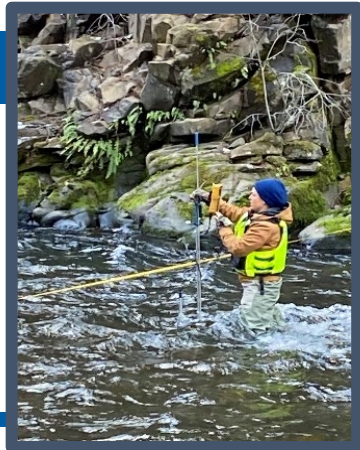


STUDY UPDATES NEWSLETTER

Understanding Groundwater-Surface Water Connections in the Walla Walla River Valley of Oregon

This Newsletter Highlights a New Study Report (OFR 2025-02) 



Why This Report Matters



Photo: Stream in Milton-Freewater, Oregon

Water from the Walla Walla River, its tributaries, and springs supports communities in Oregon and Washington. The valley is also home to Endangered Species Act-listed fish, including summer steelhead and bull trout, that depend on streamflows for migration, spawning, and cold-water habitat during dry summer months. How this water is managed affects both local agriculture and regional ecosystems.

Groundwater and surface water are highly connected in the valley. Diverting water from streams or other channels, such as distributaries, reduces flow in that channel. Groundwater pumping can also reduce streamflow, sometimes more gradually, by lowering groundwater levels and discharge that would otherwise feed springs and streams. In some places, surface water from streams and other channels seeps into the ground, often recharging groundwater. Understanding these connections helps inform groundwater and surface-water management decisions to support multiple basin needs.

This multi-year study, led by the Oregon Water Resources Department in collaboration with the Washington Department of Ecology and the U.S. Geological Survey, addresses key data gaps by measuring streamflows, discharge from springs and seeps, and distributary and irrigation channel losses (seepage losses) across the Oregon portion of the Walla Walla River alluvial fan. The report builds on past studies to provide a current, comprehensive evaluation of water movement between rivers, irrigation channels, springs, and the underlying aquifer.

Report findings provide a stronger scientific foundation for balancing agricultural needs, groundwater sustainability, and instream flow protections.

This newsletter is based on newly released Open-File Report OFR 2025-02, which is part of a multi-year study providing a comprehensive assessment of Groundwater in the Walla Walla River Basin.



Find out more information: <https://owrd.info/WWAlluvialFan>

2019

The Groundwater study fills important information gaps to help the community plan for future water needs through a series of reports.

Since early 2019, the study has collected data and is organizing results into a series of reports that will be released between 2024 and late 2026.

2024

Walla Walla River Basin Study Groundwater Report Release Timeline

2025

“Hydraulic properties of stratigraphic units and geologic structures in the Walla Walla River Basin, Oregon and Washington”

Estimate how fast or slow water moves through local rock types and explain how geological features like faults separate or connect groups of basalt wells.

2026

“Groundwater/Surface-Water Interactions within the Alluvial Fan of the Walla Walla River in Oregon”

This study measured recharge to the basin-fill aquifer from streams, distributaries, and irrigation channels. It also measured spring discharge from that aquifer back to channels.

“Stream seepage analysis to quantify stream and groundwater interactions within the Walla Walla River Basin, Oregon and Washington”

Measures groundwater discharge to and channel losses from major streams to improve understanding of the groundwater flow system.

“Hydrogeologic framework of the Walla Walla River Basin, Oregon and Washington”

Explains the thickness and depth of underground rock layers and their water-bearing properties. Present basin groundwater level maps.

“Water use and groundwater pumpage estimates in the Walla Walla River Basin, Oregon and Washington”

Estimates the amount of water used and pumped from the ground for irrigation, municipal, and other uses in the Walla Walla River Basin, including how the amount has changed in different areas through time from 1985-2022.

“Sources and timing of recharge to the groundwater system in the Walla Walla River Basin, Oregon and Washington”

Summarizes water chemistry data from water samples to identify the elevation where the water entered the groundwater system, to better understand the movement and timing of groundwater flows.

2027

“Conceptual model of the Walla Walla groundwater system”

Combines results from other studies and adds new analysis of groundwater and chemistry. It explains how groundwater works, including where it comes from, how it moves, and where it flows out.



Denotes the newly completed study report (OFR 2025-02) that is highlighted in this newsletter.

