Potential for Reclaimed Water Use Within the Puget Sound Region

White Paper #3

Human Use of Water in Puget Sound: Managing Residential Water Demand for Resilient Communities and Healthy Ecosystems in a Changing Climate

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ABOUT THIS DOCUMENT

This document is the third in a series of white papers associated with Puget Sound Partnership project '*Human Use of Water in Puget Sound: Managing Residential Water Demand for Resilient Communities and Healthy Ecosystems in a Changing Climate*.' This document shares findings from our analysis evaluating the potential for additional use of reclaimed water in the Puget Sound Region. Other project documents and data sets produced in this analysis are available via the project webpage on the University of Washington, Climate Impacts Group's website.

Suggested Citation: Thebo, A. 2025. *Potential for Reclaimed Water Use Within the Puget Sound Region.* University of Washington Climate Impacts Group. Seattle, WA. pp.25.

Acknowledgments: Funding for this work was provided by the Puget Sound Partnership. We are grateful for the feedback provided by Laura Rivas and Katherine Wyatt at the Partnership and the many others who provided feedback and answered questions.

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EXECUTIVE SUMMARY

The Puget Sound Region generates around 314 million gallons per day (MGD) of wastewater, but less than 5% is currently reused (Figure ES1). Reclaimed water—highly treated wastewater suitable for a range of beneficial uses—presents a significant, largely untapped opportunity to improve regional water resilience, support environmental goals, and diversify water supply portfolios.

This white paper evaluates the potential for reclaimed water expansion across the Puget Sound Region, considering factors such as wastewater production, discharge locations, regulatory constraints, land use, and local demand. It draws on regional datasets, land use assessments, and facility-level analyses to highlight where and how reclaimed water might be more effectively integrated into future planning.

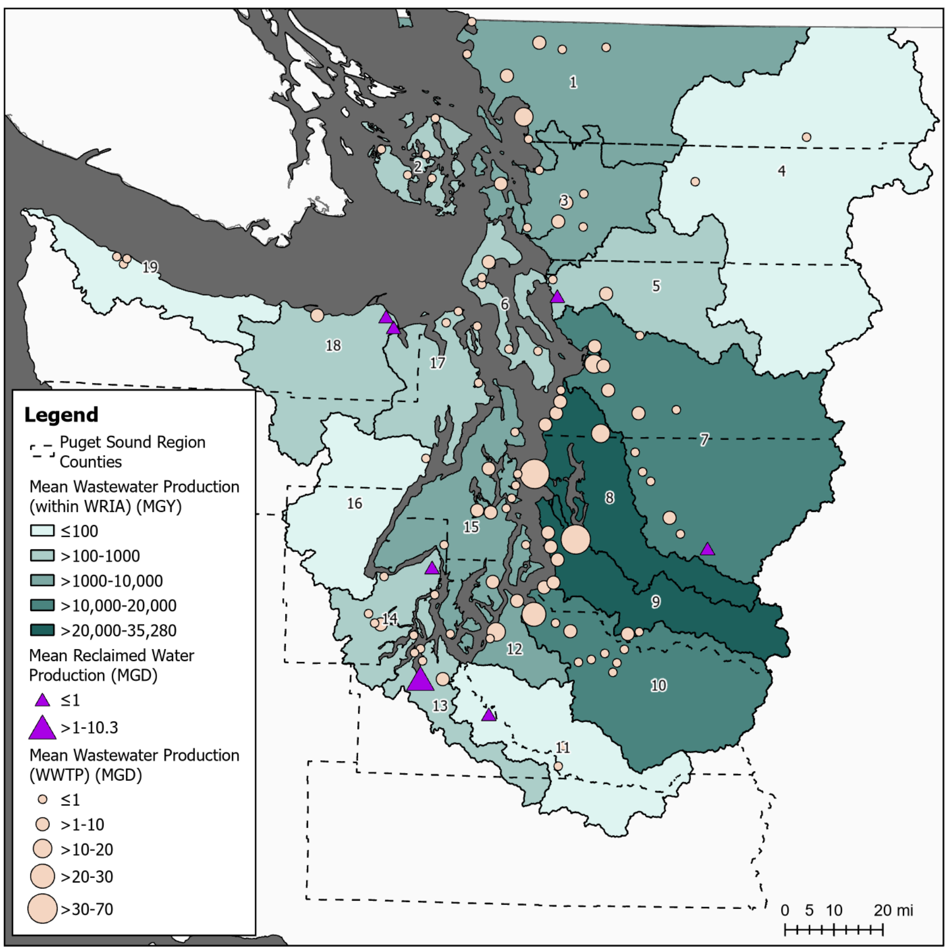

Figure ES1. Current wastewater production (by facility and WRIA) and reclaimed water projects in the Puget Sound Region.

Key Findings

- Population growth and climate change are intensifying pressure on regional water systems. While water use efficiency can significantly reduce future residential demand (Thebo 2025), long-term resilience will likely require a diversified water supply strategy that includes reclaimed water.
- The region's 102 permitted wastewater treatment plants (WWTP) vary in size and discharge location. Roughly 92% of effluent is discharged directly to Puget Sound, where reclaimed water projects face fewer permitting constraints compared to inland facilities who must demonstrate non-impairment of existing water rights under RCW 90.46.
- Reclaimed water is most often used for irrigation (agriculture, parks, green spaces), industrial uses, and non-potable urban applications such as toilet flushing. Mapping of land use around WWTP identified localized opportunities for reuse depending on proximity to compatible land uses and demand types.
- Examples such as King County's Brightwater facility and LOTT Clean Water Alliance show how large-scale facilities can support reclaimed water programs, but even small facilities are playing important roles in local water management. Projects vary widely in size, treatment class, and reuse type, offering valuable lessons for future expansion.
- While institutional, financial, and infrastructure challenges remain, the convergence of ongoing development, climate pressures, updated regulations, enhanced planning tools, and greater knowledge sharing among utilities presents a timely and strategic opportunity to advance reclaimed water use across the region.

Conclusion

As the region grows and climate variability increases, reclaimed water will likely be an important component in integrated water resources management and planning. While expansion will depend on site-specific conditions, the collective potential is substantial. Targeted investment, regulatory clarity, and regional coordination may help support broader use of reclaimed water—enhancing water supply reliability, reducing nutrient discharges, and contributing to long-term water and climate resilience for Puget Sound communities.

INTRODUCTION

Reclaimed—or recycled—water is municipal wastewater that has been treated to a level suitable for safe, beneficial reuse across a range of applications (Jones 2018). In Washington State, reclaimed water is regulated under a fit-for-purpose[1] classification system that defines minimum treatment levels and allowable uses. The Washington State Department of Ecology (Ecology) and the Department of Health (DOH) designate two main categories of reclaimed water: Class A and B (2019) (Table 1).

