



Rule Supporting Document

Amendment to Chapter 173-501 WAC Instream Resources Protection Program- Nooksack Water Resource Inventory Area (WRIA) 1

Preliminary Draft for Public Comment

April 8 – May 10, 2019

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Chapter 1 – Introduction

In January 2018, Washington passed a new law (ESSB 6091) that provides Ecology and local governments with tools to protect and enhance stream flows while ensuring that water is available for homes in rural parts of the state. ESSB 6091 was a direct response to the 2016 *Hirst*¹ decision by the Washington Supreme Court. The law (now primarily codified in Chapter 90.94 RCW, Streamflow Restoration), clarifies how counties issue building permits for rural homes intending to use a groundwater permit-exempt well for their domestic water source. The law allows new permit-exempt domestic wells to have an impact on closed water bodies and water bodies with minimum instream flows. It also requires planning efforts in 15 Water Resource Inventory Areas (WRIAs) to project consumptive use by new domestic permit-exempt wells over the next 20 years, and identify projects and actions to offset those impacts in order to achieve a net ecological benefit (NEB) for the WRIA.

The new law established a February 1, 2019 deadline for Ecology to adopt a locally developed and approved watershed plan update for WRIA 1 (Nooksack). Although a Watershed Management Plan Update was not locally approved by the deadline, tremendous work was accomplished by the WRIA 1 planning process. Ecology is building on that work to carry out the rulemaking process now required under RCW 90.94.020.

On February 5, 2019, Ecology's Water Resources Program announced the start of rulemaking to amend *Chapter 173-501 WAC - Instream Resources Protection Program – Nooksack WRIA 1* to meet the requirements in RCW 90.94.020. Ecology is required by RCW 90.94.020 to adopt rules for WRIA 1 by August 1, 2020.

The limited rule amendment will update and add to water management regulations in WRIA 1 by considering the following: 1) changing current regulations to increase flexibility for projects that retime high flows; 2) adding regulations to establish limits for domestic permit-exempt groundwater withdrawals for new users; and 3) making minor technical corrections.

Ecology developed this rule supporting document to describe the technical elements required by RCW 90.94.020 not captured in the amended rule language, including findings and documentation to support the rulemaking. Consistent with the requirements of RCW 90.94.020, this rule supporting document includes:

- The estimated consumptive use of new domestic permit-exempt wells in the WRIA for the 20 year planning horizon (2018-2038);
- Projects and actions to offset potential impacts to instream flows associated with the new domestic permit-exempt domestic water use (2018-2038);
- Adaptive management plans; and
- An evaluation for Net Ecological Benefit.

This document also explains:

- How the proposed rule amendment language is integral to the consumptive water use analysis;

¹ *Whatcom Cty. v. Hirst*, 186 Wn.2d 648, 381 P.3d 1 (2016)

- How the proposed rule amendment language supports the offset projects listed in this document.

In developing this document, Ecology reviewed technical information, including water use scenarios, project lists, technical reports, and planning meeting notes from Streamflow Restoration-related planning meetings from January 2018 - January 2019 (this includes WRIA 1 Watershed Staff Team, Planning Unit, Watershed Management Team, and Watershed Management Board meetings).

1.1 Preliminary Draft

This draft of the rule supporting document was prepared to solicit stakeholder review and to gather feedback on how Ecology proposes to meet the requirements of RCW 90.94.020 through a limited amendment to the WRIA 1 rule (WAC 173-501) and through this rule supporting document. Ecology intends to use the feedback to inform the development of the draft rule language (and rule supporting document) anticipated for release for review and formal public comment in late 2019.

Ecology is collecting feedback on the preliminary draft rule amendment and rule supporting document from April 8, 2019 through May 10, 2019 through our online eComment system and through the mail.

Online: Submit [online comments](http://ws.ecology.commentinput.com/?id=GFRjc): <http://ws.ecology.commentinput.com/?id=GFRjc>

Mail: Annie Sawabini
Department of Ecology
Water Resources Program
PO Box 47600
Olympia WA 98504-7600

The preliminary draft language and rule supporting document will be discussed at three upcoming public open houses:

Ferndale Library
2125 Main Street, Ferndale, WA 98248
1:00 – 3:00 pm
Monday, April 22, 2019

Lynden Library
216 4th Street, Lynden, WA 98264
6:00 – 8:00 pm
Monday, April 22, 2019

Ecology's Padilla Bay Reserve
10441 Bayview Edison Rd, Mt Vernon, WA 98273
9:30 – 11:30 am
Tuesday, April 23, 2019

Please note: the open houses will be an opportunity for *informal* conversations about the preliminary draft. Please plan to direct all formal comments to the above eComment system or mailing address.

1.2 Anticipated Timeline

<i>Date (subject to change)</i>	<i>Activity</i>
Feb. 5, 2019	Announce rulemaking (file the CR-101 form)
Feb. – Nov. 2019	Develop and prepare the rule language and other information
Feb. – April 2019	Meet with tribes and stakeholders, as appropriate
April 8, 2019	Publish preliminary draft rule language
April 22 – 23, 2019	Public open houses in Whatcom and Skagit Counties
April 8 – May 10, 2019	Gather informal feedback on preliminary draft rule language
Nov. 2019	Propose rule and provide public notice (file CR-102 form) Start public comment period with proposed rule text and supporting documents
Jan. 2020	Hold public hearing(s). End public comment period
Jan. – May 2020	Review public comments, revise rule if appropriate, and prepare adoption packet
May 2020	Adopt rule (file the CR-103 form)
June 2020	Effective date of Rule (usually 31 days after filing)
Aug. 1, 2020	Deadline to adopt rule under RCW 90.94.020

Chapter 2 – Basin and Subbasin Delineation

The WRIA 1 subbasins were delineated and agreed to by all watershed planning participants during the WRIA 1 Watershed Management Plan process (1998-2005, under Chapter 90.82 RCW). In 2010, the WRIA 1 Watershed Staff Team (WST) prepared the WRIA 1 [*State of the Watershed Report*](#)² for the Whatcom County community. The report was funded in part by a Washington State Department of Ecology Watershed Planning Grant (Grant #G0600298). The WST was comprised of technical staff from the five Initiating Governments (IGs): Whatcom County, Whatcom PUD #1, City of Bellingham, Lummi Nation, Nooksack Tribe); and Ecology. In the report, the subbasins were grouped together into “aggregated subbasins” based on best professional judgement of WST members, namely proximity and surficial hydrology/hydrogeology (see Figure 2.1). The established aggregated subbasins continued to be used for watershed planning purposes in the WRIA subsequent to that report.

Under the RCW 90.94.020 planning process in WRIA 1 (January 19, 2018 – February 1, 2019), the WST recommended and the PU supported the continued use of the United States portions of the nine Aggregated Subbasins³. This decision was supported by Ecology’s Lead Planner and Lead Technical Reviewer for the WRIA 1 planning effort.

Ecology’s guidance ESSB 6091 – *Streamflow Restoration Recommendations for Water Use Estimates* recommends delineating the WRIA into “suitably sized [areas] to allow meaningful determinations.” The continued use of the existing, locally agreed upon Aggregated Subbasins meets Ecology’s guidance

² <https://wria1project.whatcomcounty.org/resources/other-resources/2010-state-of-the-watershed-report>

³ Areas of WRIA 1 within Canada and in the National Forest [no development potential] northeast of the North Fork Nooksack were not included.

recommendations and is used in Ecology’s Streamflow Restoration rule supporting document and associated technical work.

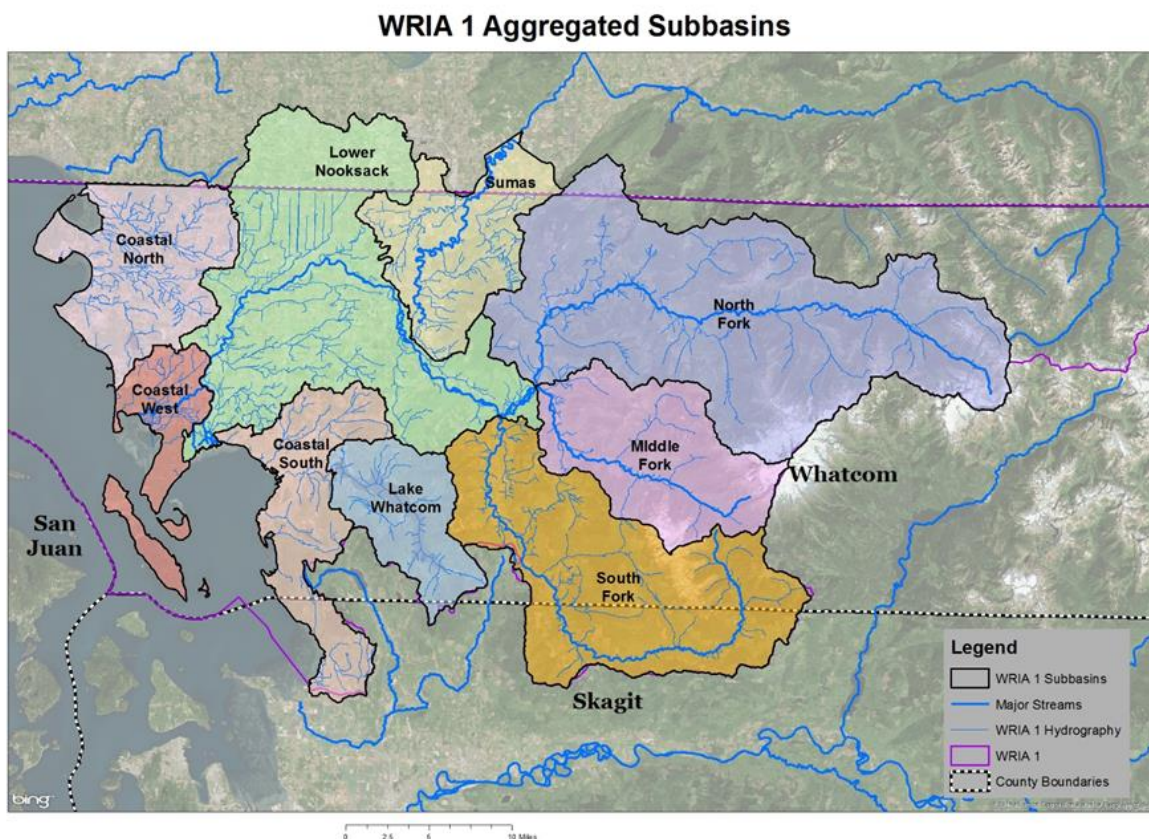


Figure 2.1 Aggregated Subbasin Delineation for WRIA 1 Rule Development

Chapter 3 – Water Use Limits for New Domestic Permit-Exempt Wells

3.1 Background and Authorities

In Washington State, the Department of Ecology is responsible for managing the water resources of the state, including permitting water use and protecting the instream resources for the benefit of the public. Ecology issues water right permits that authorize the use of a specific amount of water with a defined place of use, period of use, and purpose of use. The 1945 Regulation of Public Groundwaters (Chapter 90.44 RCW) creates an exception from permitting requirements for certain groundwater withdrawals:

...That 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 as provided in

RCW 90.44.052, or for an industrial purpose in an amount not exceeding five thousand gallons a day, is and shall be exempt from the provisions of this section. (RCW 90.44.050)

Subsequent court cases⁴ have further defined the limits on these “permit-exempt” wells.

In 2018, the Washington legislature passed RCW 90.94, a new law that provides Ecology and local governments with tools to protect and enhance stream flows while providing greater certainty for rural landowners that are reliant on permit-exempt wells for their water supply. The law also established a new maximum annual average (MAA) withdrawal limit from permit-exempt wells, set at 3,000 gallons per day (GPD) MAA for new domestic uses in WRIA 1 (RCW 90.94.020(5)). The law directs the local planning groups to consider:

Standards for water use quantities that are less than authorized under RCW 90.44.050 or more or less than authorized under subsection (5) of this section for withdrawals exempt from permitting (RCW 90.94.020(4)(d)(i))

The law further directs that:

Any modification to fees collected under subsection (5) of this section or standards for water use quantities that are less than authorized under RCW 90.44.050 or more or less than authorized under subsection (5) of this section for withdrawals exempt from permitting may not be applied unless authorized by rules adopted under this chapter or under chapter 90.54 RCW. (RCW 90.94.020(4)(e))

Ecology is modifying the water use standards for WRIA 1 during this rulemaking based on this direction from the law:

If a watershed plan that meets the requirements of this section is not adopted in water resource inventory area 1 (Nooksack) by February 1, 2019, the department must adopt rules for that water resource inventory area that meet the requirements of this section by August 1, 2020. (RCW 90.94.020(7)(a))

3.2 Withdrawal Limit Considerations

RCW 90.94 allows new domestic permit-exempt wells to impact closed water bodies and water bodies with instream flows that are not being met. However, these impacts must be offset and a NEB must be achieved in the WRIA. In determining whether to adopt withdrawal limits different from the quantities allowed under RCW 90.94.020, Ecology looked at several factors, including: (1) how the withdrawal limits impact the quantity of water needed to meet the offset requirements and achieve NEB, (2) WRIA 1 planning discussions, (3) permit-exempt water use limitations in post-2001 instream flow rules, (4) availability of water for new permits in the watershed, and (5) typical household water use.

Water use standards for new domestic permit-exempt wells are a factor in determining impacts - the greater the water use, the greater the required offsets and projects/actions needed to achieve NEB.

⁴ Such as *State of Washington Department of Ecology v. Campbell & Gwinn et al* (2002)

Water use standards are necessarily an important consideration in calculating the projected consumptive water use (see Chapter 4).

Ecology took into consideration that the WRIA 1 Planning Unit and Initiating Governments considered changes to water use standards during their work under RCW 90.94.020, and recognizes that there was not consensus between the Planning Unit and Initiating Governments on the standards.

In order to develop water use standards for the new permit-exempt wells, Ecology looked at other water use standards, descriptions, and assumptions established for domestic permit-exempt wells in recent instream flow rules in other WRIAs in Washington. Ecology considered the water use information in rules for Stillaguamish (WRIA 5), Quilicene-Snow (WRIA 17), Dungeness (WRIA 18), Lewis (WRIA 27), Salmon-Washougal (WRIA 28), Walla Walla (WRIA 32), and Entiat (WRIA 46), as well as water management programs in the Skagit (WRIA 3), and Lummi Peninsula (within WRIA 1). Ecology also considered the two different quantity limit standards established in RCW 90.94.020 and RCW 90.94.030.

The recent instream flow rules were not uniform in their descriptions and levels for setting standards for maximum daily indoor and outdoor water use from domestic permit-exempt wells. However, most post-2001 instream flow rules set water use limits lower than those specified in RCW 90.44.050. Several establish different indoor and outdoor water use standards within the WRIA based on location or other conditions (e.g., whether there is a septic system, the intended purpose of use, etc.). The recent rules were also not uniform in their how they described single and group domestic water use.

The new domestic water use standards in RCW 90.94 were not uniform across the 15 WRIAs specified in the law. As described above, the law created a new type of limit for “maximum annual average,” as compared to the daily maximum limit set forth in RCW 90.44.050. The WRIAs included in RCW 90.94.020 include a MAA of 3,000 gpd. The WRIAs included in RCW 90.94.030 include a MAA of 950 gpd, reduced during drought to 350 gpd for indoor use only and for maintaining a fire control buffer during drought. The term “fire control buffer” is not described or defined in the law.

Ecology also looked at typical household water use information. In June 2018, Ecology published guidance⁵ for planning groups describing water use studies and estimated 60 gpd per person as a reasonable estimate for indoor water use. In determining whether to change the MAA listed in RCW 90.94.020 and/or diverge from the daily maximum in RCW 90.44.050, Ecology considered how year-round indoor water use and how seasonal outdoor water use (mostly in the summer), would impact the instream resources in the WRIA. We noted that the outdoor summer water use coincides with the low summer flows in many streams in the WRIA.

