Technical Staff

Net Ecological Benefit Determination

RCW 90.94.030 Watershed Restoration and Enhancement Plan

Puyallup River Basin (WRIA 10)

Water Resources Program

Washington State Department of Ecology

Olympia, WA

April 2021

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Related Information

- Link to WREC Report[1]
- Streamflow Restoration Planning[2]

[1] https://apps.ecology.wa.gov/publications/SummaryPages/2111010.html
[2] https://ecology.wa.gov/Water-Shorelines/Water-supply/Streamflow-restoration/Streamflow-restoration-planning

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1.0 Overview

The Water Resources Inventory Area (WRIA) 10 Watershed Restoration and Enhancement Committee (Committee) has produced and approved a Watershed Restoration and Enhancement Plan (Plan), dated April 26, 2021, which addresses the requirements of chapter 90.94 RCW (RCW 90.94) relative to WRIA 10, the Puyallup River Watershed. This document provides the Ecology Water Resources Program (Program) Streamflow Restoration Section technical staff's evaluation and determination of Net Ecological Benefit (NEB) as required in RCW 90.94.030(3)(c).

In addition to the coordination and technical assistance provided by the Program to the Committee, Ecology provided Net Ecological Benefit guidance (NEB Guidance) to help them address the requirements of chapter 90.94 RCW:

> Final Guidance for Determining Net Ecological Benefit, GUID-2094 Water Resource Program Guidance, July 31, 2019, Publication 19-11-079, 131 p.

Ecology staff chaired the Committee, were the lead authors of the Plan, and voted to approve the Plan. Although not required by the statute, Ecology's NEB Guidance encourages committees to include NEB evaluations in their plans. The Plan includes an NEB evaluation and concludes, "Based on the information and analyses summarized in this plan and the assumption that projects and programmatic actions in the plan will be implemented, the WRIA 10 Committee finds that this plan achieves a net ecological benefit."

RCW 90.94.030(3)(c) indicates that Ecology "must determine that actions identified in the 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". Ecology's NEB Guidance indicates that the department intends to provide deference to the NEB recommendations in a well-developed Plan. However, it is ultimately up to the department to support its NEB decision."

2.0 Assessment of potential impacts

The Plan provides estimates of how many new permit-exempt domestic (PE) wells are likely to be constructed within WRIA 10 over the 2018-2038 planning horizon; how much new consumptive water use will likely result; and what streamflow impacts are likely to occur. To facilitate planning, the Committee divided the watershed into seven subbasins, then broke out the estimates of future wells and anticipated consumptive uses by subbasin.

2.1 Evaluation of new PE wells

The majority of WRIA 10 is within Pierce County, with the remainder located in King County. The Plan uses a different methodology in each county for projecting new PE wells over the planning horizon. Projections in Pierce County used historical well construction data across the whole county from 1999-2018, whereas projections in King County used historical building permit data in unincorporated areas from 2000-2017.

The Committee produced moderate, high, and low PE well growth projections for the for each subbasin using building records from 1999-2018 (Table 1)[3].The Committee concluded that using data encompassing the whole time period helps deal with the uncertainty in projecting PE wells.

Table 1. Number of PE Well Connections Projected between 2018 and 2038 (Table 6 in Plan)

Subbasin	Moderate Growth Scenario (1999-2018)			High Growth Scenario (1999-2008)			Low Growth Scenario (2009-2018)		
	King	Pierce	Total	King	Pierce	Total	King	Pierce	Total
Carbon River	--	109	109	--	142	142	--	87	87
Lower Puyallup River	--	102	102	--	153	153	--	53	53
Lower White River	24	52	76	24	67	91	24	42	66
Middle White River	57	--	57	57	--	57	57	--	57
South Prairie Creek	--	167	167	--	229	229	--	122	122
Upper Puyallup River	--	165	165	--	242	242	--	104	104
Upper White River	--	12	12	--	4	4	--	20	20
Total	**81**	**607**	**688**	**81**	**838**	**919**	**81**	**429**	**510**

Analysis of the estimated population growth in the basin indicates that over half of the growth is projected to occur in central western of the watershed, in the Upper Puyallup River, and the South Prairie Creek subbasin (Figure 1). The remaining projected new PE wells are fairly evenly distributed in the remaining subbasins, with the exception of the Upper White River subbasin, which is primarily commercial timber land and federally protected land.

2.2 Evaluation of impacts from new consumptive use

The Committee employed methods and assumptions recommended in Ecology's NEB Guidance to estimate consumptive indoor and outdoor water use from new PE wells.

The outdoor irrigation estimation methodology incorporates several conservative assumptions. The largest assumption is use of commercial turf grass irrigation requirements for analog watering of domestic lawns.

The Committee decided that the moderate growth projection is the most likely scenario to occur during the planning horizon. Using the high growth projection of 688 new PE wells yields a consumptive use estimate of 277.4 acre-feet per year (AFY) or 0.38 cubic feet per second (cfs) (Table 2).

[3] Note that the high growth scenario uses PE well data from 1999-2008 when residential building trends were strong and the low growth scenario uses data from 2009-2018 when residential building trends were weaker.

Figure 1. Projected Growth Map (Figure 4 in Plan)

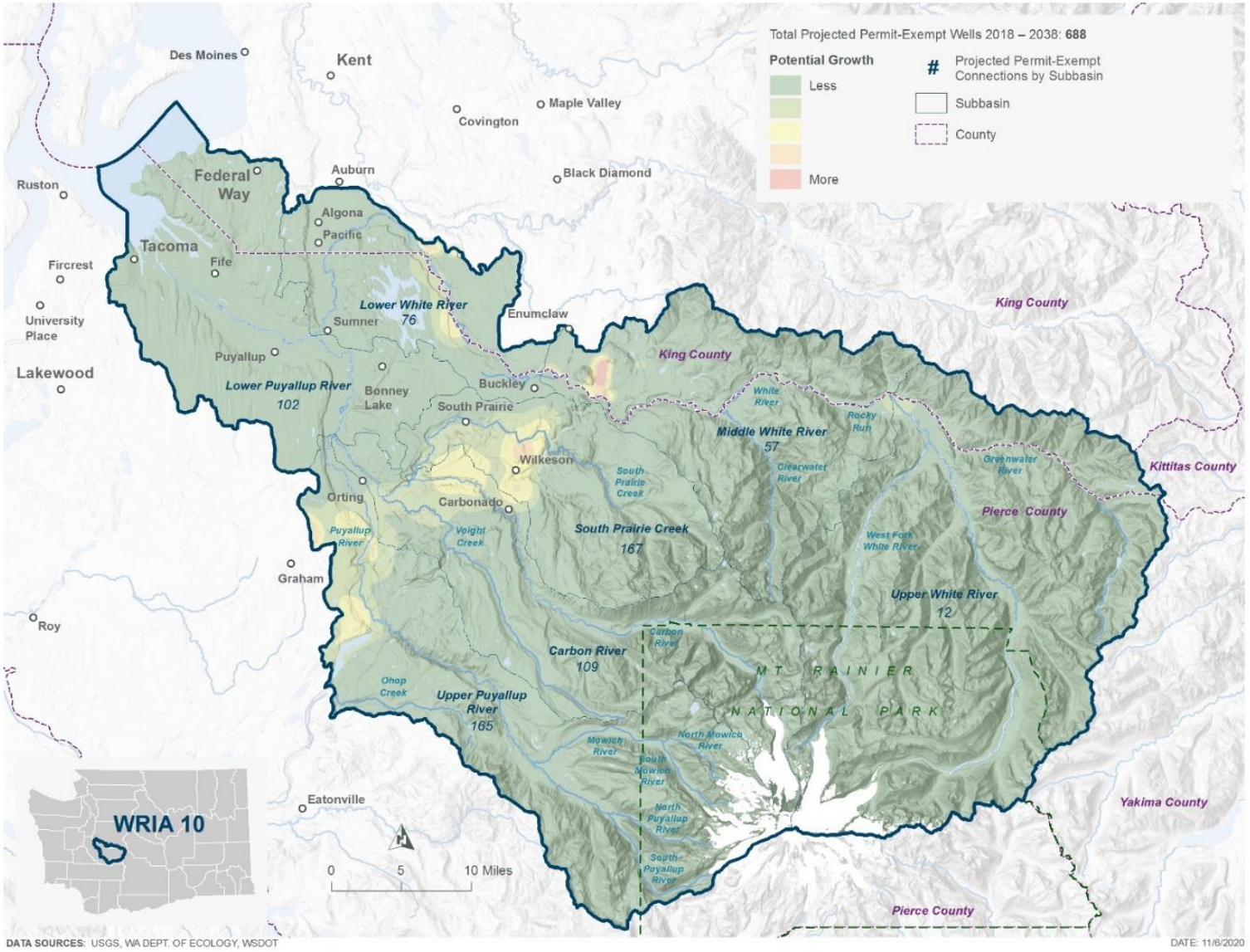


Table 2. Indoor and Outdoor Consumptive Use Estimates by Subbasin (Table 7 in Plan)

