-H5) within the Estuary/Snohomish Mainstem subbasin, benefitting the Snohomish River.
- One project (7-LP-W3) within the Little Pilchuck subbasin, benefitting Catherine Creek.
- Five projects (7-P-W4 through 7-P-W6, 7-P-H6, and 7-P-H7) within the Pilchuck subbasin, benefitting Flowing Lake, Panther Lake, Dubuque Creek, and the Pilchuck River.

- Three projects (7-P-H8 through 7-P-H10) within the Pilchuck, Woods, Estuary/Snohomish Mainstem, and/or Little Pilchuck subbasins, benefitting various streams with the subbasins.
- One project (7-W-H11) within the Woods Subbasin, benefitting Woods Creek.
- One project (7-S-H12) within the Sultan Subbasin, benefitting the Sultan River.
- Four projects (7-SM-H13 through 7-SM-H16) within the Skykomish Mainstem subbasin, benefitting the Skykomish River and Riley Slough.
- One project (7-USK-H17) within the Upper Skykomish subbasin, benefitting the lower Miller River and South Fork Skykomish River.
- One project (7-USK-H18) within the Lower Mid-Skykomish, Upper Skykomish, Raging, and Upper Snoqualmie subbasins, benefitting various streams within the subbasins.
- One project (7-CH-H19) within the Cherry-Harris subbasin, benefitting Cherry Creek.
- Two projects (7-SN-H20 and 7-SN-H21) within the Snoqualmie North subbasin, benefitting the Snoqualmie River and Tolt River.
- Two projects (7-SS-W7 and 7-SS-H23) within the Snoqualmie South subbasin, benefitting the lower Raging River and/or the Snoqualmie River. An additional project (7-SS-H22) is a feasibility project with no direct benefits.
- Three projects (7-PA-W8, 7-PA-W9, and 7-PA-H24) within the Patterson subbasin, benefitting Patterson Creek.
- Two projects (7-RR-H25 and 7-RR-H26) within the Raging subbasin, benefitting the Raging River.
- One project (7-USN-H27) within the Upper Snoqualmie subbasin, benefitting the South Fork Snoqualmie River.
- One project (7-USQ-W10) within the Upper Snoqualmie, Snoqualmie South, or Snoqualmie North subbasin, benefitting one or more streams within the subbasins depending on project location.
- One project (7-USQ-W11) within the Upper Snoqualmie, Snoqualmie South, Snoqualmie North, or Cherry/Harris subbasins, benefitting one or more streams within the subbasins depending on project location.
- Four habitat projects will be implemented in multiple subbasins. These include:
    - Living with Beavers Program: Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck
    - Small Farm Storage Initiative: Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck
    - Wetland Restoration: Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck

- Tulalip Tribes Beaver Reintroduction Program: Lower Mid-Skykomish, Upper Skykomish, Raging, Upper Snoqualmie

For the project types planned in WRIA 7, benefits could include the following:

- **Lake Stevens and Lake Shoecraft outlet modification/lake level management projects**: Aquatic habitat improvements during key seasonal periods; flexibility in reservoir outlet control; flood control benefits; and/or improved coordination with downstream hatchery streamflow needs.
- **Coho Creek Relocation and Streamflow Enhancement Project**: Aquatic habitat improvements during key seasonal periods; stream habitat restoration; improved fish access; improved spawning and rearing habitat; and increased streamflow from reclaimed water provided for streamflow augmentation.
- **Water right acquisitions and Lochaven Source Switch Project**: Aquatic habitat improvements during key seasonal periods; reduction in groundwater withdrawals and associated benefit to aquifer resources; and/or increased groundwater availability to riparian and near-shore plants.
- **MAR project(s)**: Aquatic habitat improvements during key seasonal periods; increased groundwater recharge; reduction in summer/fall stream temperature; increased groundwater availability to riparian and near-shore plants; and/or flood control benefits.
- **Snoqualmie River Watershed Surface Water Storage Project(s)**: Aquatic habitat improvements during key seasonal periods and flood control benefits.
- **Habitat improvement projects**: Increased aquatic habitat diversity, restored native vegetation, improved sediment processes, improved spawning and rearing habitat, and water quality and water temperature benefits, among others.

Some of the habitat improvement project described herein, including floodplain reconnection projects, can increase groundwater storage within the shallow aquifer system and provide hydrologic benefits not only at the project location but also downstream of the project area. Future monitoring and detailed study of these projects will help the WRIA 7 Committee better understand the streamflow benefits associated with these projects.

Table 7.3: Summary of WRIA 7 Offset Projects and Anticipated Benefits

Project Number	**Project Name**	**Project Short Description**	**River Reach Benefitted**	**Water Offset (AFY)[1]**	**Other Benefits with Quantifiable Metric** (e.g. structures per mile)	**Limiting Factor(s) Addressed**
7-T-W1	Lake Shoecraft Outlet Modification Project	Replacement of the existing stop log control structure with an adjustable slide-gate weir to allow more consistent streamflow releases during summer	West Fork Tulalip Creek	62.5	-Increased summer low flows (62.5 AFY)	
Tulalip Subbasin Water Offset Total:				62.5		
7-QA-W2	Coho Creek Relocation and Streamflow Enhancement Project	Restoration of up to 1,300 feet of Coho Creek. Augment streamflows in Coho Creek by 0.5 cfs year-round.	Coho Creek	362	-Streamflow augmentation (362 AFY) -33% increase in spawning numbers of Coho and chum within six years (% increase in population)	-Floodplain modifications -Channel conditions -Substrate conditions -Water quality -Water quantity -Rearing habitat
7-QA-H1	Jones Creek Relocation and Wetland Enhancement	Channel creation, installation of LWD and riparian reforestation, and wetland depression restoration	Jones Creek near the mouth of Snohomish River	-	-Increase in channel complexity (mapping) -Area of restored riparian buffer (3.6 acres) -Length of restored meandering channel (780 lineal feet) -Number of wetland surface infiltration ponds (4 ponds) -Number of off-channel rearing infiltration ponds (5 ponds) -LWD installation (65 structures)	-Fish habitat access -Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
7QA-H2	Marysville Stormwater Retrofits (Quilceda	Green stormwater infrastructure, retrofits of stormwater ponds, rainfall capture, & outreach and education.	Quilceda and Allen Creeks	-	-Number of stormwater pond retrofits (4 ponds) -Depave area (acres TBD) -Increased infiltration (AFY TBD) -Increase in recharge/ groundwater levels	-Water quality -Water quantity