In this watershed, as identified by the WRIA 1 Salmon Recovery Program, “low flows during the dry summer months, when human use is highest and fish are returning to streams to spawn, are the main concern⁶.” Low flows during the late spring to early fall have been repeatedly identified as a significant concern and limiting factor for WRIA 1 ESA-listed aquatic species, including in the WRIA 1 Salmonid Recovery Plan, WRIA 1 Watershed Management Plan, and Whatcom LIO Ecosystem Recovery Plan.

⁵ ESSB 6091 – *Streamflow Restoration Recommendations for Water Use Estimates*, Publication 18-11-007, June 2018.

⁶ WRIA 1 Salmon Recovery Program: “Habitat Concerns in Whatcom County,” <https://wria1project.whatcomcounty.org/wria-1-programs/wria-1-salmon-recovery-program>

Figure 3.1 illustrates the frequency that minimum instream flows are not met at the Ferndale gage over recent history. Data show increasing occurrence beginning in June and increasing thru September. This trend has prevented Ecology from approving new uninterruptible permitted water rights in WRIA 1. Recent climate trends appear to be exacerbating this trend, with hotter summers and less frequent rain events.⁷

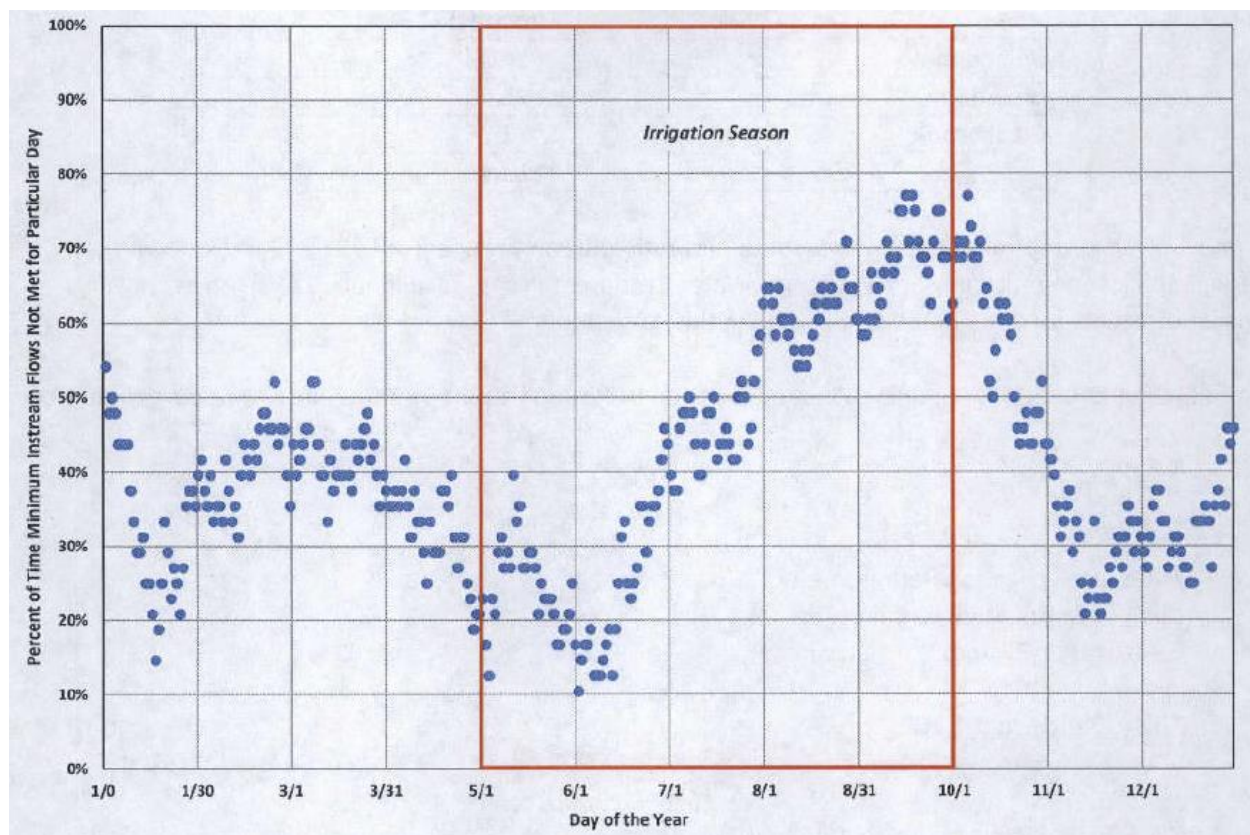


Figure 3.1. Percent of Time Minimum Instream Flows NOT met at Nooksack River at Ferndale, 1967-2014 (RH2: S1-28773 Report of Exam, 06-24-2015).

3.3 Proposed New Withdrawal Standards

Based on the information reviewed, Ecology determined that a quantity limit standard that promotes conservation is necessary to protect instream resources. Ecology proposes amending the WRIA 1 instream flow rule to establish additional limits for new permit-exempt domestic well withdrawals. To define these terms, Ecology proposes to adopt the following definitions for new permit-exempt domestic wells in the rule:

- “New permit-exempt domestic wells” are wells for groundwater withdrawals exempt from permitting under RCW 90.44.050 for the purposes of indoor domestic water use and outdoor watering for non-commercial lawn and garden.

⁷ <https://ecology.wa.gov/Air-Climate/Climate-change/About-climate-change/Water-supply-impacts>

- “Indoor domestic water use” means potable water to satisfy the domestic needs of a household, including water used for drinking, bathing, sanitary purposes, cooking, laundering, and other incidental uses.
- “Outdoor domestic water use” means water used for non-commercial lawns and gardens.

Ecology proposes to establish limits for new domestic permit-exempt well water use as the following, in a new section that would be codified as WAC 173-501-065:

- Withdrawals from a new permit-exempt domestic well serving a single connection shall not exceed 500 gallons per day for indoor domestic water use, and shall be limited to an area not to exceed a total of 1/12 (one-twelfth) of an acre, or three thousand six hundred thirty square feet (3,630 ft²) for outdoor domestic water use.
- Withdrawals from one or more new permit-exempt domestic wells serving a group domestic system that qualifies for the group domestic permit exemption under RCW 90.44.050 shall not exceed 500 gallons per day for indoor domestic water use for each connection, and shall not exceed a total use of 3,000 gallons per day for indoor domestic water use for the group; and shall be limited to an area not to exceed a total of 1/12 (one-twelfth) of an acre, or three thousand six hundred thirty square feet (3630 ft²), for outdoor domestic water use for each connection, and shall be limited to an area not to exceed a total of 1/2 (one-half) of an acre for the entire group.
- Upon the issuance of a drought emergency order under RCW 43.83B.405, withdrawals from new permit-exempt domestic wells shall be curtailed except indoor domestic water use and withdrawals to maintain up to 1/12 (one-twelfth) acre for non-commercial subsistence gardening purposes.
- The withdrawal limits defined in WAC 173-501-065(5) supersede the maximum annual average withdrawal limits specified in RCW 90.94.020.
- The department reserves the right to require metering and reporting of water use for domestic users, if more accurate water use data is needed for management of water resources in the area.
- Under all circumstances, the water use limits specified under RCW 90.44.050 shall not be exceeded.

Chapter 4 – Consumptive Use Estimates, 2018-2038

RCW 90.94.020 requires a water offset for the total quantity of water consumed by groundwater withdrawals from new domestic permit-exempt wells over the subsequent 20 years in the WRIA. In order to determine the offset quantity, Ecology must determine the projected consumptive use. This chapter analyzes and elaborates on the work completed by RH2 Inc. (RH2) as part of the WRIA 1

Streamflow Restoration planning process. RH2's analyses is memorialized in a technical memo submitted to the Department of Ecology on August 21, 2018 (*Potential Consumptive Use Impacts of Domestic Groundwater Permit-Exempt Wells Over the Next 20 Years in WRIA 1 – Final Updated*).

4.1 WRIA 1 Planning Process Analysis

RH2's technical memo laid out the results of their analyses that documented the number of new domestic permit-exempt wells expected within the nine aggregated subbasins in WRIA 1, between the years of 2018 and 2038. They documented their assumptions and the uncertainty inherent in their calculations. Population forecasts from the County's most recent Comprehensive Plan were used to develop rural population estimates by aggregated subbasin (BERK, 2018). These forecasts predict a population increase of 8,163 outside of the established Urban Growth Areas (UGAs) in Whatcom County. The BERK population data was divided by an assumed 2.56 average number of people per single-family home (Whatcom County Comprehensive Plan Update Environmental Impact Statement, 2015) to estimate the number of expected housing units. These numbers per subbasin were adjusted to account for the likely number of homes that will be constructed outside of Urban Growth Areas (UGAs), but can still hook up to water purveyors with capacity and infrastructure to serve additional customers. RH2 used BERK's data and considered several alternative scenarios to make adjustments to derive the number of new domestic permit-exempt wells per aggregated subbasin. Adjustments were also made to derive the consumptive indoor water use numbers based on Ecology guidance (Ecology, April 2018) that indoor per capita water use of 60 gpd for properties on septic systems is only 10% consumptive (with 90% return flow through the septic field).

Another component of RH2's work was an analysis of the size of the average irrigated footprint of domestic properties constructed in the watershed over the 2000 – 2014 timeframe. This effort was undertaken to develop an estimate of likely irrigated footprints for new homes that would be reliant on domestic permit-exempt wells. Outside lawn and garden watering accounts for roughly 95% of all consumptive water uses associated with new home water uses (using the example in Ecology's Interim Consumptive Use guidance document, Ecology, 2018). The groundwater permit exemption allows for up to 0.5 (one-half) acre of non-commercial lawn and garden (RCW 90.44.050). After looking at the average footprint of likely irrigated areas of a statistically significant number of homes recently built in the watershed, an average irrigated footprint of 0.28 acres was estimated for new homes across the WRIA. The report computed an average irrigated footprint size respective to each of the nine aggregated subbasins. These averages were used to compute the water duty for turf grass for anticipated new permit-exempt domestic uses in each aggregated subbasin. Adjustments were then made to derive the consumptive portion of new outside lawn and garden uses per home using Ecology's guidance that indicates about 80% of outside watering is consumptively used (Ecology, April 2018). This volume was combined with the consumptive use estimate for indoor use (based on the population projections, the average number of people per household, number of homes forecasted, etc.) to derive estimates of the consumptive use for anticipated new domestic wells in each aggregated subbasin within the WRIA.

In consultation with the WRIA 1 planning groups, RH2 presented a number of Options and Scenarios based on different consumptive use calculations and variables. Options ranged from in-house water use only to every new home utilizing a full one-half acre irrigated footprint outdoors, and 5,000 gpd indoors. Based on these scenarios, the WRIA-wide new consumptive use for homes constructed over the twenty-year timeline was calculated between 33 and 12,421 acre-feet per year. After deliberation, and

consistent with the WRIA 1 Watershed Staff Team recommendation, the WRIA 1 Planning Unit selected and approved the “Option 4, Scenario 4” estimate of 647 acre-feet per year as the best planning estimate for total volume of consumptive use water needed to offset expected new homes constructed by the end of the twenty-year timeline.

4.2 Ecology’s Analysis

In order to analyze the effects of conditions under the proposed WRIA 1 rule, Ecology obtained the report and underlying data, and reconstructed the spreadsheets that support all of RH2’s calculations. This allowed the agency to build on this body of work and to explore other water use scenarios in support of this rulemaking effort.

4.2.1 Consumptive Use – Average Use Scenario

To calculate the consumptive use estimates, Ecology made adjustments to original RH2 spreadsheet input parameters to reflect proposed rule conditions, including an outdoor domestic irrigation areal limit of 1/12 acre. In an average use scenario, Ecology assumed 2,150 new homes throughout the watershed, an average of 2.56 persons per home (153.6 gpd indoor use), and an anticipated maximum outdoor watering footprint of 1/12 of an acre (0.083 acres). The 1/12 acre irrigation footprint limit reduces the average outdoor watering footprint by 72 percent, compared to the 0.28 acre average. Using the indoor water use assumptions and this outdoor limit, the consumptive use impacts for the nine aggregated subbasins total 260 acre-feet per year (see Table 4.1). This represents the target offset volume required to meet the consumptive use impacts within the WRIA as a whole. This is lower than the original RH2 analyses, in large part, because of Ecology’s proposed outdoor irrigation conservation standard.

4.2.2 Consumptive Use – Maximum with New Limits Scenario

The proposed rule amendment language establishes an indoor withdrawal limit of 500 gpd per new domestic permit-exempt well. To evaluate how an indoor water use rate of 500 gpd for all new homes impacts the consumptive use offset calculations, a scenario was run with an assumed 2,150 new homes, an indoor water use of 500 gpd, and an outdoor irrigation footprint of 1/12 of an acre for every new home. The result was a total consumptive use offset of 343 acre-feet per year for the nine aggregated subbasins combined. The majority of consumptive use associated with each new home is associated with the outdoor water use. As noted above, indoor water use is typically only 10% consumptive, while outdoor use is 80% consumptive. Tripling the indoor use rate, from 153.6 to 500 gpd, basin-wide in the calculations only increases the offset required by 32 percent (83 acre-feet per year). This scenario’s results are included in Table 4.1.

4.2.3 Safety Factor

Ecology is using 260 acre-feet per year, as discussed in Section 4.2.1 above, as the offset target volume. This methodology is consistent with county projections and RH2 analysis from the planning process, updated with the new proposed limits. This calculation requires several assumptions related to: the number of new homes to be constructed over the specified twenty-year period; the occupancy rate; per capita water use; outdoor water use; the efficiency of the use; the consumptive use fraction for all of this use; and the impacts of this collective use on the instream resources. To address the inherent uncertainty associated with each of these assumptions, Ecology chose to multiply offset volumes in each subbasin by a factor of 1.5. Adding a “safety factor” helps assure that the volumes achieved through the planning process will more than compensate for the impact that occurs over the twenty-year planning

horizon. For the nine aggregated subbasins, the total volume required for the entire WRIA to offset new consumptive uses with this safety factor applied is 390 acre-feet per year. The total and results by subbasin can be seen in Figure 4.1.

4.2.4 Hydrogeologic Information and Assumptions

The numbers presented in Table 4.2 reflect annualized pumping impacts (acre-feet per year). The offset volumes listed in the table assume that the impacts from 2,150 additional wells directly impact surface water bodies within the watershed and that those impacts fully impact surface water bodies by the end of the twenty-year timeframe. This will likely be the case for shallow wells located near streams. However, deeper confined wells and wells located at a greater distance to their connected surface water bodies will experience lag times such that their impacts may not be fully developed by the end of the 20-year window. We propose to offset the entire projected volume ignoring any of these potential time lag issues, which provides additional assurance that the impacts will be offset. Pumping volumes will be seasonally distributed with significantly more water pumped during the irrigation season for outdoor watering than the relatively stable indoor component that occurs over the entire year. The impacts from seasonal pumping components on surface water bodies will be a function of the aquifer parameters and distance from each individual well to its connected surface water sources.

The diffusive properties of aquifers dampen the variability and amplitude of pumping effects on streamflow depletion. Key variables are aquifer parameters like hydraulic diffusivity and the distance from the well to its connected stream. The USGS created an analytical tool (STRMDEPL08) for calculating streamflow depletion caused by nearby groundwater pumping (Reeves, 2008). Calculations performed with this tool suggest that the amplitude of the annual depletion rate is largest when the well is placed close to the river, but is substantially reduced as the distance to the river is increased. As the distance of the well from the river increases, a cyclic pumping pattern indicative of summer outdoor watering has an effect on streamflow depletion that more closely resembles the annualized equivalent constant pumping rate pattern (Figure 4.2). For some time after the initiation of pumping, groundwater storage is the primary source of water to the well, and on an annual basis, the volume of depletion to the stream is less than the annual volume withdrawn by the well. Over time, the annual volume of depletion approaches the annual volume pumped at the well, regardless of the distance of the well from the river or the pattern of withdrawal.

