DEPARTMENT OF ECOLOGY
State of Washington

Draft Rule Supporting Document

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

November 2019

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Water Resources Program

Washington State Department of Ecology

Olympia, Washington

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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 develop watershed plan updates[2] or watershed restoration and enhancement plans[3] 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. Streamflow restoration projects and actions are to be prepared with implementation in mind. However, RCW 90.94.020 and RCW 90.94.030 do not predicate the issuance of building permits on the implementation of watershed plans or any projects and actions in those plans.[4]

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. RCW 90.94.020 requires Ecology to adopt rules for WRIA 1 by August 1, 2020. Per RCW 90.94.020(4)(e), any changes to fees or to groundwater withdrawal limits for new uses must be established by rule. This rule amendment does not change fees; it does change limits for groundwater withdrawals.

The limited rule amendment will update and add to water management regulations in WRIA 1 by considering the following:

1) Adding regulations to establish limits for domestic permit-exempt groundwater withdrawals for new users;
2) Changing current regulations to increase flexibility for projects that retime high flows; and
3) Making minor technical corrections.

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[1] *Whatcom Cty. v. Hirst*, 186 Wn.2d 648, 381 P.3d 1 (2016)
[2] See RCW 90.94.020
[3] See RCW 90.94.030
[4] Ecology Water Resources POL-2094.

Ecology developed this rule supporting document (RSD) 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 consumptive use estimated for 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 planning provision; and
- An evaluation for NEB.

This document also explains:

- How the proposed rule amendment is integral to the consumptive water use analysis; and
- How the proposed rule amendment 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 WRIA 1 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

A preliminary draft of the RSD 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 (chapter 173-501 WAC) and through this rule supporting document. Ecology used the feedback to inform the development of the draft rule language and draft RSD.

Ecology collected feedback on the preliminary drafts from April 8, 2019 through May 10, 2019 through our online eComment system and through the mail.

The preliminary draft language and rule supporting document were discussed at three public open houses:

Monday, April 22, 2019
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

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

The open houses were an opportunity for informal conversations about the preliminary draft.

Ecology received 329 formal comments on the preliminary draft rule. The comments were read and analyzed by Ecology, and used to inform development of the proposed rule amendment.

1.2 Draft

This draft of the rule supporting document was prepared in order to address how Ecology proposes to meet the requirements of RCW 90.94.020 through a limited amendment to the WRIA 1 rule (Chapter 173-501 WAC) and through this RSD. Ecology used the feedback received from the preliminary drafts to inform the development of the proposed rule language and this draft RSD.

Ecology will collect comments on the proposed rule amendment and draft rule supporting document through January 17, 2020 through our online eComment system and through the mail.

Online: Submit online comments: http://oth.ecology.commentinput.com/?id=fdG6m

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

Formal public comment will also be accepted at three public hearings listed below.

January 7, 2020
6:00 pm
Fairhaven Middle School, Commons Area
110 Parkridge Rd, Bellingham, WA 98225

January 8, 2020
3:00 pm
Lynden Middle School, Commons Area
8750 Line Rd, Lynden, WA 98264

January 9, 2020
10:00 am
Ecology's Padilla Bay Reserve
10441 Bayview Edison Rd, Mt Vernon, WA 98273

Oral and written comments received at the hearings will be collected and compiled with comments received online and through the mail, and will be available on our website.

1.3 Anticipated Timeline

Date (subject to change)	*Activity*
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. 19, 2019	Propose rule and provide public notice (file CR-102 form)
	Start public comment period with proposed rule text and supporting documents
Jan. 7-9, 2020	Hold public hearings
Jan. 17, 2020	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[5] participants during the WRIA 1 Watershed Management Plan process (1998-2005). In 2010, the WRIA 1 Watershed Staff Team (WST), made up of technical staff from the five Initiating Governments[6] and Ecology, prepared the WRIA 1 "*State of the Watershed Report*"[7] for the Whatcom County community. The report was funded in part by a Washington State Department of Ecology Watershed Planning Grant (Grant #G0600298). In the report, the subbasins were grouped together into "aggregated subbasins" based on the best professional judgement of WST members, using proximity and surficial hydrology/hydrogeology (see Figure 2.1). The established subbasins and aggregated subbasins continued to be used for other watershed planning[8] 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 subbasins[9]. This decision was supported by Ecology's Lead Planner and Lead Technical Reviewer for the WRIA 1 Streamflow Restoration planning effort. The nine aggregated subbasins include:

- Coastal North (CN)
- Coastal West (CW)
- Lower Nooksack (LN)
- Coastal South (CS)
- Lake Whatcom (LW)
- Sumas (SU)
- North Fork (NF)
- Middle Fork (MF)
- South Fork (SF)

Ecology's guidance "*ESSB 6091 – Streamflow Restoration Recommendations for Water Use Estimates*"[10] recommends delineating the WRIA into "suitably sized [areas] to allow meaningful determinations." The aggregated subbasins meet Ecology's guidance recommendations.

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[5] Watershed Planning, as per chapter 90.82 RCW
[6] Whatcom County, Whatcom County PUD #1, the City of Bellingham, the Lummi Nation, and the Nooksack Tribe
[7] https://wria1project.whatcomcounty.org/resources/other-resources/2010-state-of-the-watershed-report
[8] Planning in WRIA 1 apart from Chapter 90.82 RCW
[9] Areas of WRIA 1 within Canada and in the National Forest [no development potential] northeast of the North Fork Nooksack were not included.
[10] Publication #18-11-007 (June 2018)

The decision by the WRIA 1 planning process to use the existing aggregated subbasins, excluding portions in British Columbia, Canada and the National Forest (where no development potential exists) is supported by Ecology. Therefore, Ecology's Streamflow Restoration RSD and associated technical work continue to use the existing, locally agreed-upon aggregated subbasins. The nine aggregated subbasins, as used for the RSD and technical work, are shown in Figure 2.1.

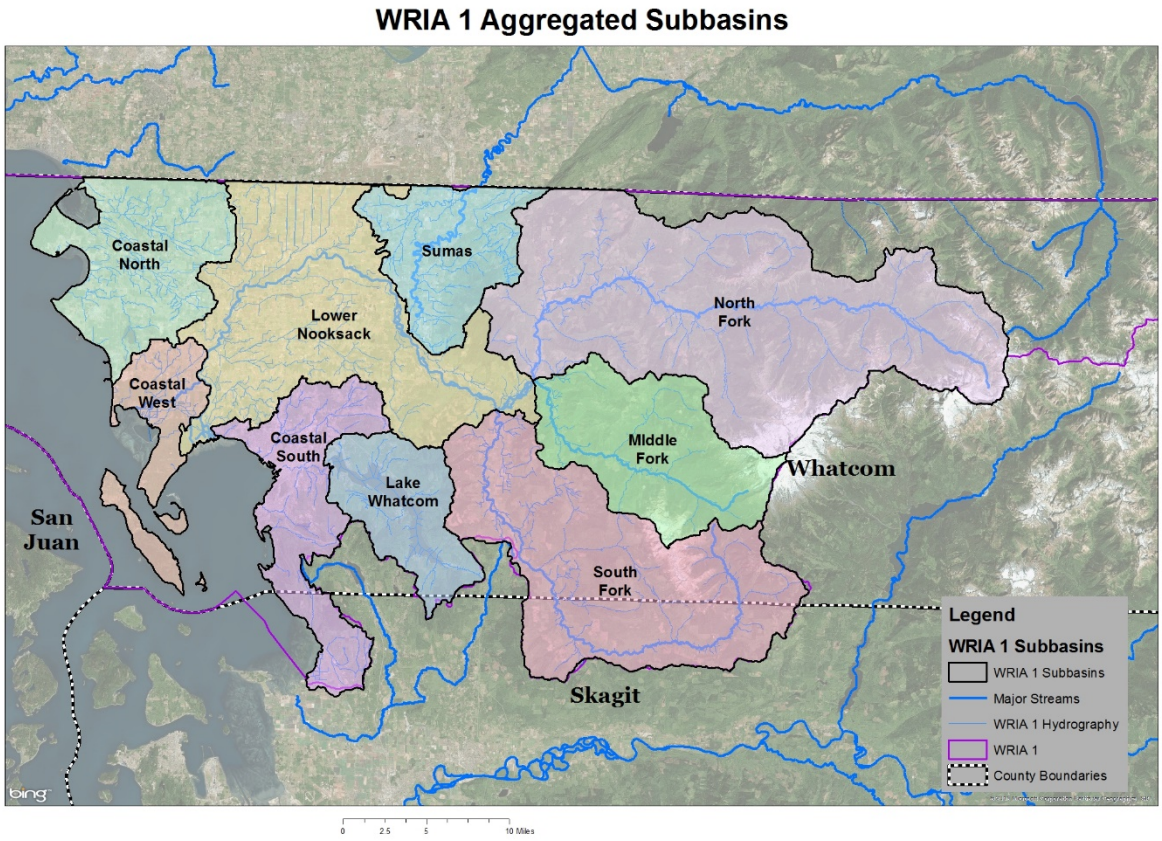

Figure 2.1. The 9 aggregated subbasins of WRIA 1 (U.S. portions) used in the rule supporting document and associated technical work for the amendment to chapter 173-501 WAC.

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 statute creates an exception from permitting requirements for certain groundwater withdrawals (RCW 90.44.050):

- Domestic - 5,000 gallons per day (GPD) daily limit
- Non-commercial lawn or garden - 1/2 acre limit (no GPD limit)
- Stockwatering - no GPD limit
- Industrial - 5,000 GPD daily limit

Decisions in subsequent court cases[11] have further defined the limits on these "permit-exempt" wells. In *Department of Ecology v. Campbell & Gwinn*[12], the Washington Supreme Court held that a development project, such as a residential subdivision, is considered to be supplied with water by a single withdrawal of groundwater. Well(s) supplying water for all the homes in the project are subject to the withdrawal limits under RCW 90.44.050 in aggregate. Though the withdrawal restrictions in chapter 90.94 RCW are specified as "per connection," the limits under *Campbell & Gwinn* also apply.

3.1.1 Initial Limits Under Chapter 90.94 RCW

In 2018, the Washington legislature passed ESSB 6091 (primarily codified in chapter 90.94 RCW), which includes new limits on new permit-exempt withdrawals. These new limits apply to building permit applicants relying on a permit-exempt well for a new home after January 19, 2018. The water use restrictions adopted in the legislation remain in place unless and until Ecology amends the limits through rulemaking.

The 2018 legislation established a new type of withdrawal limit called a maximum annual average (MAA) withdrawal limit on some new permit-exempt withdrawals. The MAA withdrawal limit was initially set at 3,000 GPD for new "domestic use" in WRIA 1 (RCW 90.94.020(5)). The term "domestic use" is not defined in chapter 90.94 RCW. Ecology has heard many different opinions and perspectives regarding the Legislature's intent when it used the term

[11] *See Department of Ecology v. Campbell & Gwinn, LLC* , 146 Wn.2d 1, 9-10, 43 P.3d 4 (2002); *Five Corners Family Farmers v. State*, 173 Wn.2d 296, 268 P.3d 892 (2011).
[12] *Campbell & Gwinn,* 146 Wn.2d at 9-10.

"domestic use" and other terms ("new water use" and "consumptive use") in the 2018 legislation. Ecology is implementing the law as it is written, and harmonizing its numerous sections. To ensure transparency, consistency, and conformity in implementing the law, Ecology has published a Policy and Interpretive Statement (POL-2094)[13] that includes how we interpret "domestic use" in the MAA limit and other terms not defined in chapter 90.94 RCW.

Harmonizing the expressly written sections in chapter 90.94 RCW, Ecology interprets "domestic use" in the MAA withdrawal limits to include both indoor and outdoor home uses, including watering of a lawn and noncommercial garden up to 1/2 acre in size. RCW 90.94.020 and RCW 90.94.030 both set MAA limits for new permit-exempt wells, at 950 GPD in WRIAs governed by RCW 90.94.030, and 3,000 GPD in WRIAs governed by RCW 90.94.020. RCW 90.94.030 goes on to specify that, during a drought, Ecology may curtail use to only 350 GPD per connection for "indoor domestic use only," and that "[n]otwithstanding the limitation to no more than [350 GPD] per connection for indoor use only, an applicant may use groundwater exempt from permitting to maintain a fire control buffer" during a drought. This language leads us to interpret that the larger MAA quantities for "domestic use" authorized in non-drought years (950 or 3,000 GPD, depending on which basin) includes both indoor and outdoor uses for a household, including watering of a lawn and noncommercial garden. If watering of a lawn and noncommercial garden was not included in the quantities specified for "domestic use," then there would have been no need for the Legislature to define the drought use limit as indoor only.

The initial withdrawal limits specified in chapter 90.94 RCW apply to the permit-exempt well withdrawals identified in RCW 90.44.050 for:

- Domestic use; and
- Watering of non-commercial lawn or garden.

Ecology interprets this to mean that a home's withdrawals for these two categories cannot exceed 3,000 GPD as the daily average over the entire year in WRIA 1. Moreover, these initial new limits apply only to building permit applicants after January 19, 2018.

The withdrawal limits under chapter 90.94 RCW do not apply to permit-exempt well withdrawals under RCW 90.44.050 for stockwater, and for industrial use. Limits established under the two laws can be 'stacked' together, regardless of the use of one or multiple wells. For example, an individual living on a property with cows on it, and operating an industry (business) on-site, could potentially withdraw water from a permit-exempt well for stockwatering purposes (with no quantity limit), and for industrial purposes (up to 5,000 GPD), and for water for their home (domestic use), consistent with the withdrawal limits set forth in chapter 90.94 RCW. This could be done from a single well or from multiple wells; however, the number of wells would not change the withdrawal limits.

An individual home within a subdivision may withdraw a maximum annual average of 3,000 GPD under chapter 90.94 RCW, but the entire subdivision project is still restricted to no more

[13] POL-2094 is available at https://fortress.wa.gov/ecy/wrdocs/WaterRights/wrwebpdf/pol-2094.pdf

than 5,000 GPD for all domestic use for all the homes in the project, and irrigation of no more than 1/2 acre of lawn or non-commercial garden, collectively, in the subdivision under *Campbell & Gwinn,* described above.