Table 1. Classes of reclaimed water and allowable uses in Washington State.

Reclaimed Water Class	Minimum Level of Treatment*	Allowable Uses	Example Uses**
Class A* **	Oxidized, coagulated, filtered, and disinfected	Uses where public or general employee contact is likely; Significant potential exists for site runoff or seepage.	Toilet flushing; Irrigation of food crops consumed raw; Landscape irrigation
Class B	Oxidized and disinfected	Restricted to sites with controlled access and minimal potential for environmental impacts.	Dust control; Irrigation of non-food crops; Irrigation of food crops not consumed raw; Industrial process water

* Regulations also include specific water quality standards for reclaimed water (e.g., Total Coliform, BOD, TSS, virus inactivation)

** Complete list of allowable uses by class in 'Purple Book' Tables 8-1 and 9-1.

*** Washington also has potable reuse rules (Class A+), but there are no current projects.

Reclaimed water projects are motivated by multiple benefits. By reusing treated wastewater, projects can reduce demand for freshwater withdrawals from local rivers and aquifers—potentially leaving more fresh water available for potable supplies, ecosystems, and other high-priority uses. Additionally, because reclaimed

[1] Fit-for-purpose reuse is the concept of matching the level of treatment to the quality of reclaimed water needed for an intended end use.

water projects divert wastewater effluent away from discharge points to other beneficial uses, these projects can reduce loads of nutrients and other contaminants to local waters. Water quality (and NPDES[2] permit compliance) is an important driver behind many current reclaimed water projects in the Pacific Northwest.

In inland areas, wastewater effluent is typically discharged to rivers and streams where it becomes 'waters of the state' and subject to allocation under existing water rights law. While Washington's 'Reclaimed Water Use Act' (RCW 90.46) prohibits impairment of existing water rights, this legal framework can make permitting more complex for inland facilities (Interagency Climate Resilience Team 2024), especially compared to facilities discharging to marine waters where water rights constraints are typically less restrictive.

Ultimately, the *realizable potential* for expanded reclaimed water use in the Puget Sound Region is shaped by a combination of factors: water supply and quality benefits, permitting and regulatory considerations, and the availability of economically viable local demand for reclaimed water.

DEFINING RECLAIMED WATER POTENTIAL

As described in the introduction, multiple factors impact the realizable potential for reclaimed water use in the Puget Sound Region. In Figure 1, we adapt a framework from the renewable energy sector to describe the potential for reclaimed water use in the Puget Sound Region.

[2] National Pollutant Discharge Elimination System (NPDES)

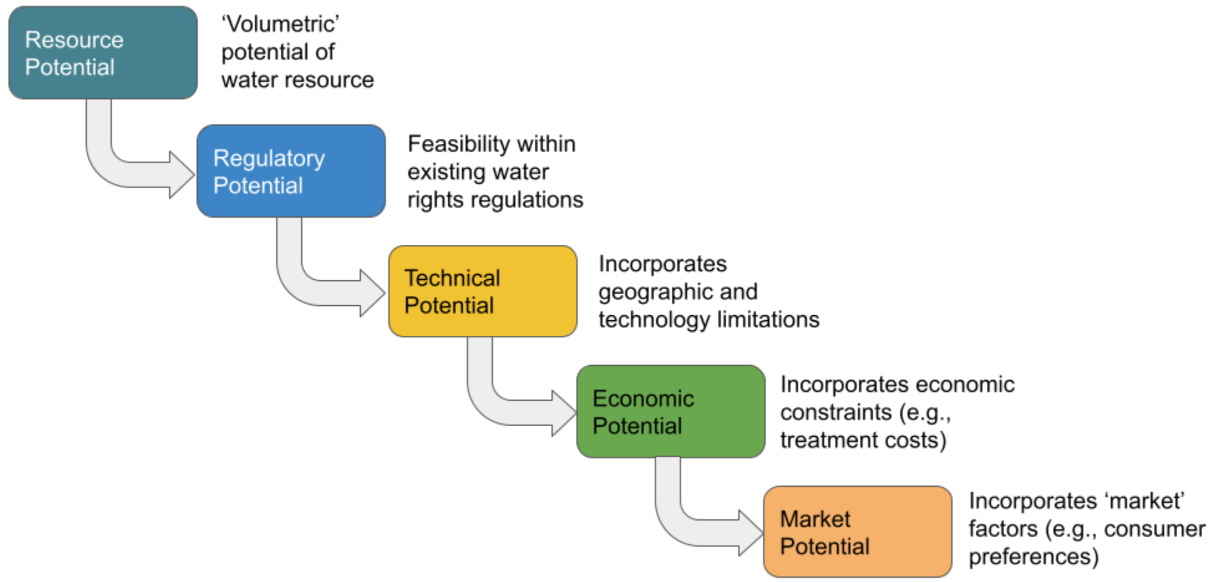

Figure 1. Conceptual framework for evaluating reclaimed water potential. Source: Adapted from Lopez et al. 2012.

In this analysis, we focus on resource (volumetric) potential with discussion of a few key factors impacting regulatory and technical potential for reclaimed water use in the Puget Sound Region. Economic and market potential impact the ultimate feasibility of specific reclaimed water projects, but are often dependent on local context and available funding mechanisms (Fagundes and Marques 2023; Bischel et al. 2012; Thebo 2021; King County Wastewater Treatment Division 2018). For example, customer willingness to pay for reclaimed water and consumer willingness to purchase produce irrigated with reclaimed water are important considerations at the project level, but difficult to evaluate in a regional assessment.

KEY DATA

This analysis relied on two primary datasets from Ecology's Water Quality Permitting and Reporting Information System (PARIS) – active permits and discharge monitoring data (Washington Department of Ecology 2025b). Subsequent tasks combine data from PARIS with other sources of data and information to gain additional insights into the potential for reclaimed water use in the Puget Sound Region.

Facility Locations: The PARIS permit search tool was used to identify all active 'Municipal NPDES IP', Municipal to Ground SWDP IP', and 'Reclaimed Water IP' locations in the study region. Permit addresses were geocoded using Geoapify then mapped using ArcGIS. Geocoded locations were checked against locations reported by facilities.

Facility Size: Reported flow data were downloaded for each facility for the 2024 Water Year (10/1/23-9/30/24). In the event that data were not available within those dates (e.g., Tacoma Central No. 1), the time range search was expanded to include 10/1/20-9/30/24. Flow data were filtered to only include samples that were averages (from continuous monitoring) and single samples. Summary statistics (e.g., mean, median, standard deviation) were calculated across available data at each facility. Facility locations, sizes, and other representative characteristics were tabulated and mapped using standard tools within ArcGIS and R.