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
	Stormwater Project)				(monitoring) -Streamflow maintenance (monitoring)	
7-QA-H3	Quilceda 8 Restoration & Potential Water Right Acquisition	Property and potential water right acquisition	Allen Creek on eastern border of the City of Marysville	-	-Property acquired (acres TBD) -Retirement of water right (16.8 AFY) -Area of restored riparian buffer (acres TBD)	-Floodplain modifications -Riparian conditions -Water quality -Water quantity
Quilceda-Allen Subbasin Water Offset Total				362		
7-ES-H4	Silver Firs Stormwater Pond Retrofit Ponds (Little Bear Stormwater)	Expand existing stormwater ponds by deepening and increasing pond infiltration capacity.	Snohomish River		-Number of stormwater pond retrofits (2 ponds) -Increased stormwater pond storage (3.09 AF) -Increased infiltration (27 AFY) -Increase in recharge/ groundwater levels (monitoring) -Streamflow maintenance (monitoring)	-Water quality -Water quantity
7-ES-H5	Thomas' Eddy Hydraulic Reconnection	Levee and revetment removal, floodplain restoration and riparian planting	Snohomish River at Bob Heirman Wildlife Park	-	-Levee/revetment removal length (1,400 lineal feet) -Floodplain reconnection (200 acres) -Increase in off-channel fish habitat access (1.5 miles) -Riparian planting (30 acres) -LWD, flood fence and beaver dam analog installation (number of structures TBD)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Estuary/Snohomish Subbasin Water Offset Total				0		
7-LP-W3	Lake Stevens Outlet Structure & Lake Level Management Project	Replacement of an outdated weir structure in the Lake Stevens outlet channel that manages the elevation in Lake Stevens	Catherine Creek	500	-Extension of design life of outlet control structure (years) -Increased lake storage (500 AFY)	-Water quantity -Lakes

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
		to maximize flood storage availability in the winter and maintain summer flows in the channel				
Little Pilchuck Subbasin Water Offset Total				500		
7-P-W4	Lochaven Source Switch	Retirement of the water right associated with the Lochaven Water System as a basis for increasing flows within the Pilchuck River and downstream areas	Pilchuck River near River Mile 15	12.7	-Reduction in Lochaven groundwater withdrawal (annual average of 29 AFY)	-Water quantity
7-P-W5	Lower Pilchuck No. 1	Acquisition of one groundwater right previously used for domestic supply	Pilchuck River	2.8	-Reduction in groundwater withdrawal (up to 5.4 AFY)	-Water quantity
7-P-W6	Lower Pilchuck No. 11	Acquisition of one groundwater right previously used for golf course irrigation	Flowing Lake, Panther Creek , and Dubuque Creek	2.1	-Reduction in withdrawal from Flowing Lake (up to 2.6 AFY)	-Water quantity
7-P-H6	Snohomish Floodplain Acquisitions Phase 1 (Lund Acquisition)	Acquisition of up to 57 acres and 1.43 miles of riparian and floodplain property adjacent to the Pilchuck River.	Middle Pilchuck River	-	-Property acquired (57 acres) -Length of protected stream channel (1.43 miles)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-P-H7	Pilchuck River City of Pilchuck	Removal or “softening” of approximately 2,000	Middle Pilchuck River	-	-Bank armoring removal length (2,000 lineal feet)	-Floodplain modifications

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
	River Armoring Removal	linear feet of bank armoring within the Middle Pilchuck subbasin.			-Riparian enhancement length (2,000 lineal feet) -Removal of transmission main under Pilchuck River mainstem -Increased connectivity to onsite wetland and off-channel habitat (acres TBD) -LWD installation (number of structures TBD)	-Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Pilchuck Subbasin Water Offset Total				17.6		
7-P-H8	Living with Beavers Program	Landowner education on the importance of beaver ponds, assistance with large tree protection, providing wetland plants, protecting culverts from damming activities, and where appropriate, installing pond-leveler devices.	TBD	-	-Site visits for technical assistance (30 visits) -Beaver management devices installed (10 devices)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-P-H9	Small Farm Water Storage Pilot	Capture and storage of stormwater runoff in manufactured landscapes, wetlands, or other storage features	TBD	-	-Increased storage (AFY TBD) -Streamflow maintenance (monitoring)	-Water quantity -Floodplain modifications
7-P-H10	Wetland Restoration	Restoration of 18 acres of degraded wetland	TBD	-	-Wetland restoration (18 acres)	-Wetland modifications -Riparian conditions -Water quality -Water quantity

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
Multiple Subbasins (Pilchuck, Woods, Estuary/Snohomish Mainstem, Little Pilchuck) Water Offset Total				0		
7-W-H11	Woods Creek Riparian Restoration Partnership	Plant native trees and shrubs 45 acres of riparian forest along the mainstem of Woods Creek and correct between 3 and 5 fish passage barriers to improve juvenile and adult access to spawning and rearing habitat	Woods Creek	-	-Riparian restoration (45 acres)	-Floodplain modifications -Riparian conditions -Water quality -Water quantity -Rearing habitat
Woods Subbasin Water Offset Total				0		
7-S-H12	Expansion of Sultan River Side Channel Network (Sultan River Floodplain Activation)	Expansion of an existing side channel network to provide structural complexity and hydraulic diversity in the main channel.	Sultan River	-	-Increase in flow delivery to floodplain (5 to 8 cfs) -Expansion in active and side channel areas (50,000 square feet) -LWD installation (6 structures)	-Floodplain modifications -Channel conditions -Substrate conditions -Water quality -Water quantity -Rearing habitat
Sultan Subbasin Water Offset Total				0		
7-SM-H13	Haskel Slough Connectivity	Modifying the inlet dike to enhance juvenile salmon rearing and flood refuge in Haskel Slough	Skykomish River near City of Monroe	-	-Modification of Haskel Slough inlet dike (as-built diagram) -Improved surface flow connectivity (monitoring)	-Floodplain modifications -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-SM-H14	East Monroe Heritage Site Acquisition	Land acquisition along the main stem of the Skykomish River to preserve as an open	Skykomish River near City of Monroe	-	-Land acquisition (43 acres)	-Floodplain modifications -Riparian conditions -Water quality

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
		space and use the site for flood water storage and displacement.				-Rearing habitat
7-SM-H15	Shinglebolt Slough	Reconnect the eastern, filled upstream section of Shingle Bolt Slough. Remove riprap and berm along Skykomish River and create side channel habitat accessible during spring out-migration flows. Project will also install log wood jams and riparian vegetation.	Skykomish River at Shinglebolt Slough	-	-Excavation of remnant flood channel (12,500 cubic yards) -Removal of riprap and berm (600 to 900 lineal feet) -Increase in fish-accessible side channel (1,600 lineal feet) -Riparian restoration (20 acres) -LWD installation (16 structures)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-SM-H16	Snohomish Confluence Project + Left Bank Floodplain reconnection at RM 1.5	Planning and property acquisition request to restore and enhance floodplain connection, abandoned side channels and connections to Riley Slough just upstream of junction of Skykomish and Snoqualmie Rivers.	Riley Slough at and upstream of Skykomish/ Snoqualmie confluence	-	-Land acquisition (acres TBD) -Length of restored slough and side channel (5,000 lineal feet) -Reestablished connection between the Skykomish and Riley Slough (as -built diagram) -Riparian restoration (acres TBD) -Physical conditions of side channel and slough (monitoring)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Skykomish Mainstem Subbasin Water Offset Total				0		
7-USK-H17	Miller River Alluvial Fan Restoration	Riprap removal, floodplain reconnection, side channel reactivation.	Lower Miller River and South Fork Skykomish River	-	-Riparian restoration (18.5 acres) -Floodplain reconnection (20 acres) -Reactivation of side channel (2,700 lineal feet) -Improved aquatic habitat complexity in main channel complex (250 lineal feet) -Riprap removal (lineal feet TBD)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
Upper Skykomish Subbasin Water Offset Total				0		
7-USK-H18	Tulalip Tribes Beaver Reintroduction Program	Protection of hydrologic processes and function in the Snohomish Watershed through the relocation of beavers from areas of human conflict to headwater tributaries for the improvement of fish rearing habitat and freshwater storage.	TBD	-	-Beaver relocation (number of animals TBD)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Multiple (Lower Mid-Skykomish, Upper Skykomish, Raging, Upper Snoqualmie) Subbasins Water Offset Total				0		
7-CH-H19	Cherry Creek Climate Resilient Watershed	Suite of actions in Cherry Valley including removal of bank armoring, riparian restoration, levee improvements and levee setbacks, culvert replacements, LWD placement, side channel excavation, and small-scale storage sites.	Cherry Creek	-	-Floodplain restoration/protection (1,100 acres) -Floodplain reconnection (8 acres) -Stream restoration (lineal feet TBD) -Bank armoring removal (lineal feet TBD) -LWD installation (5 structures) -Riparian restoration (acres TBD) -Levee rebuilding (2,000 lineal feet) -Levee setback (lineal feet TBD) -Culvert replacement (2 culverts) -Water stored (37 AFY)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Cherry-Harris Subbasin Water Offset Total				0		