3.1.2 Modifying Limits Under Chapter 90.94 RCW

Chapter 90.94 RCW states in several places that limits for new permit-exempt withdrawals can be modified. Specifically, a rule adopted under chapter 90.94 RCW may change the withdrawal limit(s) for new groundwater permit-exempt domestic water users for a specific WRIA, but those limits cannot exceed the limits set forth in RCW 90.44.050. RCW 90.94.020 provides for limits that are less than the limits set forth in RCW 90.44.050, and more or less than the initial limits set in RCW 90.94.020. Rulemaking is necessary to modify the limits.

RCW 90.94.020(4)(d) directs consideration of:

> *(ii) 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;*
>
> *(iii)* ***Specific conservation requirements*** *for new water users to be adopted by local or state permitting authorities; [emphasis added]*

RCW 90.94.020(4)(e) provides that changes to the withdrawal limits established in both Chapter 90.44 RCW and chapter 90.94 RCW must be established through the adoption of rules:

> *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. [emphasis added]*

RCW 90.94.020(5) sets certain requirements that remain in place until rules are adopted which modify them:

> *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:*
>
> > *...*
> >
> > *(f)* ***Until rules have been adopted that specify otherwise****, require the following measures for each new domestic use that relies on a withdrawal exempt from permitting under RCW 90.44.050:*
> >
> > *...*

> *(ii) An applicant may obtain approval for a withdrawal exempt from permitting under RCW 90.44.050 for domestic use only, with a* ***maximum annual average withdrawal of three thousand gallons per day per connection****. [emphasis added]*

As discussed above, the law does not apply to stockwatering and industrial use under RCW 90.44.050 per the direction in RCW 90.94.020(8) that the law is not applicable to those uses, and only applies to "new domestic groundwater withdrawals exempt from permitting":

> ***This section only applies to new domestic groundwater withdrawals exempt from permitting under RCW 90.44.050*** *in the following water resource inventory areas with instream flow rules adopted under chapters 90.22 and 90.54 RCW that do not explicitly regulate permit-exempt groundwater withdrawals: 1 (Nooksack); 11 (Nisqually); 22 (Lower Chehalis); 23 (Upper Chehalis); 49 (Okanogan); 55 (Little Spokane); and 59 (Colville) and does not restrict the withdrawal of groundwater for other uses that are exempt from permitting under RCW 90.44.050. [emphasis added]*

3.2 Withdrawal Limit Considerations

Chapter 90.94 RCW allows new domestic permit-exempt wells to impact closed water bodies and water bodies with instream flows that are not met year-round. However, these impacts must be offset and NEB must be achieved in the WRIA. In determining whether to adopt withdrawal limits less than those allowed under RCW 90.44.050, and more or less than the quantities allowed under RCW 90.94.020, Ecology looked at several factors, including:

1) How the higher or lower withdrawal limits effect the quantity of water, and, therefore, the number of projects needed in the WRIA to meet the offset requirements and achieve NEB;
2) WRIA 1 planning discussions about withdrawal limits;
3) Permit-exempt water use limitations in other recent (post-2001) instream flow rules around the state;
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 and actions needed to achieve NEB. Under chapter 90.94 RCW, new individual well users are not required to individually mitigate for their use; instead, projects at the watershed scale provide the offset for indoor and outdoor domestic use. There is a state grant funding opportunity under this law that project proponents can apply for, but funding is not guaranteed. Other local funding for projects may also be available, but again, is not guaranteed. Higher water use increases the required offset amount, which increases the number of projects and the funding that needs to be found and increases the uncertainty that all the impacts from permit-exempt use will be offset. 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, recognizing that there was not consensus on water use standards between the Planning Unit and Initiating Governments.

In order to develop water use standards for new permit-exempt wells, Ecology looked at other water use standards, descriptions, and water reservation assumptions established for domestic permit-exempt wells in recent (post-2001) instream flow rules in other WRIAs in Washington. Ecology considered the range of water use information in rules for the following WRIAs:[14]

- Stillaguamish (WRIA 5), adopted in 2005[15]
    - Domestic water use is defined as indoor use and outdoor watering.
    - A reservation for future water use was created, with each house assumed to use 350 GPD, or 175 GPD if the residence has on-site septic.
    - Outdoor domestic watering is limited to 1/12 acre for single domestic users, and a total maximum of 1/2 acre for group domestic use.
    - Ecology reserves the right to meter.
- Quilicene-Snow (WRIA 17), adopted in 2009[16]
    - A reservation for future water use was created along with a conservation standard for new uses.
    - The single domestic use conservation standard is a maximum of 500 GPD or an annual average of no more than 350 GPD, for all permit-exempt uses authorized under RCW 90.44.050.
    - For group domestic systems, the conservation standard is a maximum use of 500 GPD or an annual average no more than 350 GPD for each residence, and the groups cannot exceed a total use of 5,000 GPD for the group.
    - The Chimacum subbasin has only indoor use, no outdoor use is allowed.
    - Select subbasins have specific provisions for commercial agricultural and industrial uses.
    - Metering is required.
- Dungeness (WRIA 18), adopted in 2013[17]

[14] A map of the WRIAs is available at https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up
[15] Chapter 173-505 WAC
[16] Chapter 173-517 WAC
[17] Chapter 173-518 WAC

  - Domestic use is defined as indoor use only, with outdoor use separate.
  - Water use mitigation is purchased through a water exchange, or requires an approved mitigation plan.
  - Indoor use mitigation through the exchange is available throughout the area, outdoor and stockwatering use are only available in one area.
  - The current prices for mitigation through the exchange:
    - Indoor use (150 GPD): $1000
    - Basic Outdoor (50 ft^2, 210 GPD): $1000
    - Extended Outdoor (75 ft^2, 474 GPD): $2000
    - Stockwatering up to 5 animals (60 GPD): $1300
    - Stockwatering up to 10 animals (120 GPD): $1800
    - Stockwatering up to 15 animals (180 GPD): $2200
  - Metering is required.
- Lewis (WRIA 27), adopted in 2009[18]
  - A reservation for future water use was created, with each house assumed to use 800 GPD, or 240 GPD if the residence has on-site septic.
- Salmon-Washougal (WRIA 28), adopted in 2009[19]
  - A reservation for future water use was created, with each house assumed to use 800 GPD, or 240 GPD if the residence has on-site septic.
- Walla Walla (WRIA 32), adopted in 1977 and amended in 2007[20]
  - Permit-exempt uses other than stockwatering may occur in the Burbank area.
  - High density areas (more than one residence per 10 acres)
    - Limited to domestic indoor and outdoor only, except for stockwatering.
    - Single domestic use is limited to 1,205 GPD, group domestic is limited to 5,000 GPD for the development.
    - New users must provide water-for-water mitigation for outdoor use from May 1 to November 30.
    - Metering is required in high density areas.
  - Low density areas (less than one residence per 10 acres) are subject to the RCW 90.44.050 limits except for stockwatering.

[18] Chapter 173-527 WAC
[19] Chapter 173-528 WAC
[20] Chapter 173-532 WAC

  - Stockwatering can occur as follows:
    - Lot of 10 acres or less: 700 GPD
    - Lot of 10 to 20 acres: 2,500 GPD
    - Lot of greater than 20 acres: 5,000 GPD
    - Feedlots or other activities not related to normal grazing are not considered stockwatering.

- Entiat (WRIA 46), adopted in 2005[21]
  - Domestic use is defined to include indoor use, outdoor watering up to 1/2 acre, and stockwatering. Stockwatering does not include feed lots and other activities which are not related to normal grazing land uses.
  - A reservation for future water use was created and includes domestic, stock watering, commercial agriculture, and commercial/light industrial uses.
    - Domestic and stockwatering are allowed anywhere in the basin.
    - Outdoor may be up to 1/2 acre anywhere in the basin.
    - Commercial agriculture and commercial/light industrial uses are available only in the Lower Entiat and downstream of the "Stillwater" reach.
  - The reservation uses the follow assumptions:
    - In-house domestic uses: net use of 35 GPD per person
    - Outdoor irrigation (table provided, based on State of Washington Irrigation Guide)
    - Commercial agriculture (table provided, based on State of Washington Irrigation Guide)
    - Commercial/light industrial uses will be based on the specific purpose.
  - In times of water shortage domestic and stock-watering uses will be met first, followed by commercial agriculture and finally commercial/light industrial.
  - Metering is required.

Additionally, Ecology considered other proximate water management programs in the Skagit (WRIA 3), and Lummi Peninsula (within WRIA 1).

- Big Lake Mitigation Program, adopted 2018[22] (WRIA 3)
  - 175 GPD annual average for domestic indoor use (assumes 10 percent consumptive use for homes served by onsite septic systems)

[21] Chapter 173-546 WAC
[22] *Big Lake Mitigation Plan*, adopted 2018, https://fortress.wa.gov/ecy/wrdocs/WaterRights/wrwebpdf/BigLakeMitigationPlan.pdf

  - 143 GPD annual average for outdoor irrigation (assumes 0.13 acre of irrigated lawn)
  - Metering is required (remote-read)

- Lummi Peninsula Groundwater Settlement Agreement, Federal court-approved in 2009 (WRIA 1)
  - 350 GPD annual average, with a maximum of 0.39 acre-feet per year[23]
  - Domestic includes indoor and outdoor
  - Metering is required (remote-read)

The recent instream flow rules summarized above are 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 and RCW 90.94.020. 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 are also not uniform in their how they describe single and group domestic water use. This variation is likely informed by local hydrogeological conditions, water availability, and local planning efforts prior to rulemaking.

In considering new water use standards, Ecology also considered the quantity limit standards established in chapter 90.94 RCW. 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 creates 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 maintenance of a fire control buffer. (The term "fire control buffer" is not described or defined in the law.)

Ecology also looked at typical household water use information. Water use studies described in Ecology's June 2018 initial guidance[24] for planning groups estimated 60 GPD per person as a reasonable estimate for indoor domestic 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

[23] For State Water Users using permit-exempt wells.
[24] *ESSB 6091 – Streamflow Restoration Recommendations for Water Use Estimates*, Publication 18-11-007, June 2018.

the main concern."[25] 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 Local Integrating Organization (LIO) Ecosystem Recovery Plan. Figure 3.1 illustrates the frequency that minimum instream flows are not met at the Ferndale gage over the period 1967-2018. Data show increasing occurrence beginning in June and increasing through September. Exceedance curves depicting the 90%, 50% and 10% exceedances for this gage (Figure 3.2) demonstrate that snowpack-fed runoff peaks in early June and the river hits its annual minimum flow in early October (for the 50% exceedance curve). These two graphs demonstrate that as the summer daily flow reaches its annual minimum, the frequency of not meeting the Chapter 173-501-030 WAC Instream Flow increases. Climate change will exacerbate this trend, with hotter summers and less frequent rain events.[26]

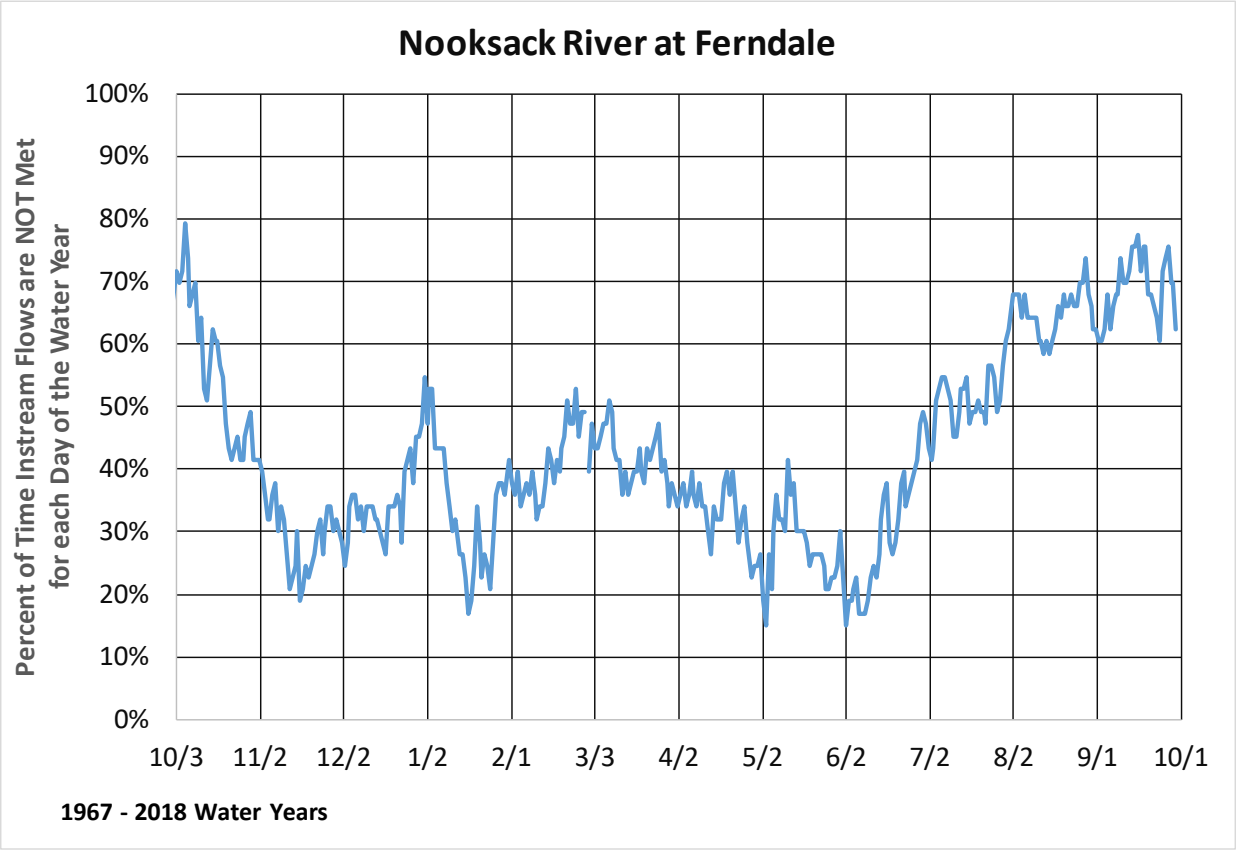

Figure 3.1. Percent of time minimum instream flows are NOT met at Nooksack River at Ferndale, 1967-2018.