RH2 developed a shapefile that locates the parcels that received building permits within the watershed over the period 2000 – 2014. Figure 4.3 is a map that shows their locations. Over this period, new homes have been scattered throughout the watershed. The distances from these parcels to nearby streams appears to be highly variable in much of the watershed. Segments of streams that are losing reaches and areas where the water table is below the streambed can influence the distance between where a well is located and what its closest connected stream is for impact analyses. With these considerations, we have chosen to approximate their depletion effects as a steady state equivalent at the subbasin and WRIA scale. Additionally, not all of these wells (represented by parcels in the shapefile) will be completed in water table aquifers. Confined well impacts on streamflow depletion will be more diffuse than water table wells. We anticipate that new domestic permit-exempt water wells will continue to be located throughout the nine aggregated subbasins of the watershed as contemplated by the WRIA 1 planning groups. We anticipate that impacts from the consumptive use portion of their collective water use will approximate steady state impacts at the watershed scale. Based on all the assumptions described above, the target volume to replace the total consumptive water use—including a 150% safety

factor (1.5 Multiplier)--throughout the WRIA on an annualized basis after 20 years is 390 acre-feet per year.

RCW 90.94 WRIA 1 (Whatcom and Skagit County) Future Use (2018 through 2038) Scenarios and Calculated Total Consumptive Water Use										
	Aggregated Subbasins Acre feet per year of Consumptive Use									Total
	1 - Coastal North	2 - Coastal South	3 - Coastal West	4 - Lake Whatcom	5 - Lower Nooksack	6 - Middle Fork Nooksack	7 - North Fork Nooksack	8 - South Fork Nooksack	9 - Sumas	
Anticipated New Homes per Subbasin	594	241	290	145	561	9	126	22	162	2,150
Per Connection Assumptions										
154 gpd (2.56*60 gpd) and 1/12 acre	74.32	28.74	37.26	16.48	67.18	1.00	14.06	2.45	18.07	259.57
500 gpd and 1/12 acre	97.37	38.09	48.52	22.11	88.95	1.35	18.95	3.31	24.36	343.00

Table 4.1. Results of analyses to calculate new domestic permit-exempt well consumptive use (in acre-feet per year) from 2,150 anticipated new wells over the twenty-year planning horizon. Calculated by aggregated subbasin. Assumptions include outdoor water efficiency = 75% (pop-up sprinklers); outdoor use is 80% consumptive; indoor use is 10% consumptive.

RCW 90.94 WRIA 1 (Whatcom and Skagit County) Future Use (2018 through 2038) Scenarios and Calculated Total Consumptive Water Use										
	Aggregated Subbasins Acre feet per year of Consumptive Use									Total
	1 - Coastal North	2 - Coastal South	3 - Coastal West	4 - Lake Whatcom	5 - Lower Nooksack	6 - Middle Fork Nooksack	7 - North Fork Nooksack	8 - South Fork Nooksack	9 - Sumas	
Anticipated New Homes per Subbasin	594	241	290	145	561	9	126	22	162	2,150
Per Connection Assumptions										
1.5 Multiplier added as a buffer	111.48	43.11	55.90	24.73	100.77	1.51	21.09	3.68	27.11	389.36

Table 4.2. Water Offset Volumes in acre-feet per year needed to meet the requirements of RCW 90.94.020 with a 1.5 Multiplier (150% total estimated consumptive volume) applied to account for uncertainty.

**WRIA 1 Consumptive Use Offset Volumes in acre-feet per Year
With a 1.5 Multiplier**

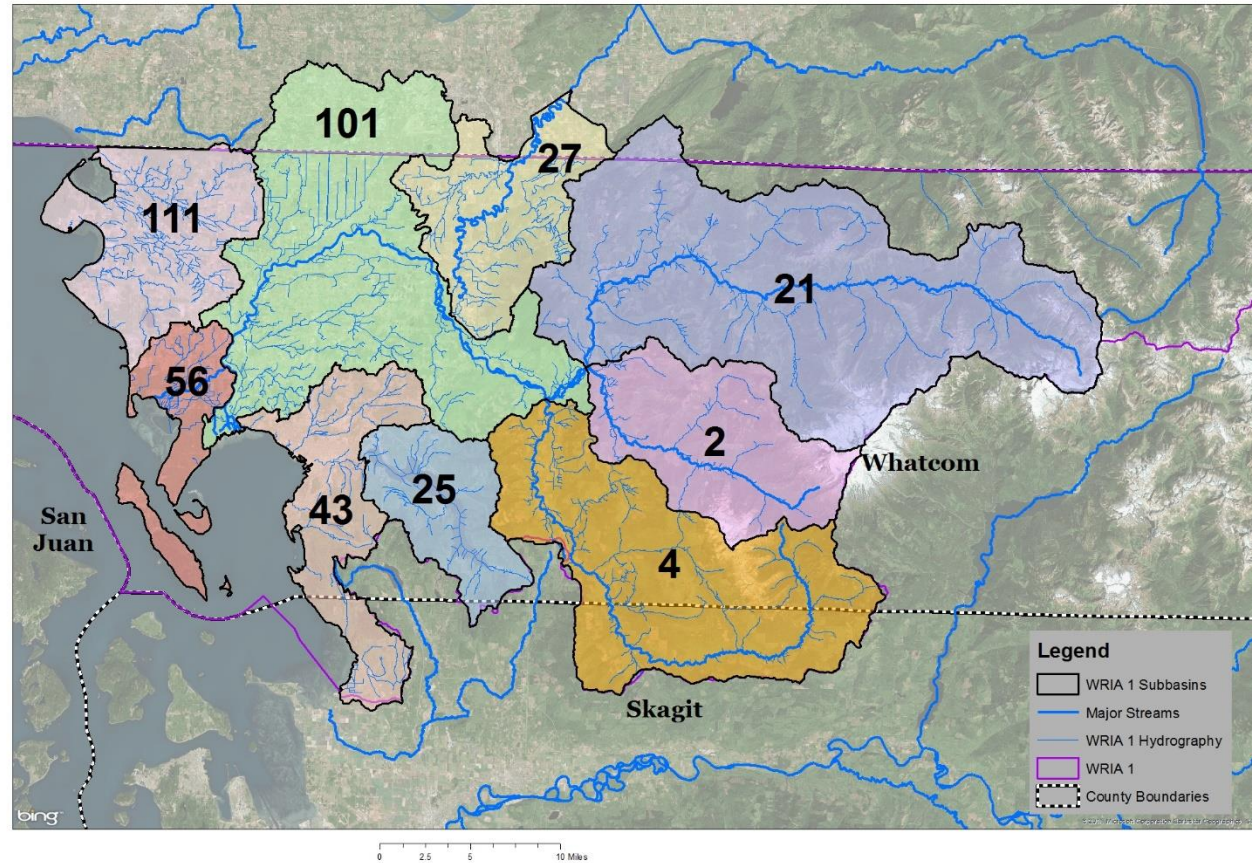


Figure 4.1. Twenty-year consumptive use offset volumes, including 1.5 Multiplier, in acre-feet per year, by aggregated subbasin.

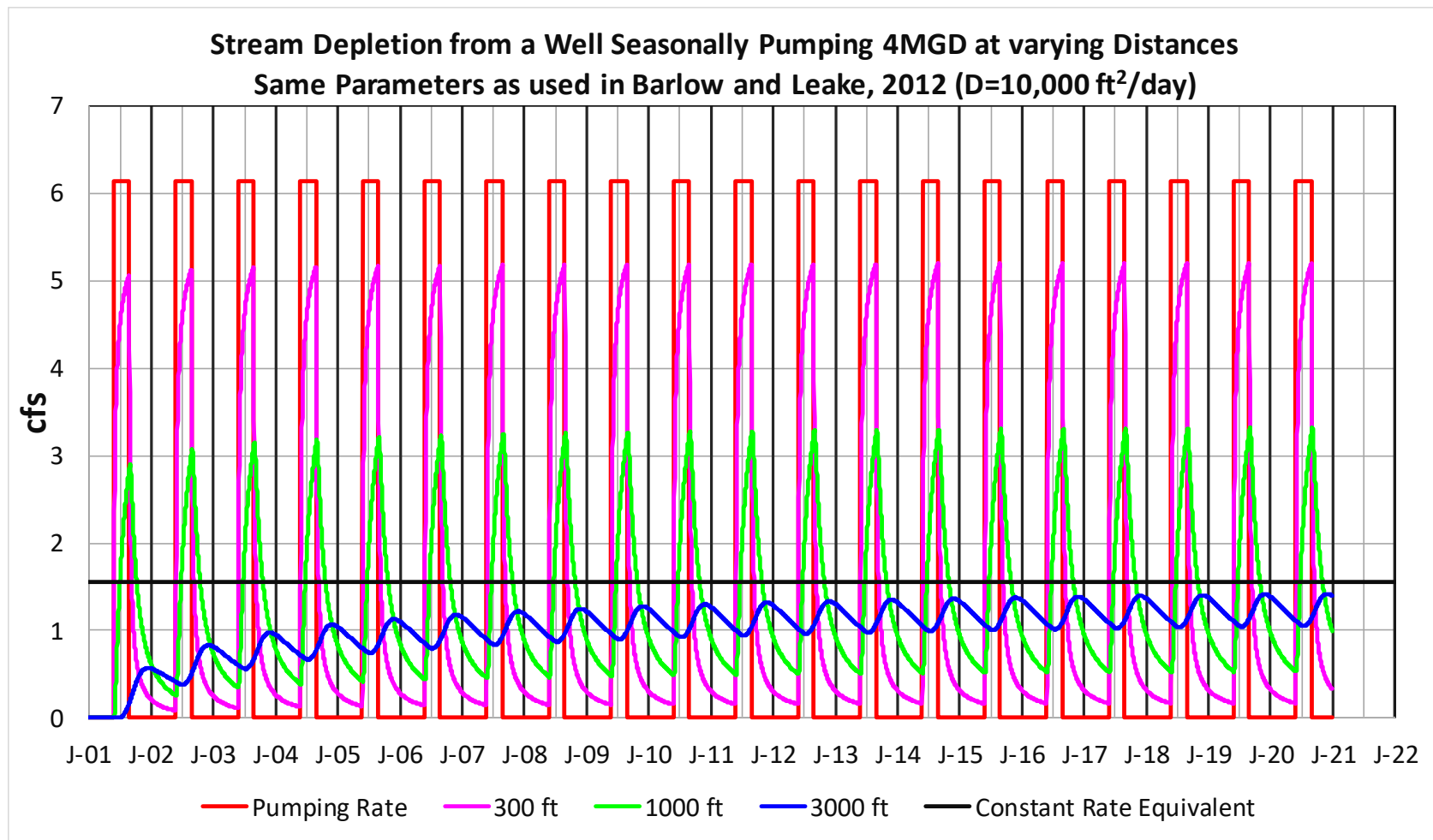


Figure 4.2. Stream depletion from a well over a twenty-year timeline. The same parameters utilized by Barlow and Leake, 2012, in their Figure 21.

Distribution of Building Permits Issued by Whatcom County 2000 - 2014

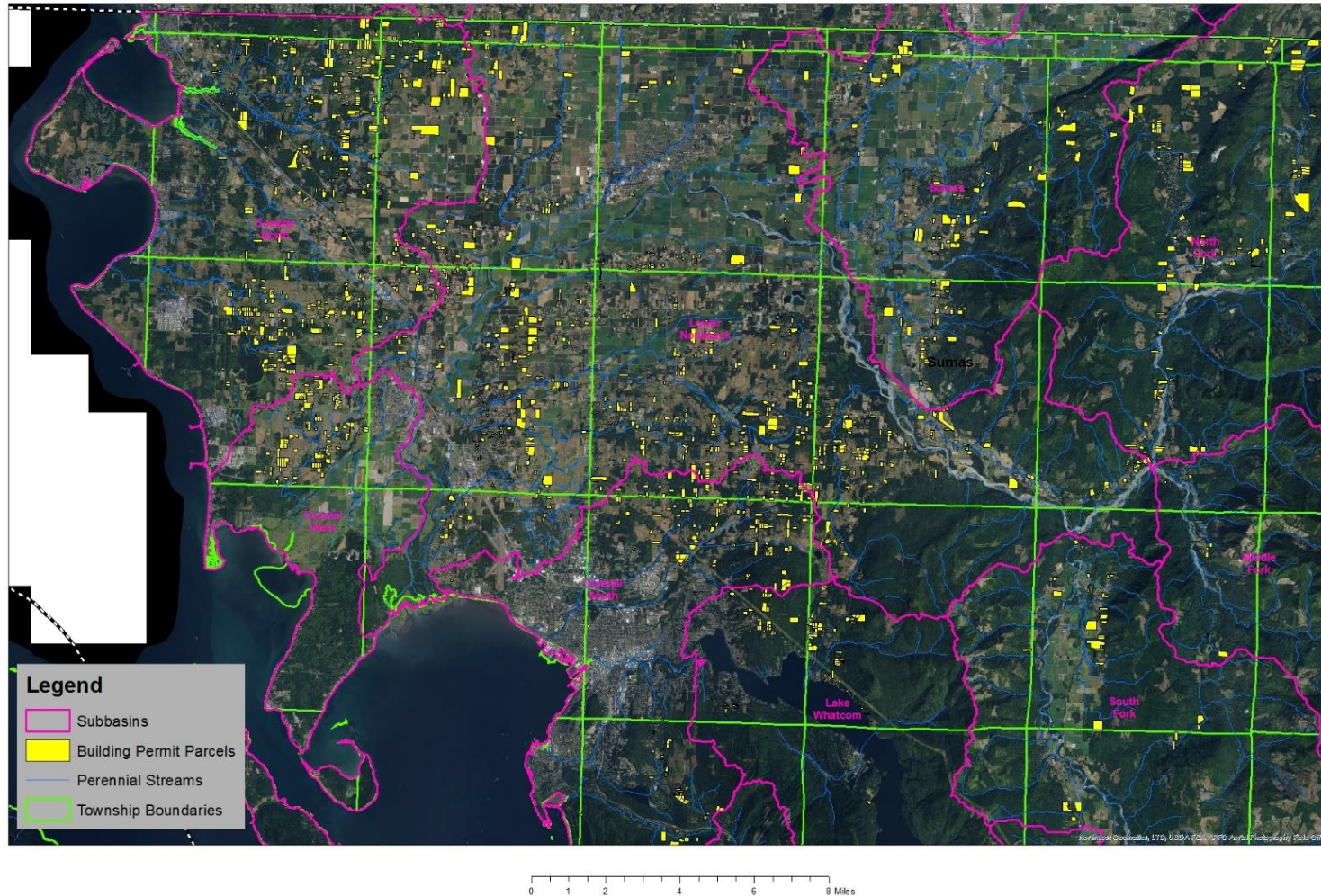


Figure 4.3. Parcels associated with building permits issued by Whatcom County between 2000 and 2014.

Chapter 5 – Retiming High Flows to Restore and Enhance Streamflows

Many of the stream management units listed in WAC 173-501 have minimum instream flow levels listed in WAC 173-501-030, as well as partial or year-round closures listed in WAC 173-501-040(1). In order to enhance streamflows and enable projects consistent with Chapter 90.94 RCW, Ecology proposes adding an exemption to WAC 173-501-070 to allow Ecology to consider projects that would withdraw water during high flow months if the projects would enhance flows during critical low flow periods.

Under this proposed exemption, a new water right could be approved during the closure period, subject to instream flows, if the proposed water use would enhance stream flows and improve instream resources. For example, Bertrand Creek presently has a year-round closure and an instream flow (WAC 173-501-030(2)). Daily streamflow data for 10 water years on Bertrand Creek (Figure 5.1) show that during the high flow months, daily average flows often significantly exceed the minimum flow. This suggests, hydrologically, that there would be opportunities every year to appropriate a limited quantity of high flow water for the purpose of retiming these high flows to enhance the creek during the summer- early fall low flow period.