Groundwater and Surface-Water Interactions within the Alluvial Fan of the Walla Walla River in Oregon (OFR 2025-02)

The Walla Walla River Basin groundwater study is a basin-wide effort to understand the groundwater system, groundwater/surface water interactions, and long-term water resource sustainability across both Oregon and Washington State. This report (OFR 2025-02) contributes detailed springs, stream, distributary, and irrigation-channel flow measurements from the Oregon portion of the Walla Walla River alluvial fan. It quantifies (1) channel seepage losses (recharge to groundwater), (2) groundwater discharge from mapped springs, and (3) reach-scale groundwater gains where flows increase between measurement sites. These multi-year measurements help describe when and where water moves between channels, springs, and the aquifer, key pieces of the lower-basin water budget. **Together with other reports from the broader bi-state/federal collaboration, these findings help support a basin-wide understanding of how water moves through the Walla Walla system and how management actions affect it over time.**

REPORT KEY FINDINGS



Spring discharge represents a significant surface-water source on the Oregon side of the Walla Walla River Valley.



Channel seepage losses upgradient of the primary spring arc are a significant source of groundwater recharge and were likely much higher historically.



Downgradient of the primary spring arc, some channels lose water to groundwater while others gain water from it (mixed gaining and losing reaches).



SCIENTIFIC TERMS DEFINED

Alluvial Fan: A fan-shaped area of sand and gravel where a river spreads out after leaving a canyon.

Channel Loss: Water that leaves a stream or irrigation channel and soaks into the ground.

Conceptual Groundwater Model: Explains how groundwater moves through a watershed; where it enters the system, how it flows underground, and where it returns to streams, springs, and pumping from wells.

Distributary: A smaller channel that branches off from a main river and carries water away from it.

Diversion: Specific location and infrastructure where water taken from a river, stream, distributary (or canal) for irrigation or other uses.

Evapotranspiration: The process by which water moves from the land and plants to the air.

Irrigation Channel: A ditch, canal, or pipeline that carries water to farms and fields.

Minimum Streamflow: The lowest streamflow needed to support fish, wildlife, and water quality.

Recharge: Water that moves into the ground and refills groundwater.

Seepage: Water that moves into or out of a stream, distributary, or canal through the bed and banks.

Seepage Run: A set of streamflow measurements used to find where a channel gains or loses water.

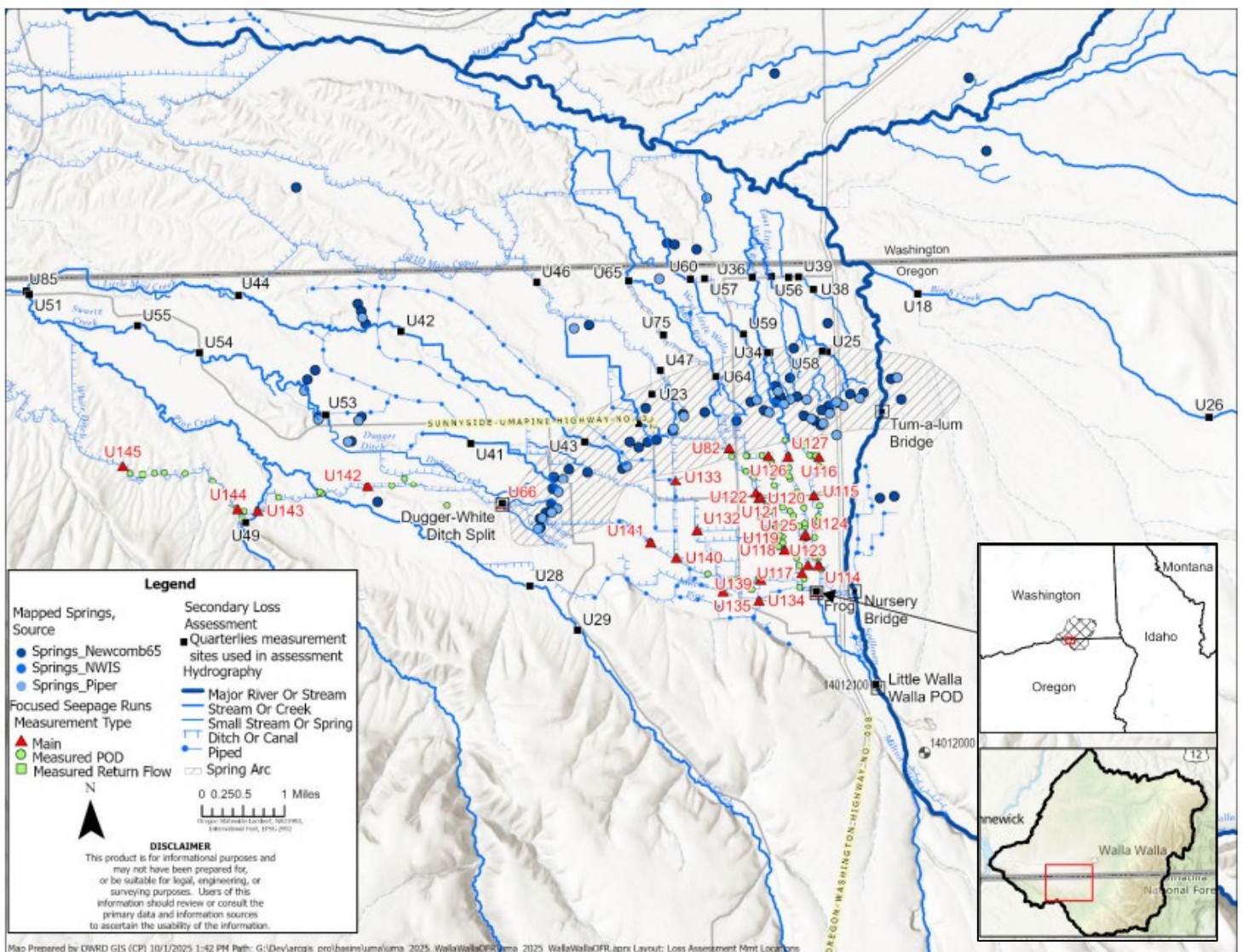
Spring: A place where groundwater naturally flows out of the ground into a stream or channel.