[25] WRIA 1 Salmon Recovery Program: "Habitat Concerns in Whatcom County," https://wria1project.whatcomcounty.org/wria-1-programs/wria-1-salmon-recovery-program
[26] https://ecology.wa.gov/Air-Climate/Climate-change/About-climate-change/Water-supply-impacts

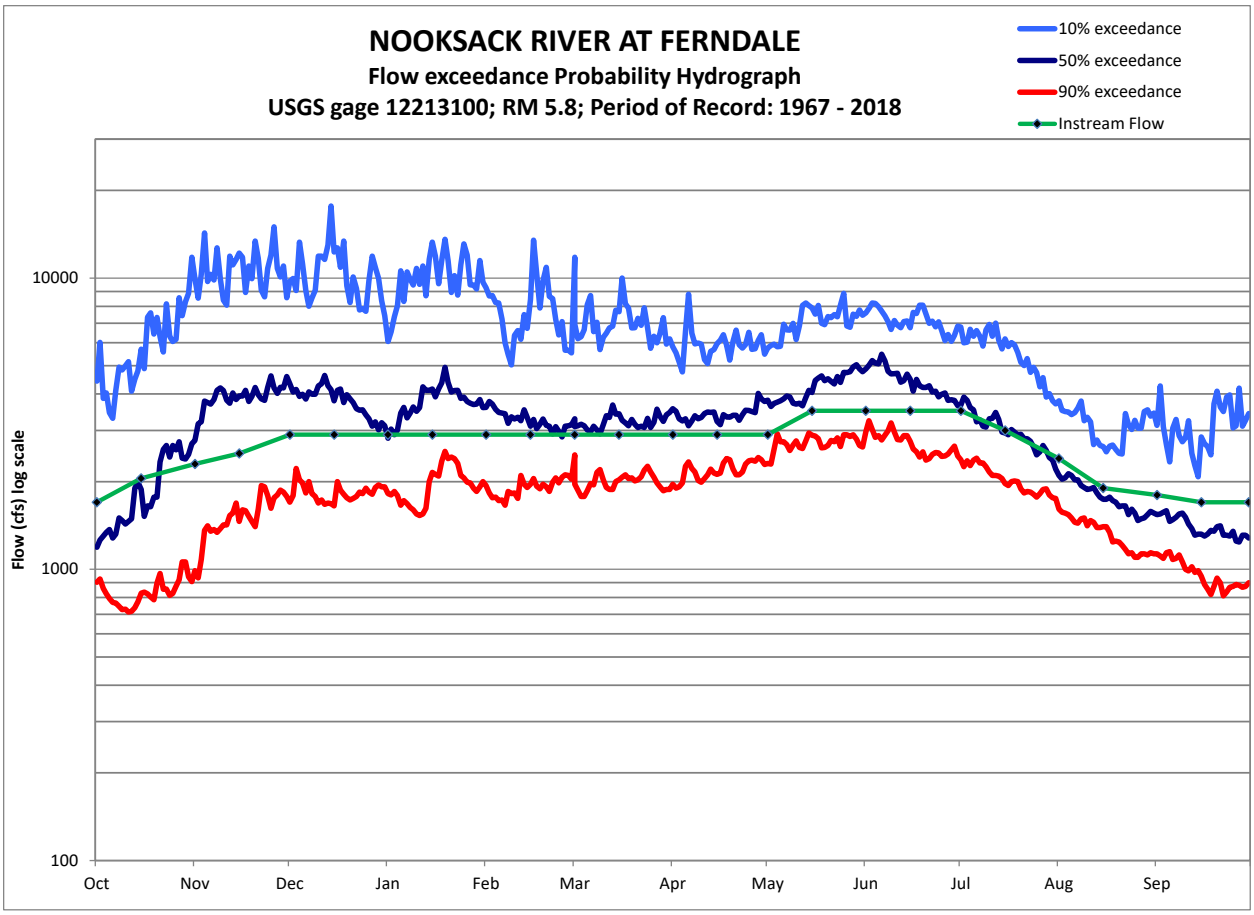

Figure 3.2. Exceedance curves for the Nooksack River at Ferndale gage for the period 1967-2017.

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 domestic water use.
- "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.
- "Subsistence gardening" means food cultivation for personal use by residents of the home.

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

- Withdrawals from a new permit-exempt domestic well(s) serving a single connection are limited as follows:
    - Indoor domestic water use shall not exceed 500 gallons per day; and
    - Outdoor domestic water use shall be limited to an area not to exceed a total of 1/12 (one-twelfth) of an acre, or 3,630 ft² (three thousand six hundred thirty square feet). Outdoor domestic water use is in addition to indoor domestic water use set forth in WAC 173-501-065(a)(i) [see directly above].
- Withdrawals from a new permit-exempt domestic well(s) serving a group domestic system that qualifies for the group domestic permit exemption under RCW 90.44.050 are limited as follows:
    - Indoor domestic water use shall not exceed 500 gallons per day for each connection, and shall not exceed a total use of 3,000 gallons per day for the entire group; and
    - Outdoor domestic water use shall be limited to an area not to exceed a total of 1/12 (one-twelfth) of an acre, or 3,630 ft² (three thousand six hundred thirty square feet), 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. Outdoor domestic water use is in addition to indoor domestic water use set forth in 173-501-065(b)(i) [see directly above].
- Upon the issuance of a drought emergency order under RCW 43.83B.405, withdrawals from new permit-exempt domestic wells may 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 as provided for under existing authorities. This includes, but is not limited to: RCW 90.44.050 and 90.44.250, and the provisions in Chapter 173-173 WAC.
- Under all circumstances, the water use limits specified under RCW 90.44.050 shall not be exceeded.

3.4 Recording and Reporting Water Use

No changes to existing metering laws or rules are proposed as a part of this rulemaking, and this rulemaking does not propose wholesale metering of all new permit-exempt domestic withdrawals. Existing laws and rules provide Ecology with the ability to require any individual user of groundwater, including new permit-exempt domestic water users, to record and report their water use, should that be deemed necessary by Ecology.

The state's water code includes several existing laws pertaining to metering, including Ecology's authority to require the measurement, recording, and reporting of water use. These long-standing authorities include:

RCW 90.44.050*: Permit to withdraw.*

> *After June 6, 1945, no withdrawal of public groundwaters of the state shall be begun, nor shall any well or other works for such withdrawal be constructed, unless an application to appropriate such waters has been made to the department and a permit has been granted by it as herein provided: EXCEPT, HOWEVER, 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, but, to the extent that it is regularly used beneficially, shall be entitled to a right equal to that established by a permit issued under the provisions of this chapter:* ***PROVIDED, HOWEVER, That the department from time to time may require the person or agency making any such small withdrawal to furnish information as to the means for and the quantity of that withdrawal****: PROVIDED, FURTHER, That at the option of the party making withdrawals of groundwaters of the state not exceeding five thousand gallons per day, applications under this section or declarations under RCW 90.44.090 may be filed and permits and certificates obtained in the same manner and under the same requirements as is in this chapter provided in the case of withdrawals in excess of five thousand gallons a day.*

RCW 90.44.250*: Investigations—Reports of appropriators.*

> *The department is hereby authorized to make such investigations as may be necessary to determine the location, extent, depth, volume, and flow of all groundwaters within the state and in making such examination, hereby is authorized and directed to cooperate with the federal government, with any county or municipal corporation, or any person, firm, association or corporation, and upon such terms as may seem appropriate to it.*
>
> *In connection with such investigation, the department from time to time may require reports from each groundwater appropriator as to the amount of public groundwater being withdrawn and as to the manner and extent of the beneficial use. Such reports shall be in a form prescribed by the department.*

Ecology promulgated its rules for measuring, recording, and reporting water use at Chapter 173-173 WAC.[27] Chapter 173-173 WAC includes meter installation requirements, record keeping responsibilities, frequency of recording and reporting water use, and more.

[27] For more information see Chapter 173-173 WAC at https://app.leg.wa.gov/wac/default.aspx?cite=173-173

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 are 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 lays out the results of their analysis of 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 document 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 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 percent consumptive (with 90 percent 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 reliant on domestic permit-exempt wells, based on no new withdrawal limits for outdoor domestic water use. Outside lawn and garden watering accounts for roughly 95 percent of all consumptive water uses associated with new home water uses (using the example in *ESSB 6091 – Streamflow Restoration Recommendations for Water Use Estimates*, 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 for 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 percent 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 permit-exempt 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. In Section 4.2.1 we describe how we calculate the consumptive use of new domestic permit-exempt wells in WRIA 1 from 2018-2038. We continue on in Section 4.2.2 to describe the safety factor applied to the offset to account for uncertainty, establishing the amount needed to be offset. Finally, in Section 4.2.3, we compare the calculated offset amount to the theoretical scenario of each new domestic permit-exempt well using the maximum allowed under the proposed rule amendment.

4.2.1 Consumptive Use Calculation

To calculate the consumptive use of new domestic permit-exempt wells in WRIA 1 from 2018-2038, Ecology made slight adjustments to the original RH2 spreadsheet input parameters to reflect proposed rule conditions. Adjustments to the spreadsheet included modifying the outdoor domestic irrigation area limit to 1/12 acre for non-commercial lawns and gardens, consistent with the proposed rule. Ecology retained the original RH2 spreadsheet information on the estimated number of future domestic permit-exempt wells, the spatial distribution of the new domestic permit-exempt wells across the 9 aggregated subbasins, and the average household population size. This information was consistent with data used in the WRIA 1 planning process and consistent with Ecology guidance (Ecology, April 2018).

Assuming 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 acre (0.083 acres), results in 260 acre-feet per year of consumptive use for WRIA 1 (see Table 4.1, with details for each aggregated subbasin in Table 4.2). This volume represents the minimum volume required to meet the consumptive use impacts within the WRIA as a whole. This volume is lower than the original RH2 analyses, in large part because of Ecology's proposed outdoor irrigation conservation standard of 1/12 acre.

4.2.2 Safety Factor to Calculate Total Offset

In order to account for uncertainty, Ecology is applying a safety factor to the 260 acre-feet per year consumptive use value. Adding a safety factor is consistent with county projections, the RH2 analysis, and the planning process.

Calculating the consumptive use volume required several assumptions related to: the number of new homes constructed over the specified twenty-year period[28]; the occupancy rate; per capita water use; outdoor water use; 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 uncertainty associated with each of these assumptions, Ecology chose to multiply the calculated consumptive use volume in each aggregated subbasin by a factor of 1.5, creating a total offset of 150%. This helps ensure that the volumes achieved through this process more than compensates for the impact that occurs over the twenty-year planning horizon and accounts for uncertainty.

For the nine aggregated subbasins, the total volume required for the entire WRIA to offset new consumptive uses with this safety factor is 390 acre-feet per year (consumptive use of 260 acre-feet per year multiplied by 1.5). The total offset volume, and the results by subbasin, are shown in Figure 4.1. The Adaptive Management protocol outlined in Chapter 7 will allow us to evaluate the safety factor and make adjustments, if needed, in the future.

4.2.3 Comparison of the Total Offset with a Maximum Use Scenario

For comparison's sake, Ecology thought it would be helpful to understand the hypothetical offset required if every new domestic permit-exempt well used the maximum volume legally available to it over the next 20 years ("maximum use scenario"). To calculate the maximum consumptive use, Ecology presumed full use of the indoor withdrawal limit of 500 GPD per new domestic permit-exempt well established in the proposed rule amendment language (500 GPD every day for every new domestic permit-exempt well).

[28] The WRIA 1 planning group's estimate of 2,150 new homes (using permit-exempt wells for their water source) over twenty years, averages 107 new homes per year. However, it should be noted that Whatcom County reported that, during 2018, only 8 building permits for new homes using domestic permit-exempt wells were issued. While this represents data for only one year, it suggests that a projected average of 107 new homes may be high, which would provide an additional "safety factor" to ensure that projects and actions identified in this RSD will offset new domestic permit-exempt use during the twenty-year period.

To evaluate how assuming the maximum indoor water use for all new domestic permit-exempt wells impacts the consumptive use offset calculations, a consumptive use volume was calculated assuming 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 is a total consumptive use volume of 343 acre-feet per year for WRIA 1. 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 percent consumptive, while outdoor use is 80 percent consumptive. Tripling the indoor use rate from an average of 153.6 to the maximum 500 GPD, basin-wide in the calculations increases the offset required by 32 percent (83 acre-feet per year). This scenario's detailed results are included in Table 4.2.

Although it is not realistic that every new home uses the maximum indoor value every day for the next 20 years, this scenario is helpful in understanding the theoretical effects on offset requirements. The maximum use scenario also provides a benefit in comparing the calculated consumptive use multiplied by the safety factor to the maximum use scenario (see Table 4.1).

4.2.4 Hydrogeologic Information and Assumptions

The numbers presented in Table 4.3 reflect annualized pumping impacts (acre-feet per year). The offset volumes listed in the table assume that the impacts from 2,150 additional domestic permit-exempt wells directly impact surface water bodies within the watershed 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 from 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 lag time 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, as compared to 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 pumping begins, groundwater storage is the primary source of water to the well, and on an annual basis, the

volume of stream depletion is less than the annual volume withdrawn by the well. Over time however, 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.