Future projects proposed in the WRIA that benefit instream resources could use this exemption to apply for permits. Ecology anticipates that future projects, such as managed aquifer recharge (MAR) storage projects located on closed tributaries, may use this proposed exemption. Additionally, two projects identified in Chapter 6, Bertrand groundwater augmentation of tributaries (Project ID 2), and convert surface water users to groundwater sources (Project ID 26) may apply for a permit under this exemption.

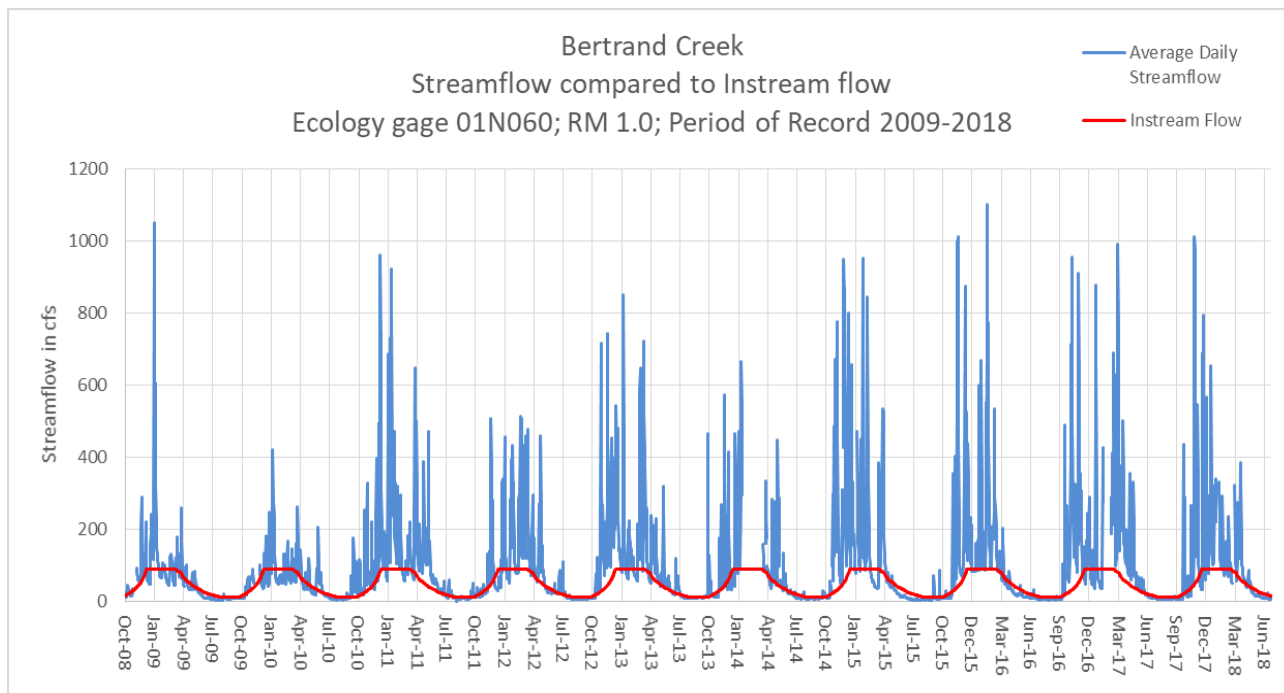


Figure 5.1: 10-year daily flow hydrograph of Bertrand Creek with instream flow showing opportunities every year to take small amounts of water during high flow seasons for projects to benefit stream flows during the low flow season.

5.1 Data Needs

Project proponents interested in pursuing a water right permit application under WAC 173-501-070(4) would need to provide the data necessary to test the hydrologic conditions. This requirement could be met by supplying a hydrologic record with 10 or more years of average daily streamflow data (gaged or synthesized) and a 10-50-90% exceedance flow hydrograph (Figure 5.2). If the relevant stream does not have an instream flow or low flow condition (SWSL), a habitat study (e.g., a Toe-Width study) is needed to establish a minimum flow for the requested withdrawal period. In addition, the applicant would need to include a hydrologic assessment of the projected streamflow benefits, including the expected quantity, location, and timing of streamflow benefits.

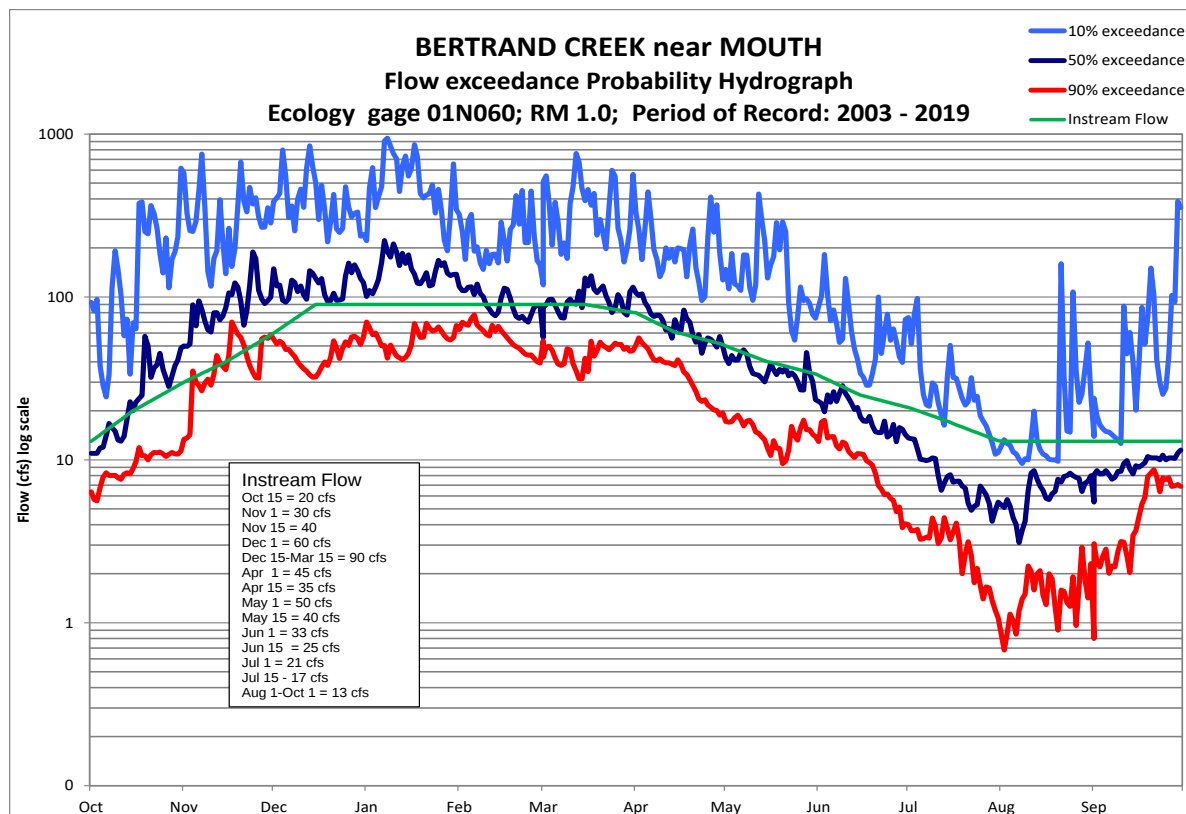


Figure 5.2: 10-50-90% exceedance flow hydrograph of Bertrand Creek with instream flows. Months where the instream flow is below the 50% exceedance have frequent opportunities of physical availability. A biological test is still needed to confirm availability.

5.2 The Review Process

When reviewing a water right permit application under WAC 173-501-070(4), Ecology will review the hydrologic record for data quality and accuracy. If a habitat study is required, Ecology, in consultation with WDFW, will review the habitat study and determine an appropriate low flow condition (WAC 173-501-040(1)). In addition, and in consultation with the Tribes and WDFW, Ecology will:

- Review the project to verify the quantity and timing of benefit to instream resources,
- Determine any stream function or instream resource benefits derived from high flows, and
- Determine if the proposed withdrawal during high flows would impair any recognized benefits.

If the withdrawal could be made without impairing high flow function or benefits, and Ecology determines that the project would provide increased stream flow benefits during the critical flow period (usually summer and early fall) to benefit instream resources, the new use could be approved with the following conditions:

- Period and conditions of availability;
- Instream flow (WAC 173-501-030(2)) or low flow condition (WAC 173-501-040(1));
- Annual Quantity (Qa) and Instantaneous Quantity (Qi) limits for the interruptible right; and

- Installation and operation of a telemetered gage (if necessary) to be used to determine when flow is available for withdrawal.

Ecology proposes to add the following exemption to WAC 173-501-070:

(4) New interruptible uses may be approved from streams regulated under WAC 173-501-040 if the department determines through a water right permit application process under Chapter 90.03 RCW that the proposed use is consistent with the intent of Chapter 90.94 RCW to restore and enhance streamflows, and would offset potential impacts to instream flows associated with permit-exempt domestic water use.

Chapter 6 – Projects and Actions

During their Streamflow Restoration planning work during the past year (January 19, 2018 - February 1, 2019), the WRIA 1 planning groups spent considerable effort developing projects and actions intended to meet RCW 90.94.020 offset amounts and achieve NEB in WRIA 1. As a part of this rulemaking process, Ecology staff reviewed work accomplished during the Watershed Management Plan Update planning process, including proposed projects and actions.

The WRIA 1 planning process, including the staff team and Planning Unit, developed a list of projects intended to achieve offsets and NEB. The WRIA 1 planning work identified 45 projects categorized as “Early Action,” “Preliminary Projects, or “Other Projects.” Ecology considered this project list as a starting point in order to develop its own list of projects and actions that, once implemented, achieve the water offset and meet the NEB criteria outlined in RCW 90.94.020 (See Chapter 9 for more discussion of NEB). The 13 projects and actions identified by Ecology in this document were chosen based on likelihood of implementation. Ecology looked for projects that demonstrate one or more of the following: existing funding for the project provided by Ecology; existing funding provided by another entity; likelihood for achieving offset and/or NEB; partner willingness; an advantageous location in the watershed; and overall feasibility. Progress on the projects will be tracked under an adaptive management plan described below in Chapter 7. The high likelihood of project completion and the adaptive management mechanism provide Ecology with a reasonable assurance that the projects will meet the offset and achieved NEB during the planning horizon. The project list (Table 6.1) provides for more total offsets than needed for the watershed (including the 150% safety factor or 1.5 Multiplier), thereby exceeding the offset requirements of RCW 90.94.020(4)(b). Offsets are met and greatly exceeded in six of the aggregated subbasins. They are not met in three aggregated subbasins: Coastal South (CS), Lake Whatcom (LW), and Sumas (SU). Though Ecology identified geographically distributed projects to meet each aggregated subbasins’ projected offset requirements, in some cases this was not feasible. Per RCW 90.94.020(4)(b), in-time and in-place offsets are not required, so long as offsets are met in total across the WRIA.

That said, it is expected that the projected consumptive use calculations (including the safety factor) in each of the three aggregated subbasins where complete offsets are not achieved, are *conservative*, because they likely *overestimate* the required offset amounts.

- Coastal South (CS): Ecology expects that the calculated consumptive water use amount for CS is likely high, as much of this area drains directly to saltwater (Salish Sea/Puget Sound), and, groundwater pumping is therefore less likely to affect surface waters.
- Lake Whatcom (LW): LW is a highly regulated aggregated subbasin with inter-basin delivery of Middle Fork waters to Lake Whatcom (under the City of Bellingham’s water rights) and a regulated lake outfall. As such, compensation for some of the projected offset amounts may inadvertently already occur. During the WRIA 1 planning process, the WRIA 1 Watershed Staff Team recommended focusing offset projects in other aggregated subbasins, due to the high level of regulation of this aggregated subbasin. Additionally, Project ID #21’s offsets are not included in the offset totals; however, the project will likely provide offset amounts in the LW Aggregated Subbasin.
- Sumas (SU): SU does not currently have any projects, although there is a potential project proponent and broad interest in expanding Project ID #1 to the SU aggregated subbasin.

WRIA-wide projects described below, such as a WRIA-wide Conservation Program (Project ID 21), and the likely extension of the Dairy Waste Processing pilot project (Project ID 1), are also anticipated to provide for offsets across the WRIA, including these three aggregated subbasins. Thus, the project table likely underestimates the aggregated subbasins’ offset amounts, and is consistent with the recommendations of the WRIA 1 technical staff (WRIA 1 Watershed Staff Team) regarding the LW Aggregated Subbasin.

The list intentionally includes projects anticipated to exceed the projected required offsets, including the safety factor. This provides for additional levels of certainty that offsets are met and NEB achieved in the WRIA, in case projects are not implemented and/or don’t achieve the anticipated results (see Chapter 7 on Adaptive Management). Ecology selected the list of projects based on the criteria above to be reasonably assured the projects would be carried out. However, some uncertainty remains that will be tracked and addressed by adaptive management.

All project sponsors voluntarily agreed to have their projects listed here. Although project sponsors noted a willingness to proceed, the listing of a project herein does not obligate the project sponsor to carry out the project in any way. Neither projects nor their anticipated results are guaranteed.

The following projects and actions⁸ will be used in the NEB determination (see Chapter 9).

⁸ Project ID numbers from the WRIA 1 Streamflow Restoration (RCW 90.94) planning efforts (Jan 2018-Feb 2019) are retained here for consistency purposes and ease in cross-referencing other existing technical materials that reference the Project IDs.

WRIA 1 Project No.	Funding Status	Name	Offset (afy)									Total
			Coastal North (CN)	Coastal South (CS)	Coastal West (CW)	Lk Whatcom (LW)	Lower Nooksack (LN)	Middle Fork (MF)	North Fork (NF)	South Fork (SF)	Sumas (SU)	
1	Funded	Dairy Waste Processing/Treatment								13.4		13.4
2		Bertrand Augmentation					170.7					170.7
8		MAR - North Fork site							200			200
19	Partially Funded	Skookum Creek Restoration								1,449		1,449
19NG		Wetland Restoration, Enhancement/Creation								2		2
21		Stewart Mountain/SF Nooksack Conservation				2,413.3*	2,413.3*			2,413.3*		7,240*
23	Funded	Middle Fork Porter Creek Phase 4 Project						11.2				11.2
24	Partially Funded	Birch Bay/Blaine Deep Wells	440				440					880
26		Lower Nooksack SW to GW Conversion Projects					158					158
28		Storage Projects including Gravel Pits					365					365
44	Funded	PUD No. 1: Vista Road Project	194									194
45		PUD No. 1: Lake Terrell/ Coastal Drainages	185		139							324
46NG modified	Partially Funded	WRIA 1 Conservation Program	UNK	UNK	UNK	UNK	UNK	UNK	UNK	UNK	UNK	UNK
		Total	819	0	139	0	1,134	11	200	1,464	0	3,767
		Offset Needed (afy)	111	43	56	25	101	2	21	4	27	390
		Difference	708	-43	83	-25	1,033	9	179	1,460	-27	3,377

Table 6.1. Offset Project List Used in Rule Development. * = Used lower end of the suggested range, divided equally into the three impacted aggregated subbasins. Since offset amounts will not be fully realized within 20-yr. planning horizon, offset amounts are not included in Table Totals. UNK = Unknown/Undetermined.