POTENTIAL FOR RECLAIMED WATER USE

RESOURCE POTENTIAL

Background

At a basic level, the resource (or volumetric) potential for reuse is simply the quantity of water available for reuse in the absence of other constraints. In this analysis, we defined the resource potential for reclaimed water as the average quantity of wastewater produced in the region. Current reclaimed water production was considered in this analysis but was not subtracted from current wastewater production given its greater month-to-month variability and small overall volumes (see below).

Current Wastewater Production and Reclaimed Water Use

The Puget Sound Region currently produces an average of roughly 314 MG of wastewater each day. This includes a mix of domestic wastewater and effluent from industrial, commercial, institutional, and other sources. Wastewater is treated at

102 permitted facilities, which vary widely in scale.[3] These range from large regional plants—such as some King County facilities, which treat over 60 MGD—to 34 small-scale facilities that each treat less than 0.1 MGD (Figure 2).

While seasonal fluctuations in flow[4] were observed—most notably, higher flows in winter months due to inflow and infiltration (I&I)—the mean and median flow values at most facilities were relatively close. For this analysis, mean flow was assumed to be representative of current production of treated wastewater at each facility. In Figure 2 we summed mean flows at all wastewater treatment plants (WWTP) within each Water Resource Inventory Area (WRIA) to approximate total wastewater production by sub-region. Facility locations are shown as pink dots (WWTP permittees) and purple triangles (reclaimed water permittees), scaled by size.

There are currently ten active reclaimed water permits in the region with others, such as Kingston, in the planning stages. As a percent of the total wastewater produced in the region, only a small portion is currently reused (less than five percent). Quantifying actual reclaimed water production is complicated by inconsistent reporting, seasonal variation in demand (and production), and gaps in available data. However, based on PARIS reporting, permitted reclaimed water facilities collectively treat approximately 10–17 MGD. Reclaimed water production varies seasonally, depending on end use. Demand for irrigation water is minimal in the winter months whereas toilet flushing, industrial process water, and some groundwater recharge applications provide more year-round reuse potential.

Facilities of all sizes are represented among current reclaimed water permittees, including long-standing projects such as LOTT Clean Water Alliance (Olympia), Brightwater (King County), and Sequim. These projects support a wide range of

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[3] Municipal NPDES + Municipal to Ground SWDP individual permits. Industrial reuse and some direct industrial discharges are regulated separately under their own permits. These facilities are not included in this analysis. This analysis also does not include wastewater being managed locally via onsite systems.

[4] Facility DMR data in PARIS reported the monitoring location for flow data as inflow. Given negligible losses in flow in conventional treatment facilities, we assumed that these data were also representative of the facility's production of treated wastewater.

applications including agricultural and landscape irrigation, groundwater recharge, industrial uses, and non-potable building systems (e.g., toilet flushing).

In addition to delivering tangible supply and water quality benefits, many reclaimed water facilities engage in public education and outreach, showcasing their systems through parks, demonstration gardens, and community centers. Although the total number of permitted projects remains relatively low, the geographic clustering of some systems (e.g., LOTT and Yelm; Sequim and Sunland Water District) highlight opportunities and potential examples of peer learning, resource sharing, and regional coordination that could inform future expansion.

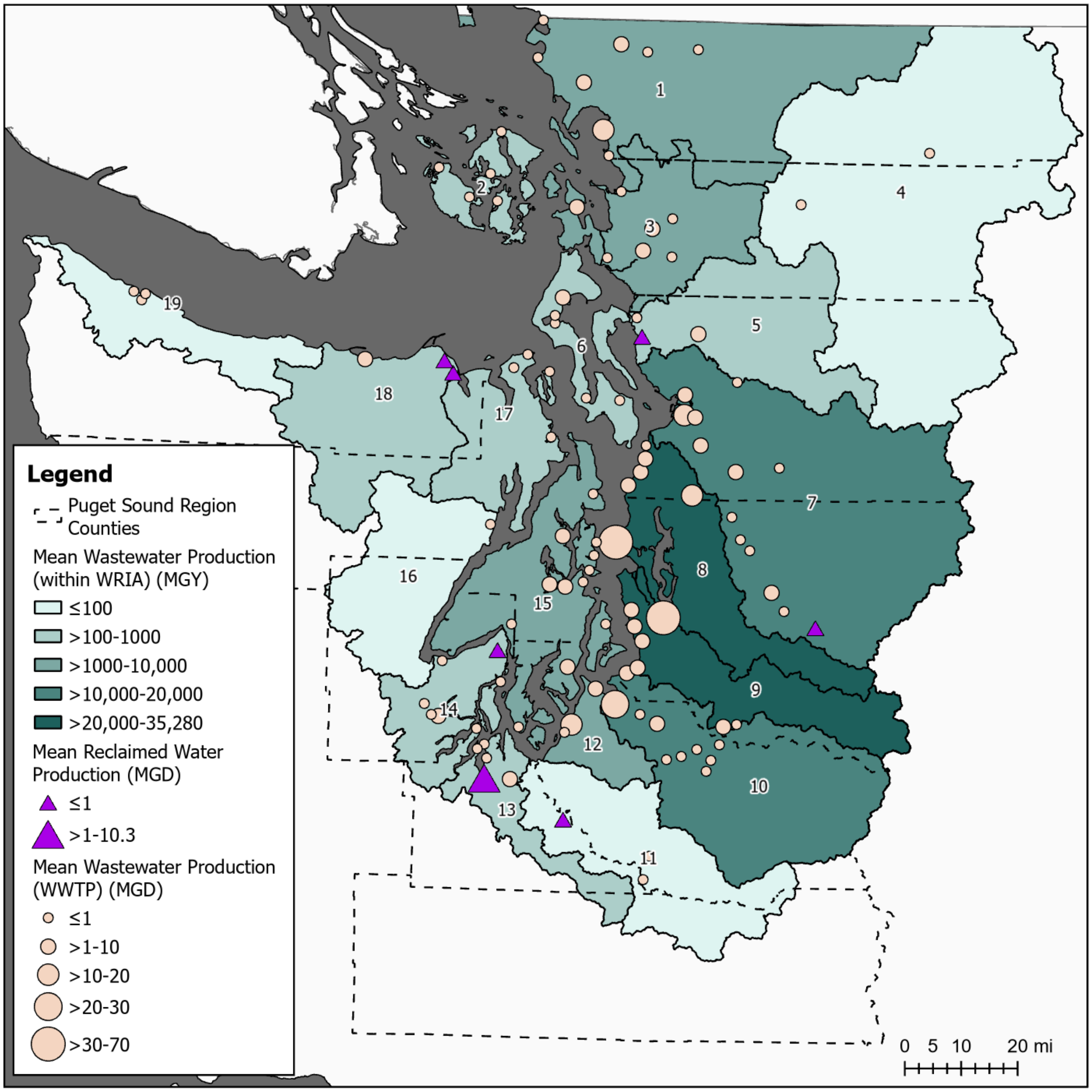

Figure 2. Current wastewater production (by facility and WRIA) and reclaimed water projects in the Puget Sound Region.