The STRMDEPL08 analysis depicted in Figure 4.2 is for an irrigation well that pumps a large quantity of water (6.14 cfs) continuously over a three month irrigation season. This analysis isn't specific to the particulars of domestic permit-exempt well use in WRIA 1, which would involve significantly smaller volumes of water for each well. It is informative because it shows how even large seasonal pumping stresses on streamflow depletion are often attenuated out over the entire year and approach a steady-state, annualized volume pumped over a twelve month period. This occurs even though the irrigation well was pumped at a much higher rate over just the irrigation season. As the distance of the well from the stream increases, the depletion impacts to the stream are attenuated.

Aquifer parameters that are representative of an unconfined aquifer in Whatcom County were input into the USGS analytical tool. Additionally, pumping volumes were chosen that represent the volumes pumped by all anticipated new domestic permit-exempt wells, each individually watering an irrigated footprint of 1/12 of an acre. The depletion results suggest that the impacts will be below the steady-state, annualized pumping rate at all three well distances used in the original USGS report (Figure 4.3). This is the case even though summer water use is up to four times the winter pumping rate in this analysis (see Table 4.4 for parameter values). Values for Transmissivity (5,000 ft^2/day), Storativity (0.11), and Streambed Conductance (1 ft/day) were derived from work performed by Associated Earth Sciences Inc. for their ongoing 2019 groundwater modeling efforts in WRIA 1. The consumptive use fraction of these pumping rates would be less (see Table 4.4).

The USGS's analytical tool is conservative in that it will likely overestimate stream depletion because it doesn't consider induced recharge that may occur within the watershed (when groundwater pumping lowers a high water table below the land surface allowing additional infiltration) and it only reflects water table conditions. Even so, it is helpful in showing the timing and magnitude of depletion impacts over the course of the year for the combined monthly average pumping stresses needed to supply all of the anticipated new domestic permit-exempt wells in the WRIA. Even water table wells located within a couple hundred feet of their connected streams will deplete those streams at less than the annualized, steady-state rate (see Figure 4.3).

RH2 developed a shapefile that locates the parcels that received building permits within the watershed over the period 2000 – 2014. Figure 4.4 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 impact analyses of distance between a well location and its closest connected stream.

With these considerations, we have chosen to approximate the projected new wells' 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, for average use with a 1.5 safety factor (1.5 Multiplier), throughout the WRIA on an annualized basis after 20 years is 390 acre-feet per year.

Table 4.1. Results of offset (including 1.5 safety factor), compared to calculated consumptive use and maximum use.

	AFY
Calculated Consumptive Use	260
Theoretical Maximum Use	343
Offset (Consumptive Use + 1.5 Safety Factor)	**390**

Table 4.2. Results of analyses to calculate new domestic permit-exempt well consumptive use (in acre-feet per year) from 2,150 anticipated new homes connecting to permit-exempt wells over the twenty-year planning horizon. Calculated by aggregated subbasin. Assumptions include outdoor water efficiency = 75 percent (pop-up sprinklers); outdoor use is 80 percent consumptive; indoor use is 10 percent 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									
		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	Total
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 4.3. Water Offset Volumes in acre-feet per year needed to meet the requirements of RCW 90.94.020 with a 1.5 safety factor applied to account for uncertainty.

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									
		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	Total
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 4.4. Monthly domestic permit-exempt well pumping rates needed to provide both indoor and outdoor watering requirements for 2.56 persons per household and an irrigated footprint of 1/12 of an acre. Outdoor water duty is calculated for the highest Crop Irrigation Requirement station (Bellingham) in the watershed. Monthly pumping rates (in GPM and cfs) needed to supply all anticipated 2,150 new homes connected to permit-exempt wells expected over the 20-year timeline are included in the bottom of the table.

	Bellingham Irrigation Requirement for turf/pasture (WIG Appendix B)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**	
Monthly Bellingham Crop Irrigation Requirement in Inches CIR				0.86	2.21	3.14	4.29	3.19	1.49				15.19	inches
AF for **0.083 [1/12]** acre lot size				0.0079	0.0204	0.0290	0.0396	0.0294	0.0137					
gpd per month if 75% efficient				86	214	315	416	309	149					
gpm equivalent				0.06	0.15	0.22	0.29	0.21	0.10					
If 2.56 people, indoor use rate in gpm	0.107	0.107	0.107	0.107	0.107	0.107	0.107	0.107	0.107	0.107	0.107	0.107		
Total Daily pumping rate per household in gpm	0.11	0.11	0.11	0.17	0.26	0.33	0.40	0.32	0.21	0.11	0.11	0.11		
Daily Consumptive Use pumping rate in gpm	0.01	0.01	0.01	0.06	0.13	0.19	0.24	0.18	0.09	0.01	0.01	0.01		
2150 new exempt wells expeced by 2038: Monthly gpm pumping rate	229	229	229	358	549	699	850	691	452	229	229	229		
2150 new exempt wells expeced by 2038: Monthly gpm consumptive rate	23	23	23	126	279	399	520	392	201	23	23	23		
2150 new exempt wells expeced by 2038: Monthly cfs pumping rate	0.511	0.511	0.511	0.798	1.224	1.557	1.894	1.540	1.008	0.511	0.511	0.511	0.927	=Average

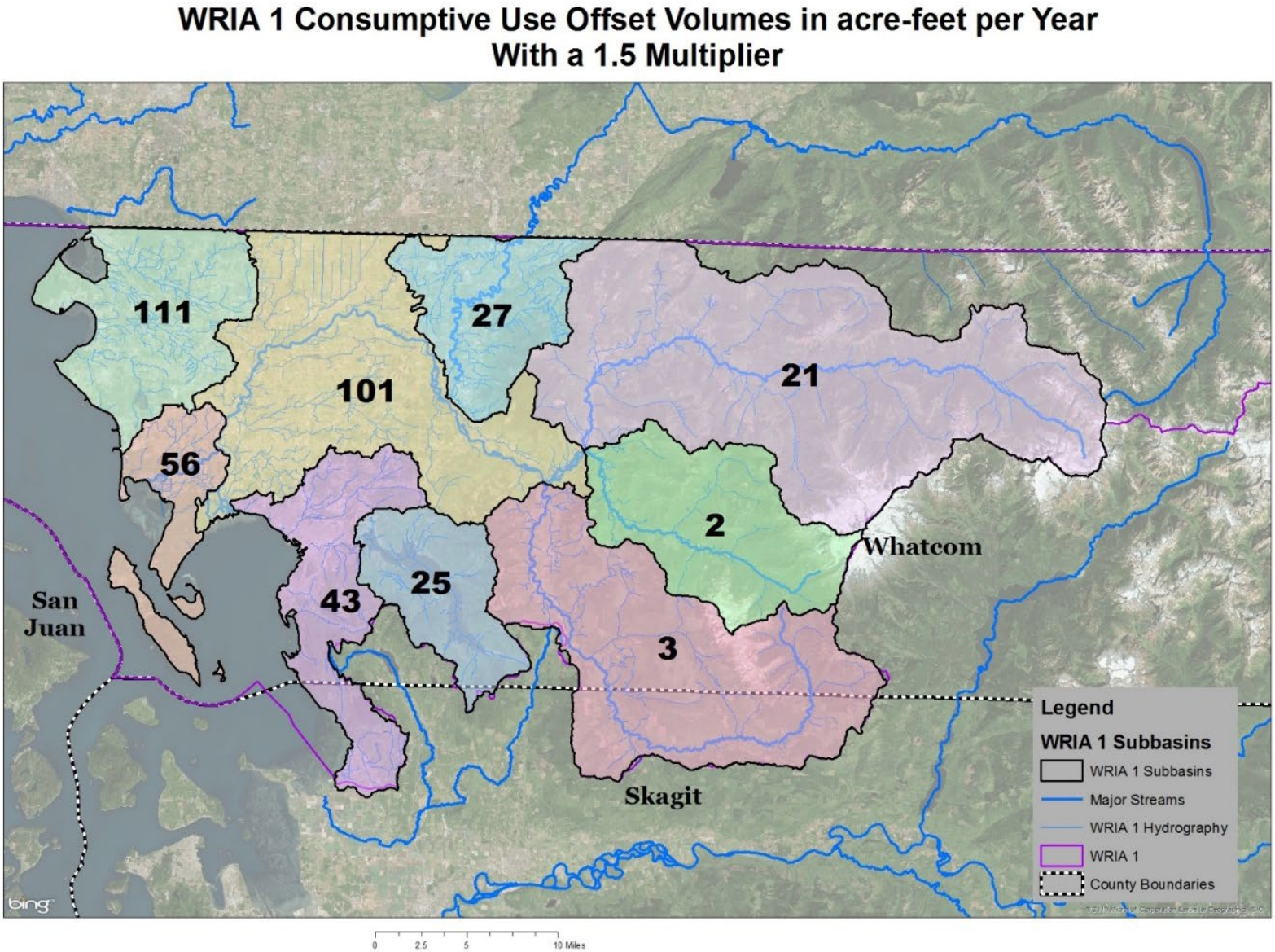

Figure 4.1. Twenty-year consumptive use offset volumes, including 1.5 safety factor, in acre-feet per year, by aggregated subbasin.

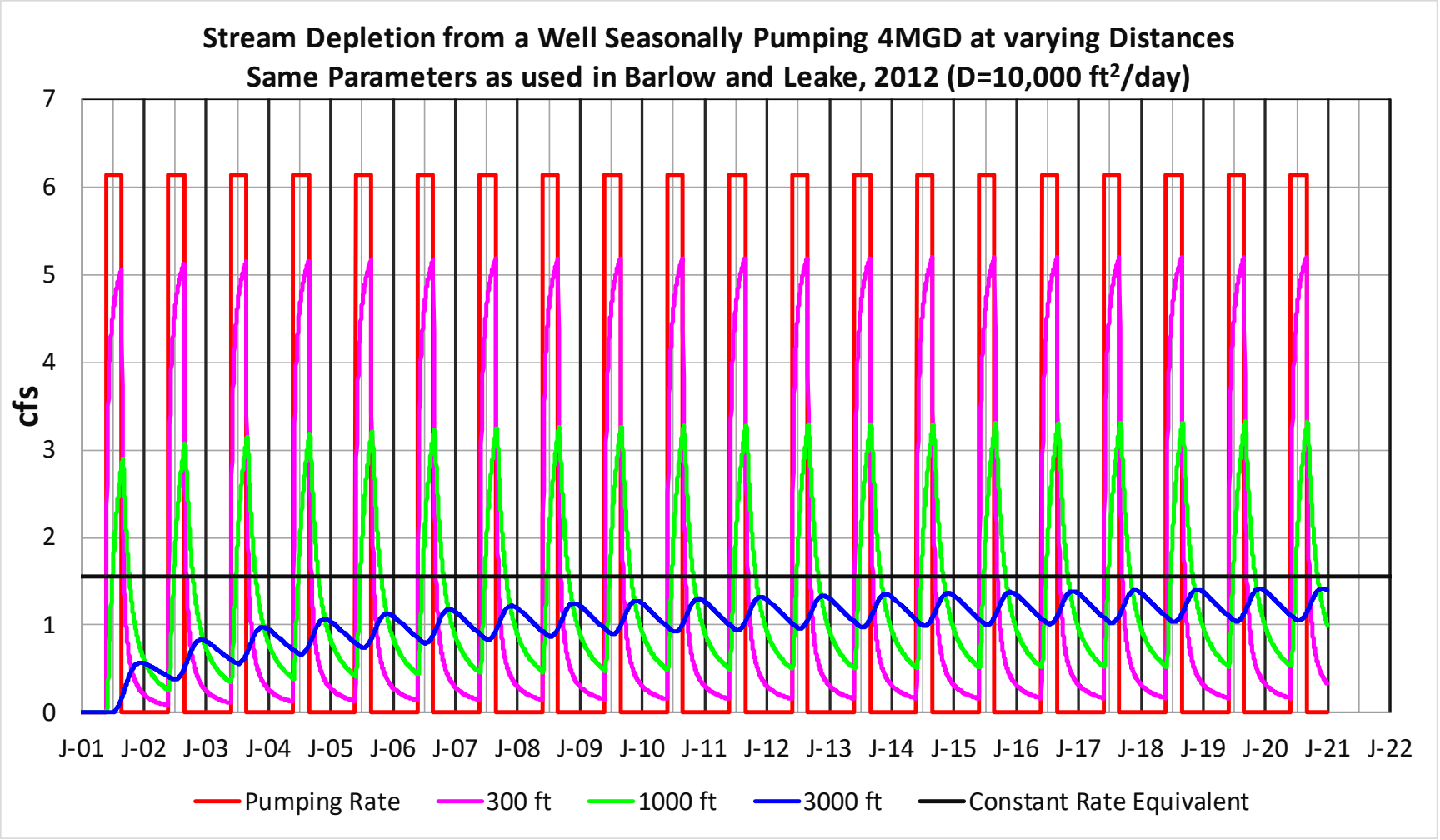

Figure 4.2. Stream depletion from a well over a twenty-year timeline. The same parameters utilized by Barlow and Leake, 2012, in their Figure 21.