Project descriptions for each of the projects⁹ were included as a part of the WRIA 1 planning group's technical work [see RH2's "FINAL Task 2 Deliverable – Projects and Actions" technical memorandum]. *Summary* descriptions from that technical memorandum are included below (see technical memorandum for additional details):

Project ID 1: Dairy waste processing/treatment

Aggregated Subbasin: South Fork (potential to extend WRIA-wide)

Public Utility District No. 1 of Whatcom County (PUD) is partnering with Coldstream Farm (a dairy on the South Fork) and Regenix on a pilot project to install and operate a dairy waste processing project. Coldstream Farm produces about 60,000 gallons of manure a day, 22,000 of which would go through nanofiltrations and reverse osmosis to produce 12,000 gallons of clean water per day, along with 16 cubic yards of nutrient-rich solid manure and 8,000 gallons of nitrogen and potassium-rich concentrate for use as a chemical-free fertilizer. This fertilizer would be used by the farm and by participating berry and potato farmers to replace imported fossil fuel-based fertilizers. It is hoped that the project would demonstrate the effectiveness and economic viability of such projects for implementation in other places in WRIA 1 and across the state.

The Coldstream Farm/Regenix project is a funded pilot project. It includes funding to install the treatment equipment and approximately 9 months of operation and maintenance to monitor the output water and ensure the system is operating as intended. It also includes permitting costs, including an NPDES permit for the discharge of the water and, perhaps, a U.S. Army Corps of Engineers permit for the outfall structure. The discharge water would be the property of the PUD through the agreement between the project partners (Coldstream Farm, Regenix, and PUD).

Expected benefit(s): 13.4 AFY offset

Project ID 2: Bertrand groundwater augmentation of tributaries

Aggregated Subbasin: Lower Nooksack

Continue and expand the pilot program started in 2017 by the Bertrand Watershed Improvement District (WID) to use groundwater to augment surface water flows within Bertrand Creek during low flow periods. The project utilizes existing wells from raspberry growers after the raspberry crop is harvested. Wells are pumped using existing infrastructure and routed via new pipelines on the creek bank, before discharging into Bertrand Creek during late August and September. The pumping effort continues until both Bertrand Creek (at the mouth) and the Nooksack River (at Ferndale) are above the minimum instream flows and the flows are increasing, at which point pumping ends.

The future expanded project may include up to seven additional locations for the discharge of water to Bertrand Creek. Total additional pumped water is 3,490 gpm. Each project should plan to pump one-seventh of that quantity (approximately 500 gpm).

This project is applying for a permit under the legal framework established in RCW 90.94.090 for the *Foster* pilot projects. Additionally, the project may apply for the retiming exemption described in Chapter 5.

Expected benefit(s): 170.7 AFY offset

⁹ Except Project ID 8: MAR-North Fork site; developed by Ecology staff
Preliminary Draft for Public Comment – April 8, 2019

Project ID 8: MAR—North Fork site

Aggregated Subbasin: North Fork Nooksack

Ecology's Water Resources Program identified several potential sites for developing managed aquifer recharge (MAR) projects in the Nooksack basin on publically owned land. One potential site is located adjacent to the North Fork of the Nooksack River on Washington Department of Natural Resources ground located in Section 1, T39N R5E. This project would augment stream flows by increasing surficial aquifer discharge to the North Fork of the Nooksack River above what occurs under current conditions. MAR projects typically involve diverting a small fraction of high-flow season streamflow to spreading basins or other infiltration facilities in the adjacent floodplain or uplands. This diverted surface water infiltrates into a shallow aquifer, migrates through the aquifer, and ultimately discharges back to surface water as re-timed groundwater baseflow. Washington Geological Survey mapping in the area suggests that alluvium aquifer material should be present at the proposed location. The anticipated storage volume for this project is 200 acre-feet per year. This storage opportunity has not been critically evaluated nor have any discussions taken place with any landowners and further investigations are necessary. There is no current project sponsor, but Ecology expects to work with the community to identify a sponsor.

Expected benefit(s): 200 AFY offset

Project ID 19: Skookum Creek restoration

Aggregated Subbasin: South Fork Nooksack

The Whatcom Land Trust recently purchased 1,400 acres of high-quality forested riparian habitat in the Skookum Creek watershed, a major tributary to the South Fork of the Nooksack River. The Skookum Creek riparian corridor would permanently protect 2.3 miles of high-quality cold water spawning and rearing habitat for coho, steelhead, and bull trout; the lower 0.6 miles of Skookum Creek is documented habitat for ESA-listed spring Chinook. The project area is a steep ravine that has had major logging operations impact the water quality by removing shade cover and contributing sediments to the creek and its tributaries. The project sponsor desires to restore the property to allow natural ecosystem functions to occur, including growing and recruiting large trees into the creek to form deep cold-water pools for salmonid habitat. This acquisition creates the opportunity for a significant landscape-scale restoration project. 750 acres of protected buffer in forested riparian zones would reduce sediment, control erosion, increase shading, and delivery of large woody debris to benefit fish habitat.

Expected benefit(s): 1,449 AFY offset, NEB (ecosystem recovery, salmon habitat, & restoration)

Project ID 19NG: Wetland restoration, enhancement, and/or creation on Ecology NEP approved parcels

Aggregated Subbasin: South Fork Nooksack

Wetlands perform varying functions, including storing water to augment late season low flows, and improving water quality by filtering contaminants from water. Historic wetlands could be restored, existing wetlands could be enhanced, and new wetlands could be created. The Nooksack Tribe has completed a watershed conservation plan, reach-scale plan, and conceptual scope of work for the Ecology-National Estuary Program (NEP) grant that promotes this tool. This project involves wetlands hydrologic and vegetative restoration on several parcels in the Black Slough drainage. The hydrologic restoration involves decommissioning drainage ditches and creating small shallow detention ponds in areas adjacent to Black Slough as an approved component of the Nooksack Tribe's Ecology-NEP grant

project. The project would eliminate agricultural activities on 30 acres and provide shade to promote cooler temperatures.

Expected benefit(s): 2 AFY offset, NEB (wetland enhancement & creation, WQ improvements, vegetation restoration)

Project ID 21: Stewart Mountain/South Fork Nooksack conservation sale

Aggregated Subbasins: Lake Whatcom, Lower Nooksack, South Fork Nooksack

The Stewart Mountain/South Fork Nooksack Conservation Easement Acquisition project is an approximately 7,000-acre conservation easement purchase by the Whatcom Land Trust on the east slope of Stewart Mountain, the portion of Stewart Mountain that is primarily in the South Fork Nooksack Watershed. The conservation easement would increase harvest rotations from 40 to 80 years, restrict logging of slopes over 60% grade, and increase riparian buffers substantially to 300 feet or 500 feet, depending on the stream type. Project proponents have been working on modeling water quality and quantity benefits of allowing commercial forests to mature and adopting more restrictive logging practices. The instream flow impacts would be substantial over time. A general estimate of instream flow benefits by project proponents is in the 10 to 20 cfs range. Further refinement of these estimates, as well as the estimates by aggregated subbasin is needed. In the table, as developed by the WRIA 1 planning process, the lower end of the suggested range of quantities was used, then divided equally into the three impacted aggregated subbasins. Since offset amounts would not be fully realized within 20-yr. planning horizon, offset amounts are not included in Table Totals.

Expected benefit(s): 7,240* AFY offset, NEB [reduction in logging frequency and total area, WQ improvements, increased riparian buffers]

*Since offset amounts would not be fully realized within 20-yr. planning horizon, offset amounts are not included in calculated totals for projected offsets.

Project ID 23: Middle Fork Porter Creek alluvial fan project

Aggregated Subbasin: Middle Fork

A 200-foot section of the levee on the right bank of Porter Creek would be breached to allow development of the alluvial fan, with the old channel partially excavated to allow for reconnection with the former pathway of Porter Creek and inundation of the floodplain. A large berm, composed of material excavated for the side channel, would be placed just downstream of the removed levee to prevent the side channel from being dewatered during the low flow summer months. The berm would be fortified with logs at the toe to prevent scouring and provide some cover for salmonids. Logs along the banks of Porter Creek may be toppled to help direct high flows into the forested side channels on the right bank, providing refugia habitat for juvenile salmonids. Juvenile salmonids would benefit from 2,300 feet of side channel rearing habitat in the Porter Creek area by increasing connectivity with the floodplain and side channels. The reconnected floodplain provides up to 11.2 acre-feet of additional groundwater storage capacity. Expected outcomes include: additional cool water pools salmonids for holding; improved salmonid spawning in the reach; reduced scour and deposition of fine sediment on salmon redds; improved survival of juveniles; improved flow during summer low flow periods, as well as creating resiliency due to climate change impacts.

This Lummi Nation project is funded by Ecology under grant WRPIFA-1719-LuInBC-00013.

Expected benefit(s): 11.2 AFY offset, NEB [floodplain reconnection, levee removal, salmon habitat improvements]

Project id 24: Birch Bay Water & Sewer District / City of Blaine deep wells

Aggregated Subbasin: Lower Nooksack

The Birch Bay Water and Sewer District (district) and City of Blaine (city) have been investigating the extent of a deep aquifer, disconnected from the Nooksack River, located near Blaine. This deep aquifer is generally productive, contains groundwater that would discharge to marine water, and is separated by bedrock ridges from the deep connate water found near the City of Lynden. The district and city would like to consider establishing a well field completed in this deep aquifer and piping the water to the east into the Lower Nooksack aggregated subbasin to alleviate municipal water supply issues (primarily high nitrate concentrations in the Sumas Outwash Aquifer and lack of sufficient water rights to meet anticipated growth).

If water imported from this well field is able to replace water used under an existing water right, that water right can be placed into the Trust Water Rights Program and could be used to offset consumptive impacts in the Lower Nooksack Aggregated Sub-Basin. Other opportunities include use of the water for augmentation purposes to surface waters.

Preliminary work for this project is funded by Ecology under grant WRPIFA1719-BiBWSD-00014, and previously under WRPIFA-1517-BiBWSD-00048.

Expected benefit(s): 880 AFY offset

Project ID 26: Convert surface water users to groundwater sources

Aggregated Subbasin: Lower Nooksack

Convert ten surface water right holders to groundwater sources.

1. S1-*08081C, Bertrand Creek, 0.34 cfs (152.6 gpm).
2. S1-*07174C, Bertrand Creek, 0.25 cfs (112.2 gpm).
3. S1-006738CL and S1-070366CL, Van Ditch – Bertrand Creek, 1 cfs (448.8 gpm).
4. S1-006739CL, Bertrand Creek, 1 cfs (448.8 gpm).
5. S1-*05661C, Double Ditch – Fishtrap, 0.1 cfs (44.8 gpm).
6. S1-*07948C, Fishtrap Creek, 0.2 cfs (89.8 gpm).
7. S1-*08700C, Fishtrap Creek, 0.3 cfs (134.6 gpm).
8. S1-*01549C, Bertrand Creek, 0.8 cfs (359.1 gpm).
9. S1-*01142C, Double Ditch, 1 cfs (448.8 gpm).
10. S1-21626C, Mormon Ditch, 0.22 cfs (98.7 gpm).

It is assumed that each individual conversion would require a water right change application to be processed through the cost reimbursement program, a new well, and associated equipment. The Whatcom Watershed Improvement Districts are the project sponsor.

This project is applying for a permit under the legal framework established in RCW 90.94.090 for the *Foster* pilot projects. Additionally, the project may apply for the retiming exemption described in Chapter 5.

Expected benefit(s): 158 AFY offset, NEB [removal of surface water pumps/pipes, PTOs, and clearing of streamside vegetation for equipment diversions, aquifer properties will dampening depletion effects]

Project ID 28: Storage projects, including gravel pits

Aggregated Subbasin: Lower Nooksack

Divert spring high flows or floodwaters from the Nooksack River, at times when minimum instream flows are met, south of Everson into existing gravel pits (no longer mined) near the intersection of Pole Road and the Everson-Goshen Road. The high flow water slowly infiltrates through the porous lake beds, recharging the aquifer and creating a localized high groundwater feature. Groundwater then radially flows outward, adding cold flow to the groundwater-fed tributaries and Mainstem Nooksack River late in the summer/fall during lower flows. The movement of the groundwater should be monitored via a network of existing (or proposed) wells surrounding the gravel mines and stream gages. Currently, there is only a gage on TenMile. This project should include adding gages or at least monitoring locations to Fourmile, Scott Ditch, and Cougar Creek. This project assumes a total diversion of approximately 365 afy of water, based on flooding four of the large pits, which equates to approximately 5 feet of water level increase. There is no current project sponsor, but Ecology expects to work with the community to identify a sponsor.

Expected benefit(s): 365 AFY offset

Project ID 44: Vista Road project

Aggregated Subbasin: Coastal North

The PUD is constructing a pipeline to move water from its Plant No. 2 on the Nooksack River near Trigg Road in Ferndale to the Grandview Industrial Park, located at Salashan Parkway in Ferndale, ¼-mile west of Interstate 5 on State Route 548, Grandview Road. The project assumes that water would be conveyed from the entrance to the business park to the northeast to discharge directly into the existing stormwater pond that is connected to California Creek on Salashan Loop Road. The project includes construction of 2,200 LF of 6-inch PVC pipe installed in the Whatcom County roadway, sufficient to provide a constant discharge of 120 gpm to more than offset the entire estimated future consumptive use from new domestic exempt uses in the Coastal North aggregated sub-basin (111 acre-feet per year (afy)), and an energy dissipater to aerate the water prior to discharge into the pond that is connected to California Creek. Fish homing (scent) issues would be addressed. Additional work by the project proponent and other interested parties would likely provide for habitat and other ecological improvements in the area.

This project is funded by Ecology under grant WSRP-2019-WCPUD1-00019. Grant sponsor's budget proposes \$200,000 out of the \$700,000 grant for habitat improvements associated with the pond and California Creek, including culvert removal.

Expected benefit(s): 194 AFY offset, NEB [habitat restoration, WQ improvement, culvert removal/fish passage improvement]

Project ID 45: Lake Terrell/Coastal Drainages

Aggregated Subbasin: Coastal North

The Whatcom Co. PUD #1 would provide water from its existing industrial supply pipeline serving the Cherry Point area to augment flows in Terrell Creek to offset domestic groundwater permit-exempt well impacts in the Coastal North aggregated sub-basin. This project involves tapping into the existing high-pressure supply line and discharging water into the Lake Terrell/Terrell Creek drainage. The project includes tapping into the Aldergrove Road supply line in the vicinity of the Terrell Creek crossing and discharging up to 120 gpm of water through a discharge structure into Terrell Creek to increase flows downstream. Water quality monitoring is assumed required based on the discharge or out of basin water within Terrell Creek (potentially dissimilar water chemistry). Fish homing (scent) issues would be addressed. Additional work by the project proponent and other interested parties may provide for habitat and other ecological improvements in the area.

Expected benefit(s): 324 AFY offset, NEB [habitat restoration, WQ improvement]

Project ID 46NG¹⁰: WRIA 1 Conservation Program (previously titled: improve outdoor water use efficiency)

Aggregated Subbasin: WRIA 1-wide (all)

As originally conceived, this was an outdoor-only efficiency project. However, the project was subsequently modified by the WRIA 1 Planning Unit to provide for indoor and outdoor water conservation on a WRIA-wide basis. This program may include, but is not limited to, such things as: improved maintenance practices for agriculture irrigation systems, advanced methods of irrigation scheduling, soil-moisture sensors improvements to irrigation efficiencies, xeriscaping, drought-tolerant plantings, foregoing irrigation by homeowners, and other domestic and agricultural conservation practices.

Whatcom County Council approved \$50,000 towards this endeavor, for both domestic and agricultural conservation. Additional funding would likely be needed to fully realize this program.

Expected benefit(s): unknown AFY offset

Chapter 7 – Adaptive Management

Whether or not the actions in the proposed WRIA 1 rule and rule supporting documents achieve NEB depends upon the assumptions used to determine potential impacts from domestic permit-exempt wells, implementation of projects and actions to achieve the consumptive use offset and NEB, and the accuracy of projected benefits from consumptive use offset and NEB projects and actions. To address these variables and uncertainties, Ecology proposes an adaptive management approach. Adaptive management is an iterative and systematic decision-making process that aims to reduce uncertainty over time and help meet performance goals by learning from the progress and outcomes of projects and actions.