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
7-SN-H20	Camp Gilead Levee Removal Phase 2	Levee removal on the left bank of the Snoqualmie River to reconnect floodplain habitat.	Snoqualmie River at Camp Gilead	-	-Levee/revetment removal (1,675 lineal feet) -Floodplain reconnection (acres TBD) -Riparian restoration (acres TBD)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-SN-H21	McElhoe-Pearson Restoration Project	Removal of the McElhoe Pearson levee or creation of a flow through channel to improve habitat connectivity.	Snoqualmie River	-	-Floodplain restoration (acres TBD) -Riparian restoration (lineal feet TBD)	-Floodplain modifications -Riparian conditions -Water quality -Water quantity -Rearing habitat
Snoqualmie North Water Offset Total				0		
7-SS-H22	Lower Tolt LB Floodplain Reconnection (SR 203 to Confluence)	Feasibility study to determine options for fully or partially removing existing levee/revetment to improve floodplain connection.	Lower Tolt River	-	-N/A – project is a feasibility study	-Floodplain modifications -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-SS-H23	Fall City Floodplain Reconnection Design and Construction – Left Bank and Right Bank	Project includes 2 adjacent floodplain reconnection projects: Barfuse Project and Hafner Project.	Lower Snoqualmie River, River Mile 34.5	-	-Levee removal/setback (2,000 lineal feet) -Floodplain restoration (45 acres) -River edge restoration (2,600 lineal feet) -Floodplain reconnection (145 acres)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Snoqualmie South Water Offset Total				0		

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
7-SS-W7	Raging River No. 1	Acquisition of two water rights used for irrigation, domestic supply, commercial-campground, and stock watering	Raging River and Snoqualmie River Confluence	126	-Reduction in groundwater withdrawal (up to 120 AFY)	-Water quantity
Snoqualmie South Subbasin Total				126		
7-PA-W8	Patterson No. 1	Acquisition of two groundwater rights previously used to support fish propagation, domestic supply, stock watering, and irrigation	Patterson Creek	29.7	-Reduction in groundwater withdrawal (up to 174 AFY)	-Water quantity
7-PA-W9	Patterson No. 4	Acquisition of three groundwater rights previously used to support a farm and, subsequently, a golf course	Patterson Creek	71.6	-Reduction in groundwater withdrawal (up to 155.8 AFY)	-Water quantity
7-PA-H24	Patterson Creek Floodplain Restoration (Sub-Watershed 2C) + Patterson Creek Floodplain Acquisitions	Property acquisition to perform floodplain restoration through riparian restoration and channel complexity.	Patterson Creek, River Mile 7	-	-Floodplain restoration (30 acres) -Land acquisition (18 acres) -Riparian restoration (24 acres)	-Floodplain modifications -Riparian conditions -Water quality -Water quantity -Rearing habitat
Patterson Subbasin Water Offset Total				101.3		
7-RR-H-25	Raging River Left Bank Mouth Levee Removal (Bernard Memorial Park)	Levee removal at Bernard Memorial Park and reconnect 6 acres of floodplain habitat.	Raging River at Bernard Memorial Park	-	-Levee removal (lineal feet TBD) -Floodplain restoration (acres TBD) -Riparian restoration (acres TBD)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
						-Water quality -Water quantity -Rearing habitat
7-RR-H-26	Raging River Bridge to Bridge Acquisitions + Raging River Bridge to Bridge Floodplain Restoration	Property acquisitions for future floodplain restoration projects. Proposed restoration actions include removal and setback of levee along right bank of Raging River.	Raging River, River Mile 2	-	-Levee removal/setback (4,000 lineal feet) -Floodplain reconnection (35 acres) -Riparian restoration (acres TBD)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
Raging River Subbasin Water Offset Total				0		
7-USN-H27	South Fork Snoqualmie River Levee Setback Project (Nintendo Project)	Levee setback and creation of floodplain and riparian habitat.	South Fork Snoqualmie River	-	-Levee removal/setback (2,500 lineal feet) -Floodplain reconnection (25 acres) -Riparian restoration (12 acres)	-Floodplain modifications -Channel conditions -Substrate conditions -Riparian conditions -Water quality -Water quantity -Rearing habitat
7-USQ-W10	MAR in Snoqualmie Watershed; Potential Sites: North Bend, Three Forks, NF 5700	Diversion of streamflow from the Snoqualmie River or tributary for infiltration at a constructed MAR facility	TBD	100	-Increased groundwater recharge (AFY TBD) -Increase in groundwater levels (monitoring) -Streamflow maintenance (monitoring)	-Water quality -Water quantity
7- USQ-W11	Snoqualmie River Watershed Surface Water Storage	Diversion of streamflow from the Snoqualmie River or tributary for detention at a surface water storage reservoir	TBD	104 - 3,311 [2]	-Water volume stored (AF TBD) -Increased groundwater recharge (AFY TBD)	-Water quantity

Project Number	Project Name	Project Short Description	River Reach Benefitted	Water Offset (AFY)[1]	Other Benefits with Quantifiable Metric (e.g. structures per mile)	Limiting Factor(s) Addressed
		for later release to the subject stream				
Upper Snoqualmie Subbasin Water Offset Total				204		

Notes:

[1]Totals may differ due to rounding.

[2] A range of 104 to 3,311 AFY is provided for this project in Chapter Five. The low end of the range (104 AFY) was used to develop the total estimated offset benefit.

7.4 Adaptive Management to Reduce Uncertainty

The WRIA 7 Committee identified a number of challenges related to plan implementation, described in Chapter Six. These challenges include the impact of climate change, uncertainty in consumptive use estimates, uncertainty in offsets associated with specific project types, project implementation challenges, narrowness in the scope of this watershed plan, and other factors. The Committee has included implementation recommendations in the plan to address uncertainty in plan implementation.

Implementation recommendations include increased legislative funding for plan implementation and funding for adaptive management, biennial reports from Ecology, a process for reconvening the Committee, funding tracking, provisions to allow Ecology to adjust the projects and actions in the plan after adoption, PE well tracking, continued monitoring of streamflow and groundwater levels, continued studies of WRIA 7 hydrology, and project effectiveness monitoring. These measures, in addition to the project portfolio and associated benefits described in Table 7.3, increase the resiliency of the plan and provide reasonable assurance that the plan can adequately offset new consumptive use from PE wells anticipated during the planning horizon.