Reuse Potential and Current Water Demand

Accurately quantifying total current water use in the Puget Sound Region remains challenging due to data limitations and inconsistent reporting across sectors (Thebo 2024). However, available estimates indicate substantial potential for reclaimed water to offset existing withdrawals. According to the U.S. Geological Survey, public water system use in the region was approximately 423 million gallons per day

(MGD) in 2020 (Dieter et al. 2018; Luukkonen et al. 2023). Our own analysis estimates total current residential water demand in the region is approximately 393 MGD—263 MGD indoors and 130 MGD outdoors (Thebo 2025). Notably, neither of these figures include agricultural use, a potentially significant demand sector for reclaimed water. Collectively, these data suggest meaningful opportunities for reclaimed water to contribute to regional water supplies.

Future Wastewater Production and Water Use Efficiency

The population of the Puget Sound Region is projected to increase from 5.7 million to 10.5 million by 2080 (Puget Sound Partnership 2024). If current per capita wastewater generation rates remain unchanged, total regional wastewater production would increase from an estimated 314 MGD to approximately 578 MGD—an 84 percent increase. However, our analysis of future residential water demand suggests that continued improvements in indoor water use efficiency could significantly reduce per capita water use, thereby moderating future wastewater volumes (Thebo 2025). While outdoor water use is largely consumptive, approximately 80 percent of indoor residential water use is returned to wastewater systems (DeOreo et al. 2016). Although wastewater composition and flows vary across utilities, a substantial portion of the region's total wastewater originates from indoor residential use. Our analysis did not look at commercial, industrial, and institutional or agricultural water demand, but it is likely that efficiency gains are also possible in these sectors (Chinnasamy et al. 2021). Effective reclaimed water planning must account not only for population growth but also for projected changes in water use efficiency, which will directly affect the volume of wastewater available for reuse.

REGULATORY POTENTIAL

Background

Washington's Reclaimed Water Use Act (RCW 90.46) "prohibits the cessation of a wastewater discharge, for the purpose of reclaiming it and putting it to beneficial use, if stopping that wastewater discharge will cause a downstream impairment of existing water rights" (Washington Department of Ecology and Washington State Department of Health 2019). As a result, while there are reclaimed water projects in inland areas, permitting such projects is more complex. Applicants must demonstrate that proposed reclaimed water use will not impair existing water rights, or implement mitigation measures to address any identified impacts. In this section, we look at the distribution of each WRIA's wastewater flows by discharge location and instream flow rule status.

Discharge Locations

The discharge locations of permitted facilities were identified based on the location of the facility and additional details from the system website and/or permit. In this assessment, we looked at three general classes of discharge locations—marine waters, inland surface waters, and groundwater. Of the approximately 314 MGD of wastewater produced in the Puget Sound Region, 92 percent is discharged to marine waters, seven percent to inland surface waters, and less than one percent to groundwater (Figure 3).

In most Puget Sound WRIAs, the majority of effluent is discharged to marine waters (Figure 3). The Lower Skagit–Samish, Stillaguamish, Upper Skagit, and Deschutes are exceptions to this trend. Coincidentally, these same watersheds are WRIAs where our residential water demand modeling also predicted large increases in demand (on a percentage basis) under the business-as-usual scenario (Thebo 2025). This has important implications for reclaimed water potential—without improvements in water use efficiency, increased population will drive corresponding growth in wastewater volumes. However, developing reclaimed water projects in these inland WRIAs may face regulatory hurdles related to water rights, particularly under Washington's impairment-based permitting framework.