As described in the consumptive use estimate chapter, there is a level of uncertainty regarding Ecology's estimate of the consumptive-use impacts associated with future domestic permit-exempt wells. To account for this uncertainty, Ecology applied a safety factor of 1.5 times the projections (1.5 Multiplier or 150% safety factor). Ecology is confident that this approach addresses any uncertainty with growth projections and related impacts in instream resources.

There is additional uncertainty with the water quantity offset estimates associated with projects and actions and the sustaining benefits associated with projects included to meet NEB. Ecology applied several criteria, described in

¹⁰ Modified from original RH2 Technical Memo description.
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Chapter 6, to select 13 projects from the Planning Units list of 45 projects in order to select those projects with a reasonable assurance of being successfully carried out. The adaptive management approach proposed here focuses on ensuring that the suite of water offset and NEB projects provide the anticipated benefits.

7.1 Adaptive Management Approach

Whatcom County, in its role as Lead Agency, will prepare annual reports and 5-year self-assessments, as described below. This two-tiered approach facilitates adaptive management in the event that the WRIA 1 permit-exempt domestic well growth projections and offset and NEB projects benefits differ from the assumptions made in this rule supporting document. While Whatcom County will be responsible for tracking the overall Streamflow Restoration implementation effort, individual project tracking will be the responsibility of each project proponent implementing their respective RCW 90.94.020 project. Whatcom County's role focuses on gathering and compiling information and submitting it to Ecology.

1. Annual Reporting

- a. *Whatcom County will prepare and submit a brief memo (less than 5 pages) to Ecology by April 1 of the year following rule adoption, and every year thereafter during the planning horizon period, describing:*
 - i. *The number of new building permits associated with new domestic permit-exempt wells issued in the prior calendar year.*
 - ii. *A brief (no more than a few sentences) description of the status of each of the WRIA 1 Streamflow Restoration projects/actions undertaken to meet the offsets and/or NEB related to this rule amendment.*
 - iii. *Any other RCW 90.94.020 rule implementation actions to date, including any changes in approach since the last report, and any challenges identified that may require a change in approach.*

2. Five-Year Self-Assessment

- a. *Whatcom County will prepare and submit to Ecology by July 1, 2025, and every five years thereafter during the planning horizon period, a description of:*
 - i. *The total (cumulative) number of new building permits associated with domestic permit-exempt wells issued from January 19, 2018 thru the most recent calendar year.*
 - ii. *The status of the implementation of WRIA 1 Streamflow Restoration (RCW 90.94.020) projects/actions.*
 - iii. *An estimate of the quantity of water and instream flow benefits realized through implementation of projects/actions identified in this WRIA 1 rule supporting document or other Streamflow Restoration (RCW 90.94.020) work.*
- b. *In addition to describing accomplishments to date, this Assessment is an opportunity to recommend substitutions of new projects or actions if some of the currently proposed projects/actions are not proving to be as feasible or providing the results as anticipated. Whatcom County will provide this information in consultation with project proponents. Ecology will review any proposed changes and make a final decision on modifications to the projects and actions identified in this rule-supporting document.*
- c. *It is intended that the Five-Year Assessment is in addition to the Annual Reporting. However, where information is redundant, it does not need to be repeated and may be referenced.*

As part of the Five-Year Self-Assessments, project proponents will be required to provide the County and Ecology with information necessary to track implementation and progress on any projects included in Chapter 6 or added through the five-year assessment process. This information includes, but is not limited to:

- Entity responsible for implementation and staff/contact information
- Timelines and dates of completion for actions implemented
- Legal issues encountered
- Identification of permits required and schedules for obtaining those permits
- Estimated costs associated with implementation, operation and maintenance, if applicable
- Secured and/or potential funding source(s), if applicable
- Overall assessment of the progress, including recommendations for potential adjustments if the action is not being successfully implemented
- Other information of interest/relevance

One of the most challenging aspects of the Five-Year Self-Assessments will be estimating the quantity of flow benefits realized through project implementation. In most cases, the estimates used will be the same as those provided in this rule supporting document, which are based on a series of outcome assumptions. Depending on the progress of individual projects, the entity implementing the project may choose to update the flow benefit estimates, based on conditions and circumstances encountered.

3. Ongoing Compliance with RCW 90.94.020(5)

Whatcom County will continue to fulfill the requirements of RCW 90.94.020(5) - which includes recording relevant restrictions on titles, and recording and reporting the number of building permits issued by the County – after Ecology’s adoption of this rule amendment.

The overall purpose of the adaptive management approach is to enable adjustments based on new or more accurate information associated with permit-exempt domestic well growth and project implementation. As indicated in Item 2(b) above, the Five-Year Self-Assessment will be an opportunity to suggest alternative projects and/or actions if those listed in Chapter 6 are not implementable as anticipated. Ecology will make any changes to the project lists through a technical memorandum, which will describe and document the justification for the change. Substitution of projects/actions will be made at Ecology’s discretion based on information contained in the Five-Year Self-Assessments and other data readily available (such as grant reports to Ecology).

Chapter 8 – Local Government Requirements and Permit Fee

RCW 90.94.020 includes several requirements for cities and counties issuing building permits and approving subdivisions. It also establishes a fee for building permit applicants who would rely on new domestic permit-exempt wells for water supply.

The requirements for cities and counties in RCW 90.94.020 are:

(5) Until an updated watershed plan is approved and rules are adopted under this chapter or chapter 90.54 RCW, a city or county issuing a building permit under RCW 19.27.097(1)(c), or approving a subdivision under chapter 58.17 RCW in a watershed listed in subsection (2) of this section must:

(a) Record relevant restrictions or limitations associated with water supply with the property title;

(b) Collect applicable fees, as described under this section;

(c) Record the number of building permits issued under chapter 19.27 RCW or subdivision approvals issued under chapter 58.17 RCW subject to the provisions of this section;

(d) Annually transmit to the department three hundred fifty dollars of each fee collected under this subsection;

(e) Annually transmit an accounting of building permits and subdivision approvals subject to the provisions of this section to the department;

The requirement for building permit applicants relying on a new domestic permit-exempt well in RCW 90.94.020(5)(f)(i) is:

An applicant shall pay a fee of five hundred dollars to the permitting authority;

Ecology proposes to adopt these same requirements in the WRIA 1 rule amendment as part of our modification of the domestic permit-exempt withdrawal limits. We are aware that the WRIA 1 planning participants considered, but did not come to full agreement, on modifying the fee associated with new domestic permit-exempt wells. However, Ecology decided to incorporate these requirements without change, in the following new section (see Chapter 2 for a discussion of 173-501-065(1), (2) and (5)):

WAC 173-501-065 Permit-exempt groundwater for future domestic uses.

(3) Consistent with the provisions of RCW 90.94.020(5), a city or county issuing a building permit under RCW 19.27.097(1)(c), or approving a subdivision under chapter 58.17 RCW, in this WRIA must:

(a) Record the limitations as described in WAC 173-501-065(5) with the property title;

(b) Collect the applicable fee, as described in WAC 173-501-065(4);

(c) Record the number of building permits issued under chapter 19.27 RCW or subdivision approvals issued under chapter 58.17 RCW subject to the provisions of this section;

(d) Annually transmit to the department three hundred fifty dollars of each fee collected under this subsection; and

(e) Annually transmit an accounting of building permits and subdivision approvals subject to the provisions of this section to the department.

(4) Consistent with the provisions of RCW 90.94.020(5), an applicant for a building permit shall pay a fee of five hundred dollars to the permitting authority.

Chapter 9 – NEB Determination

RCW 90.94.020(4)(c) states that prior to adoption of an updated watershed plan: “...the department must determine that actions identified in the watershed plan, after accounting for new projected uses of water over the subsequent twenty years, will result in a net ecological benefit to instream resources within the water resource inventory area.”

RCW 90.94.020(7)(b) further states that if a watershed plan that meets the requirements of this section is not Preliminary Draft for Public Comment – April 8, 2019

adopted, “the department must adopt rules for that water resource inventory area that meet the requirements of this section by August 1, 2020.” This chapter provides Ecology’s analysis and determination on whether the NEB requirement is met.

In June 2018, Ecology issued Interim Guidance for Determining NEB¹¹ (Interim Guidance) to assist Streamflow Restoration planning groups on expedited planning tracks, including WRIA 1. This guidance states:

A Net Ecological Benefit determination means anticipated benefits to instream resources from actions designed to restore streamflow will offset and exceed the projected impacts to instream resources from new water use.

The Interim Guidance goes on to provide guidance on the process and information Ecology will use to evaluate NEB. The guidance describes the following four elements to the analysis and evaluation: 1) estimate 20 years of new domestic permit-exempt water use; 2) describe and evaluate offset projects; 3) describe how the planned projects and actions are linked or coordinated with other existing plans and actions, and 4) provide a description and evaluation that the projects and action will achieve NEB.

9.1 Estimating 20 years of new domestic permit-exempt water use

The first element of the NEB guidance describes estimating 20 years of new domestic permit-exempt water use at a scale that allows meaningful determinations. In Chapters 2, 3, and 4 of this document, Ecology describes: aggregated subbasins and use limits for new domestic permit-exempt wells, and then calculates 20 years of new consumptive domestic permit-exempt use based on data and technical information from the earlier Streamflow Restoration planning work. Together, this information led to Ecology’s estimate of 390 acre-feet per year needed to offset 20 years of domestic permit-exempt well consumptive water use. This includes a 150% safety factor.

9.2 Describing and evaluating offset projects

The second element of the NEB guidance discusses describing and evaluating offset projects, including both water offset and non-water offset projects/actions. In Chapters 5, 6, and 7 of this document, Ecology describes: amending the current WRIA 1 instream flow rule (WAC 173-501) to allow retiming projects that benefit instream resources; projects and actions to offset the 20 years of projected domestic permit-exempt consumptive use; and an adaptive management framework to track the progress of projects and actions over time.

RCW 90.94.020 lists specific requirements for domestic permit-exempt water offset projects: “[a]t a minimum, the watershed plan must include those actions that the planning units determine to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic water use. The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary. Lower priority projects include projects not in the same basin or tributary and projects that replace consumptive water supply impacts only during critical flow periods;” (90.94.020(4)(b)). The law prioritizes offset projects that are in-time and in the same tributary, but recognizes that this may not always be feasible. The law also authorizes offset projects in other parts of the basin from where impacts occur (out-of-place projects), and authorizes impact offsets that are out-of-time. This new standard is a significant departure from the legal requirements for permitted water users and from those that existed for domestic permit-exempt uses prior to adoption of RCW 90.94. The law recognizes that new domestic permit-exempt wells located in closed basins will impair instream flows and established Chapter 90.94 RCW, Streamflow Restoration, to address this.

¹¹ *Interim Guidance for Determining Net Ecological Benefit*, June 2018, Publication 18-11-009
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9.2.1 Planning Unit Projects

While WRIA 1 did not finish their planning process and approve a watershed plan update in the time allotted by the law, the WRIA 1 planning participants did extensive project identification and quantification work in support of activities needed to satisfy the statutory requirements of RCW 90.94.020. In the end, The WRIA 1 planning process, including the staff team and Planning Unit, developed a list of 45 projects to offset the consumptive use impacts from new domestic permit-exempt wells in the watershed and help provide a NEB. Their work is memorialized in meeting notes (January 2018 - January 2019) and much of the project information is included in a document submitted to Ecology in October 2018 (*Final Task 2 Deliverable – Projects and Actions, October 2, 2018*) by RH2 Inc.

The WRIA 1 Planning Unit, in consultation with the Watershed Staff Team, categorized projects as “Early Action,” “Preliminary Projects, or “Other Projects,” based on their near term financial and technical feasibility and project planning maturity. A short narrative description of these individual projects was developed by the consultants, in consultation with the project proponent or others knowledgeable about the project. These descriptions estimate the quantity of water offset for each potential project and identify any additional net ecological benefits (i.e., if the project has habitat-related benefits).

9.2.2 Ecology’s Project List

Ecology leaned heavily on this list of locally-approved projects and actions for achieving offsets for projected consumptive use impacts and achieving a net ecological benefit.

As discussed in Chapter 6, Ecology reviewed and identified a suite of projects from the WRIA 1 planning effort’s list of approved projects that Ecology believes, once implemented, offer a reasonably assurance that the consumptive use impacts of new domestic permit-exempt wells from 2018-2038 will be offset. In total, Ecology’s project list provides an estimated 3,767 acre-feet of offset water each year. This is an order of magnitude greater than 390 acre-feet per year, Ecology’s estimate of the volume needed to offset impacts from 20 years of domestic permit-exempt wells, including a 150% safety factor. In addition to the offset benefits, many of these projects provide habitat improvements at specific project locations.

9.3 Project and Action Connections to Other Work

The third element of the NEB guidance discusses how the planned projects and actions are linked or coordinated with other existing plans and actions. Several of the projects described in Chapter 6 build on existing projects and/or are coordinated with other local plans and actions. These include:

- Project ID 1: Dairy waste processing/treatment. This project stems from a partnership between Coldstream Farm/Regenis, PUD #1, the Department of Agriculture, and a local farm. It is consistent with meeting local (Shellfish Recovery, Whatcom LIO, WRIA 1 Salmon Recovery), state, and federal goals for water quality improvements, and water resource improvements for instream benefits and salmon recovery.
- Project ID 2: Groundwater augmentation of tributaries. This project comes from the Bertrand Watershed Improvement District. It is consistent with the WID’s goals, and is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream benefits and salmon recovery.
- Project ID 8: MAR—North Fork site. This project is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream benefits and salmon recovery.
- Project ID 19: Skookum Creek restoration. This project represents the next step in the Whatcom Land Trust’s large-scale restoration project in a tributary to the South Fork of the Nooksack River. The South Fork is noted as a primary habitat recovery area for Salmon Recovery purposes, with the purpose of recovering WRIA 1

ESA-listed Spring Chinook population. This project is consistent with improvements for meeting State TMDL (for high temperature) goals in the South Fork.

- Project ID 19NG: Wetland Restoration, enhancement, and/or creation. This project represents the next step in a completed watershed conservation plan for the South Fork of the Nooksack River. The South Fork is a primary habitat recovery area for Salmon Recovery purposes, with the purpose of recovering WRIA 1 ESA-listed Spring Chinook population. This project is consistent with improvements for meeting State TMDL (for high temperature) goals in the South Fork.
- Project ID 21: Stewart Mountain/South Fork Nooksack conservation sale. This project continues work accomplished by the Whatcom Land Trust and local landowners to provide for increased water quality and water quantity benefits for Lake Whatcom, the Lower Nooksack, and the South Fork Nooksack. This project is consistent with improvements for meeting State TMDL (for high temperature) goals in the South Fork, and meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream benefits and salmon recovery.
- Project ID 23: Middle Fork Porter Creek alluvial fan. This project is the next phase of recovery and restoration work in Middle Fork Porter Creek. Funding has been leveraged to provide for multiple instream and out-of-stream benefits, including increased habitat, restoration, improved salmon survival. The project is consistent with improvements for meeting local WRIA 1 Salmon Recovery goals.
- Project ID 24: Birch Bay Water & Sewer District / City of Blaine deep wells. This project continues work previously accomplished by BBWSD & COB, and supported by Ecology. Realizing opportunities to provide a new source of water not in continuity to closed surface waters could provide for stream augmentation or replacement of water for water users with existing sources in-continuity to local surface waters. This is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream benefits and salmon recovery.
- Project ID 26: Convert Surface Use to Groundwater Use. Converting direct surface water diversions to groundwater withdrawals has realized significant improvements in instream flows in the Bertrand Creek. This project is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream benefits and salmon recovery; as well, it provides improvements/benefits for the water right holders and is consistent with the goals of many of the local WIDs.
- Project ID 28: Storage projects. Repurposing existing gravel pits (no longer mined) as seasonal storage of re-timed flood waters for discharge during lower flow periods provides great benefits consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream benefits and salmon recovery.
- Project ID 44: Vista Road project. In partnering with numerous local and state partners, the project proponent is leveraging numerous opportunities to improve water quantity, quality, and provide restoration of the site. This project provides offsets, habitat improvements, water quality improvements, and salmon passage improvements. This project is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for habitat restoration, water quality improvements, instream water resource benefits, and salmon recovery.
- Project ID 45: Lake Terrell/Coastal Drainages. This project proposes to provide instream benefits, as well as habitat restoration and water quality improvements. This project is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for habitat restoration, water quality improvements, instream water resource benefits, and salmon recovery.
- Project ID 46NG: WRIA 1 Conservation Program. This program aims at reducing indoor and outdoor water use. This is consistent with state (DOH, Ecology) and local goals to reduce water use, and is consistent with meeting local (Whatcom LIO, WRIA 1 Salmon Recovery) and state goals for water resource improvements for instream water resource benefits, and salmon recovery.