7.5 NEB Evaluation Findings

The WRIA 7 watershed plan is intended to provide a path forward for offsetting an estimated 797.4 acre-feet per year (AFY) of new consumptive water use in WRIA 7. The plan primarily achieves this offset through a total of 11 water offset projects with a cumulative offset projection of 1,373.4 AFY. This projected total water offset is more than 150 percent of the projected consumptive use of 797.4 AFY and exceeds the consumptive use estimate by 576 AFY.

Within this plan, 11 water offset projects and 27 habitat improvement projects provide numerous benefits to aquatic and riparian habitat. While many of these habitat improvement projects have potential streamflow benefits, the WRIA 7 Committee chose to exclude any associated water offset from the plan's accounting as related to those habitat projects.

As noted above, the WRIA 7 Committee has recommended adaptive management measures to provide reasonable assurance that the plan will adequately address new consumptive use impacts anticipated during the planning horizon, despite inevitable challenges that will arise during project feasibility study, implementation, operation, and maintenance.

The WRIA 7 Committee considered the water offset projects and habitat projects portfolio as presented in this plan as a whole to evaluate whether the plan, when implemented as envisioned, provides a net ecological benefit to the WRIA. As discussed in Chapters 4 through 7 of this plan, the WRIA 7 Committee identified uncertainties throughout the planning process. Among these are uncertainties associated with estimating the number of new PE wells and associated consumptive use, changing climate, changing development patterns, project implementation, and available funding and support for adaptive management.

The WRIA 7 Committee searched exhaustively to identify potential water offset projects. Due to the existing strain on water resources within WRIA 7 (discussed in Chapter Two), water offset projects were difficult to identify. The water offset projects identified by the Committee are distributed across seven subbasins. Two of the water offset projects identified (Lake Stevens Outlet Structure & Lake Level Management Project and Coho Creek Relocation and Streamflow Enhancement Project) provide a large portion of the total estimated water offset, and relatively low in the WRIA, which means that there are large portions of the watershed that will not directly benefit from the water offset produced by those projects. If water offset projects implemented are concentrated in any one area of WRIA 7 and other projects identified are not able to be implemented, the Committee hopes that similar water offset projects could be identified and implemented through adaptive management in areas without water offset projects.

The habitat projects identified by the Committee provide benefits to 15 of the 16 subbasins. While the Committee was not able to identify any habitat projects in the Tulalip subbasin, the Committee believes that the projects and their benefits are adequately distributed across the WRIA. If any of the habitat projects are not able to be implemented, the WRIA 7 Committee hopes that similar projects with equivalent benefits could be identified and implemented in WRIA 7 through adaptive management.

The WRIA 7 Committee considers the 11 water offset projects as vital to address consumptive use. The project portfolio, including the water offset and habitat projects, is important to achieving NEB. The Committee determined that a more finely calibrated screening mechanism for directing implementation of the project list was not appropriate at this stage in the planning process due to time constraints and level of project development. While several projects have feasibility studies completed or underway, others have not. The Committee recognizes that projects may be ranked differently in the future once they have been further developed and did not want to presuppose ranking for more conceptual projects.

As project sponsors pursue project implementation, it is possible that some projects in this plan will not be constructed due to feasibility and design constraints or other factors. The Committee believes that the current project list is an ambitious project portfolio that, if adaptively managed, will compensate for the absence of tiering, prioritizing, or sequencing at this stage in the planning process.

All 38 of the projects in the Committee's project portfolio have project sponsors identified who are ready to proceed with feasibility (where not already completed), design, and implementation once funding is secured. As mentioned in Section 5.3.3, the types of water offset projects proposed in this plan have been successfully implemented within Washington State and the technology to implement these types of projects is established. The Committee believes that the ambitious project portfolio of 38 projects and the adaptive management plan described in Chapter Six provides reasonable assurance this plan's anticipated benefits will exceed consumptive use impacts over the planning horizon in the face of inherent uncertainties.

Through this planning process, the WRIA 7 Committee identified a suite of projects that provide water offset and ecological benefits to WRIA 7. Based on the information and analyses summarized in this plan and the assumption that this plan will be implemented, the WRIA 7 Committee finds that this plan can achieve a net ecological benefit in WRIA 7, as required by RCW 90.94.030 and defined by the Final NEB Guidance (Ecology 2019).