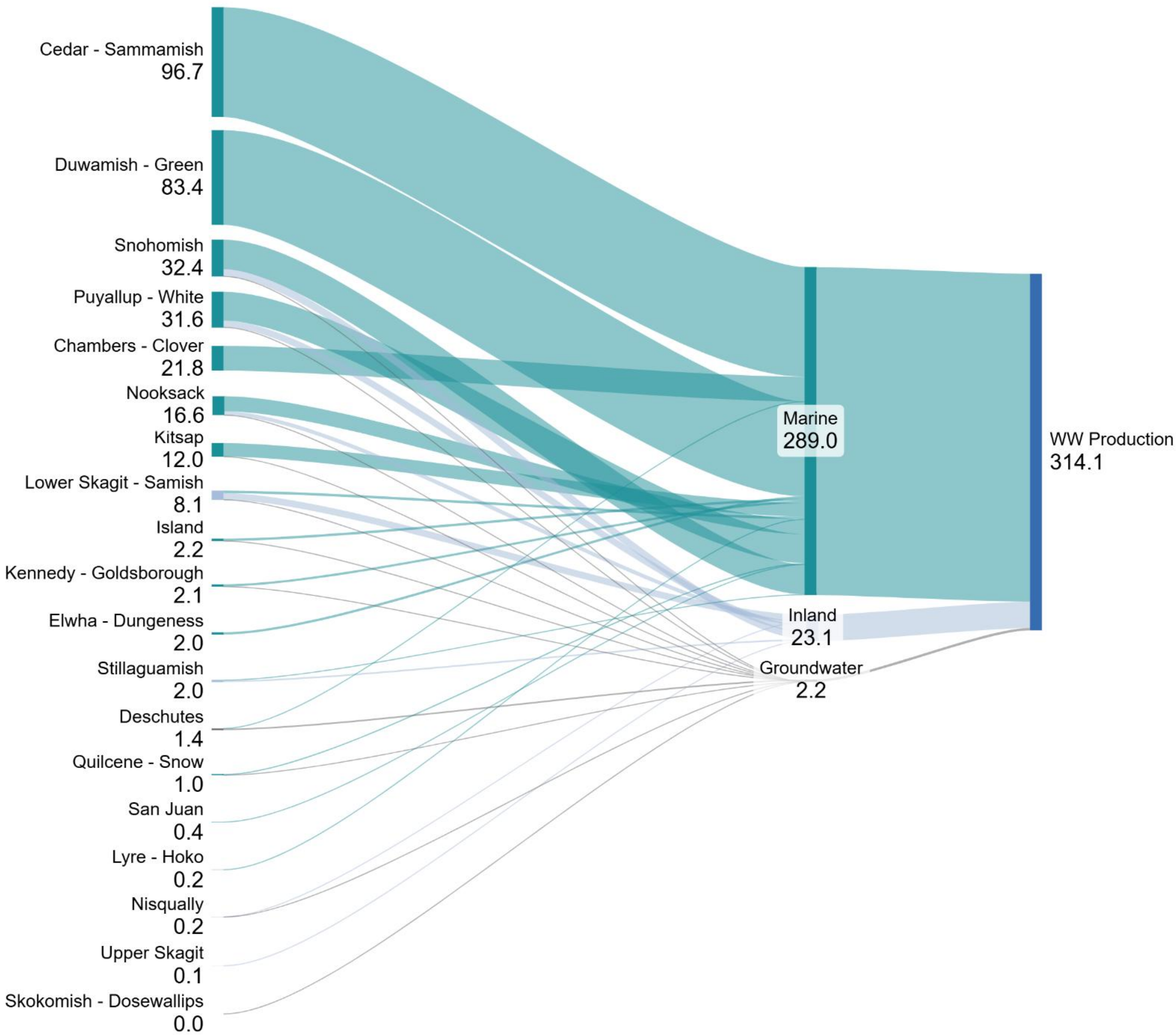

Figure 3. 2023-24 mean total wastewater production (MGD) by WRIA and discharge location.

Instream Flow Rules

Many Puget Sound watersheds have existing instream flow rules, which establish minimum flow thresholds for surface waters and, in some cases, close basins to new water right appropriations (Figure 4). These rules are critical for assessing the feasibility and potential benefits of reclaimed water projects. Under Washington's Reclaimed Water Use Act (RCW 90.46), reclaimed water projects must not impair existing water rights—an important constraint, particularly for inland dischargers where effluent contributes to regulated surface waters.

In contrast, most wastewater in the region is discharged directly to Puget Sound, where instream flow rules and impairment concerns typically do not apply. In this context, the presence of instream flow rules may also serve as a proxy for water scarcity, highlighting basins where reclaimed water could offer the greatest strategic value—both in offsetting freshwater demand and in supporting environmental flow objectives.

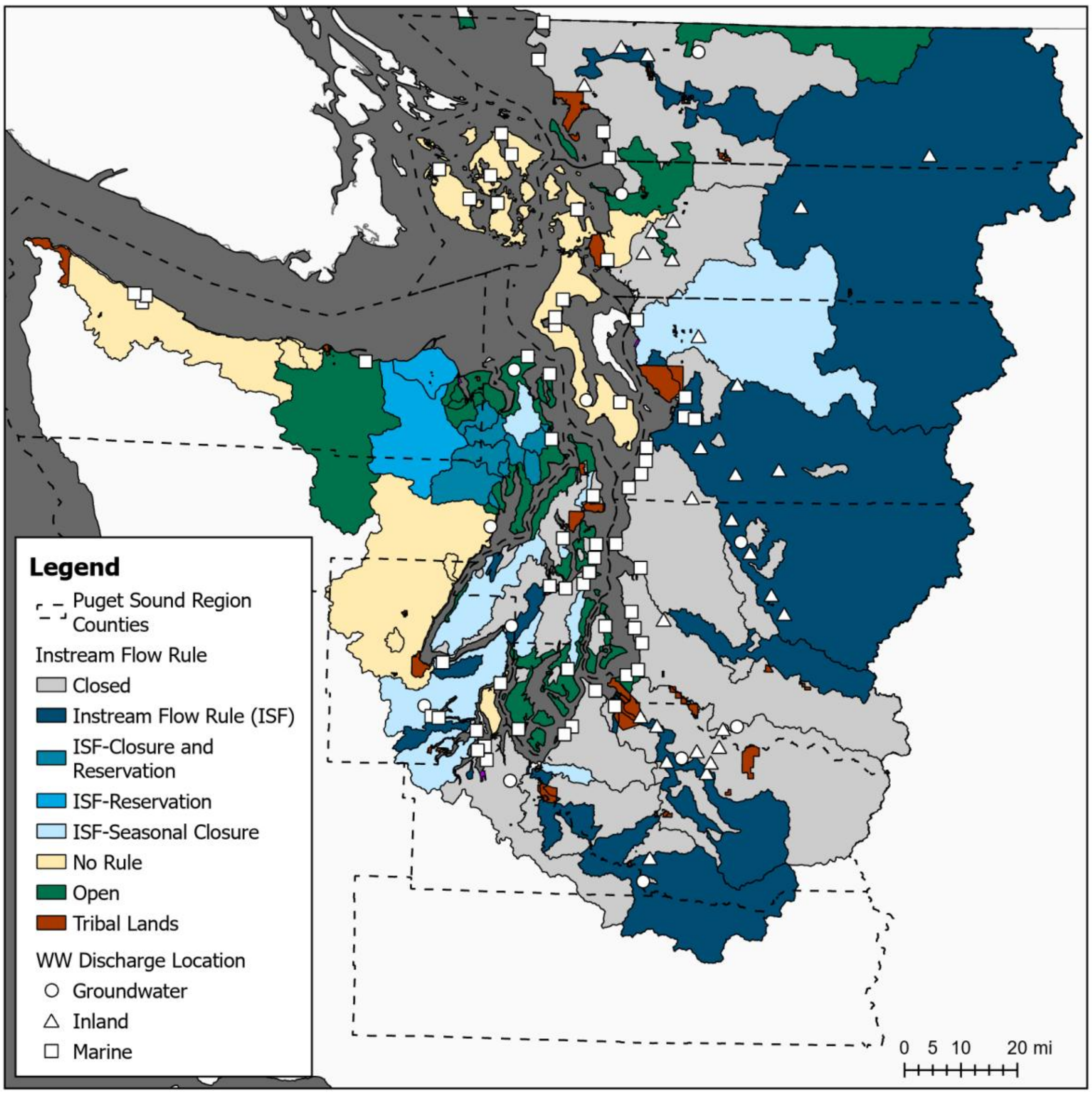

Figure 4. WWTP discharge locations, instream flow rules, and water rights availability by watershed. Data: PARIS; Ecology (2021)

Table 2 summarizes WWTP discharge volumes by receiving water type, the presence of instream flow rules and limits on new water rights, based on Washington Department of Ecology (2021) classifications. Notably, the majority of both WWTP and current reclaimed water permit holders are located in watersheds that are closed to new surface water withdrawals, reinforcing the relevance of reclaimed water as a tool for addressing long-term supply constraints in these areas.