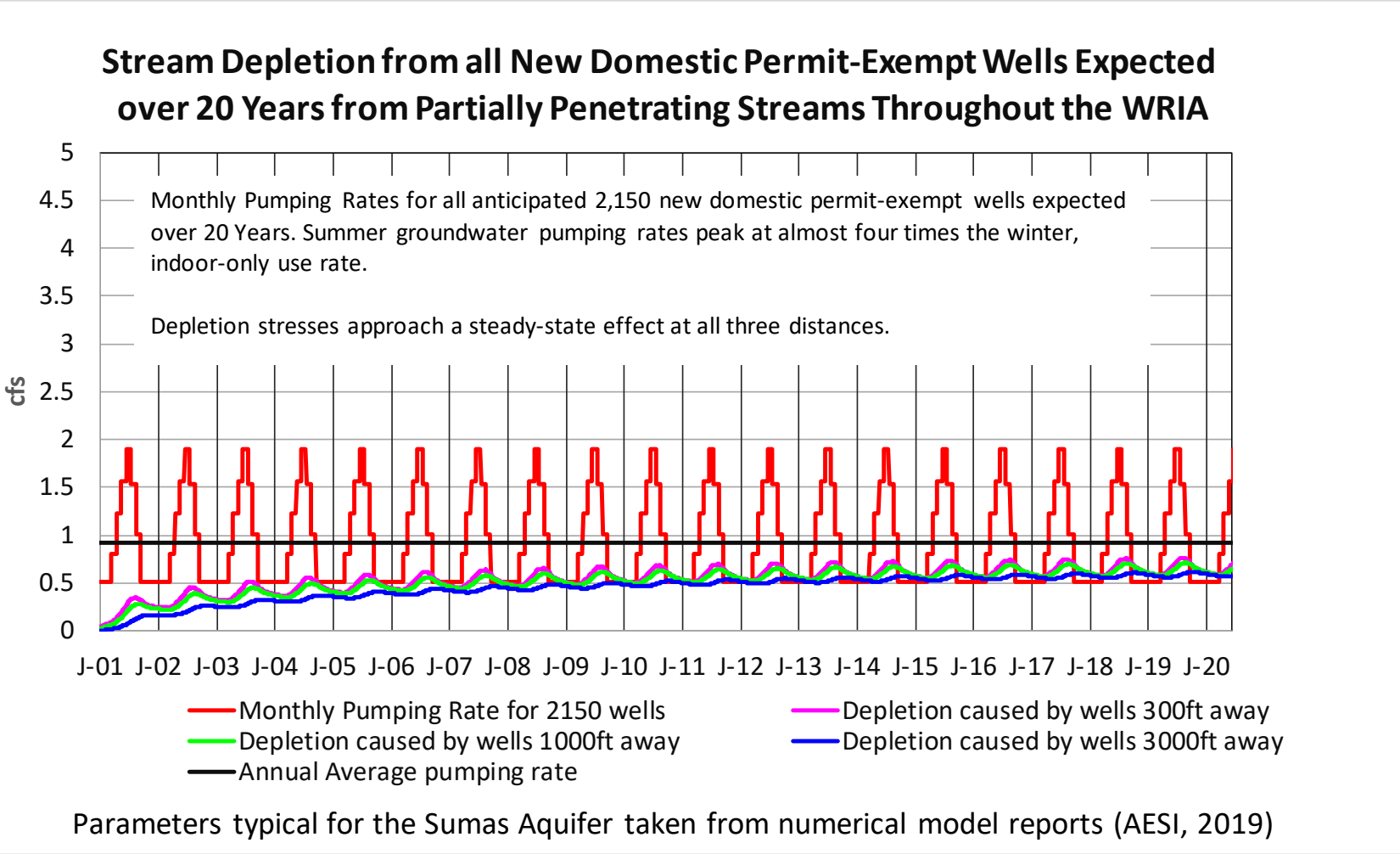

Figure 4.3. Analytical results obtained from the USGS STRMDEPL08 program utilizing parameters that are typical for the Sumas Aquifer in Whatcom County. The monthly pumping rate represents the volume pumped by all 2,150 new homes connected to permit-exempt wells expected in the watershed. It assumes all wells will be completed in the water table aquifer, parameters are the same throughout the entire watershed, and uses the highest crop water duty station in the watershed for all wells.

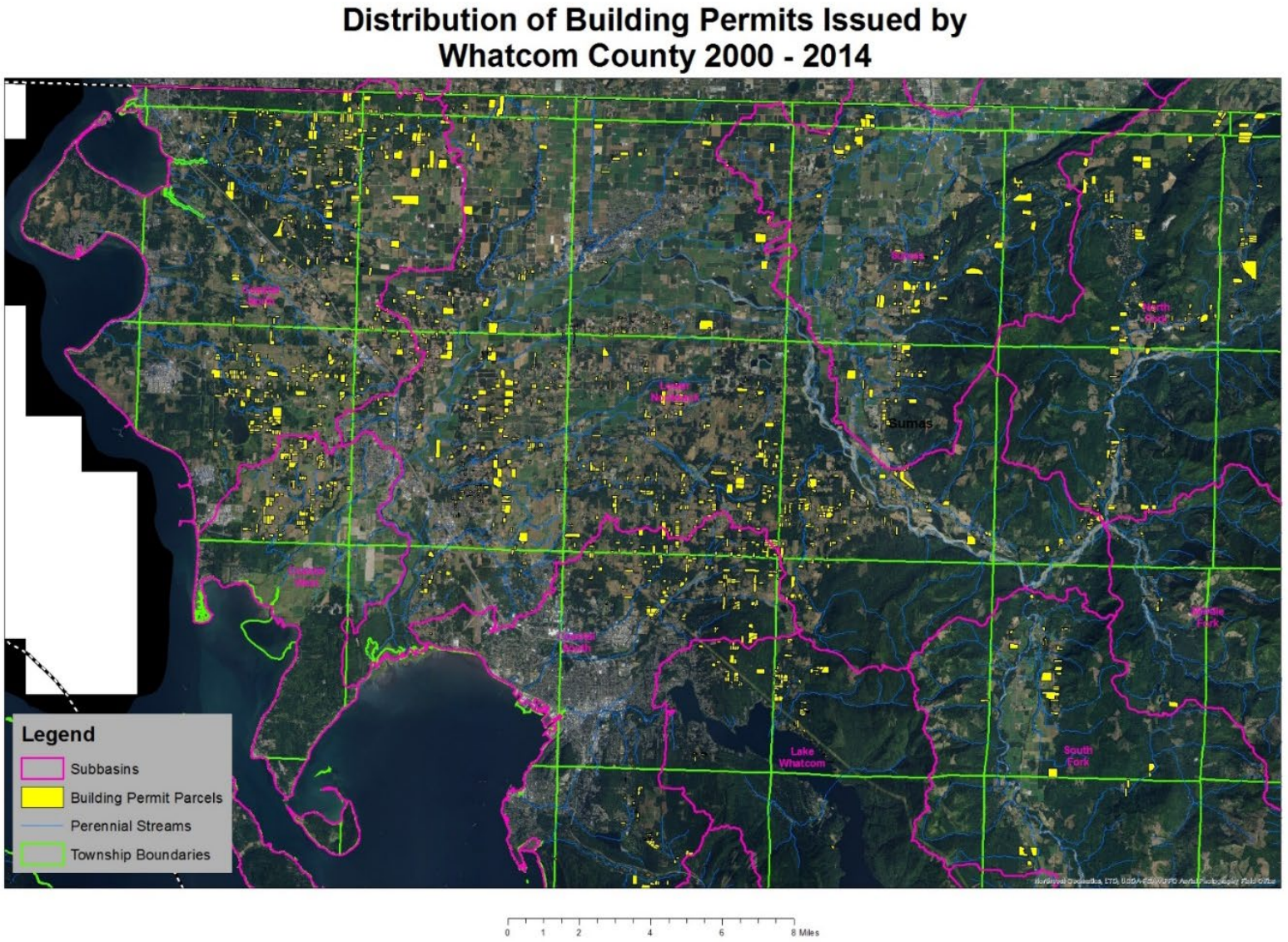

Figure 4.4. Parcels associated with building permits issued by Whatcom County between 2000 and 2014.

Chapter 5 – Retiming High Flows to Restore and Enhance Streamflows

Ecology's 2018 Interim Guidance on Determining Net Ecological Benefit gives a number of examples of projects that can provide water offsets and habitat benefits including retiming water from the high flow to the low flow seasons. However, many of the stream management units in WRIA 1 have partial or year-round closures listed in WAC 173-501-040(1), making water unavailable for these types of retiming projects.

For example, Bertrand Creek has a year-round closure and an instream flow (WAC 173-501-030). Daily streamflow data for 16 water years on Bertrand Creek (Figure 5.1) show that during the high flow months, daily average flows are often hundreds of cfs above the established instream flow levels. This suggests, hydrologically, that a project could be designed to appropriate some portion of the high flow water to enhance the instream resources in a creek that occasionally flows in the tenths of a cfs during low flow periods.

In order to enhance streamflows and enable projects consistent with chapter 90.94 RCW or other applicable laws, such as chapters 90.03 and 90.44 RCW, Ecology proposes adding an exemption to WAC 173-501-070 to allow Ecology to consider projects that would withdraw water in closed basins during high flow months.

Water availability for low flow periods is not the only consideration for Ecology. High streamflows provide important biological and physical benefits such as fish migration and channel maintenance flows (WDFW and WDOE, 2016) that will need to be considered when exploring a retiming project. Ecology recognizes that some of the high flows need to be left in the stream.

Under this proposed exemption, a new water right could be approved during the closure period, subject to an established instream flow or Surface Water Source Limitation (SWSL) and conditions necessary to protect high flow functions, provided the proposed water use would enhance stream flows and improve instream resources. Ecology anticipates that future projects, such as managed aquifer recharge (MAR) storage projects located on closed tributaries, could be eligible for water right permits using this proposed exemption.

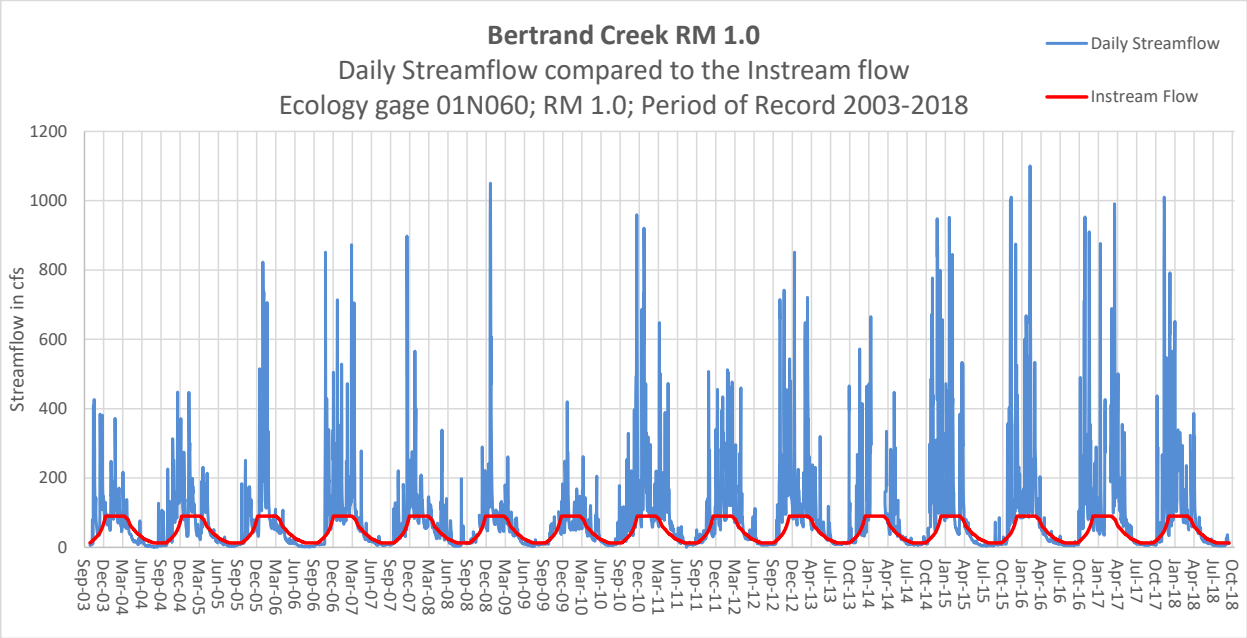

Figure 5.2. 16 years of daily flow data from the Bertrand Creek gage with the instream flow showing opportunities even during drought years to take small amounts of water during high flow seasons for projects to benefit stream flows during the low flow season.

5.1 Data Needs

Project proponents interested in pursuing a water right permit application under the proposed exemption in WAC 173-501-070(4) will need to provide the data necessary to test for hydrologic availability. 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 (see Figure 5.2 for an example). If the relevant stream does not have an instream flow or low flow condition (such as in a SWSL), a habitat study (e.g., a Toe-Width study) will be needed and Ecology, in consultation with WDFW, will need to establish a SWSL for the requested withdrawal period. In addition, the applicant will need to include a hydrologic assessment of the projected streamflow benefits, including the expected quantity, location, and approximate timing of streamflow benefits.

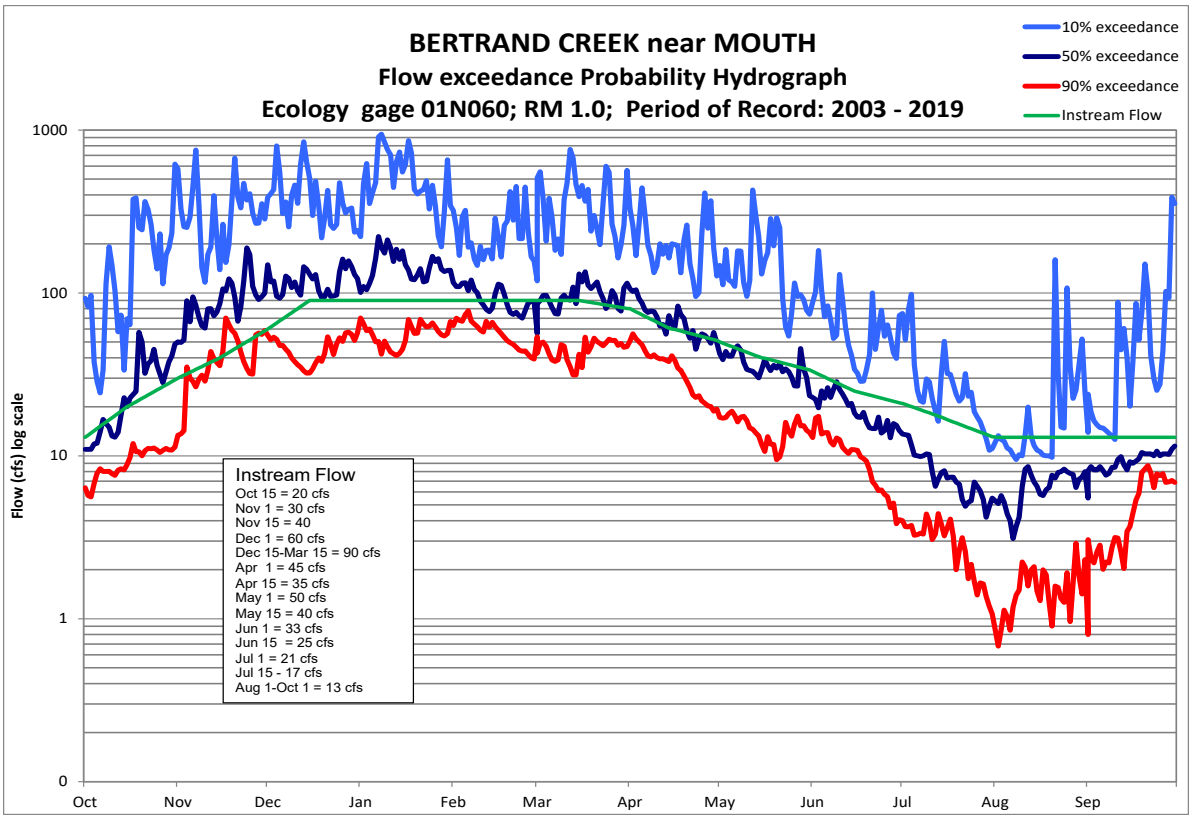

Figure 5.2. 10-50-90% exceedance flow hydrograph of Bertrand Creek with instream flows. Months where the instream flow is below the 50 percent exceedance have frequent opportunities of physical availability. A biological test is still needed to confirm availability.