Subbasin	Projected PE wells	Indoor CU		Outdoor CU		Total CU/year in 2038	
		Acre-feet per year	Gallons per day	Acre-feet per year	Gallons per day	Acre-feet per year	Gallons per day
Carbon River	109	1.83	1,634	42.11	37,593	43.9	39,191
Lower Puyallup River	102	1.71	1,527	39.41	35,183	41.1	36,692
Lower White River	76	1.28	1,143	29.36	26,211	30.6	27,318
Middle White River	57	0.96	857	22.02	19,658	23.0	20,533
South Prairie Creek	167	2.81	2,509	64.52	57,600	67.3	60,082
Upper Puyallup River	165	2.77	2,473	63.75	56,912	66.5	59,367
Upper White River	12	0.20	179	4.64	4,142	4.8	4,285
TOTAL	**688**	**11.6**	**10,356**	**265.8**	**237,291**	**277.4**	**247,647**

Ecology technical staff consider 277.4 AFY a conservative consumptive use estimate for planning purposes for two main reasons:

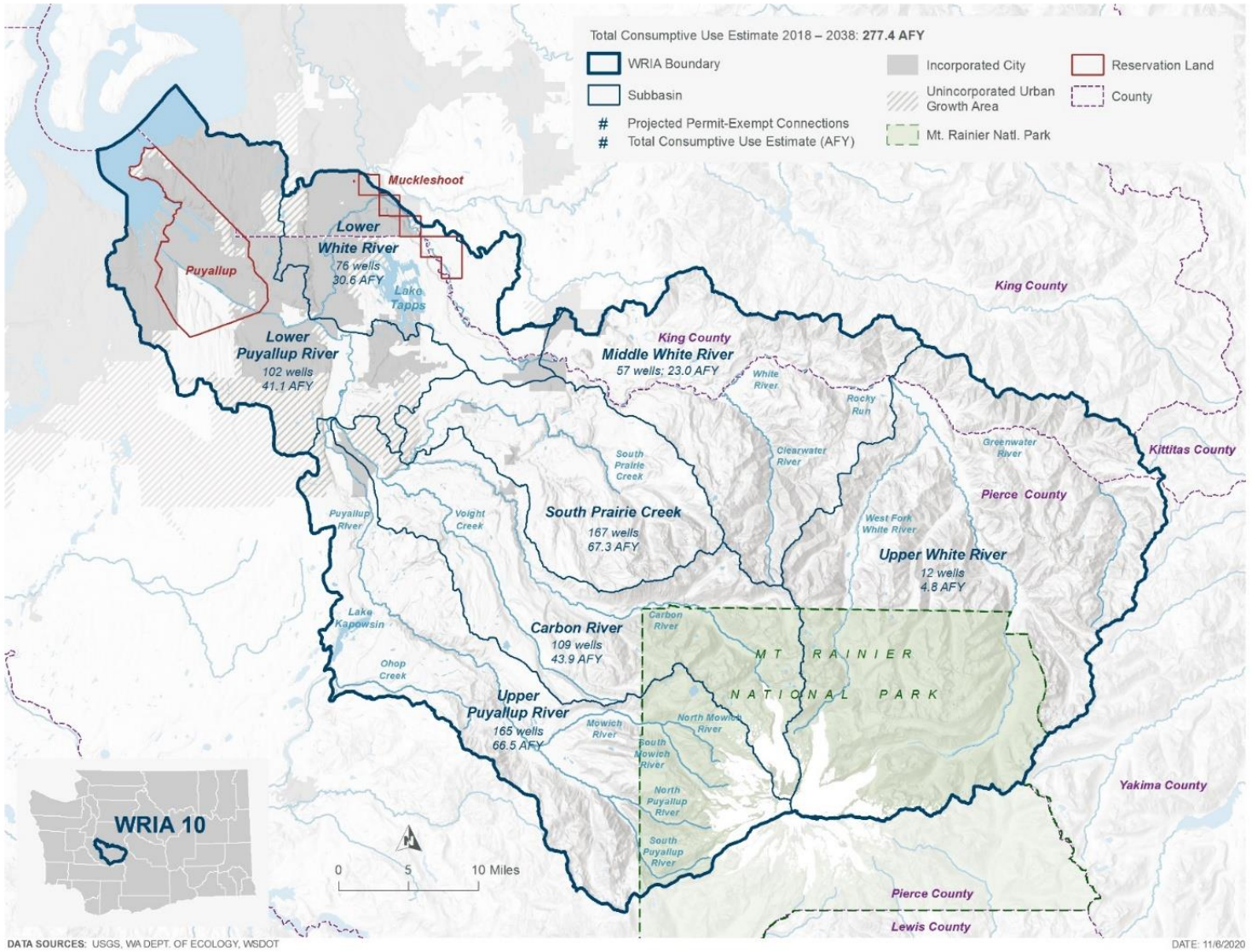
1. The outdoor watering consumptive use calculations used commercially grown turf grass as an analog for household lawns.
2. There are no seasonal adjustments to outdoor water use to account for decreased use in the non-irrigation months, i.e., the plan correctly assumes that more outdoor water use will occur in the summer months.

While there is some degree of variability for irrigation of domestic lawns and gardens during the summer, the non-irrigation months are assigned an irrigation amount when it is probable that minimal outdoor use occurs. These two factors build in a safety factor to the consumptive use estimates and helps address uncertainty in the outdoor water use methodology.

2.3 Evaluation of streamflow impacts

PE wells withdraw water from many different hydrogeologic units and at various depths in WRIA 10.

Figure 2. WRIA 10 estimated PE well consumptive use by subbasin 2018-2038 (Figure 5 in Plan)



As explained in Appendix B of Ecology's NEB Guidance, while PE well water use and pumping associated with residential development will produce seasonal increases, particularly during the summer months, these impacts will be attenuated by their distance from surface water, both laterally and vertically. Therefore, most impacts from new PE wells in WRIA 10 will essentially be "steady-state" (spread evenly) throughout the year.

While consumptive use impacts will essentually be steady-state, they represent the greatest percentage of surface flow during the low flow periods of late summer and early fall.

3.0 Plan water and non-water offset projects

Watershed plans must identify projects that will offset the potential impacts that PE wells installed from 2018-2038 will have on streamflow, and result in a NEB to WRIA 10.

This section classifies projects as:

- Water offset projects.
- Habitat projects.
- Programmatic actions.

Water offset projects provide a quantifiable streamflow benefit, and thus their contribution to offsetting consumptive use from PE wells is quantifiable.