Table 2. Wastewater discharges by location and type of instream flow rule.

Watershed Instream Flow Rule	WWTP Discharge Location	Number of Locations	Sum of Mean Flow (MGD)
Closed	Marine	25	222.6
	Inland	10	12.5
	Groundwater	4	1.8
	Sum Locations	**39**	**236.9**
	Current Reclaimed Water Permits*	5	10.6
Instream Flow Rule	Marine	4	26.1
	Inland	15	9.2
	Groundwater	3	0.1
	Sum Locations	**22**	**35.4**
	Current Reclaimed Water Permits*	1	0
Instream Flow Rule - Seasonal Closure	Marine	7	6.3
	Inland	1	1.4
	Groundwater	1	0.2
	Sum Locations	**9**	**7.8**
	Current Reclaimed Water Permits*	2	0.2
Instream Flow Rule - Reservation	Current Reclaimed Water Permits*	2	0.6
No Rule	Marine	16	4.9
	Groundwater	2	0.1
	Sum Locations	**18**	**4.9**
Open	Marine	10	8.8
	Groundwater	2	0
	Sum Locations	**12**	**8.8**
Tribal Lands	Marine	1	20.2
	Inland	1	0

* Mean/median inflow to reclaimed water facility (in Discharge Management Data reporting for reclaimed water permittees.

TECHNICAL POTENTIAL

Background

Washington's reclaimed water law enables a wide range of reuse applications. However, the feasibility of any specific reuse project depends on both the nature of local demand and the capacity of the treatment facility to produce a sufficient quantity and quality of water to meet that demand (Sheikh, Nelson, and Thebo 2019). In this section, we evaluate key indicators that help characterize potential end uses for reclaimed water in proximity to existing WWTP across the Puget Sound Region.

Land Use Near Existing WWTP

Demand for reclaimed water is most commonly associated with specific land use categories—agriculture, parks/open space, public land, dense urban areas, and industrial. Within these areas, reclaimed water is often used for irrigating crops, landscaping, and recreational fields. In public and urban settings, non-potable applications such as toilet and urinal flushing are also common. Industrial uses vary by sector but commonly include process water, equipment cleaning, and cooling.

To assess the potential for reclaimed water use near WWTP in the Puget Sound Region, we quantified the area of high-potential land use classes within one- and two-mile buffers of each facility (Figures 5 and 6). This analysis used a parcel-level land use dataset developed by the Washington State Department of Commerce (2018).

Land use patterns adjacent to WWTP vary significantly across the region. Outlying facilities in King, Snohomish, Skagit, and Whatcom counties are more likely to be near agricultural lands, whereas facilities located within the Inner Sound are surrounded by more intensive urban and industrial development. These differences have direct implications for the types of reuse applications that are feasible, as well as the outreach strategies and partnerships required for successful implementation.

Existing reclaimed water projects across the region reflect this diversity, with current uses including agricultural and landscape irrigation, groundwater recharge, and environmental restoration.

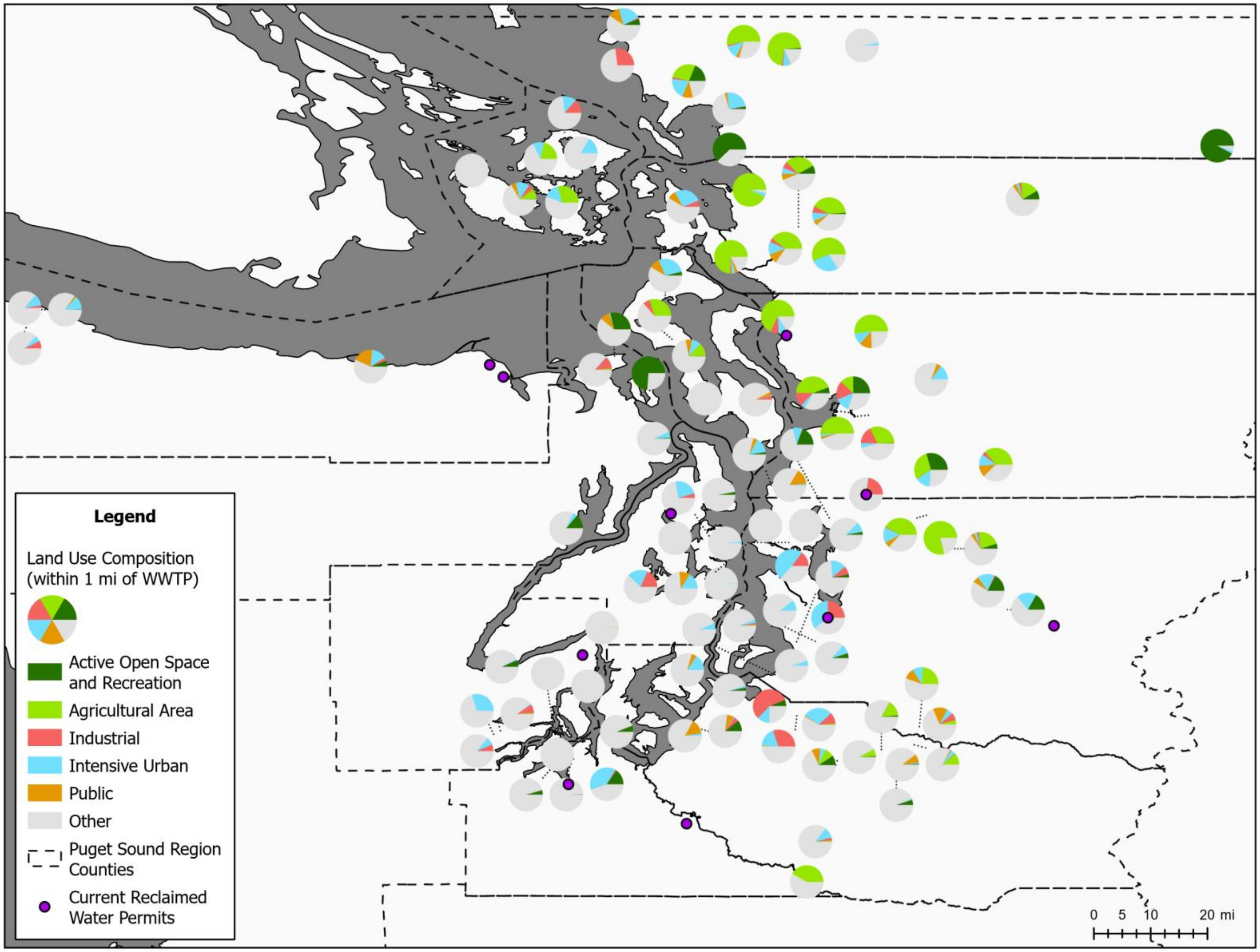

Figure 5. Land use composition within one mile of existing wastewater treatment facilities.