9.4 NEB Description and Evaluation

The fourth element of the Interim Guidance discusses providing a description and evaluation that the projects and action will achieve NEB.

9.4.1 Comparison of Aggregated Subbasin Summer Low Flow and Consumptive Use

Comparisons of the impacts from new domestic permit-exempt wells versus offsets need to consider both the flow benefits and habitat benefits associated with the offset projects and actions strategies. It is important to recognize the relative scale of the impacts and offsets. WRIA-wide, Ecology calculated a projected offset requirement of 390 acre-feet per year for the consumptive uses associated with new domestic permit-exempt wells during the 2018 – 2038 timeframe, including the 150% safety factor. This converts to an annual flow of 0.54 cfs across the entire watershed. If new domestic permit-exempt wells are concentrated in a small area, the impacts could represent a high percentage of measured flow. However, new domestic permit-exempt wells will most likely be distributed at a low concentration throughout the watershed, and the effect of new uses at any one specific location will likely be small and unmeasurable. Surface water flows in the watershed are highly variable throughout the year and summer low flows in small tributaries can be in the single digits (see Table 9.1). In the Mainstem Nooksack River, the 7-day low flow at Ferndale is about 974 cfs (Table 9.1).

Summer low flows for several of the tributary basins are summarized in Table 9.1. For the aggregated subbasins with gages located in their lower reaches, Ecology can quantify summer low flow conditions. This allows us to compare the volume of water leaving the aggregated subbasin during the critical summer low flow period with the anticipated volume needed to offset consumptive use impacts from new domestic uses in that aggregated subbasin. The impacts from the anticipated new consumptive uses are less than one percent of the respective historical summer low flows for the six aggregated subbasins where the comparison can be made. This does not represent the impacts to smaller tributary basins, nor do we forecast consumptive use impacts in these smaller areas. For five smaller tributary basins, their respective summer low flow numbers are listed in Table 9.1 for each gages' period of record.

9.4.2 Habitat Indices

Ecology compared the locations of select Ecology-listed projects and actions with a Washington Department of Fish and Wildlife (WDFW) dataset depicting the relative value of locations throughout the Puget Sound with respect to conservation of fish and wildlife habitats (see Figure 9.1). In 2013, WDFW published the watershed characterization study (Wilhere et. al, 2013) that generated the data used for this map. The study was designed to provide useful, scientifically credible information for smart growth in the Puget Sound Basin. The overall WDFW project developed datasets to assess watershed characterizations for both water resources (flow and quality) and fish and wildlife habitats in terrestrial, freshwater, and marine shoreline environments within the entire Puget Sound. The authors divided the eighteen WRIsAs that surround and contribute to the Puget Sound into 2,940 assessment units.

A straight comparison of the locations of pumping impacts, flow offset strategies, and habitat projects with WDFW's fish and habitat conservation units is not possible since the locations of areas affected by the pumping are not fully defined and often fall within multiple habitat conservation units. However, as indicated in Figure 9.1, the higher value habitat areas are located within the upper half of the WRIA, within the mainstem tributary subbasins (North, Middle, and South Forks of the Nooksack). Multiple offset and habitat projects are located within these higher habitat value areas (green shaded assessment units on the map) within the watershed. These upper tributary basins will experience around six percent of the projected consumptive use impacts from new domestic permit-exempt uses but they will receive the offset benefits from 44 percent of the anticipated volume of offset water projects listed in this report. Once projects on the list are completed, these three mainstem tributary basins will benefit from a net additional 1,648 acre-feet per year in flow. Benefits from these offset projects will flow downstream, through the Lower Nooksack subbasin, where benefits will also be realized.

Additional offset projects are located in the lower reaches of the watershed, areas that expect higher densities of new domestic permit-exempt uses (and, not coincidentally, generally lower value habitat areas – more yellow and orange assessment units on the map in Figure 9.1). Sixty-eight percent of the new domestic permit-exempt well consumptive use offset impacts are expected within the Coastal North, Coastal West, and Lower Nooksack aggregated subbasins.

9.4.3 Salmonid Distribution Indices

Adding the WDFW's Statewide Washington Integrated Fish Distribution (SWIFD) database to the map (Figure 9.2) shows where salmonid species populations are concentrated in the watershed. The upper tributary basins are important not only for their habitat value, but they also contain extensive salmonid species distributions including ESA-listed Chinook, Steelhead, and Bull Trout. Multiple offset projects are located in critical species population areas. These projects will directly benefit the salmonid species present in these reaches. Even the lower habitat subbasins in the western half of the watershed have extensive salmonid species distributions that will benefit from offset projects in these subbasins.

Building on Figure 9.2, Figure 9.3 adds WDFW's SWIFD database to shows where salmonid population life stages are distributed throughout the watershed. The upper tributary basins are important not only for their habitat value, but they also contain extensive salmonid presence distributions including spawning and rearing habitat. Multiple offset projects are located in critical species distribution areas. These projects will directly benefit the salmonid species present in these reaches. Even the lower habitat subbasins in the western half of the watershed have extensive salmonid presence distributions that will benefit from offset projects in these subbasins.

All of the water-offset projects contribute to habitat improvements as they increase streamflow at their respective locations. Most of the aggregated subbasins in the WRIA will achieve offsets that greatly exceed their impact volumes (see Figure 9.4) and therefore contribute to streamflow restoration at the WRIA and aggregated subbasin scales. Only three of the nine aggregated subbasins in the WRIA do not have currently identified projects that will offset the anticipated consumptive uses¹². All three are located in the lower portions of the watershed (Lake Whatcom, Coastal South, and Sumas). Lake Whatcom is highly managed by imported water (Middle Fork diversions) and dam operations, which also restricts fish distribution. The Sumas aggregated subbasin drains to Canada. Coastal South has multiple drainages that flow directly to saltwater. All three have salmonid species present. Sumas and Coastal South have some of the lowest habitat values in the watershed (red shaded assessment units in Figure 9.2). Collectively, these three aggregated subbasins represent about 22 percent of the total anticipated consumptive use impacts from new domestic permit-exempt uses. As a component of the adaptive management protocols of this rule, entities can continue to seek offset projects for these aggregated subbasins to add to the offset project list.

9.4.4 Specific Habitat Projects

Multiple projects have specific habitat enhancement components identified in their project proposals (in addition to their water offset project components). Examples include:

- Project #19NG: wetlands restoration in the Black Slough of the South Fork subbasin where drainage ditches will be decommissioned and detention ponds will be created adjacent to Black Slough. The project will eliminate agricultural activities on 30 acres and provide shade to promote cooler temperatures.
- Project #19: riparian corridor rehabilitation at Skookum Creek in the South Fork subbasin where land acquisition of riparian habitat and the cessation of timber harvesting will permanently allow natural ecosystem function to be re-established; 2.3 miles of riparian buffer on both sides of the creek will be

¹² This does not include WRIA-wide projects/actions, in which offsets and/or NEB are likely to be realized across the WRIA, including in these three aggregated subbasins.

permanently protected. 750 acres of protected buffer in forested riparian zones will reduce sediment, control erosion, increase shading, and delivery of large woody debris to benefit fish habitat.

- Project #21: a 7,000 acre conservation easement purchase in the Stewart Mountain area of the South Fork (overlapping into other watersheds) subbasin will increase harvest rotations, restrict logging on steep slopes, and increase riparian buffers.
- Project #23: alluvial fan restoration at Porter Creek in the Middle Fork subbasin where levee removal and reconnected floodplain provides 11.2 acre-feet of additional groundwater storage with spawning and rearing flow improvements, engineered side channel reconnection and logjams will provide additional rearing habitat, temperature refugia and pool development.
- Project #26: conversion of surface water diversions to groundwater uses in tributary basins of the Lower Nooksack will remove pumps and other structures from Bertrand and Fishtrap Creeks improving habitat in addition to increasing flows.
- Project #44: habitat improvements at California Creek in the Coastal North subbasin associated with culvert reconstruction, stormwater pond repurposing, and habitat enhancements contemplated during construction activities. Grant sponsor's budget proposes \$200,000 of habitat improvements associated with the pond and California Creek, including culvert removal.

9.5 NEB Determination Summary

It is Ecology's determination that NEB is achieved through promulgation of this rule supporting document and implementation of the associated projects and actions. The projects and actions included in Chapter 6 and discussed in this chapter are projected to offset anticipated new consumptive uses by an order of magnitude. With the inclusion of a 150% safety factor, Ecology estimates that 390 acre-feet per year is required to offset the consumptive use impacts associated with the 20 year planning horizon. In total, 2,150 new domestic permit-exempt wells are projected during this timeframe in WRIA 1. Ecology has included a list of projects that add or retime 3,767 acre-feet of offset water to the watershed (Table 9.2), representing a tenfold offset of the estimated consumptive use. The projects described in Chapter 6 on Ecology's list were selected because they were highly likely to be carried out, giving Ecology a reasonable assurance that required offset would be met and NEB would be achieved by the end of the planning horizon. The reasonable assurance is supported by the adaptive management described in Chapter 7.

All of the water-offset projects will provide an ecological benefit to the watershed over and above what is needed to offset new consumptive uses. Additional projects that improve habitat and instream resources and provide additional ecological benefit to the watershed are on the project list. Ecology's adaptive management approach will enable adjustments and course corrections over time and establishes an approach to incorporate new information as well as new projects and actions. At the aggregated subbasin scale, new consumptive uses will likely be a fraction of one percent of the existing summer low flow and in two thirds of the aggregated subbasins, will be offset many-fold if all the projects are carried out.

Ecology's Interim Guidance defines NEB as, "anticipated benefits to instream resources from actions designed to restore streamflow will offset and exceed the projected impacts to instream resources from new water use." Chapter 4 describes the consumptive use estimates and projected impacts associated with new water use. Chapters 3, 6, 7, and 9 describe the range of anticipated benefits associated with the identified projects and actions. Together, the projects and actions identified in this rule support document will offset projected impacts, enhance streamflow and biological function, and result in a net ecological benefit in WRIA 1. For example:

- Projects exceed the impacts by 3,377 acre-feet per year across the nine aggregated subbasins.
- Each project has a local proponent who wants to see these projects realized and will advocate and sponsor projects if funding becomes available.

- Many of the offset projects are located in higher habitat value areas of the watershed.
- Additional water offset projects will be developed within the lower portions of the watershed where a majority of the consumptive use impacts from new domestic permit-exempt wells are anticipated.
- Most of these offset projects are located in higher value salmonid presence and distribution areas.

Ecology is confident that the projects and actions identified and discussed in this chapter and further described in Chapter 6 meet the intent of the legislature and requirements of RCW 90.94, and result in a net ecological benefit to instream resources within WRIA 1.

Potential Offset Project Primary Locations derived from WRIA1-Approved Project List

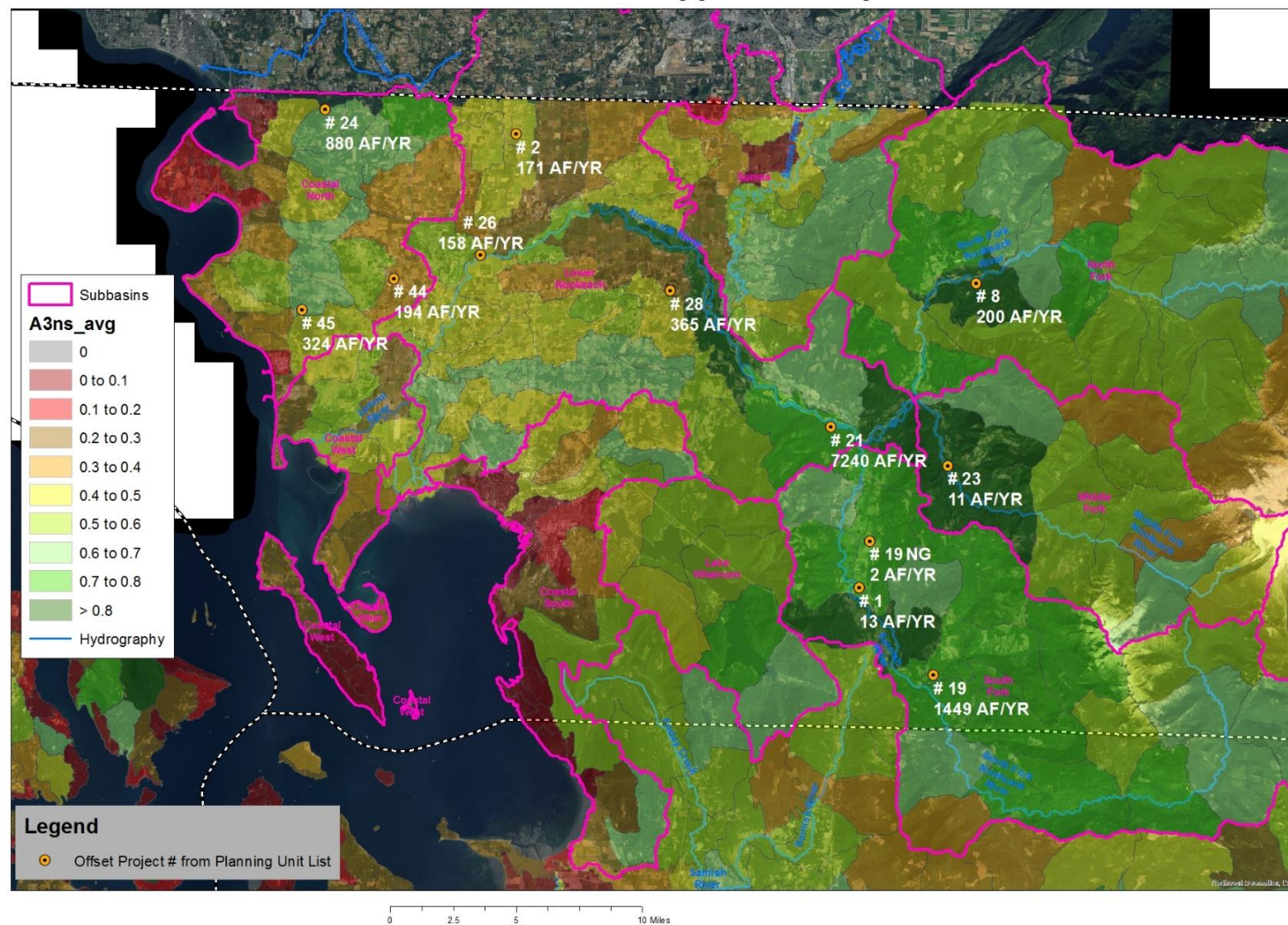


Figure 9.1. Offset Project locations overlain on top of WDFW's Watershed Characterization habitat indices average of the three main components of relative value: hydrogeomorphic features, watershed habitats index, and accumulative downstream habitats.