Habitat projects contribute toward achieving NEB by focusing on actions that improve the ecosystem function and resilience of aquatic systems, support the recovery of threatened or endangered salmonids, and protect instream resources including important native aquatic species. Habitat projects may also result in an increase in streamflow, but the water offset benefits for these projects is difficult to quantify with a high degree of certainty. Therefore, this plan does not rely on habitat projects to contribute toward offsetting consumptive use, however it recognizes they provide ecological benefits and therefore should be included in the plan.

Programmatic actions are non-capital projects that are implemented at a subbasin or larger scale, increase knowledge of water use in the WRIA, and contribute to water conservation. While programmatic actions may contribute to a lower overall PE well consumptive use in the watershed, the benefits of these actions are widely dispersed and difficult to quantify.

3.1 Water offset projects

Water offset projects presented in the Plan are described below. Table 3 summarizes project descriptions and Figure 3 indicates project locations.

The Plan focuses primarily on water right projects, because water rights placed in permanent trust within the Trust Water Rights Program provide reliable, durable, and legally protected offsets for PE wells.

The water offset projects listed in this plan are sorted into tiers:

- Tier 1 projects represent projects with the greatest certainty of being implemented, have specific locations, project sponsors, and in some cases are already being implemented.
- Tier 2 projects have less certainty because they are less developed, lack project sponsors, or lack specific locations at this time.

Tier 1 projects provide an estimated 375.3 acre-feet per year in offsets. The Tier 1 projects will fully offset the consumptive use in WRIA 10.

Tier 2 project water offsets that provide reasonable assurance that the plan can meet NEB if Tier 1 offsets are not fully realized.

The projects in the Plan provide an estimated 788.3 acre-feet per year in offsets, more than double the consumptive use estimate of 277.4 acre-feet per year.

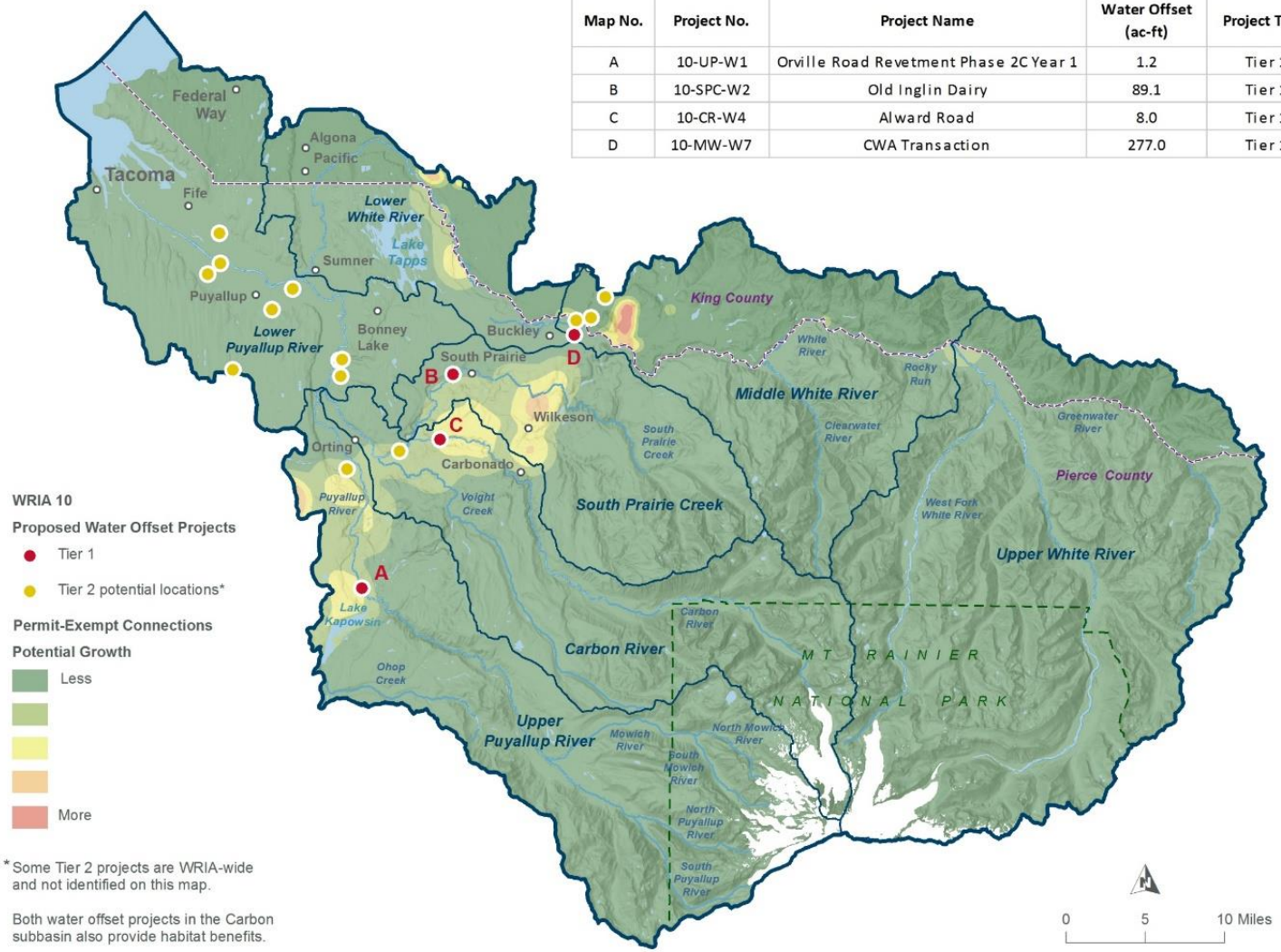
Table 3. WRIA 10 Offset Projects (Table 8 in Plan)

Project Number	Project Name	Project Type and Brief Description	Water Offset (AFY)	Timing of Water Offset	Additional Benefits	Project Sponsor	Tier
Carbon River (CR)							
10-CR-W4	Alward Road	Levee Setback. Property acquisition and restoration of 150 acres of floodplain. Includes decommission of 20 PE wells	8	Year-round	Restoration of 150 acres of floodplain, flood hazard reduction	Pierce County	1
10-CR-W3	Carbon River Levee Setback and Acquisition	Water Right and Levee Setback. Purchase a property as part of a larger levee setback project and acquire associated water right.	14.3	Irrigation Season	Habitat restoration.	Pierce County	2
Lower Puyallup (LP)							
10-LP-W6	Potential MAR	MAR. Construct an MAR in a gravel pit supplied with Tacoma Water. Three potential locations are identified in the Lower Puyallup.	300	Year-round		TBD	2
10-LP-W10	Bond	Water Right. Acquire water right as part of a larger property transfer and protection with the City of Puyallup	30	Irrigation Season		City of Puyallup	2
Middle White (MW)							
10-MW-W7	CWA purchase	Water Right. Acquire a portion of the Cascade Water Alliance water right to place in trust.	277	Year-round		Potential: Ecology or partners	1
South Prairie Creek (SPC)							
10-SPC-W2	Old Inglin Dairy	Water Right. Floodplain restoration of former dairy, and place water rights into trust after plants are established.	89.09	Irrigation Season	Floodplain restoration/reconnection, habitat enhancement.	Pierce Conservation District	1
Upper Puyallup (UP)							

Project Number	Project Name	Project Type and Brief Description	Water Offset (AFY)	Timing of Water Offset	Additional Benefits	Project Sponsor	Tier
10-UP-W1	Orville Road Revetment Phase 2C Year 1	Floodplain Reconnection/Levee Setback. Purchased and decommission a PE well that served 3 homes as part of this project.	1.2	Year-round	Habitat restoration. 1,500 Linear Feet of setback revetment, 19 engineered log jams.	Pierce County	1
WRIA-Wide (WW)							
10-WW-W8	Green Stormwater Infrastructure	Stormwater infiltration. Support Green Stormwater Infrastructure retrofits for both individual property owners and jurisdictions. Goal of 10 projects per year.	27	Year-round	Water quality improvements	Pierce Conservation District	2
10-W9-W17	WWT assessment	Water Right. Acquire 10% of the water rights identified through Washington Water Trust assessment. These rights are listed individually in this table.	41.71	Irrigation Season		TBD	2
		WRIA 10 Total Water Offset	**788.3**				
		WRIA 10 Consumptive Use Estimate	**277.4**				
		Tier 1 Offsets	**375.3**				