Expanding the buffer from one to two miles around wastewater treatment facilities significantly increases the total area of land with potential for reclaimed water use (Figure 6). For smaller facilities, reclaimed water use is typically limited to sites directly adjacent to the treatment plant, due to the high capital and operational costs associated with distribution infrastructure. However, there are notable examples where alignment between facility capacity, benefits, and partner demand have enabled the development of more extensive distribution systems. These include projects such as Monterey One Water (CA), Harvest Water (CA), and initiatives by the Southwest Florida Water Management District, which demonstrate the feasibility of broader-scale reuse when driven by coordinated planning and shared investment.

Effluent from two major King County wastewater treatment facilities—Brightwater and South Plant—is treated at inland locations, then conveyed more than twelve miles for discharge in Puget Sound. Both facilities hold active reclaimed water permits. Although current reclaimed water production remains modest relative to the overall treatment capacity of each plant, volumes are expected to grow. Brightwater currently supplies approximately 7–9 million MGD for a range of uses in the Sammamish Valley, with plans to expand delivery in future years (Klug 2015). The South Plant produces roughly 100 million gallons per year (MGY) of reclaimed water (King County Wastewater Treatment Division 2024).

These reclaimed water programs provide important localized benefits—such as irrigation, public engagement, and conservation of instream flows—and have helped raise awareness of recycled water as a viable resource in the Puget Sound Region. However, both projects continue to face the perennial challenge of identifying long-term partners and scaling infrastructure to more fully integrate reclaimed water into regional water management strategies.

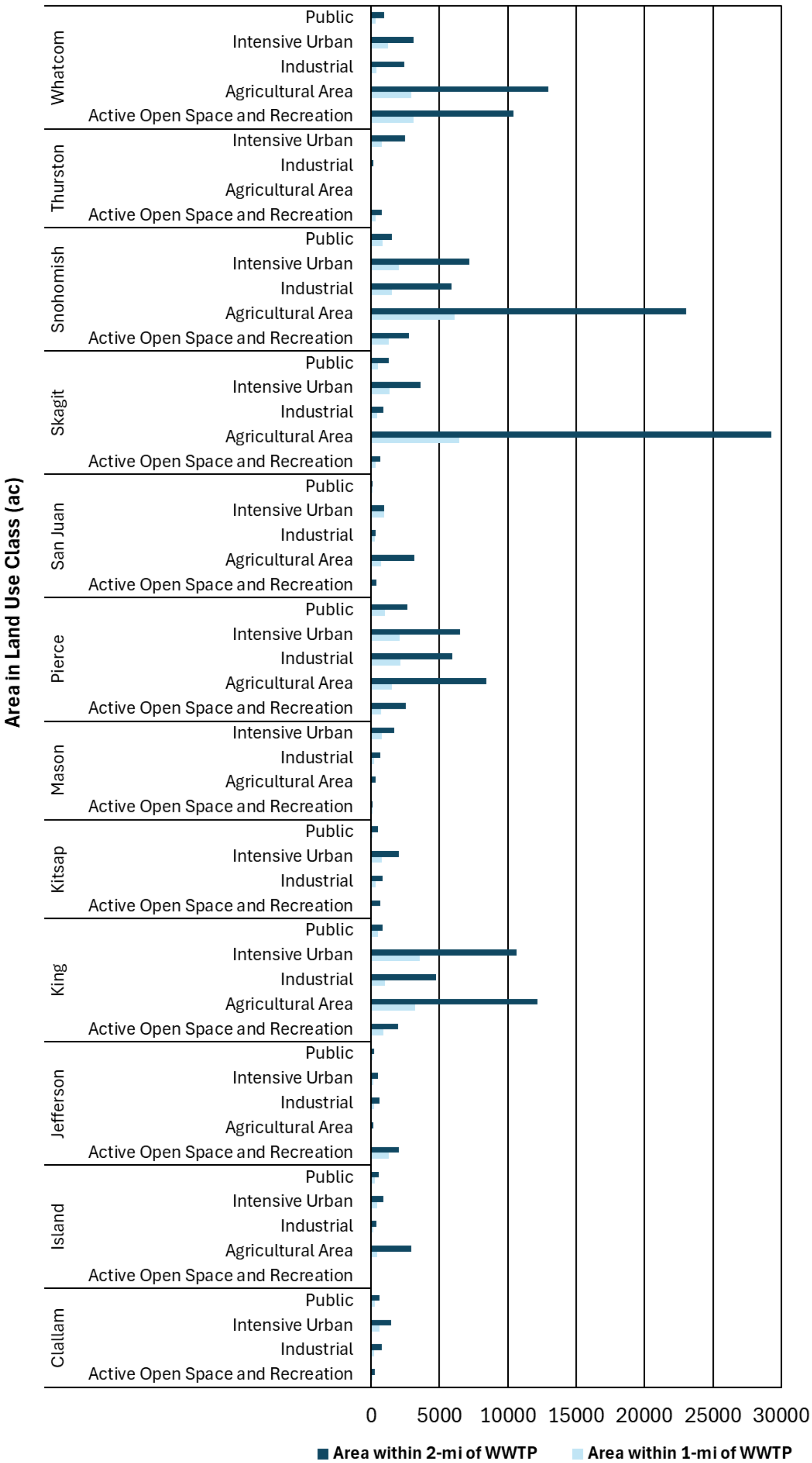

Figure 6. Area in land use class within one and two miles of existing WWTP.

DISCUSSION

BENEFITS OF RECLAIMED WATER

Water Supply

Reclaimed water offers substantial potential to enhance regional water supply resilience by reducing pressure on existing freshwater resources, particularly during periods of drought and seasonal variability (USEPA and USAID 2012). Despite the Puget Sound Region's overall abundance of precipitation, it faces increasing water management challenges driven by peak summer demand, groundwater depletion, climate change, and rapid population growth (Vano et al. 2010). By repurposing highly treated wastewater for uses such as irrigation, industrial cooling, and process water, reclaimed water can offset some withdrawals from rivers, reservoirs, and aquifers, helping preserve these critical resources for potable supply and ecosystem health. Existing projects in the region, such as LOTT Clean Water Alliance's groundwater recharge and King County's Brightwater project, demonstrate the tangible benefits of reclaimed water in supplementing supply and reducing environmental impacts. Existing reclaimed water programs are working directly with Washington's Trust Water Rights Program (Klug 2015) to ensure that users of reclaimed water do not lose their existing water rights. As a drought-resilient and locally available resource, reclaimed water can support a more diversified and secure water portfolio while advancing regional adaptation to climate change and population growth. Understanding the regional volumetric potential for reclaimed water use is an important first step, but additional work is needed to fully integrate reclaimed water into long-range water planning and management frameworks.