Potential Offset Project Primary Locations derived from WRIA1-Approved Project List

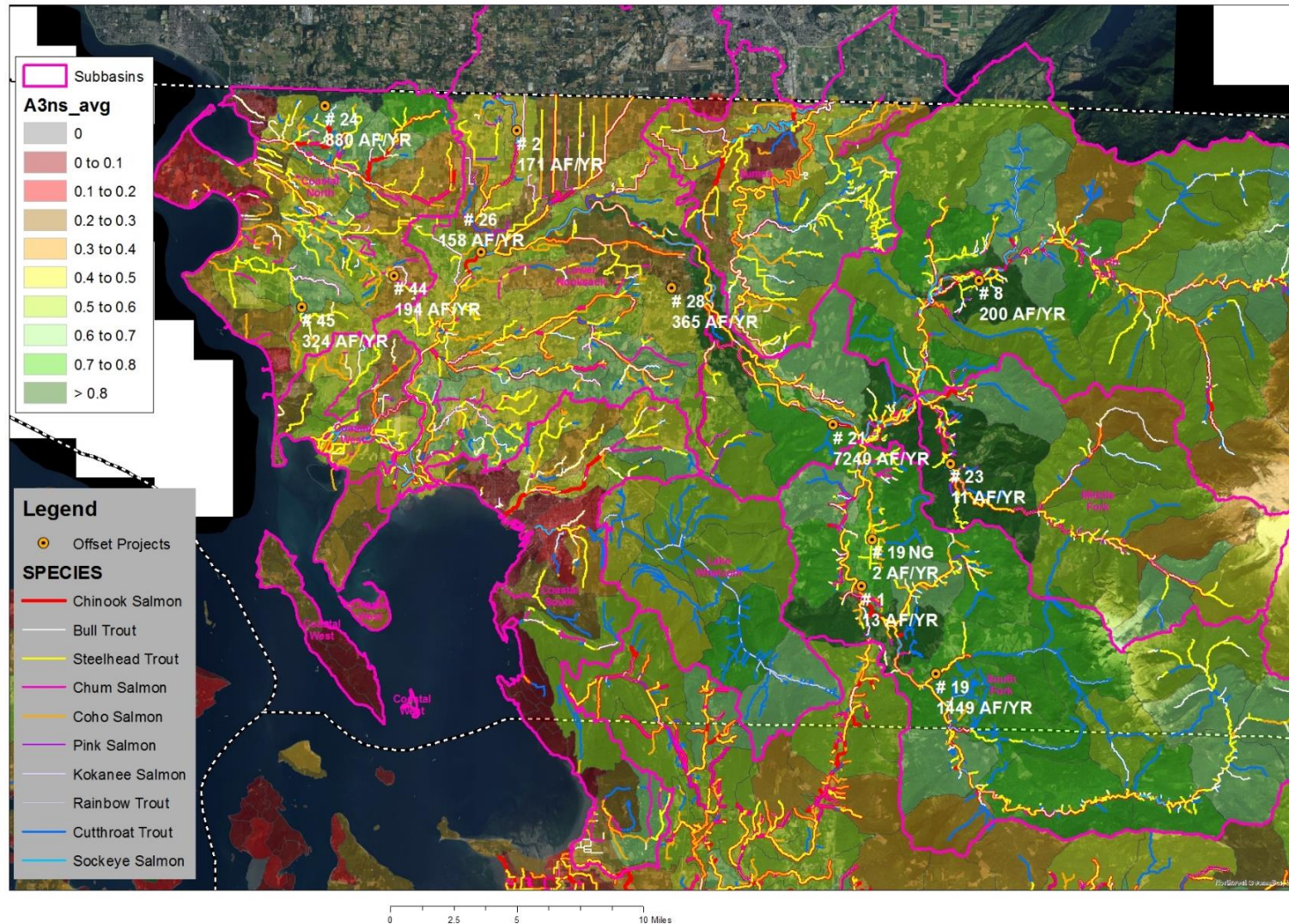


Figure 9.2. Offset Project locations overlain on top of WDFW's Watershed Characterization habitat indices average of the three main components of relative value: hydrogeomorphic features, watershed habitats index, and accumulative downstream habitats. Salmonid distribution from the Statewide Washington Integrated Fish Distribution (SWIFD) database.

Potential Offset Project Primary Locations derived from WRIA1-Approved Project List

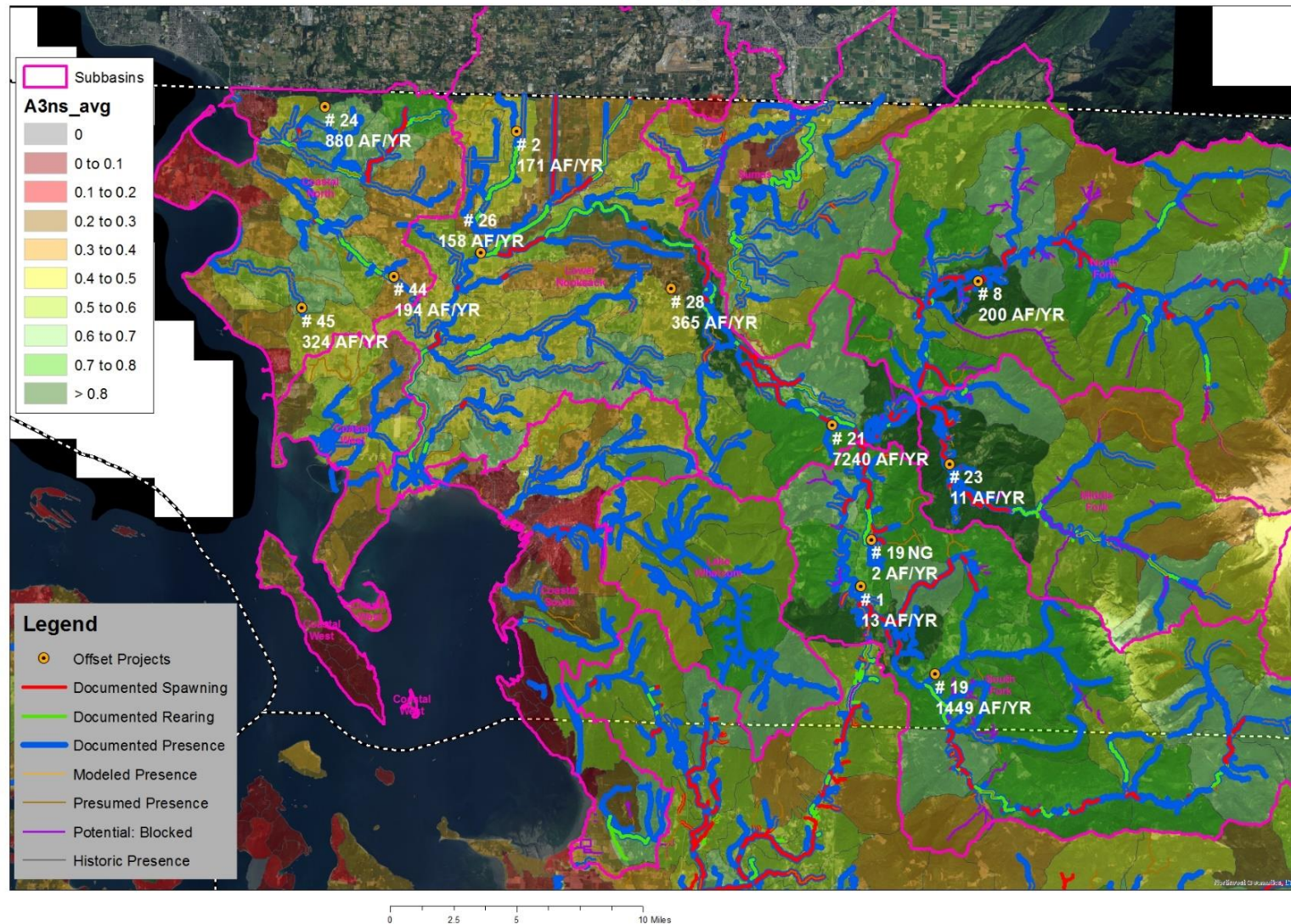


Figure 9.3. Offset project locations overlain on top of WDFW's Watershed Characterization habitat indices average of the three main components of relative value: hydrogeomorphic features, watershed habitats index, and accumulative downstream habitats. Salmonid presence distribution from the Statewide Washington Integrated Fish Distribution (SWIFD) database.

Potential Offset Projects vs Consumptive Use Forecast in Acre-feet per Year

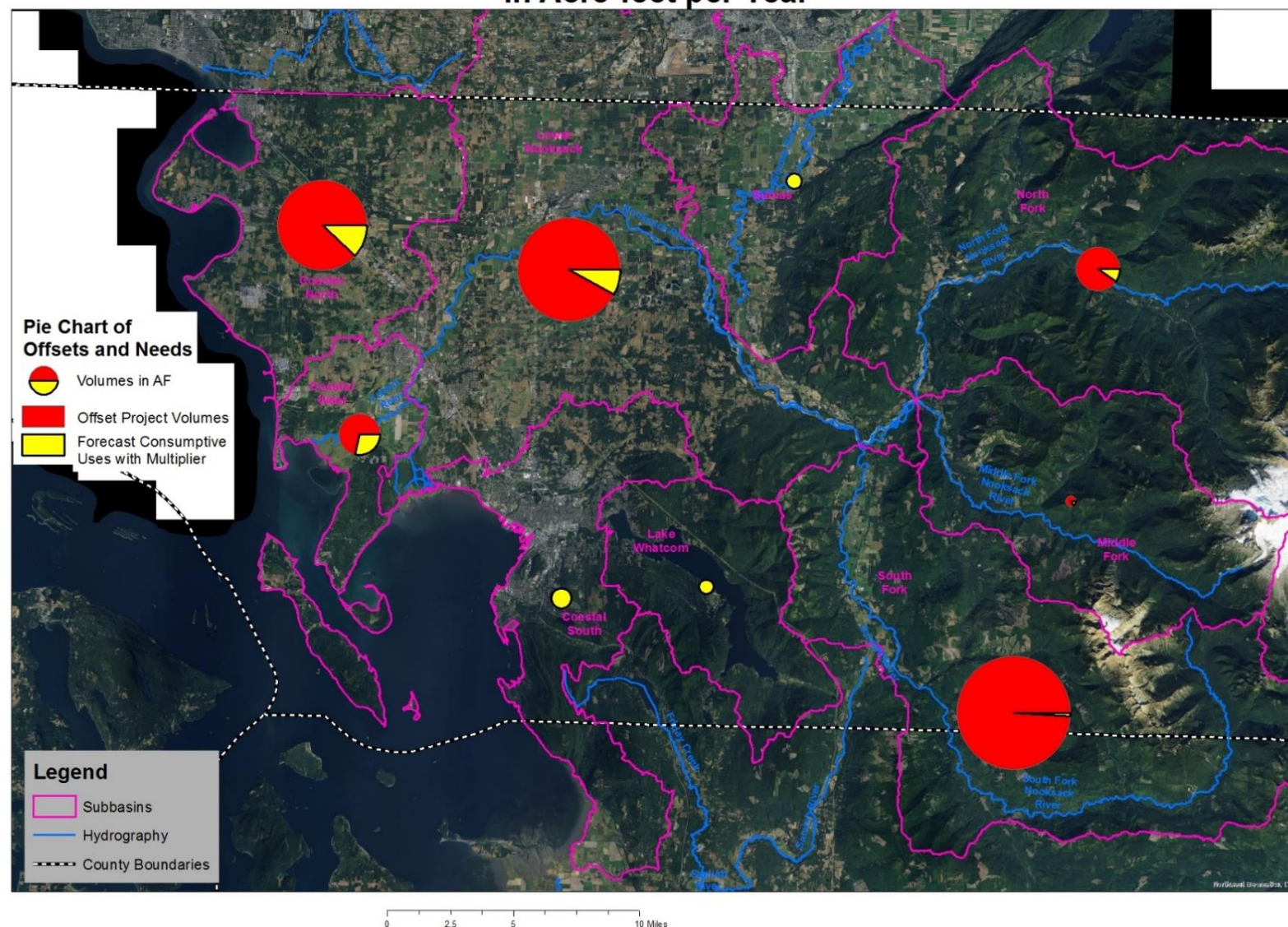


Figure 9.4. Potential offset project volumes, compared to forecasted impacts from new consumptive domestic exempt uses in each aggregated subbasin.

Summer Low Flow Comparison with Forecasted Offset Volumes (including multiplier)									
	Aggregated Subbasins 7 Day Low Flows versus Forecasted Volume in cfs								
	1 - Coastal North	2 - Coastal South	3 - Coastal West	4 - Lake Whatcom	5 - Lower Nooksack	6 - Middle Fork Nooksack	7 - North Fork Nooksack	8 - South Fork Nooksack	9 - Sumas
Period of Record Summer 7 Day Low Flow in cfs				4	974	127	535	110	13
Offset Consumptive Use Volume in cfs (annualized)	0.15	0.059	0.077	0.035	0.14	0.003	0.029	0.004	0.037
Offset Consumptive Use Volume as percent of Low Flow				0.875%	0.014%	0.002%	0.005%	0.004%	0.285%
Gage Number				12203500	12213100	12208000	12207200	12209000	12214500
Tributary Basin Period of Record Summer 7 Day Low Flow in cfs									
	Tenmile Ck 12212900				4.1				
	Bertrand Ck 01N060				4.5				
	Fishtrap Ck 12212000				5.3				
	Dakota Ck 12214000	1.4							
	California Ck 01R090	0.88							

Table 9.1. Summer low flow (7-day low flow) values for tributary basins within the watershed. The Coastal subbasins do not have a single creek that discharges the flow generated within their respective areas as individual streams directly discharge to the Puget Sound. The consumptive use offset volumes anticipated for the new domestic permit-exempt wells forecast to be developed within their respective aggregated subbasins have been annualized for comparison. Smaller tributary basin summer low flows are also included in the Table if they were available.

Project List				Offset (afy)						
Aggregated Subbasin	Coastal North	Coastal South	Coastal West	Lake Whatcom	Lower Nooksack	Middle Fork	North Fork	South Fork	Sumas	Total
Offset Project Totals	819	0	139	0	1,134	11	200	1,464	0	3,767
Offset Needed (afy)	111	43	56	25	101	2	21	4	27	390
Difference	708	-43	83	-25	1,033	9	179	1,460	-27	3,377

Table 9.2. Aggregated Subbasin Offset Project Volumes versus Offset Needed to replace consumptive use impacts.

Chapter 10 – Conclusion

This rule supporting document captures Ecology’s technical considerations and analysis to meet the requirements of RCW 90.94.020. Elements of the analysis on withdrawal limits for new domestic permit-exempt wells and a new exemption to allow retiming projects that benefit instream resources are proposed as amendments for *Chapter 173-501 WAC - Instream Resources Protection Program – Nooksack WRIA 1*. Consistent with the requirements of RCW 90.94.020, this rule supporting document: (1) estimates consumptive use of new domestic permit-exempt wells in WRIA 1 for 2018-2038; (2) sets forth projects and actions to offset potential impacts to instream flows associated with the new domestic permit-exempt domestic water use; (3) provides adaptive management plans; and (4) describes and evaluates for Net Ecological Benefit. As well, the document explains how the proposed rule amendment language is integral to the consumptive water use analysis and how it supports the offset projects listed in this document. These elements required by RCW 90.94.020 are described in this rule supporting document, but are not proposed to be added to the rule.

Ecology prepared this preliminary draft document to provide information to interested parties about how Ecology plans to meet the requirements of RCW 90.94.020, and to gather feedback early in the process to inform the development of the rule proposal. We appreciate the ongoing engagement of the WRIA 1 Planning Unit and Initiating Governments, as well as the interested and engaged citizenry in WRIA 1. We look forward to constructive feedback on our preliminary draft documents.

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