Figure 3. WRIA 10 Water Offset Project (Figure 6 in Plan)

Map No.	Project No.	Project Name	Water Offset (ac-ft)	Project Type
A	10-UP-W1	Orville Road Revetment Phase 2C Year 1	1.2	Tier 1
B	10-SPC-W2	Old Inglin Dairy	89.1	Tier 1
C	10-CR-W4	Alward Road	8.0	Tier 1
D	10-MW-W7	CWA Transaction	277.0	Tier 1



Carbon River Subbasin

Project Name: Alward Road Acquisition and Restoration

Project Description: Pierce County proposes to acquire property, construct a setback levee, and make other restoration improvements which will reconnect 150 acres of floodplain adjacent to the Carbon River. The acquisition area of the proposed project is located between river miles 6.8 and 8.0 of the Carbon River. This project is Tier 1 because it is underway and expected to continue to be implemented.

Proposed actions at the site include removing approximately 8,925 linear feet of existing levee located along the left (south) bank of the Carbon River. An armored levee of approximately 9,850 linear feet would be constructed and set back from the Carbon River to the south, encompassing an area of approximately 142 acres. Engineered log jams (ELJs) would be constructed alongside Alward Road to protect it from erosion. Riparian restoration would also occur in floodplain areas.

The habitat benefits of this project include reconnecting previously disconnected floodplain, increasing fish habitat diversity in the lower Carbon River, and restoring channel forming processes in the reach.

A total of 30 properties will be acquired as part of this project. Outreach has occurred and landowner agreements have been signed for ten properties in Phase 3 of the project.

Additional outreach will occur in subsequent phases.

An estimated 20 residential structures will be acquired and removed, providing an estimated water offset benefit equal to 20 new PE wells, or 8 acre-feet per year.

Project Name: Carbon River Future Levee Setback and Acquisition.

Project Description: Pierce County is currently conducting a feasibility study to increase flood protection and improve fish habitat conditions on the Carbon River near Bridge Street and Voights Creek. This project is Tier 2 because landowner support has not been secured.

Due to the sensitive nature of property and water right acquisition negotiations and the timing of this Plan, this Plan does not identify the specific location or property owner. Pierce County has expressed interest in placing the water right in Permanent Trust once the property is acquired.

Elements of this project include selecting a preferred alternative, designing the project, acquiring properties, building a setback levee, adding habitat elements in the floodplain, and removing the existing levee.

The habitat benefits of this project include reconnecting previously disconnected floodplain, increasing fish habitat diversity in the lower Carbon River, and restoring channel forming processes in the reach.

As a phase of the project, Pierce County anticipates acquiring a property and associated water rights upstream of river mile 4.4. The property is associated with a water right certificate. Washington Water Trust used irrigation delineation analysis to estimate 9.71 acres have been

irrigated in recent years. Using the same calculation that estimated this plan's consumptive use, this water right would be able to offset an estimated 14.3 acre-feet per year. This is an estimate of consumptive use quantity. An extent and validity determination by Ecology is required to determine the actual quantity available for acquisition.

Lower Puyallup Subbasin

Project Name: Managed Aquifer Recharge

Project Description: This project would construct a passive MAR project using source water from Tacoma Water pipeline to recharge a significant volume of water into shallow aquifers. This project is Tier 2 because it is conceptual and does not yet have a sponsor or specific location.

In WRIA 10, a review of potential sites focused on gravel pit sites near the City of Tacoma pipeline. All of the potential sites are located in the Lower Puyallup River subbasin.

Preliminary calculations of the potential size and infiltration capacity if a suitable gravel pit site is located were performed. A MAR facility may only need a footprint of 2 acres to infiltrate 300 acre-feet per year.

It was assumed that diversion and infiltration would occur during winter months as the City of Tacoma pipeline has excess capacity during winter.

A flow rate of 1 cfs (450 gallons per minute) would be required from the City of Tacoma pipeline to infiltrate 300 acre-feet during the winter season. If several sites are feasible, the selection of how many are used and how much water is infiltrated at each would be a decision of the project sponsor.

MAR facilities provide year-round benefits. A MAR project can be scaled to the desired water offset or streamflow benefit. The amount and timing of water infiltrated can also be adjusted to time streamflow benefits to maximize benefits for fish.

Project Name: Bond Water Right

Project Description: The City of Puyallup proposes to purchase a water right as part of a larger property transfer to the city for conservation and protection purposes. This project is Tier 2 because the water use history is unknown.

The property has been used in the past as a berry farm. In 1970, Ecology issued a groundwater water right certificate for 150 gallons per minute, and 30 AFY from May 1 to October 1 to irrigate 25 acres.

The City of Puyallup has conducted initial outreach to the water right holder and has expressed interest in placing the water right into permanent trust once the property transfer is complete.

An extent and validity determination by Ecology is required to determine the actual quantity available for acquisition.

Middle White Subbasin

Project Name: CWA Water Right Acquisition

Project Description: This project would acquire and place into trust a portion of the municipal water right from the Cascade Water Alliance (CWA). This project is Tier 1 because Ecology conducted a tentative determination of extent and validity of the water right in 2000.

CWA supplies water for several municipalities in King County. CWA has expressed willingness in working with Ecology for the purchase and transfer into permanent trust a small portion of their water right. The water is diverted from the White River at river mile 24.3, held in Lake Tapps and released at river mile 3.6.

Ecology is currently in discussion with CWA on acquiring a small portion of the water right. The barriers to completion are negotiation of the acquisition and funding to purchase the water right. The project would have lasting benefits as the Trust Water Right would be held in perpetuity.

South Prairie Creek Subbasin

Project Name: Old Inglin Dairy Restoration and Water Right Acquisition

Project Description: The Pierce Conservation District (PCD) proposes to restore the Old Inglin Dairy property, located near the town of South Prairie, to functioning floodplain of South Prairie Creek. This project is Tier 1 because PCD has expressed interest in selling the water rights into permanent trust once the restoration project is established, which will occur in three to five years.

The restoration phase of the project includes planting and other habitat enhancements. Once the plants are established (about 3-5 years after planting), PCD proposes to place two water right certificates into permanent trust. South Prairie Creek is the source of both water rights and the purpose is irrigation. PCD currently uses the water right to irrigate plants in preparation and maintenance of riparian and floodplain plants.

WWT used irrigation delineation analysis to estimate consumptive use of 89.09 acre-feet per year. An extent and validity determination by Ecology is required to determine the actual quantity available for acquisition.

Upper Puyallup Subbasin

Project Name: Orville Road Revetment Phase 2C Year 1

Project Description: Pierce County will continue a setback revetment project along left bank of the Puyallup River between river miles 27.8 and 28.2. This project is Tier 1 since this project is underway, the county has purchased the property, and there is high certainty that this offset will occur.

Work under this phase will add 1,500 linear feet of setback revetment and 19 engineered log jams. This project will also decommission one PE well that served three homes, providing an offset of 1.2 acre-feet a year, or 0.4 acre-feet a year per home.

WRIA-Wide Offset Projects

Project Name: Various Water Right Acquisitions

Project Description: Acquire water rights included in the Washington Water Trust (WWT) water right assessment. This collection of projects is Tier 2 because no project sponsor or outreach has been conducted on these water rights, although some WRIA 10 Committee members have expressed willingness to sponsor a project or conduct outreach when an opportunity arose.

WWT conducted a rapid water rights assessment on eleven rights that fit the criteria identified by the WRIA 10 Committee. The assessment estimated that these eleven water rights would provide a total offset of 417.1 acre-feet per year.