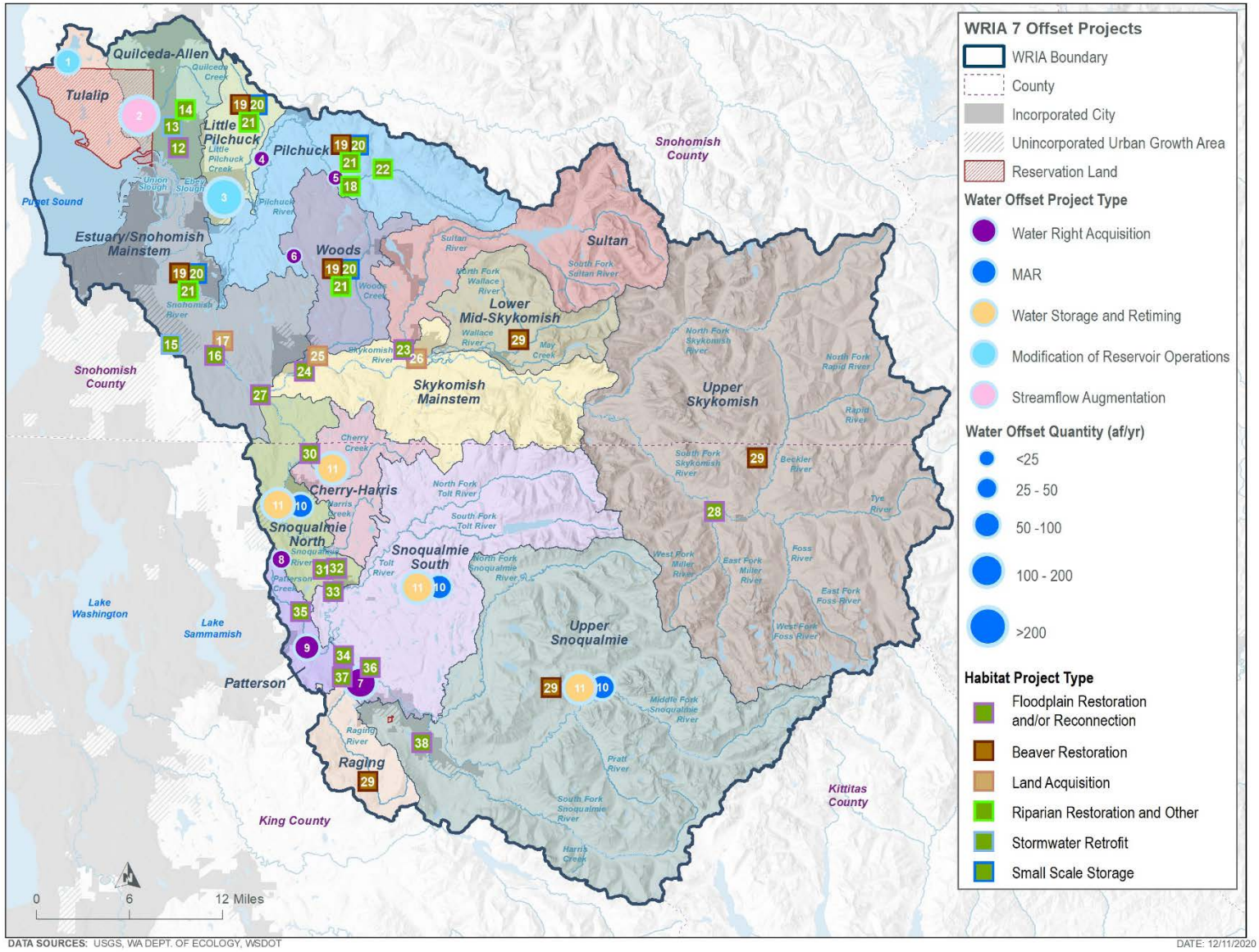


Figure 7.1: WRIA 7 Offset Projects

Table 7.4: Table to Accompany Figure 7.1: WRIA 7 Offset Projects

Map No.	Project No.	Project Name
1	7-T-W1	Lake Shoecraft Outlet Modification Project
2	7-QA-W2	Coho Creek Relocation and Streamflow Enhancement Project
3	7-LP-W3	Lake Stevens Outlet Structure & Lake Level Management Project
4	7-P-W4	Lochaven Source Switch
5	7-P-W5	Lower Pilchuck No. 1
6	7-P-W6	Lower Pilchuck No. 11
7	7-SS-W7	Raging River No. 1
8	7-PA-W8	Patterson No. 1
9	7-PA-W9	Patterson No. 4
10	7-USQ-W10	MAR in Snoqualmie Watershed
11	7-USQ-W11	Snoqualmie River Watershed Surface Water Storage
12	7-QA-H1	Jones Creek Relocation and Wetland Enhancement
13	7QA-H2	Marysville Stormwater Retrofits (Quilceda Stormwater Project)
14	7-QA-H3	Quilceda 8 Restoration & Potential Water Right Acquisition
15	7-ES-H4	Silver Firs Stormwater Pond Retrofit Ponds (Little Bear Stormwater)
16	7-ES-H5	Thomas' Eddy Hydraulic Reconnection
17	7-P-H6	Snohomish Floodplain Acquisitions Phase 1 (Lund Acquisition)
18	7-P-H7	Pilchuck River Armoring Removal
19	7-P-H8	Living with Beavers Program
20	7-P-H9	Small Farm Storage Initiative
21	7-P-H10	Wetland Restoration
22	7-W-H11	Woods Creek Riparian Restoration Partnership
23	7-S-H12	Expansion of Sultan River Side Channel Network (Sultan River Floodplain Activation)
24	7-SM-H13	Haskel Slough Connectivity

Map No.	Project No.	Project Name
25	7-SM-H14	East Monroe Heritage Site Acquisition
26	7-SM-H15	Shinglebolt Slough
27	7-SM-H16	Snohomish Confluence Project + Left Bank Floodplain reconnection at RM 1.5
28	7-USK-H17	Miller River Alluvial Fan Restoration
29	7-USK-H18	Tulalip Tribes Beaver Reintroduction Program
30	7-CH-H19	Cherry Creek Climate Resilient Watershed
31	7-SN-H20	Camp Gilead Levee Removal Phase 2
32	7-SN-H21	McElhoe-Pearson Restoration Project
33	7-SS-H22	Lower Tolt LB Floodplain Reconnection
34	7-SS-H23	Fall City Floodplain Reconnection Design and Construction -Left Bank and Right Bank
35	7-PA-H24	Patterson Creek Floodplain Restoration (Sub-Watershed 2C) + Patterson Creek Floodplain Acquisitions
36	7-RR-H-25	Raging River Left Bank Mouth Levee Removal (Bernard Memorial Park)
37	7-RR-H-26	Raging River Bridge to Bridge Acquisitions + Raging River Bridge to Bridge Floodplain Restoration
38	7-USN-H27	South Fork Snoqualmie River Levee Setback Project (Nintendo Project)

End of plan body

Appendices

WRIA 7 Snohomish

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January 2021

Appendix A – References

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Appendix B – Glossary

Acre-feet (AF): A unit of volume equal to the volume of a sheet of water one acre in area and one foot in depth. (USGS)

Adaptive Management: An iterative and systematic decision-making process that aims to reduce uncertainty over time and help meet project, action, and plan performance goals by learning from the implementation and outcomes of projects and actions. (NEB)

Annual Average Withdrawal: RCW 90.94.030 (4)(a)(vi)(B) refers to the amount of water allowed for withdrawal per connection as the annual average withdrawal. As an example, a homeowner could withdraw 4,000 gallons on a summer day, so long as they did not do so often enough that their annual average exceeds the 950 gpd.

Beaver Dam Analogue (BDA): BDAs are man-made structures designed to mimic the form and function of a natural beaver dam. They can be used to increase the probability of successful beaver translocation and function as a simple, cost-effective, non-intrusive approach to stream restoration. (From Anabranch Solutions)

Critical Flow Period: The time period of low streamflow (generally described in bi-monthly or monthly time steps) that has the greatest likelihood to negatively impact the survival and recovery of threatened or endangered salmonids or other fish species targeted by the planning group. The planning group should discuss with Ecology, local tribal and WDFW biologists to determine the critical flow period in those reaches under the planning group's evaluation. (NEB)

Cubic feet per second (CFS): A rate of the flow in streams and rivers. It is equal to a volume of water one foot high and one foot wide flowing a distance of one foot in one second (about the size of one archive file box or a basketball). (USGS)

Domestic Use: In the context of Chapter 90.94 RCW, "domestic use" and the withdrawal limits from permit-exempt domestic wells include both indoor and outdoor household uses, and watering of a lawn and noncommercial garden. (NEB)

ESSB 6091: In January 2018, the Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091 in response to the Hirst decision. In the Whatcom County vs. Hirst, Futurewise, et al. decision (often referred to as the "Hirst decision"), the court ruled that the county failed to comply with the Growth Management Act requirements to protect water resources. The ruling required the county to make an independent decision about legal water availability. ESSB 6091 addresses the court's decision by allowing landowners to obtain a building permit for a new home relying on a permit-exempt well. ESSB 6091 is codified as Chapter 90.94 RCW. (ECY)

Evolutionarily Significant Unit (ESU): A population of organisms that is considered distinct for purposes of conservation. For Puget Sound Chinook, the ESU includes naturally spawned Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound and the Strait of Georgia. Also, Chinook salmon from 26 artificial propagation programs. (NOAA)

Foster Pilots and Foster Task Force: To address the impacts of the 2015 Foster decision, Chapter 90.94 RCW established a Task Force on Water Resource Mitigation and authorized the Department of Ecology to issue permit decisions for up to five water mitigation pilot projects. These pilot projects will address issues such as the treatment of surface water and groundwater appropriations and include management strategies to monitor how these appropriations affect instream flows and fish habitats. The joint legislative Task Force will (1) review the treatment of surface water and groundwater appropriations as they relate to instream flows and fish habitat, (2) develop and recommend a mitigation sequencing process and scoring system to address such appropriations, and (3) review the Washington Supreme Court decision in Foster v. Department of Ecology. The Task Force is responsible for overseeing the five pilot projects. (ECY)

Four Year Work Plans: Four year plans are developed by salmon recovery lead entities in Puget Sound to describe each lead entity's accomplishments during the previous year, to identify the current status of recovery actions, any changes in recovery strategies, and to propose future actions anticipated over the next four years. Regional experts conduct technical and policy reviews of each watershed's four year work plan update to evaluate the consistency and appropriate sequencing of actions with the Puget Sound Salmon Recovery Plan. (Partnership)

Gallons per day (GPD): An expression of the average rate of domestic and commercial water use. 1 million gallons per day is equivalent to 1.547 cubic feet per second.