5.2 The Review Process

Proposed retiming projects will need to go through the water right appropriation procedure under chapter 90.03 RCW. 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, Ecology will:

- Review the project and determine that there is a reasonable assurance of the potential quantity and timing of benefit to instream resources,
- Determine any stream function or instream resource benefits derived from high flows,
- Determine if and when the proposed withdrawal during high flows would impair any recognized benefits.

Ecology will notify and consult with WDFW on the application, consistent with current practice. Ecology will also confer with WRIA 1 Tribes on any water right applications for proposed projects relying on this new proposed retiming exemption. If the withdrawal can be made without impairing high flow function or benefits, and Ecology determines that the project

provides increased streamflow 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:

1. The project would be subject to an instream flow (ISF) or SWSL;
2. Appropriate conditions necessary to protect and preserve high flow stream functions, such as fish migration and channel maintenance and the timing or flow conditions that determine water availability; and
3. Installation and operation of a telemetered gage (if necessary) to be used to determine when flow is available for diversion.

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 the water right appropriation procedure under Chapter 90.03 RCW that the proposed use is consistent with:

(a) the intent of chapter 90.94 RCW to offset potential impacts to instream flows associated with permit-exempt domestic water use, or

(b) applicable laws and restores and enhances streamflows."

Chapter 6 – Projects and Actions

During their Streamflow Restoration planning work (January 19, 2018 - February 1, 2019), the WRIA 1 planning groups spent considerable effort developing projects and actions to meet RCW 90.94.020 offset requirements and achieve NEB. 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 Watershed Staff Team and Planning Unit 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). Ecology built on the information provided for each of these projects. Descriptions, offset, and NEB data were taken from the WRIA 1 Streamflow Restoration planning process (January 2018-February 2019), primarily captured in RH2's "FINAL Task 2 Deliverable – Projects and Actions" technical memorandum. Project updates that occurred between February 1, 2019 and this rulemaking were included where possible.

The 13 projects and actions identified by Ecology in this document were chosen based on their likelihood of implementation (see Table 6.1). Ecology looked for projects that demonstrate one or more of the following: an advantageous location in the watershed; likelihood for achieving offset and/or NEB; existing funding for the project provided by Ecology; existing funding provided by another entity; partner willingness; and, overall feasibility.

The project list (Table 6.1) intentionally includes projects anticipated to exceed the projected required offsets, including a safety factor. Ecology identified geographically distributed projects in an attempt to meet each aggregated subbasin's projected offset requirements. In-time and in-subbasin offsets would be of highest priority; however, this was not always feasible and, per RCW 90.94.020(4)(b), in-time and in-subbasin offsets are not required, as long as offsets are met in total across the WRIA. The projects in this RSD exceed the offsets required across WRIA 1, and therefore meet the overall statutory requirements for offsets.

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. This provides for additional levels of certainty that offsets are met and NEB is achieved in the WRIA, in case certain projects are not implemented and/or don't achieve the anticipated results.

Ecology selected the list of projects based on the above criteria to be reasonably assured the projects would be carried out. However, some uncertainty remains. In order to reduce uncertainty, project implementation and offsets will be tracked and addressed under an adaptive management plan described in Chapter 7. The combination of the high likelihood of project completion and the adaptive management mechanism provide Ecology with a reasonable assurance that the projects will meet the offset requirement and achieve NEB during the planning horizon (see Chapter 9 for more on NEB).

All project proponents voluntarily agreed to have their projects listed here. Although project proponents noted a willingness to proceed, the listing of a project herein does not obligate Ecology to fund a project or the project proponent to carry out the project (see Ecology's POL-2094). Therefore, neither the completion of projects nor the attainment of their anticipated results are guaranteed. However, the inclusion of multiple projects vetted for pertinence and feasibility provides reasonable assurance that projected consumptive use from new domestic permit-exempt withdrawals will be offset and that NEB will be achieved. Ecology will encourage project proponents and advocates to work towards completing the projects, and will use incentives through the grant funding provided under the law.

The following projects and actions[29] will be used in the NEB determination (see Chapter 9).

[29] Project ID numbers from the WRIA 1 Streamflow Restoration (chapter 90.94 RCW) 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 ID No.	Funding Status	Name	Offset (AFY)									
			Coastal North (CN)	Coastal South (CS)	Coastal West (CW)	Lake Whatcom (LW)	Lower Nooksack (LN)	Middle Fork (MF)	North Fork (NF)	South Fork (SF)	Sumas (SU)	Total
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 projects[30] were developed 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 RH2's technical memorandum for additional details on the projects):

Project ID 1: Dairy waste processing/treatment

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

Public Utility District No. 1 of Whatcom County (Whatcom PUD #1) is partnering with Coldstream Farm (a dairy on the South Fork of the Nooksack River) and Regenis 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 use in other places in WRIA 1 and across the state.

The Coldstream Farm/Regenis project is a funded pilot project. It includes funding to install the treatment equipment and approximately nine 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 Whatcom PUD #1 through the agreement between the project partners (Coldstream Farm, Regenis, and Whatcom PUD #1).

Estimated benefit(s): 13.4 acre-feet per year (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 (Bertrand WID) to use groundwater to augment surface water flows within Bertrand Creek during low flow periods. The project uses existing raspberry growers' irrigation wells after the raspberry crop is harvested and irrigation has ended for the season. 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 time augmentation ends. The future

[30] Except Project ID 8: MAR-North Fork site; developed by Ecology staff

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.

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 a permit under the retiming exemption described in Chapter 5.

Estimated benefit(s): 170.7 AFY offset

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 proponent, but Ecology expects to work with the community to identify a proponent.

Estimated 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 proponent 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.

Estimated 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. Historical 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 wetland 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.

Estimated 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 percent grade, and increase riparian buffers substantially to 300 feet or 500 feet, depending on the stream type. Project proponents have been working on modeling the 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 sub-basins. Since offset amounts would not be fully realized within 20-year planning horizon, offset amounts are not included in table totals.

Estimated benefit(s): 7,240[31] AFY offset, NEB [reduction in logging frequency and total area, WQ improvements, increased riparian buffers]

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 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.

Estimated 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).

[31] In order to be conservative in the expected benefit calculations, offset amounts not anticipated to be fully realized within 20-year planning horizon, were not included in calculated totals for projected offsets.

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.

Estimated 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 proponent.

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 a permit under the retiming exemption described in Chapter 5.

Estimated benefit(s): 158 AFY offset, NEB [removal of surface water pumps/pipes, PTOs, and clearing of streamside vegetation for equipment diversions, aquifer properties will dampen 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 Creek. 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 proponent, but Ecology expects to work with the community to identify a proponent.

Estimated benefit(s): 365 AFY offset

Project ID 44: Vista Road project

Aggregated Subbasin: Coastal North

The Whatcom County PUD #1 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 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 proponent's budget proposes $200,000 out of the $700,000 grant for habitat improvements associated with the pond and California Creek, including culvert removal.

Estimated benefit(s): 194 AFY offset, NEB [habitat restoration, water quality 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.

Estimated benefit(s): 324 AFY offset, NEB [habitat restoration, water quality improvement]

Project ID 46NG[32]*: 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.

Estimated benefit(s): unknown AFY offset

[32] Modified from original RH2 Technical Memo description.

Chapter 7 – Adaptive Management

Whether or not the projects and 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 and framework 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 some 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 safety factor). Ecology is confident that this approach addresses any uncertainty with growth projections and related potential impacts to 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 Chapter 6, to select 13 projects from the Planning Unit's list of 45 projects, in order to select those projects with a reasonable assurance of successful implementation. The adaptive management approach proposed here focuses on ensuring that the suite of water offset and NEB projects provide the anticipated benefits, namely offsetting projected consumptive impacts to instream flows associated with permit-exempt domestic water use and achieving NEB at the WRIA scale, over a 20-year planning horizon, as required by RCW 90.94.020.

The adaptive management approach in this document is prepared with implementation in mind. However, RCW 90.94.020 does not require that there be an obligation on any party to ensure that plans, or projects and actions in those plans or associated with rulemaking, are implemented. Furthermore, the law does not predicate the issuance of building permits on the implementation of watershed plans or any projects and actions in those plans.

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 the 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, 2023, 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, projects previously added as part of this self-assessment process, or other related 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. *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 (for Five-Year Self-Assessments) with information necessary to track implementation and progress on any projects included in Chapter 6 or added through the Five-Year Self 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 benefit 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 or entities implementing the project may choose to update the flow benefit estimates, based on conditions and circumstances encountered.

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-Assessments provides opportunities to suggest alternative projects and/or actions if those listed in Chapter 6 are not implementable as anticipated. Ecology will make changes to the project list 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 using domestic permit-exempt wells. It also establishes a fee for building permit applicants who 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. 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. 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.

Ecology provides its formal Policy and Interpretive Statement on local government obligations related to chapter 90.94 RCW in POL–2094, Section 5:

Under RCW 90.94.020…Ecology interprets local governments in the…affected WRIAs[33] to have the following obligations as of January 19, 2018[34]:

- *Collect a $500 fee for each development permit authorizing a new permit-exempt domestic withdrawal regulated by chapter 90.94 RCW. The law does not specify whether local governments must collect the fee at the time of a subdivision or building permit application. Local governments are expected to annually remit $350 from each fee collected to Ecology. The $500 fee is in addition to existing well drilling fees required under chapter 18.104 RCW.*
- *Record withdrawal restrictions on the title of affected properties. Ecology recommends local governments use the following language: "Domestic water use at this property is subject to a water use limitation of a maximum annual average withdrawal of [three thousand or nine hundred and fifty or other amount specified by rule[35]] gallons per day, per connection, subject to the five thousand gallons per day limit in RCW 90.44.050."*

[33] WRIAs 1, 7-15, 22-23, 49, 55, and 59.
[34] These are the initial directions provided in RCW 90.94.20 and RCW 90.94.030. RCW 90.94.20 and RCW 90.94.030 further provide that these obligations may be changed through rulemaking. Where rulemaking modifies these obligations, they should be appropriately interpreted with the respective modifications.
[35] Local governments should include the relevant volume, *i.e.* one of the amounts in the brackets.

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 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 NEB[36] (Interim Guidance) to assist Streamflow Restoration planning groups on expedited planning tracks, including WRIA 1. This is the guidance Ecology previously established would be used to evaluate NEB in a WRIA 1 watershed plan update or a rulemaking. 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 Interim 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: WRIA 1's aggregated subbasins; use limits for new domestic permit-exempt wells; and the calculations of 20 years of new consumptive domestic permit-exempt water use based on data and technical information from the WRIA 1 Streamflow Restoration planning work in 2018-2019. Together, this information led to Ecology's basin-wide estimate of 390 acre-feet per year needed to offset 20 years of domestic permit-exempt well consumptive water use. This estimate includes a 1.5 safety factor to ensure we do not underestimate the impact of the new use.

[36] *Interim Guidance for Determining Net Ecological Benefit*, June 2018, Publication 18-11-009

9.2 Describing and evaluating offset projects

The second element of the Interim Guidance examines describing and evaluating offset projects, including both water offset and other non-water 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 improve streamflows and 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(4)(b) 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;"*

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 current legal requirements for permitted water right holders and from those that existed for domestic permit-exempt uses prior to adoption of chapter 90.94 RCW. Chapter 90.94 RCW recognizes that new domestic permit-exempt wells located in 15 specified WRIAs may impair instream flows and established these planning requirements to address such impacts.

9.2.1 Planning Unit Projects

While WRIA 1 planning participants did not approve a watershed plan update in the time allotted by the law, the WRIA 1 planning process did extensive project identification and quantification work in support of activities needed to satisfy the statutory requirements of RCW 90.94.020. The WRIA 1 planning process, including the WRIA 1 Watershed 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 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. Short narrative descriptions of these individual projects was developed by the consultants, in consultation with the project proponent

or others knowledgeable about the projects. These descriptions estimate the quantity of water offset by each potential project and identify any additional net ecological benefits (i.e., if the project has habitat-related benefits) that would result from them.

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 reasonable assurance that the consumptive use impacts of new domestic permit-exempt wells from 2018-2038 will be offset on the WRIA scale. In total, Ecology's project list provides an estimated 3,767 acre-feet per year of offset water. 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 the 1.5 safety factor. In addition to the offset benefits, many of these projects provide habitat improvements at specific project locations.