To account for the uncertainty and the state of outreach for these water rights, this plan only counts ten percent of the total offset estimate, or 41.7 acre-feet per year. The WWT assessment report is included in Appendix I.

Project Name: Rain Gardens and Green Stormwater Infrastructure

Project Description: Pierce Conservation District has proposed to implement a program of rain garden and Green Stormwater Infrastructure (GSI) construction. This project is Tier 2, because the number of facilities may vary depending on finding suitable areas to retrofit, funding, and capacity of Pierce Conservation District.

This type of project could be applied to existing roofs and driveways, roadways, parking lots and other impervious areas that generate stormwater. The techniques include rain gardens, planter boxes, bio-infiltration swales, permeable pavement and reducing the footprint of roadways and replacing with GSI (green streets).

The Pierce Conservation District is ready to proceed immediately if the program was supported and funded. This plan assumes 10 facilities installed per year. Assuming an offset volume of 0.15 acre-foot per rain garden, this project would provide an offset value of 27 acre-feet per year after 18 years of installing facilities.

Summary

In conclusion, the four Tier 1 water offset projects included in the plan total 375.3 AFY, a net gain of 98.3 AFY, and will enhance the natural conditions of the surrounding habitat helping lead to achieving NEB. All of the Tier 1 projects have sponsors and have had some degree of planning or investigations completed. These projects are spatially distributed across several subbasins in areas expected to have the majority of new PE wells constructed over the planning horizon. Technical staff believe there is reasonable confidence that both offset project will continue to move forward and the projects should perform as necessary to meet the requirements of RCW 90.94.030.

3.2 Habitat projects

Habitat and conservation projects are those that contribute toward achieving NEB by:

- Improving ecosystem function and resilience of aquatic systems
- Supporting the recovery of threatened or endangered salmonids
- Protecting instream resources including native aquatic species.

In general, these projects would increase stream complexity, reconnect floodplains, promote fish passage, and enhance natural processes that had been lost to the benefit of salmonids and other aquatic species.

Habitat projects defined in Table 4 were developed to different levels ranging from broad concept to the design level and highlighted in the Plan. Figure 4 shows the locations of the proposed habitat projects.

Table 4. WRIA 10 Habitat Projects (Table 9 in Plan)

Project Number	Project Name	Project Type and Brief Description	Additional Benefits	Project Sponsor
Lower Puyallup (LP)				
10-LP-H5	Deer Creek Stream Bed Relocation	Relocate the creek bed to allow for a better connection to the floodplain, restore habitat in the adjacent areas.	Improve habitat and provide flood storage.	City of Puyallup
10-LP-H6	Swan Creek Channel and Bank Stabilization	In-channel stabilization and restoration measures including installation of woody material and streambed gravel.	Restore 2.5 miles of Swan Creek.	Pierce County and Puyallup Tribe
10-LP-H7	Silver Creek bank Stabilization	Restoration. Stabilize slopes of Silver Creek to stop channel incision.	Habitat restoration.	City of Puyallup
10-LP-H8	Puyallup River (Union Pacific) Setback Levee (RM 2.6-3.0) - Acquisition	Levee setback. Acquire up to 30 acres of floodplain and former intertidal habitat.	Habitat restoration.	Pierce County
10-LP-H9	Clear Creek RM 2.9 Acquisition and Levee	Levee setback and floodplain reconnection. Construct a new 13,600' levee along Clear Creek and remove flood gate. Reconnect up to 500 acres of floodplain.	Habitat restoration.	Pierce County
10-LP-H10	Fennel Creek Phase 3	Floodplain restoration This project will restore the Fennel Creek right bank floodplain to a more natural state. Project may include a small offset by removing existing PE wells.	Restore 14 acres of floodplain.	Pierce County
Lower White (LW)				
10-LW-H14	Jovita Creek Habitat Project	Restoration actions to address channel confinement, and that restore habitat and habitat forming processes.	Habitat restoration.	City of Edgewood

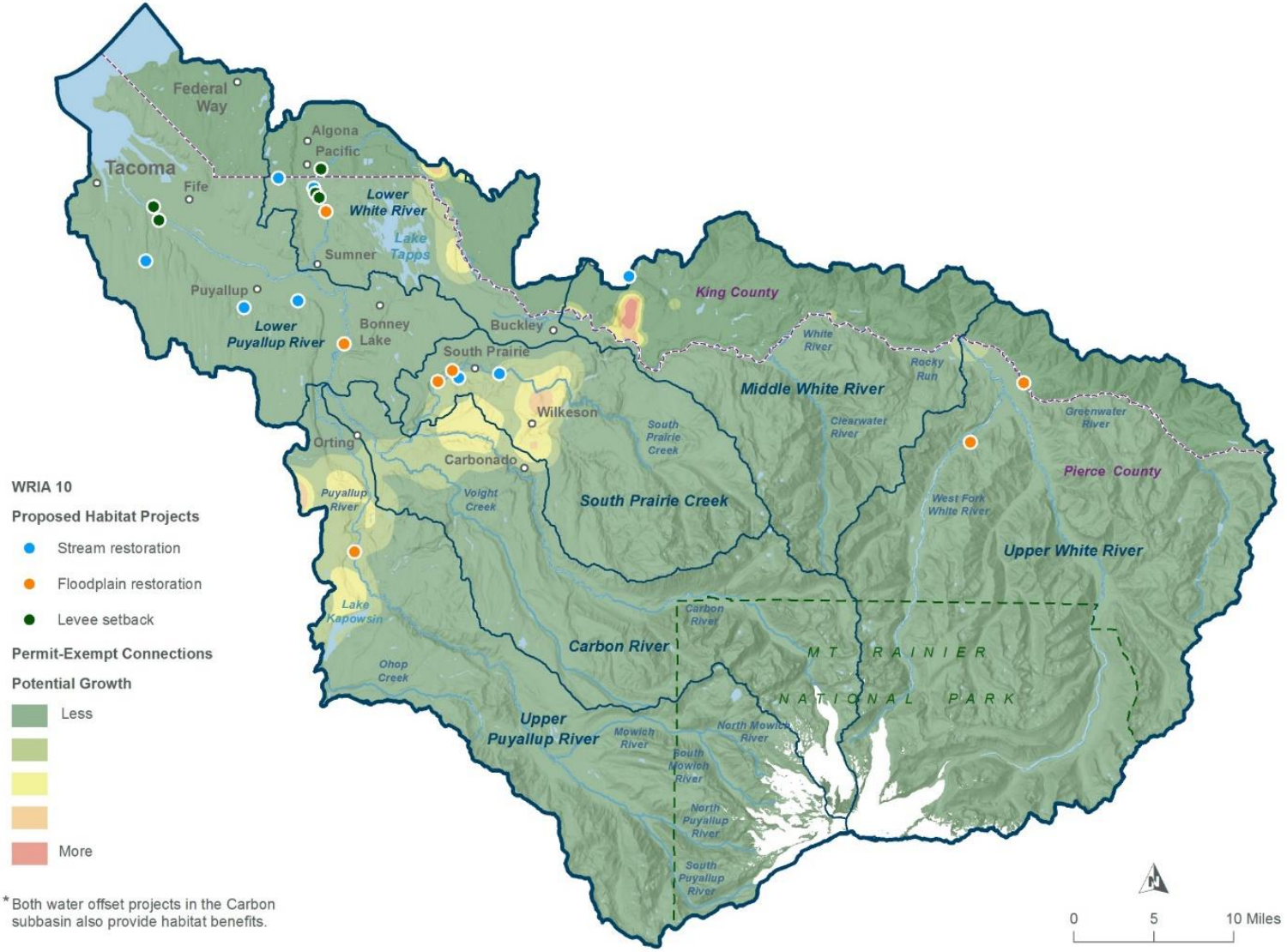
Project Number	Project Name	Project Type and Brief Description	Additional Benefits	Project Sponsor
10-LW-H15	Pacific Right Bank	Levee setback The proposed project will remove a levee and other artificial floodplain fill, allowing for off-channel habitat and floodplain restoration. The total project area available for restoration is estimated at 32 acres.	Habitat restoration, floodplain reconnection.	King County Flood Control District
10-LW-H16	White River LB RM 2.9-4.2 Restoration	Habitat restoration. White River Restoration will restore sustainable instream, floodplain, and wetland habitats within a 170-acre area along the Lower White River between river miles 2.9 and 4.2. The tailrace between RM 3 and RM 3.5 is part of the Foster Pilot Project and not included as part of the offset and NEB accounting.	Restore sustainable instream, floodplain, and wetland habitats within a 170 acre area along the Lower White River between river miles 2.9 and 4.2.	City of Sumner
10-LW-H17	White river bridge (Stewart Road) replacement RM 4.9	The project will consist of replacing the existing Stewart Road Bridge with a new bridge. The existing bridge is a restriction along the river, and a new bridge will allow the river more room to move naturally, allowing better utilization of instream habitat beneath the bridge. The current bridge also limits the flow of large woody debris, while a new bridge will let them large woody debris flow downstream and accumulate naturally through the rest of the lower White River.	Habitat restoration.	City of Sumner
10-LW-H18	White River Setback LB RM4.4-4.8 Stewart	The project consists of a levee setback on the left bank between RM 4.4 - RM 4.8. This project will improve rearing opportunity by creating slow water habitat, increased number/depth of pools, engaging floodplain food webs, improving high flow refuge with floodplain wetlands, and greater main channel roughness. Restore riparian forests. The project will reconnect about 20 acres of floodplain.	Habitat restoration. Reconnect 20 acres of floodplain.	City of Sumner