Group A public water systems: Group A water systems have 15 or more service connections or serve 25 or more people per day. Chapter 246-290 WAC (Group A Public Water Supplies), outlines the purpose, applicability, enforcement, and other policies related to Group A water systems. (WAC)

Group B public water systems: Group B public water systems serve fewer than 15 connections **and** fewer than 25 people per day. Chapter 246-291 WAC (Group B Public Water Systems), outlines the purpose, applicability, enforcement, and other policies related to Group B water systems.(WAC)

Growth Management Act (GMA): Passed by the Washington Legislature and enacted in 1990, this act guides planning for growth and development in Washington State. The act requires local governments in fast growing and densely populated counties to develop, adopt, and periodically update comprehensive plans.

Home: A general term referring to any house, household, or other Equivalent Residential Unit. (Policy and Interpretive Statement)

Hydrologic Unit Code (HUC): Hydrologic unit codes refer to the USGS's division and sub-division of the watersheds into successively smaller hydrologic units. The units are classified into four levels: regions, sub-regions, accounting units, and cataloging units, and are arranged within each other from the largest geographic area to the smallest. Each unit is classified by a unit code (HUC) composed of two to eight digits based on the four levels of the classification in the hydrologic unit system (two digit units are largest and eight digits are smallest). (USGS)

Impact: For the purpose of streamflow restoration planning, impact is the same as new consumptive water use (see definition below). As provided in Ecology WR POL 2094 "Though the statute requires the offset of 'consumptive impacts to instream flows associated with permit-exempt domestic water use' (RCW 90.94.020(4)(b)) and 90.94.030(3)(b)), watershed plans should address the consumptive use of new permit-exempt domestic well withdrawals. Ecology recommends consumptive use as a surrogate for consumptive impact to eliminate the need for detailed hydrogeologic modeling, which is costly and unlikely feasible to complete within the limited planning timeframes provided in chapter 90.94 RCW. " (NEB)

Instream Flows and Instream Flow Rule (IFR): Instream flows are a specific flow level measured at a specific location in a given stream. Seasonal changes cause natural stream flows to vary throughout the year, so instream flows usually vary from month to month rather that one flow rate year-round. State law requires that enough water in streams to protect and preserve instream resources and uses. The Department of Ecology sets flow levels in administrative rules. Once instream flow levels are established in a rule, they serve as a water right for the stream and the resources that depend on it. Instream flow rules do not affect pre-existing, or senior, water rights; rather, they protect the river from future withdrawals. Once an instream flow rule is established, the Department of Ecology may not issue water rights that would impair the instream flow level. (ECY)

Instream Resources Protection Program (IRPP): The IRPP was initiated by the Department of Ecology in September 1978 with the purpose of developing and adopting instream resource protection measures for Water Resource Inventory Areas (WRIAs) (see definition below) in Western Washington as authorized in the Water Resources Act of 1971 (RCW 90.54), and in accordance with the Water Resources Management Program (WAC 175-500).

Instream Resources: Fish and related aquatic resources. (NEB)

Large woody debris (LWD): LWD refers to the fallen trees, logs and stumps, root wads, and piles of branches along the edges of streams, rivers, lakes and Puget Sound. Wood helps stabilize shorelines and provides vital habitat for salmon and other aquatic life. Preserving the debris along shorelines is important for keeping aquatic ecosystems healthy and improving the survival of native salmon. (King County)

Lead Entities (LE): Lead Entities are local, citizen-based organizations in Puget Sound that coordinate salmon recovery strategies in their local watershed. Lead entities work with local and state agencies, tribes, citizens, and other community groups to adaptively manage their local salmon recovery chapters and ensure recovery actions are implemented. (Partnership)

Listed Species: Before a species can receive the protection provided by the Endangered Species Act (ESA), it must first be added to the federal lists of endangered and threatened wildlife and plants. The List of Endangered and Threatened Wildlife (50 CFR 17.11) and the List of Endangered and Threatened Plants (50 CFR 17.12) contain the names of all species that have been determined by the U.S. Fish and Wildlife Service (Service) or the National Marine Fisheries Service (for most marine life) to be in the greatest need of federal protection. A species is added to the list when it is determined to be endangered or threatened because of any of the following factors: the present or threatened destruction, modification, or curtailment of its

habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; or other natural or manmade factors affecting its survival. (USFWS)

Local Integrating Organizations (LIO): Local Integrating Organizations are local forums in Puget Sound that collaboratively work to develop, coordinate, and implement strategies and actions that contribute to the protection and recovery of the local ecosystem. Funded and supported by the Puget Sound Partnership, the LIOs are recognized as the local expert bodies for ecosystem recovery in nine unique ecosystems across Puget Sound. (Partnership)

Low Impact Development (LID): Low Impact Development (LID) is a stormwater and land-use management strategy that tries to mimic natural hydrologic conditions by emphasizing techniques including conservation, use of on-site natural features, site planning, and distributed stormwater best management practices (BMPs) integrated into a project design. (ECY)

Managed Aquifer Recharge (MAR): Managed aquifer recharge projects involve the addition of water to an aquifer through infiltration basins, injection wells, or other methods. The stored water can then be used to benefit stream flows, especially during critical flow periods. (NEB)

National Pollutant Discharge Elimination System (NPDES): The NPDES permit program addresses water pollution by regulating point sources that discharge pollutants to waters of the United States. Created by the Clean Water Act in 1972, the EPA authorizes state governments to perform many permitting, administrative, and enforcement aspects of the program. (EPA)

Net Ecological Benefit (NEB): Net Ecological Benefit is a term used in ESSB 6091 as a standard that watershed plans (see below for definition) must meet. The outcome that is anticipated to occur through implementation of projects and actions in a plan to yield offsets that exceed impacts within: a) the planning horizon; and, b) the relevant WRIA boundary. See *Final Guidance for Determining Net Ecological Benefit - Guid-2094 Water Resources Program Guidance.* (NEB)

Net Ecological Benefit Determination: Occurs solely upon Ecology's conclusion after its review of a watershed plan submitted to Ecology by appropriate procedures, that the plan does or does not achieves a NEB as defined in the Net Ecological Benefit guidance. The Director of Ecology will issue the results of that review and the NEB determination in the form of an order. (NEB)

Net Ecological Benefit Evaluation: A planning group's demonstration, using NEB Guidance and as reflected in their watershed plan, that their plan has or has not achieved a NEB. (NEB)

New Consumptive Water Use: The consumptive water use from the permit-exempt domestic groundwater withdrawals estimated to be initiated within the planning horizon. For the purpose of RCW 90.94, consumptive water use is considered water that is evaporated, transpired, consumed by humans, or otherwise removed from an immediate water environment due to the use of new permit-exempt domestic wells. (NEB)

Office of Financial Management (OFM): OFM is a Washington state agency that develops official state and local population estimates and projections for use in local growth management planning. (OFM)

Offset: The anticipated ability of a project or action to counterbalance some amount of the new consumptive water use over the planning horizon. Offsets need to continue beyond the planning horizon for as long as new well pumping continues. (NEB)

Permit exempt wells: The Groundwater Code (RCW 90.44), identified four "small withdrawals" of groundwater as exempt from the permitting process. Permit-exempt groundwater wells often provide water where a community supply is not available, serving single homes, small developments, irrigation of small lawns and gardens, industry, and stock watering.