The geographic distribution of the proposed projects and actions will result in project offsets that will meet and greatly exceed impacts in six of the aggregated subbasins: Coastal North (CN), Coastal West (CW), Lower Nooksack (LN), North Fork (NF), Middle Fork (MF), and South Fork (SF). However, offsets do not exceed projected impacts in the Coastal South (CS), Lake Whatcom (LW), and Sumas (SU) aggregated subbasins.

- Coastal South: Ecology expects that the *calculated* consumptive water use amount for CS is likely higher than *actual* consumptive water use, as much of the groundwater in this aggregated subbasin drains directly to saltwater (Salish Sea/Puget Sound), rather than to (inland) surface water. Since groundwater tends to flow directly to the Puget Sound, rather to inland freshwater systems groundwater pumping by new permit-exempt domestic withdrawals is less likely to affect inland surface waters than calculated numbers suggest. Thus, the impact of new permit exempt domestic withdrawals is likely much smaller than the calculated consumptive water use amount.
- Lake Whatcom: This 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 Lake Whatcom Aggregated Subbasin.
- Sumas: This subbasin 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.

Although Ecology identified geographically distributed projects and actions in an attempt to meet each aggregated subbasin's projected offset requirement, this was not always feasible. WRIA-wide projects, such as a WRIA-wide Conservation Program (Project ID 21), and the potential 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 subbbasins. Thus, the project table in Chapter 6 likely underestimates the aggregated subbasins' offset amounts, as well as the geographic expanse of projects. Additionally, 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. The projects in this RSD exceed the offsets required across WRIA 1, per the requirement in RCW 90.94.020(4)(b), and therefore meet the overall requirements of the statute.

9.3 Project and Action Connections to Other Work

The third element of the Interm 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, Whatcom 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 total maximum daily load (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, and 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 the district and the city, 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 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 partnership with numerous local and state partners, the project proponent is leveraging numerous opportunities to improve water quantity and 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 (Department of Health, 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 actions 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. 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 1.5 safety factor. This converts to an average continuous 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 flow percentage of a small stream. 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 quite small.

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 summer 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 gage's period of record.

Ecology received comments on the preliminary draft from multiple entities suggesting that because the depletion impacts to streamflow from a new domestic permit-exempt use are too small to physically measure, they don't need to be offset. Case law is very clear that unmeasurable isn't the same as incalculable, and RCW 90.94.020 is clear about the offset and NEB requirements, regardless of measurability. New domestic permit-exempt uses will impair streamflows in closed basins. RCW 90.94.020(1) authorizes those impacts through compliance with the requirements in the statute. The projects outlined in Chapter 6 are meant to offset these individually unmeasurable impacts at the WRIA scale, consistent with the requirements of the law.

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. WDFW 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 WRIAs that surround and contribute to the Puget Sound into 2,940 assessment units.

A straight comparison of the locations of potential pumping impacts, flow offset strategies, and habitat projects with WDFW's fish and habitat conservation assessment units is not possible since the locations of areas affected by the pumping are not fully defined and often fall within multiple habitat conservation assessment units. However, as indicated in Figure 9.1, the higher value habitat areas (green shaded Index A3ns_avg values) 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 an additional 1,648 acre-feet per year in flow (see Table 6.1). Beyond providing water offsets, this water also provides ecological benefits from increased summer flows, including, but not limited to, improved temperatures, increased habitat, and increased oxygen levels. Benefits from these offset projects will flow downstream, through the Lower Nooksack subbasin, and increase as the flow benefits accumulate at the different confluences.

Additional offset projects are located in the lower reaches of the watershed, in areas that expect higher densities of new domestic permit-exempt uses (and, not coincidentally, are 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. All three of these highly impacted aggregated subbasins contain water offset projects that greatly exceed the consumptive use impacts anticipated from new wells in these aggregated subbasins and provide net benefits to the WRIA (see Figure 9.4).

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 high habitat value, but they also contain extensive salmonid species distributions including ESA-listed Chinook, Steelhead, and Bull Trout. Building on Figure 9.2, Figure 9.3 adds WDFW's SWIFD database to show where salmonid population life stages are distributed throughout the watershed. It shows the upper tributary basins are also important for their extensive distribution of salmonid spawning and rearing lifestages. Multiple offset projects are located in and will provide benefits for critical species population areas. 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.

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 projected 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 currently have identified projects that offset the anticipated consumptive use[37]. All three aggregated subbasins have salmonid species present (see Figures 9.2 and 9.3), but are located in the lower portions of the watershed (Lake Whatcom, Coastal South, and Sumas) which limits the area of impact. Lake Whatcom is highly managed by water imported from out of basin (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. 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 approach of this rule supporting document, entities are encouraged 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:

[37] 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.

- 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 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 proponent's budget proposes $200,000 of habitat improvements associated with the pond and California Creek, including culvert removal.

9.4.5 Additional Discussion on Seasonal Pumping Stress Impacts on Streamflow Depletion

In Chapter 4.2.4, Ecology explains its rationale for why we believe it is appropriate to consider that new domestic permit-exempt uses create steady-state depletion impacts on streamflow. We received comments from multiple entities that expressed concerns that increases in seasonal pumping stresses during the irrigation season have transient impacts on streamflow depletion that are over and above the steady-state rate. While we don't concur with these concerns (see Figure 4.3), we did evaluate pumping stresses on a monthly time-step to compare these impacts against the cumulative water offset volumes expected from the projects listed in Chapter 6.

Using the Crop Irrigation Requirement numbers from the Bellingham station in the Washington Irrigation Guide Appendix B for turf/grass, we have calculated the monthly water duty for a typical new home in the watershed (2.56 occupants who water 1/12 of an acre during the summer) on a daily basis (GPD) and on a monthly gallons per month (GPM) basis. Peak summer

use (July) is roughly four times the winter (in-house use only) pumping rate (see Table 4.4). As we have acknowledged previously, summer pumping is much higher than the annual average.

Applying these pumping stresses to all 2,150 projected new domestic permit-exempt wells creates a WRIA-wide peak monthly demand of up to 850 GPM. As shown in Table 9.3, the water offset projects listed in Chapter 6 generate a real-time offset volume equivalent to 2,291 GPM across the watershed. Even though we don't believe transient pumping stresses associated with seasonal irrigation creates transient streamflow depletion impacts that need to be directly addressed, the project offset volumes exceed the seasonal peak monthly pumping rate.

9.5 NEB Determination Summary

It is Ecology's determination that NEB is achieved through issuance 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 potential consumptive impacts to instream flows associated with permit-exempt domestic water use by an order of magnitude. With the inclusion of a 1.5 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 were selected because they had a project proponent or high level of interest, giving Ecology a reasonable assurance that the projects would be carried out. There is also enough theoretical or modeled evidence to give Ecology a reasonable assurance that these projects will meet the required offset and NEB will be achieved by the end of the planning horizon. The reasonable assurance is supported by the adaptive management process 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 by the projects identified in Chapter 6.

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 supporting 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 manage 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 chapter 90.94 RCW, and result in a net ecological benefit to instream resources within WRIA 1.

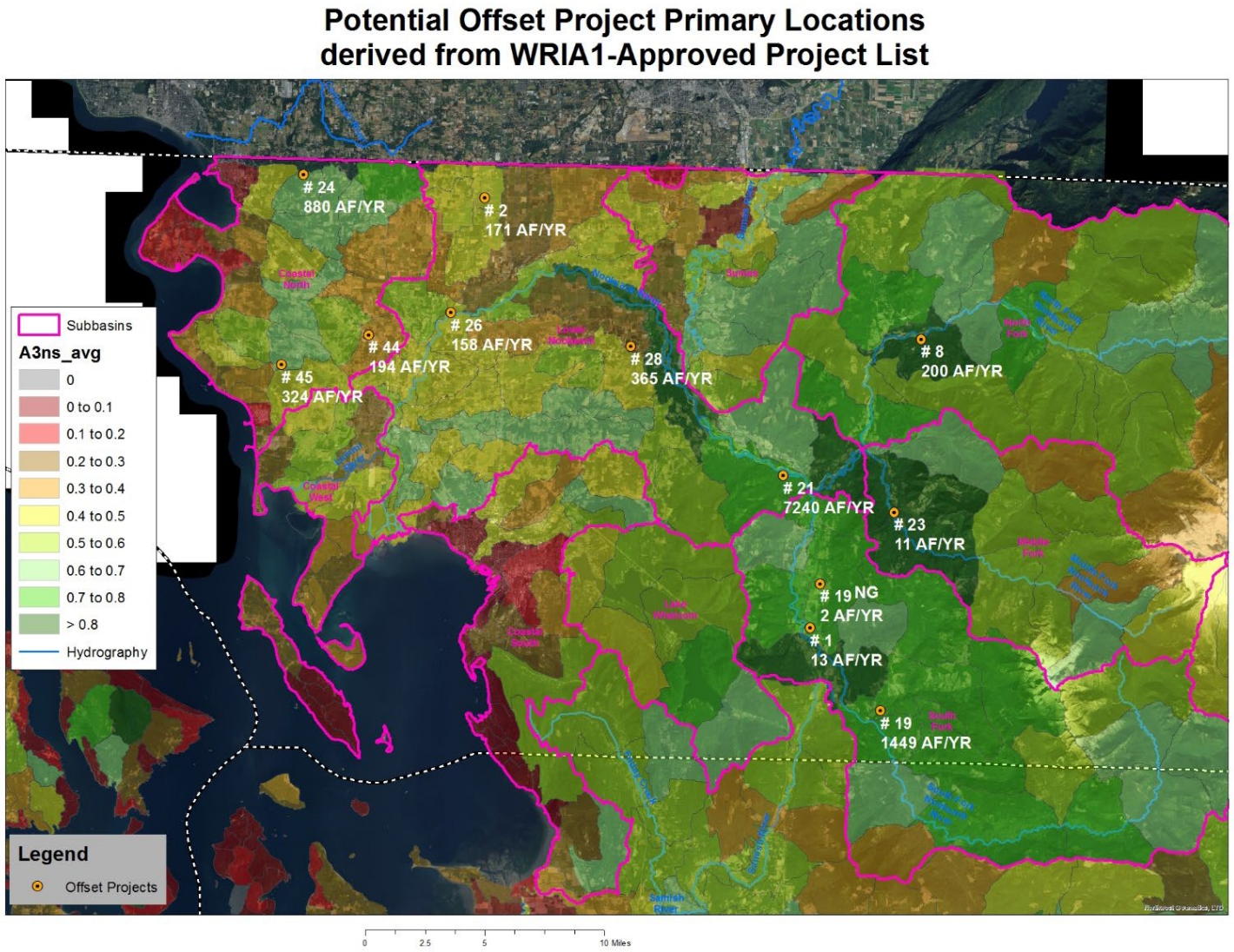

Figure 9.1. Offset Project locations overlain on top of WDFW's Watershed Characterization habitat indices average (A3ns_avg index in legend) of the three main components of relative value: hydrogeomorphic features, watershed habitats index, and accumulative downstream habitats.

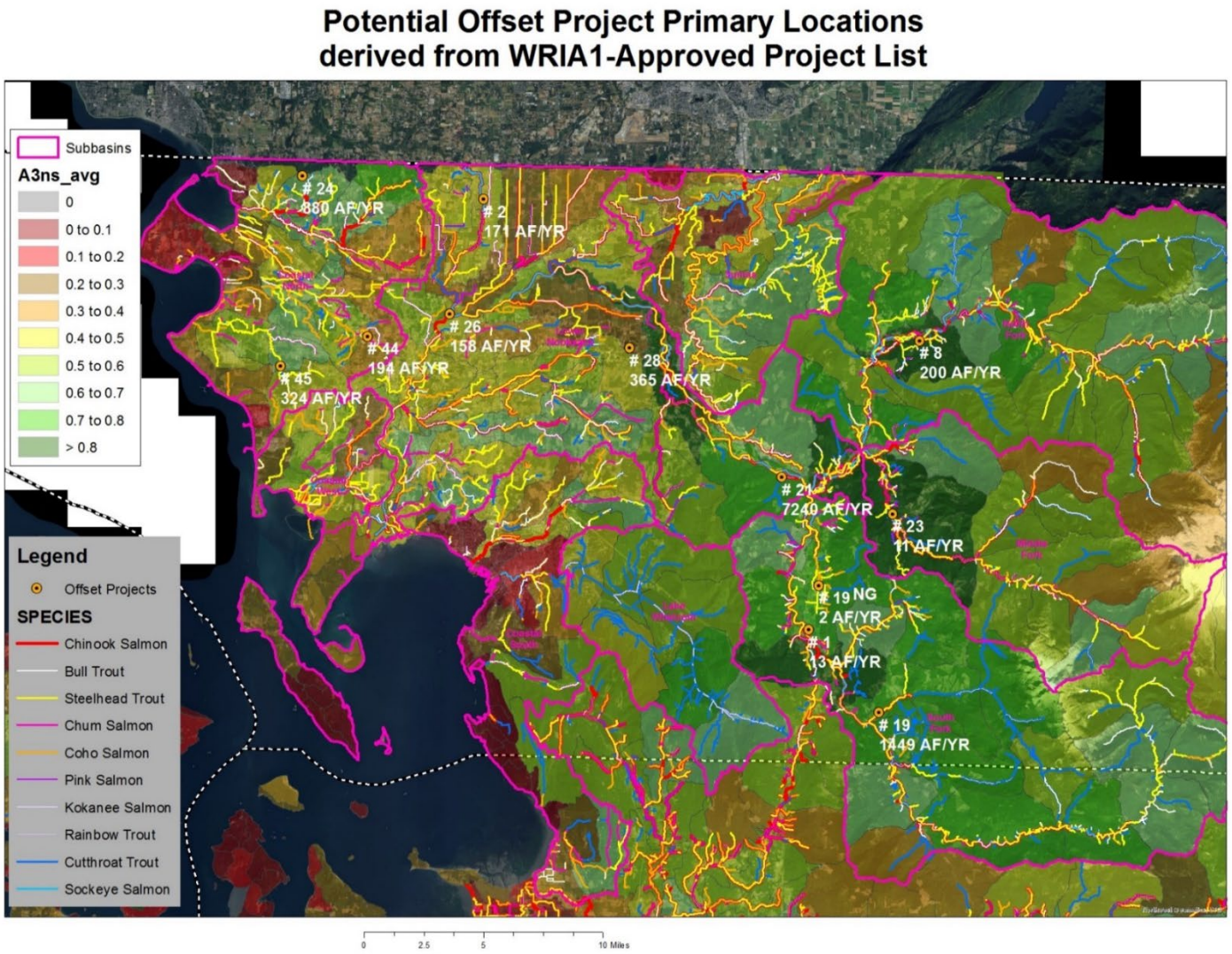

Figure 9.2. Offset Project locations overlain on top of WDFW's Watershed Characterization habitat indices average (A3ns_avg index in legend) of the three main components of relative value: hydrogeomorphic features, watershed habitats index, and accumulative downstream habitats. Salmonid distribution from the Statewide Washington Integrated Fish Distribution (SWIFD) database.