Project Number	Project Name	Project Type and Brief Description	Additional Benefits	Project Sponsor
10-LW-H19	Pacific Pointbar	The project consists of a levee setback on the left bank between RM 4.4 - RM 4.8. This project will improve rearing opportunity by creating slow water habitat, increasing number/depth of pools, engaging floodplain food webs, improving high flow refuge with floodplain wetlands, and greater main channel roughness. Restore riparian forests. The project will reconnect about 25 acres of floodplain.	Habitat restoration. Reconnect 25 acres of floodplain.	City of Sumner
Middle White (MW)				
10-MW-H13	Enumclaw Golf Course Restoration	Stream restoration to move Boise Creek back to its historic channel adjacent to the Enumclaw Golf Course.	Increased habitat complexity and channel roughness.	City of Enumclaw and Puyallup Tribe
South Prairie Creek (SPC)				
10-SPC-H2	Implement habitat projects based on SPC study.	Habitat improvement projects. Identify and design protection and restoration actions for the lower 15.5 miles of South Prairie Creek and the lower 6 miles of Wilkeson Creek.	Habitat restoration, water quality improvements, fish passage improvements.	Pierce Conservation District, Puyallup Tribe
10-SPC-H3	Stubbs Project	In-channel stabilization and restoration measures including installation of woody material and streambed gravel. Slight chance of a water right acquisition included in this project.	Habitat restoration.	Pierce Conservation District

Project Number	Project Name	Project Type and Brief Description	Additional Benefits	Project Sponsor
10-SPC-H4	South Prairie Creek RM 4.0-4.5 Floodplain Planting	Habitat improvement. Continue planting on the South Prairie Creek Preserve property between river mile 4.0 and 4.5 to maintain and in-fill existing plantings on the property.	Habitat restoration and establishment of 50-55 acres of forested floodplain.	Pierce Conservation District, South Puget Sound Salmon Enhancement Group (SPSSEG)
10-SPC-H22	South Prairie Creek Floodplain Reconnection, RM 2.7-2.8 Phase 1	Floodplain restoration. Acquire 73 acres and implement a multi-benefit floodplain reconnection project that would reduce flood risk and maintenance costs, restore vital salmon habitat, and keep the property in agricultural production.	Habitat restoration. Water quality improvements.	Pierce Conservation District
Upper Puyallup (UP)				
10-UP-H1	Orville Road Revetment at Kapowsin Creek	This project will construct a setback revetment along the left bank Puyallup River near RM 26.3 from Kapowsin Creek confluence upstream. May allow for re-connection of approximately 25-acres of forested floodplain between Puyallup River and Orville Road.	Habitat restoration. Reconnect 25 acres of floodplain.	Pierce County
Upper White (UW)				
10-UW-H11	Greenwater Phase 4 Implementation	Reach scale restoration to restore instream complexity and floodplain connectivity.	Restore 1.2 miles of Greenwater River.	SPSSEG
10-UW-H12	West Fork White Floodplain Project	Floodplain restoration project to restore habitat and habitat-forming processes.		SPSSEG
WRIA-Wide (WW)				

Project Number	Project Name	Project Type and Brief Description	Additional Benefits	Project Sponsor
10-WW-H20	Land acquisition, water right acquisition, and restoration	Seek out opportunities for land and water right acquisitions, large scale habitat restoration (including beaver-related projects where appropriate), and floodplain reconnection/levee setbacks.	Habitat restoration, habitat protection.	Multiple
10-WW-H21	Levee setbacks	Implement projects included on the Pierce County Levee Setback Feasibility Study as opportunities arise. The study lists levees in Pierce County that may be set back to improve floodplain function and habitat. Any of these levee setback projects would contribute to NEB as well as small but difficult to calculate water offsets by allowing for additional infiltration during high flow events.	Floodplain reconnection, habitat restoration.	Pierce County

Figure 4. WRIA 10 Proposed Habitat Projects (Figure 7 in Plan)



3.3 Programmatic Actions

In addition to the projects described above, the Plan identifies programmatic actions that will increase the knowledge of PE well water use and increase water conservation efforts throughout the WRIA. These programmatic actions do not have specific locations, but would improve PE well water management.

The proposed programmatic actions include:

- Water conservation education and incentive programs.
- Voluntary PE well metering pilot project.
- An update to Ecology's well log database.

These efforts will indirectly help lessen impacts from new consumptive use impacts during the planning horizon and increase the chances of the Plan achieving a NEB.

4.0 Ecology Technical Staff Net Ecological Benefit analysis

RCW 90.94.030(3)(c)) requires that,

> "Prior to adoption of the watershed restoration and enhancement plan, the department must determine that actions identified in the 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."

4.1 New PE wells and consumptive use estimates

The Plan applies moderate population growth estimates that project a total of 688 new PE well connections in WRIA 10 over the 2018 to 2038 planning horizon. Based on this projection, the Plan presents a conservative new consumptive water use estimate resulting from PE wells of 277.4 acre-feet per year in WRIA 10. The highest projected growth in PE wells is expected in the South Prairie Creek subbasin and the lower portions of the Middle White and Upper Puyallup subbasins (Table 5).

Ecology technical staff concur with this analysis, and believes that the conservative new PE well consumptive water-use estimate effectively addresses the inherent uncertainties in the methodologies used.

4.2 Quantity and spatial distribution of water offset projects

The Plan includes nine water offset projects two groups (Tier 1 and 2) which represent the likelihood and confidence of those projects being implemented.

- Tier 1 projects are estimated to provide 375.3 AFY of water.
- Tier 2 projects are estimated to provide 413 AFY of water.
- Tier 1 and Tier 2 projects are estimated to provide a combined total of 788.3 AFY of water.

The Tier 1 projects are located in ideal locations where the high expected PE well construction areas are likely to occur. About half of the Tier 2 projects are interspersed with the Tier 1 projects, with the remaining ones located down basin in the Lower Puyallup subbasin (Figure 3).