Permit-exempt uses: Groundwater permit exemptions allow four small uses of groundwater without a water right permit: domestic uses of less than 5,000 gallons per day, industrial uses of less than 5,000 gallons per day, irrigation of a lawn or non-commercial garden, a half-acre or less in size, or stock water. Although exempt groundwater withdrawals don't require a water right permit, they are always subject to state water law. (ECY)

Planning groups: A general term that refers to either initiating governments, in consultation with the planning unit, preparing a watershed plan update required by Chapter 90.94.020 RCW, or a watershed restoration and enhancement committee preparing a plan required by Chapter 90.94.030 RCW. (NEB)

Planning Horizon: The 20-year period beginning on January 19, 2018 and ending on January 18, 2038, over which new consumptive water use by permit-exempt domestic withdrawals within a WRIA must be addressed, based on the requirements set forth in Chapter 90.94 RCW. (NEB)

Projects and Actions: General terms describing any activities in watershed plans to offset impacts from new consumptive water use and/or contribute to NEB. (NEB)

Puget Sound Acquisition and Restoration (PSAR) fund: This fund supports projects that recover salmon and protect and recover salmon habitat in Puget Sound. The state legislature appropriates money for PSAR every 2 years in the Capital Budget. PSAR is co-managed by the Puget Sound Partnership and the Recreation and Conservation Office, and local entities identify and propose PSAR projects. (Partnership)

Puget Sound Partnership (Partnership): The Puget Sound Partnership is the state agency leading the region's collective effort to restore and protect Puget Sound and its watersheds. The organization brings together hundreds of partners to mobilize partner action around a common agenda, advance Sound investments, and advance priority actions by supporting partners. (Partnership)

Puget Sound Regional Council (PSRC): PSRC develops policies and coordinates decisions about regional growth, transportation and economic development planning within King, Pierce, Snohomish and Kitsap counties. (PSRC)

RCW 90.03 **(Water Code)**: This chapter outlines the role of the Department of Ecology in regulating and controlling the waters within the state. The code describes policies surrounding surface water and groundwater uses, the process of determining water rights, compliance measures and civil penalties, and various legal procedures.

RCW 90.44 **(Groundwater Regulations)**: RCW 90.44 details regulations and policies concerning groundwater use in Washington state, and declares that public groundwaters belong to the

public and are subject to appropriation for beneficial use under the terms of the chapter. The rights to appropriate surface waters of the state are not affected by the provisions of this chapter.

RCW 90.44.050**(Groundwater permit exemption)**: This code states that any withdrawal of public groundwaters after June 6, 1945 must have an associated water right from the Department of Ecology. However, any withdrawal of public groundwaters for stock-watering purposes, or for the watering of a lawn or of a noncommercial garden not exceeding one-half acre in area, or for single or group domestic uses in an amount not exceeding five thousand gallons a day, or for an industrial purpose in an amount not exceeding five thousand gallons a day, is exempt from the provisions of this section and does not need a water right.

RCW 90.82 **(Watershed Planning)**: Watershed Planning was passed in 1997 with the purpose of developing a more thorough and cooperative method of determining what the current water resource situation is in each water resource inventory area of the state and to provide local citizens with the maximum possible input concerning their goals and objectives for water resource management and development.

90.54 RCW **(Water Resources Act of 1971):** This act set the stage for the series of rules that set instream flow levels as water rights, as well as a compliance effort to protect those flows.

RCW 90.94 **(Streamflow Restoration)**: This chapter of the Revised Code of Washington codifies ESSB 6091, including watershed planning efforts, streamflow restoration funding program and the joint legislative task force on water resource mitigation and mitigation pilot projects (Foster task force and pilot projects).

Reasonable Assurance: Explicit statement(s) in a watershed plan that the plan's content is realistic regarding the outcomes anticipated by the plan, and that the plan content is supported with scientifically rigorous documentation of the methods, assumptions, data, and implementation considerations used by the planning group. (NEB)

Revised Code of Washington (RCW**)**: The revised code is a compilation of all permanent laws now in force for the state of Washington. The RCWs are organized by subject area into Titles, Chapters, and Sections.

Salmon Recovery Funding Board (SRFB): Pronounced "surf board", this state and federal board provides grants to protect and restore salmon habitat. Administered by a 10-member State Board that includes five governor-appointed citizens and five natural resource agency directors, the board brings together the experiences and viewpoints of citizens and the major state natural resource agencies. For watersheds planning under Section 203, the Department of Ecology will submit final draft WRE Plans not adopted by the prescribed deadline to SRFB for a technical review (RCO and Policy and Interpretive Statement).

Section 202 or Section 020: Refers to Section 202 of ESSB 6091 or Section 020 of RCW 90.94 respectively. The code provides policies and requirements for new domestic groundwater withdrawals exempt from permitting with a potential impact on a closed water body and potential impairment to an instream flow. This section includes WRIAs 1, 11, 22, 23, 49, 59 and

55, are required to update watershed plans completed under RCW 90.82 and to limit new permit-exempt withdrawals to 3000 gpd annual average.

Section 203 or Section 030: Refers to Section 203 of ESSB 6091 or Section 030 of RCW 90.94 respectively. The section details the role of WRE committees and WRE plans (see definitions below) in ensuring the protection and enhancement of instream resources and watershed functions. This section includes WRIAs 7, 8, 9, 10, 12, 13, 14 and 15. New permit-exempt withdrawals are limited to 950 gpd annual average.