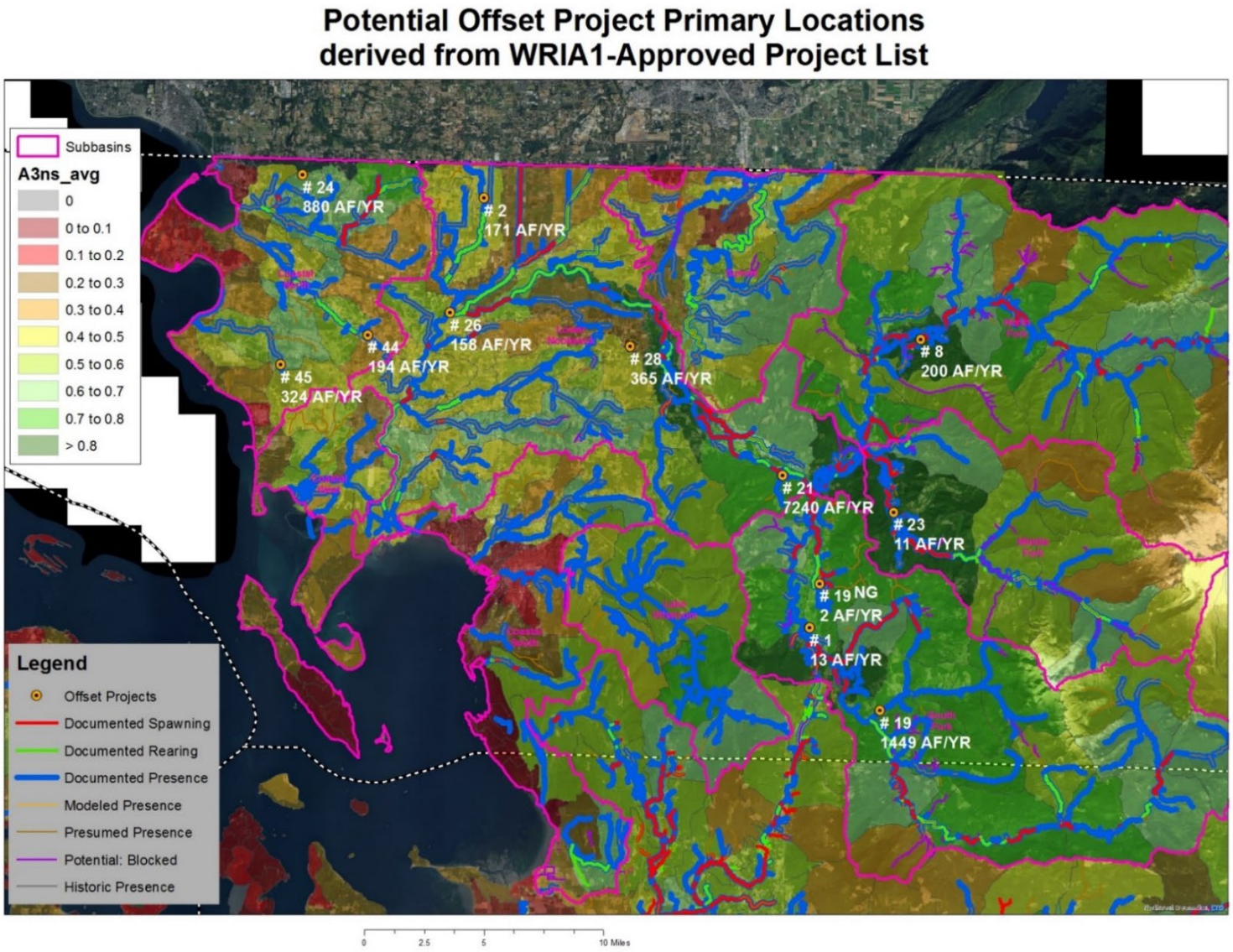

Figure 9.3. Offset project locations overlain on top of WDFW's Watershed Characterization habitat indices average (A3ns_avg index in legend) of the three main components of relative value: hydrogeomorphic features, watershed habitats index, and accumulative downstream habitats. Salmonid presence distribution from the Statewide Washington Integrated Fish Distribution (SWIFD) database.

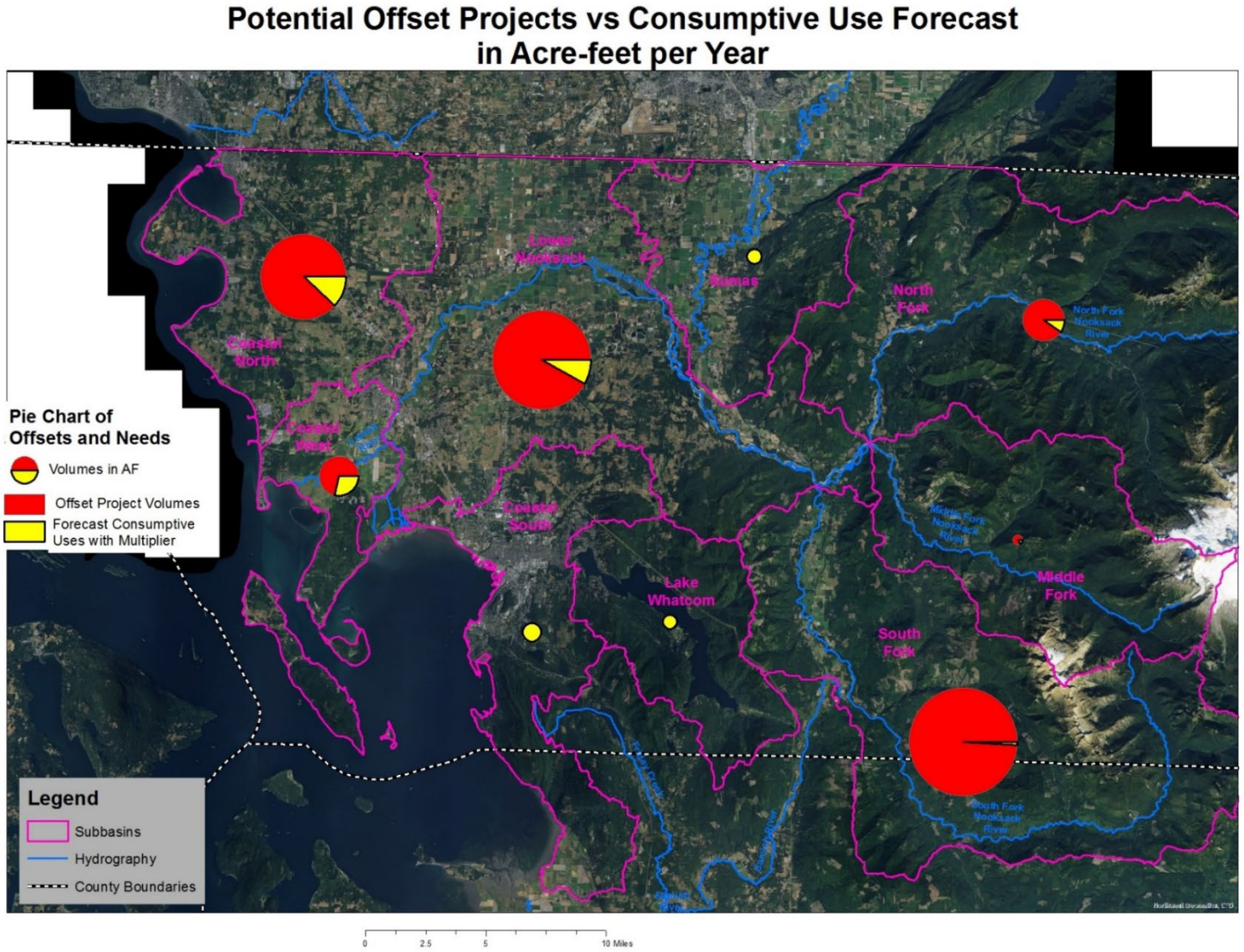

Figure 9.4. Potential offset project volumes, compared to forecasted impacts from new consumptive domestic exempt uses in each aggregated subbasin.

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.

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								
	Skookum Ck 12209500										29	
	Racehorse Ck 1226900									3.8		

Table 9.2. Aggregated subbasin offset project volumes versus offsets needed to replace consumptive use impacts.

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 9.3. Comparison of anticipated monthly pumping rate for expected 2,150 new domestic permit-exempt wells (as derived in Table 4.4) versus the offset volumes anticipated from offset projects identified in Chapter 6.

	Monthly Pumping Rates to Supply New Domestic Permit-Exempt Wells											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2150 new exempt wells expeced by 2038: Monthly gpm pumping rate	229	229	229	358	549	699	850	691	452	229	229	229
Annualized Offset rate from Project List (3767 AF/yr) in gpm	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291

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) Outlines an adaptive management process; and
4) Describes and evaluates for net ecological benefit, consistent with Ecology's 2018 Interim Guidance.

The document also 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 draft document to provide information to interested parties about how Ecology plans to meet the requirements of RCW 90.94.020, and to gather comments to inform development of the final rule. 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 draft documents.

References

2010 State of the Watershed Report (Available at: https://wria1project.whatcomcounty.org/resources/other-resources/2010-state-of-the-watershed-report)

Barlow, P.M., and Leake, S.A., 2012, Streamflow depletion by wells—Understanding and managing the effects of groundwater pumping on streamflow: U.S. Geological Survey Circular 1376, 84 p. (Available at http://pubs.usgs.gov/circ/1376/)

BERK Consulting, Inc. August 2, 2018. *WRIA 1 Sub-Basin Growth Projections, 2018-2038, Memorandum*.

Reeves, H.W., 2008, STRMDEPL08—An extended version of STRMDEPL with additional analytical solutions to calculate streamflow depletion by nearby pumping wells: U.S. Geological Survey Open-File Report 2008–1166, 22 p.

RH2 Engineering, Inc. "Figure 3." S1-28773 *Report of Exam*, 06-24-2015, Coordinated Cost Reimbursement Water Right Processing Investigator's Report.

RH2 Engineering, Inc. August 21, 2018. Technical Memorandum RE: Potential Consumptive Use Impacts of Domestic Groundwater Permit-Exempt Wells Over the Next 20 Years in WRIA 1 – FINAL UPDATED.

RH2 Engineering, Inc. October 2, 2018. Technical Memorandum: FINAL Task 2 Deliverable – Projects and Actions.

Puget Sound Partnership Watershed Recovery Plan: Nooksack Chapter (2005). (Available at https://www.psp.wa.gov/salmon-recovery-watersheds.php)

Washington State Department of Ecology. April 2018. *ESSB 6091 – Streamflow Restoration Recommendations for Water Use Estimates*. Publication 18-11-007 Retrieved May 30, 2018 (Available at https://fortress.wa.gov/ecy/publications/SummaryPages/1811007.html)

Washington State Department of Ecology. June 2018. Interim Guidance for Determining Net Ecological Benefit. Publication 18-11-009 (Available at https://fortress.wa.gov/ecy/publications/SummaryPages/1811009.html)

Washington State Department of Ecology. 2018. Big Lake Mitigation Plan. (Available at https://fortress.wa.gov/ecy/wrdocs/WaterRights/wrwebpdf/BigLakeMitigationPlan.pdf)

Washington State Department of Ecology. July 2019. Water Resources Program Policy POL 2094: Streamflow Restoration Policy and Interpretive Statement. (Available at https://fortress.wa.gov/ecy/wrdocs/WaterRights/wrwebpdf/pol-2094.pdf)

WDFW (Washington Department of Fish and Wildlife) and WDOE (Washington Department of Ecology). 2016 (updated). Instream Flow Study Guidelines: Technical and Habitat Suitability Issues including fish preference curves. Washington Department of Ecology Publication 04-11-007: 79 pp. Updated April 2016. (Available at https://fortress.wa.gov/ecy/publications/publications/0411007.pdf.)

Whatcom LIO Recovery Plan (2017). (Available at https://pspwa.app.box.com/s/nxli7o61pnjxx4rkmo7nokcjh9huc0kf)

Wilhere, G.F., T. Quinn, D. Gombert, J. Jacobson, and A. Weiss. 2013. A Coarse-scale Assessment of the Relative Value of Small Drainage Areas and Marine Shorelines for the Conservation of Fish and Wildlife Habitats in Puget Sound Basin. Washington Department Fish and Wildlife, Habitat Program, Olympia, Washington.

WRIA 1 Salmonid Recovery Plan (2005). (Available at http://salmonwria1.org/webfm_send/23)

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

WRIA 1 Watershed Management Plan (2005). (Available at https://wria1project.whatcomcounty.org/resources/guiding-documents-plans/wria-1-watershed-management-plan-associated-documents)

Appeal

When final, under the Administrative Procedure Act (APA), this publication, along with all the supporting documents, is subject to judicial review as part of the adoption of the amendment to WAC 173-501. You have a right to challenge this decision by filing a petition for review of the rule amendment in Superior Court under RCW 34.05.570(2). To challenge this publication by filing a petition for review you must comply with all applicable requirements in the APA.