Surplus water offset is achieved in a total of three subbasins (Lower Puyallup, Middle White, and South Prairie Creek), ranging from 21.8 acre-feet per year in the South Prairie Creek subbasin to 288.9 acre-feet per year in the Lower Puyallup subbasin. A deficit in water offset occurs in a total of four subbasins (Carbon River, Lower and Upper White, and Upper Puyallup), ranging from 4.8 acre-feet per year in the Upper White subbasin to 65.30 acre-feet per year in the Upper Puyallup subbasin. This water surplus in some areas and water deficits in others creates ecological benefits and deficits that will need to be considered in our NEB analysis.

Two projects that are specified as "WRIA-wide" have not been located in a specific subbasin. Those projects would provide an additional offset of 68.7 acre-feet per year in yet to be determined locations in the watershed.

Table 1. Subbasin Water Offset Totals Compared to PE Well Consumptive Use Estimate (Table 15 in Plan)

Subbasin	Offset Project Totals (AFY)	Tier 1 Offsets (AFY)	Tier 2 Offsets (AFY)	PE Well Consumptive Use (AFY)[1]	Surplus/ Deficit (AFY) [2]
Carbon River	22.3	8	14.3	43.9	-21.6
Lower Puyallup River	330	0	330	41.1	+288.9
Lower White River	0	0	0	30.6	-30.6
Middle White River	277	277	0	23.0	+254
South Prairie Creek	89.1	89.1	0	67.3	+21.8
Upper Puyallup River	1.2	1.2	0	66.5	-65.3
Upper White River	0	0	0	4.8	-4.8
WRIA-wide projects	68.71	0	68.7	-	+68.71
WRIA 10 Total	**788.3**	**375.3**	**413**	**277.4**	**+510.9**

Notes:
[1] Values in table have been rounded, which is why totals may differ.
[2] Surplus water offset is associated with a positive value and a deficit in water offset is associated with a negative value.

Chapter 90.94 RCW allows for offset projects to occur anywhere within a WRIA, provided that overall Plan achieves NEB within the WRIA. It does not require that offsets are located in the same subbasin as where anticipated PE well consumptive use is expected to occur. Ecology staff considered whether the balance of impacts and benefits will lead to an overall benefit based on the magnitudes and locations of these effects relative to one another.

Based on the projects presented in Figure 3, projected water benefits are located within the basin to provide maximum flow benefits with the highest certainty of achieving NEB.

4.3 Quantity and spatial distribution of habitat projects

The Committee has identified 22 habitat and conservation projects to include in the Plan (Table 4). The Committee did not tier the habitat projects. Six of the projects with habitat benefits had full details presented in Appendix H. Nineteen projects had a description included in the plan. Two of the projects only had the brief description shown in Table 4. Although not listed in Table 4, the two Carbon River subbasin projects are combination water offset and habitat restoration projects and the restoration component was included in our analysis.

All projects have project sponsors and as detailed in the plan, most are listed as Near-Term Actions by the Salmon Recovery Lead Entity (Lead Entity 2018). Ten of the projects are located in areas where the highest growth is expected in the WRIA and twelve are in the Lower Puyallup and Lower White River subbasins. All of the levee setback projects are located low in the watershed whereas the stream restoration and floodplain restoration projects are evenly mixed in their respective distributions.

Ecology technical staff reviewed all the information presented for the projects with purported habitat benefits and were only able to quantify ecological benefits from projects W4, H4, H6, H10-H13, H18 & H19, and even some of these projects did not quantify all their habitat benefits. Combining the quantifiable project benefits gives an estimated 8.1 miles of stream restoration and at least 259 acres of floodplain restoration and enhancement.

For the purpose of NEB determination, Ecology technical staff relied on this subset of projects to use as the minimum ecological improvements anticipated from plan implementation. The habitat benefits from the remaining projects, while not as certain or quantifiable at this time, could also provide on-the-ground improvements and ecological benefits to the watershed once they are implemented. This provides a reasonable assurance that the minimum ecological benefits would be achieved even if the quantifiable projects fail to deliver the expected benefits.

While many of these projects have potential streamflow benefits, this Plan does not account for potential water offset benefits from habitat projects. The ecological and streamflow benefits from habitat projects are supplemental to the quantified water offsets. Implementation of the numerous general habitat improvement projects, in coordination with other restoration programs, will contribute to the goal of achieving a NEB.

4.4 Comparison of Plan projects with WDFW habitat index study results

Technical staff compared the spatial distribution of the Plan's habitat projects against results of the Washington Department of Fish and Wildlife (WDFW) watershed characterization study (Wilhere et. al., 2013). That study was conducted at the small drainage area Assessment Unit scale for Puget Sound. Figure 5 (produced by Ecology) shows WDFW's habitat index (A3ns_avg) for each of their Assessment Unit drainages in WRIA 10. Quantity and quality of habitats were assessed for eight salmonid species. This index shows relative conservation value and considers the density of hydro-geomorphic features, local salmonid habitats, and the accumulative

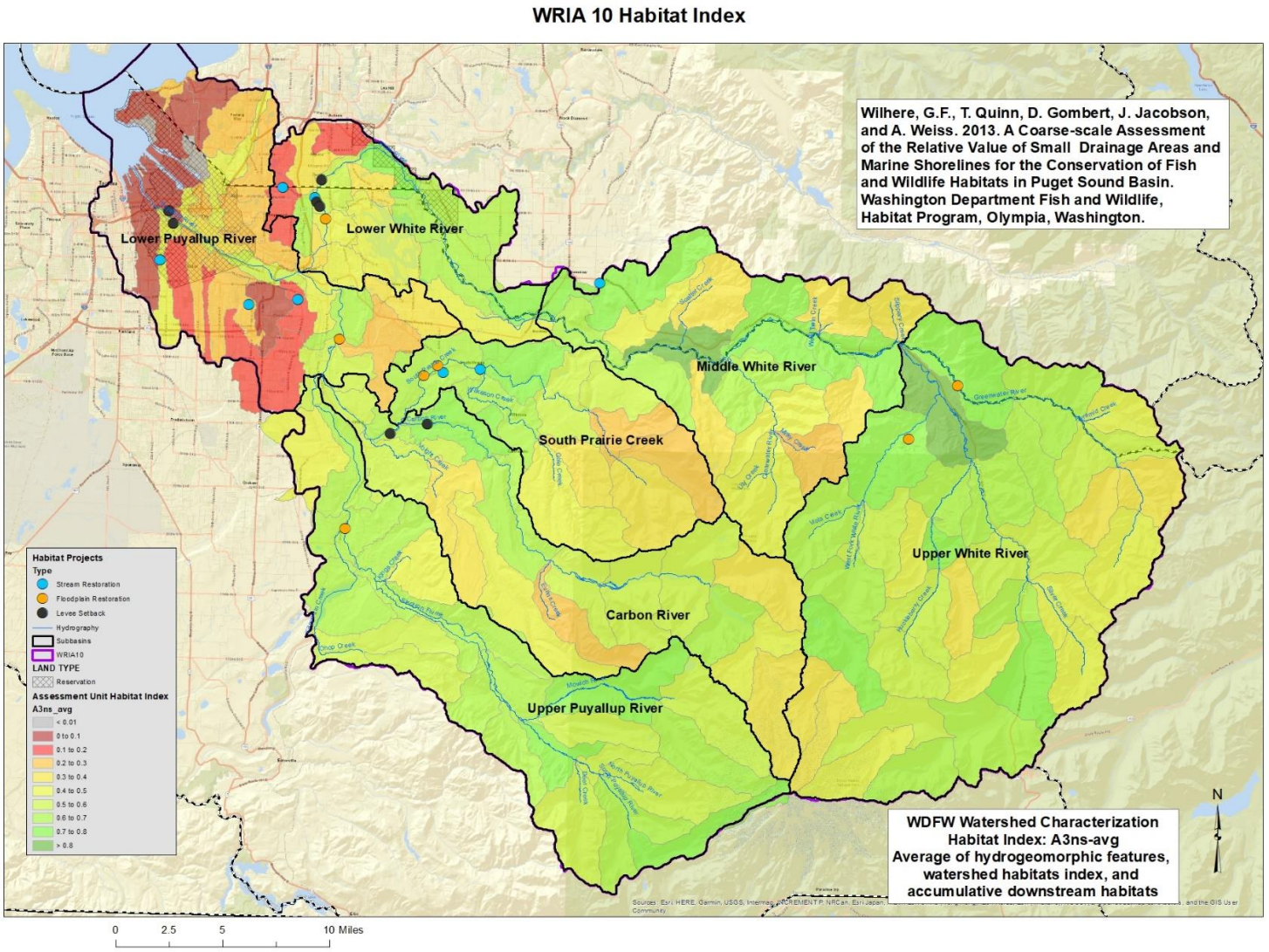
downstream habitats. Blocks with the highest, accumulated, downstream habitat values are dark green, yellow indicates a high restoration potential, and lowest value blocks are brown to dark red.