SEPA and SEPA Review: SEPA is the State Environmental Policy Act. SEPA identifies and analyzes environmental impacts associated with governmental decisions. These decisions may be related to issuing permits for private projects, constructing public facilitates, or adopting regulations, policies, and plans. SEPA review is a process which helps agency decision-makers, applications, and the public understand how the entire proposal will affect the environment. These reviews are necessary prior to Ecology adopting a plan or plan update and may be completed by Ecology or by a local government. (Ecology)

Subbasins: A geographic subarea within a WRIA, equivalent to the words "same basin or tributary" as used in RCW 90.94.020(4)(b) and RCW 90.94.030 (3)(b). In some instances, subbasins may not correspond with hydrologic or geologic basin delineations (e.g. watershed divides). (NEB)

Trust Water Right Program: The program allows the Department of Ecology to hold water rights for future uses without the risk of relinquishment. Water rights held in trust contribute to streamflows and groundwater recharge, while retaining their original priority date. Ecology uses the Trust Water Right Program to manage acquisitions and accept temporary donations. The program provides flexibility to enhance flows, bank or temporarily donate water rights. (ECY)

Urban Growth Area (UGA): UGAs are unincorporated areas outside of city limits where urban growth is encouraged. Each city that is located in a GMA fully-planning county includes an urban growth area where the city can grow into through annexation. An urban growth area may include more than a single city. An urban growth area may include territory that is located outside of a city in some cases. Urban growth areas are under county jurisdiction until they are annexed or incorporated as a city. Zoning in UGAs generally reflect the city zoning, and public utilities and roads are generally built to city standards with the expectation that when annexed, the UGA will transition seamlessly into the urban fabric. Areas outside of the UGA are generally considered rural. UGA boundaries are reviewed and sometimes adjusted during periodic comprehensive plan updates. UGAs are further defined in RCW 36.70.

WAC 173-566 **(Streamflow Restoration Funding Rule)**: On June 25, 2019 the Department of Ecology adopted this rule for funding projects under RCW 90.94. This rule establishes processes and criteria for prioritizing and approving grants consistent with legislative intent, thus making Ecology's funding decision and contracting more transparent, consistent, and defensible.

Washington Administrative Code (WAC): The WAC contains the current and permanent rules and regulations of state agencies. It is arranged by agency and new editions are published every two years. (Washington State Legislature)

Washington Department of Ecology (DOE/ECY): The Washington State Department of Ecology is an environmental regulatory agency for the State of Washington. The department administers laws and regulations pertaining to the areas of water quality, water rights and water resources, shoreline management, toxics clean-up, nuclear and hazardous waste, and air quality.

Washington Department of Fish and Wildlife (WDFW): An agency dedicated to preserving, protecting, and perpetuating the state's fish, wildlife, and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities. Headquartered in Olympia, the department maintains six regional offices and manages dozens of wildlife areas around the state, offering fishing, hunting, wildlife viewing, and other recreational opportunities for the residents of Washington. With the tribes, WDFW is a co-manager of the state salmon fishery. (WDFW)

Washington Department of Natural Resources (WADNR or DNR): The department manages over 3,000,000 acres of forest, range, agricultural, and commercial lands in the U.S. state of Washington. The DNR also manages 2,600,000 acres of aquatic areas which include shorelines, tidelands, lands under Puget Sound and the coast, and navigable lakes and rivers. Part of the DNR's management responsibility includes monitoring of mining cleanup, environmental restoration, providing scientific information about earthquakes, landslides, and ecologically sensitive areas. (WADNR)

Water Resources (WR): The Water Resources program at Department of Ecology supports sustainable water resources management to meet the present and future water needs of people and the natural environment, in partnership with Washington communities. (ECY)

Water Resources Advisory Committee (WRAC): Established in 1996, the Water Resources Advisory Committee is a forum for issues related to water resource management in Washington State. This stakeholder group is comprised of 40 people representing state agencies, local governments, water utilities, tribes, environmental groups, consultants, law firms, and other water stakeholders. (ECY)

Watershed Plan: A general term that refers to either: a watershed plan update prepared by a WRIA's initiating governments, in collaboration with the WRIA's planning unit, per RCW 90.94.020; or a watershed restoration and enhancement plan prepared by a watershed restoration and enhancement committee, per RCW 90.94.030. This term does not refer to RCW 90.82.020(6). (NEB)

Watershed Restoration and Enhancement Plan (WRE Plan): The Watershed Restoration and Enhancement Plan is directed by Section 203 of ESSB 6091 and requires that by June 30, 2021, the Department of Ecology will prepare and adopt a watershed restoration and enhancement plan for WRIAs 7, 8, 9, 10, 12, 13, 14 and 15, in collaboration with the watershed restoration and enhancement committee. The plan should, at a minimum, offset the consumptive impact of new permit-exempt domestic water use, but may also include recommendations for projects and actions that will measure, protect, and enhance instream resources that support the recovery of threatened and endangered salmonids. Prior to adoption of an updated plan, Department of Ecology must determine that the actions in the plan will result in a "net

ecological benefit" to instream resources in the WRIA. The planning group may recommend out-of-kind projects to help achieve this standard.

WRIA: Water Resource Inventory Area. WRIAs are also called basins or watersheds. There are 62 across the state and each are assigned a number and name. They were defined in 1979 for the purpose of monitoring water availability. A complete map is available here: https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up

Appendix C – Committee Roster

Entity Representing	Primary Representative	Alternates
Washington State Department of Ecology	Ingria Jones	Stacy Vynne McKinstry
Tulalip Tribes	Daryl Williams	Anne Savery
Snoqualmie Indian Tribe	Matt Baerwalde	Cindy Spiry
King County	Denise DiSanto	Janne Kaje
Snohomish County	Terri Strandberg	Ann Bylin
Snoqualmie Valley Watershed Improvement District	Cynthia Krass	Erin Ericson
Snohomish Public Utilities District	Brant Wood	Keith Binkley
Washington Department of Fish and Wildlife	Kirk Lakey	Lindsey Desmul
Washington Water Trust	Emily Dick	Will Stelle
Snohomish Conservation District	Bobbi Lindemulder	Kristin Marshall
Master Builders Association of King and Snohomish Counties	Dylan Sluder	Mike Pattison
City of Arlington	Mike Wolanek	Josh Grandlienard
City of Carnation	Sam Kollar	Bob Jean
City of Duvall	Michael Remington	Jennifer Knaplund
City of Everett	Jim Miller	Souheil Nasr
City of Gold Bar	Rich Norris	Denise Beaston
Town of Index	Kim Peterson	Norm Johnson
City of Lake Stevens	David Leviton	Jon Stevens
City of Marysville	Matthew Eyer	Karen Latimer
City of Monroe	Megan Darrow	Jordan Ottow
City of North Bend	Jaime Burrell	
City of Snohomish	Glen Pickus	Brooke Eidem
City of Snoqualmie	Steve Nelson	Andy Dunn
Snoqualmie Watershed Forum (ex officio)	Elissa Ostergaard	Cory Zyla
City of Seattle (ex officio)	Paul Faulds	Elizabeth Ablow
Snohomish Basin Salmon Recovery Forum (ex officio)	Morgan Ruff	Gretchen Glaub

Appendix D – Operating Principles

The approved and signed operating principles can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Appendix%20D-%20Approved%20and%20signed%20operating%20principles.pdf

Appendix E – Subbasin Delineation Memo

The subbasin delineation technical memo can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Appendix%20E-Subbasin%20Delineation%20Memo.pdf

Appendix F – Growth Projections Memo

The PE well projections technical memo can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Appendix%20F-PE%20Well%20Projections%20Memo.pdf

Appendix G – Consumptive Use Memo

The consumptive use technical memo can be found online:

https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Appendix%20G-Consumptive%20Use%20Estimates%20Memo.pdf

Appendix H – Projects

Project descriptions can be found online:
https://www.ezview.wa.gov/Portals/_1962/images/WREC/WRIA07/Final%20Plan/Appendix%20H-Project%20Descriptions.pdf