Water Quality

Reclaimed water can deliver multiple, distinct water quality benefits, particularly in regions facing stringent regulatory and ecological constraints. By diverting highly treated effluent from surface water discharges, reclaimed water reduces both volumetric discharges and associated pollutant loads to receiving water bodies (USEPA and USAID 2012). This is especially relevant in the Puget Sound region, where WWTP are subject to current and anticipated requirements for nutrient reduction, temperature control, and other water quality parameters (Washington Department of Ecology 2025a). As a result, compliance with NPDES permits is a major driver for reclaimed water projects across the Pacific Northwest. Notable examples include Clean Water Services in Oregon, which uses reclaimed water to meet stringent discharge requirements in the Tualatin River basin (Clean Water Services 2025), and the City of Hayden, Idaho, which implemented reuse to avoid costly upgrades for nutrient removal (Sheikh, Nelson, and Thebo 2019). Additionally, by reducing surface water withdrawals, reclaimed water use can help maintain cooler instream temperatures—critical for salmonid habitat—while redirecting warmer reclaimed water to non-potable uses. In agricultural applications, reclaimed water can also provide nutrients, potentially offsetting synthetic fertilizer use when nutrient content is properly managed (Natural Resources Conservation Service 2023). Looking ahead, increasing regulatory pressure to reduce nutrient discharges to Puget Sound could further incentivize the expansion of reclaimed water systems as a viable water quality and resource management strategy.

Environment and Ecosystems

The use of reclaimed water can provide several ecosystem benefits, particularly in preserving and enhancing local habitats (Halaburka et al. 2013). By reducing reliance on freshwater sources for irrigation and other non-potable needs, reclaimed water can help maintain the flow of critical rivers, streams, and wetlands, supporting aquatic life and ensuring the health of riparian ecosystems. This practice is especially important in a region where seasonal droughts can put stress on natural water systems (Mauger and Vogel 2020). Additionally, reclaimed water can be used for habitat restoration projects, such as wetlands and marshes, which rely on consistent water availability to support biodiversity. By recycling water rather than drawing from fragile ecosystems, reclaimed water use can help maintain ecological balance, support wildlife habitats, and contribute to the resilience of ecosystems in the face of climate change and growing human populations.

Climate Resilience

The multiple benefits of reclaimed water—including enhanced supply reliability, improved water quality, and ecosystem support—contribute meaningfully to both local and regional climate resilience objectives. In the Puget Sound region, climate projections indicate increased summer temperatures, reduced snowpack, and more frequent high-intensity winter precipitation events, all of which threaten the reliability of traditional water sources (Mauger and Vogel 2020). Reclaimed water can help augment regional water portfolios by providing a consistent, drought-resilient supply that supports aquifer recharge and sustains instream flows during critical low-flow periods. This added operational flexibility is a cornerstone of climate-resilient water systems, enabling utilities to respond adaptively to hydrologic variability and infrastructure stressors. Reclaimed water is directly recognized as a key adaptation strategy in Washington's State Climate Strategy (Interagency Climate Resilience Team 2024).

REALIZING RECLAIMED WATER BENEFITS

There is volumetric potential for expanding reclaimed water use in the Puget Sound Region. However, to date, progress has been constrained by a range of policy, implementation, and funding barriers (King County Wastewater Treatment Division 2018). Looking ahead, multiple converging pressures—including rapid population growth, increasing climate variability, and regulatory limits on nutrient discharges—are likely to elevate the strategic value of reclaimed water as a resilient, climate-adaptive supply option.

With a growing population, land use in many areas of the Puget Sound Region is expected to change dramatically over the next sixty years (Puget Sound Partnership 2024). This has important implications for reclaimed water planning. Historically, agricultural and landscape irrigation have been significant users of reclaimed water. Warmer summers, driven by climate change, will likely increase irrigation demand in urban parks, sports fields, and other urban green spaces. However, identifying agricultural partners with consistent demand remains a challenge, particularly given the high capital costs of constructing and maintaining distribution infrastructure. With increasing population and urbanization, finding economically viable partnerships with the agricultural sector may be increasingly challenging.

At the same time, projected population growth and patterns of urban development may also create new opportunities for decentralized urban reuse. Urban densification may expand the viability of onsite, district-scale, and satellite reclaimed water systems. While our analysis did not look explicitly at the potential for decentralized reuse, a recent analysis by Seattle Public Utilities pairing data on major water users and land use classes favorable for district-scale reuse identified significant potential within the City of Seattle (Brasch 2020). Additionally, the Washington Department of Health is developing new rules regulating onsite non-potable reuse, which may help standardize design and permitting for decentralized applications. Taken together, these regulatory changes, combined with long-term development trends, could enable a new generation of reclaimed water projects aligned with urban growth and integrated water management goals.

CONCLUSION

Reclaimed water represents a valuable yet underutilized resource in the Puget Sound Region. With roughly 314 million gallons of wastewater produced daily across 102 permitted facilities, the volumetric potential for beneficial reuse is substantial. However, less than five percent of this volume is currently reused, reflecting a complex set of technical, regulatory, financial, and institutional barriers.

As the region faces mounting challenges related to population growth, climate change, water rights constraints, and nutrient loading, reclaimed water can play a critical role in enhancing water supply resilience, environmental protection, and sustainable development. Projects like those at LOTT Clean Water and Brightwater demonstrate the potential for large-scale reuse to deliver localized benefits, while smaller facilities and satellite systems highlight opportunities for distributed, fit-for-purpose solutions.

Local context—including discharge location, adjacent land use, and instream flow rules—will shape the feasibility and design of reclaimed water projects. Inland dischargers often face permitting hurdles but are typically situated closer to agricultural irrigation opportunities. Conversely, marine-discharging plants have fewer permitting limitations but often face higher infrastructure costs to reach upland users.

Expanding reclaimed water use will not occur uniformly, but rather through tailored strategies that align site-specific opportunities with infrastructure investment, regulatory advances, and community engagement. As state agencies finalize new reuse regulations and utilities plan for future growth, integrating reclaimed water into long-range water and wastewater planning frameworks will be essential. Doing so can help Puget Sound communities build a resilient, efficient, and sustainable water future that balances environmental protection, public health, and long-term supply security.

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