The relative value of a small watershed is indicated in Figure 5 based on an average of:

1. The density of wetlands and undeveloped floodplains inside it.
2. The quantity and quality of salmonid habitats inside it.
3. The quantity and quality of salmonid habitats outside and downstream of it.

Overlain on the habitat index information in Figure 5 are the locations of all habitat projects listed in the Plan (including the two Carbon River subbasin water offset projects). The project map symbols correspond with those in Figure 4.

Figure 5. Habitat Index Map



4.5 Uncertainty, implementation and adaptive management

There is uncertainty associated with all analyses presented in the Plan – ranging from the amount of consumptive use anticipated from future PE wells to the benefits likely to occur from the proposed projects. However, Ecology technical staff agree that the Plan uses sufficiently conservative methodologies and estimates for growth and PE well consumptive use projections.

Ecology technical staff have reasonable confidence that the selected Tier 1 water offset projects presented in the Plan have a high degree of confidence for implementation success and ultimately offsetting the estimated new PE well consumptive use quantity over the planning horizon.

An important consideration is the distribution and scaling of offset projects within the basin. Tier 1 water offset projects total 375.3 AFY of the 277.4 AFY required for offset during the planning horizon. The majority of the offset water comes from the Cascade Water Alliance (CWA) and Old Inglin Dairy water right acquisitions.

The CWA project is categorized as Tier 1 because the CWA's water right recently went through a tentative determination of extent and validity in 2000 and the CWA has been receptive to opening talks to a water right acquisition.

The Pierce Conservation District (PCD) has already acquired the Old Inglin Dairy water right through a land purchase. The PCD expects to place the water right into the State Trust Water Right Program once they have completed a riparian planting and restoration project at the site.

These two Tier 1 projects account for 97% of all Tier 1 offset water and 46% of total offset water projects in the entire WRIA. Additionally, one Tier 2 offset project, an MAR supplied with City of Tacoma water, accounts for 73% of Tier 2 projects and 38% of all offset water. Ecology technical staff are concerned that the Plan with 84% of all offset water in three projects at three discrete locations will result in water and ecological deficits in the other subbasins. Ecology technical staff considered this imbalance during the NEB analysis.

The Plan includes programmatic action recommendations that will indirectly help offset new consumptive PE well uses. The actions identified in the plan include water conservation education and incentive programs, a voluntary PE well metering pilot project, and an update to Ecology's well log database.

5.0 Ecology Technical staff NEB determination

RCW 90.94.030 requires that prior to plan adoption, Ecology must determine that the Watershed Restoration and Enhancement Plans will result in a NEB to instream resources.

The WRIA 10 Plan anticipates 688 new PE wells and a consumptive water use of 277.4 AFY using a moderate growth estimate, WRIA-wide, over the 2018-2038 planning horizon. Offset projects described in the Plan focus on stream reconnection, managed aquifer recharge, stormwater infiltration, water right acquisition, and green stormwater infrastructure.

The Plan proposes to offset new projected water use through nine projects, for a total estimated offset quantity of 788.3 AFY. All of the water offset projects were placed into one of two tier groups based upon the confidence of their implementation. Four Tier 1 water offset

projects account for 47% (375.3 AFY) of the total water offset projects and will provide a surplus WRIA-wide of 97.9 AFY of water over the consumptive use target of 277.4 AFY. The Plan has identified an additional 413 AFY in Tier 2 water offset projects across the WRIA that help provide reasonable assurance of the Plan achieveing NEB. The water balance at the WRIA-scale indicates a basin-wide surplus of 510.9 AFY.

The benefits associated with the water offset projects in the Lower Puyallup River, Middle White River, and South Prairie Creek subbains far exceed the PE well consumptive use estimate in those subbasins and on a WRIA-wide scale. This water surplus provided habitat benefits in the subbasin and downstream.

This leaves four subbasins with a projected total water defecit of -122.3 AFY. The 30.6 afy deficit in the Lower White subbasin is offset by the 254 afy surplus from the Middle White leaving 223.4 afy of surplus providing benefits downstream. The three remaining subbasins have water deficits that will need to be addressed through habitat projects or benefits from other subbasins.

The water offset projects are complimented by 22 habitat improvement projects. Two water offset projects also provide streamflow habitat benefits. While some of these habitat improvement projects have potential streamflow benefits, the Committee excluded any associated water offset from the Plan's water offset accounting, due to the high complexity of estimating any offset quantities. Of the 22 projects with habitat benefits presented, nine of them had quantifiable and reasonably assured habitat benefits of an estimated 8.1 miles of stream restoration and at least 259 acres of floodplain restoration and enhancement. Three of the projects (H4, H10 & H11) are adjacent to other completed restoration projects so some project synergy can be expected.

As is evident on Figure 5, higher-valued conservation index areas in the middle of the watershed have habitat projects identified in the Plan that will enhance and protect existing valuable habitat. There are also a number of lower-valued conservation index areas lower in the watershed with identified projects that will help restore degraded habitats. These actions will provide added assurance that the Plan will result in a NEB.

Ecology technical staff finds that the following factors provide sufficent evidence that the projects in the Plan, on balance, will achieve NEB:

- There will be downstream benefits from the excess CWA project offset water that will make its way down to the Lower White River subbasin where there are projected water deficits and no Tier 1 water offset projects.
- Projects H11 and H12 will provide 5.3 miles of stream and floodplain restoration in a subbasin with projected 4.8 afy water deficit.
- The Alward Road water offset projects in the Carbon River subbasin (W4), seeks to restore 150 acres of floodplain profiding fish habitat and restoring natural stream processes in a subbasin with a projected 21.6 afy deficit.
- The Upper Puyallup subbasin has a projected water deficit of 65.3 afy and has no quantifiable habitat project. While this will result in an ecological loss in this subbasin,

the WRIA wide surplus of 510.9 afy and the additional habitat projects in the other subbasins will generate far more ecological benefits for fish.

- High-valued conservation index areas will be enhanced and protected by identified habitat projects. Lower-valued conservation indexs areas will benefit from proposed restoration projects.

The WRIA 10 Committee identified a number of challenges related to plan implementation and recommends programmatic actions to address these. These actions described recommends:

- PE well tracking.
- Offset and habitat project implementation tracking.
- Periodic watershed plan implementation reporting, with recommended actions if offsets are not being achieved.

Based on the projects included in the Plan, Program staff conclude the WRIA 10 Plan uses reasonable and scientifically-sound methods during the analyses presented. In addition, the Plan recommends actions that increase the likelihood that implementation will lead to a NEB.

Therefore, Ecology staff conclude that there is a reasonable assurance that the Plan will provide significant improvements to stream resources within WRIA 10 and achieve a NEB in the context of chapter 90.94 RCW.

6.0 References

Ecology 2019a. Washington State Department of Ecology (July 2019). Final Guidance for Determining Net Ecological Benefit GUID-2094. Publication 19-11-079 131p. https://fortress.wa.gov/ecy/publications/documents/1911079.pdf.

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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. WDFW, Habitat Program, Olympia, Washington.