Streamflow (Discharge): The amount of water flowing in a stream, measured in cubic feet per second (cfs).

How the Report Was Done (Methods and Data Collection)

From 2021 to 2024, OWRD scientists measured flow in streams, canals, springs, and distributaries across the Oregon side of the Walla Walla River alluvial fan to understand how water moves between channels and the aquifer. One effort used coordinated “seepage runs” that compared flows at the top and bottom of selected channel reaches, while accounting for diversions and inputs, to determine where channels gained water from groundwater or lost water into the ground. A subset of reaches was remeasured in a different season to evaluate whether gains and losses changed seasonally. During seepage runs, crews **measured each site multiple times (5) and averaged the results**, which reduces measurement uncertainty and improves confidence in the estimated gains and losses compared to a single measurement. With lower uncertainty, the study can better distinguish real gains and losses from measurement noise, helping explain why some reach-scale results differ from past efforts, even on the same channels.

A second effort measured flows from springs quarterly (seasonal), both where spring water formed its own channels and where springs added flow to existing channels. The study used satellite-based evapotranspiration estimates to account for any unmeasured surface water diversions that might be influencing the flow measurements. All measurements followed standardized scientific protocols, and uncertainties were evaluated to ensure results were reliable. These methods provide a detailed picture of how surface water and groundwater interact across the landscape.



Map: Basin location and study area (Oregon-side Walla Walla River Alluvial Fan)

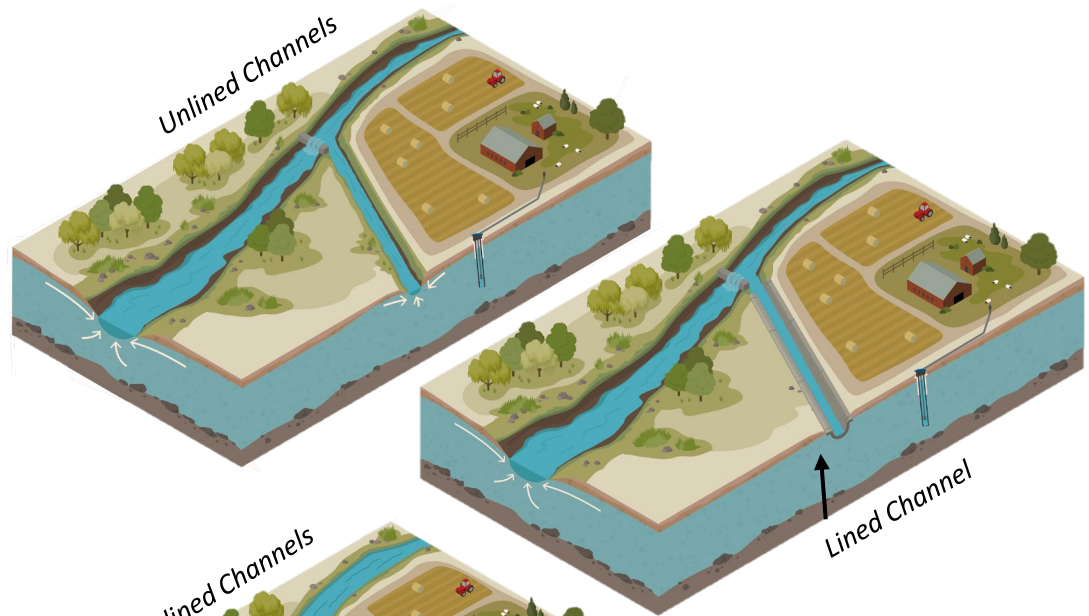
Surface water (streams and irrigation channels) interactions with groundwater

The graphics below show common interactions between surface water (rivers/streams and irrigation channels) and groundwater. Understanding this movement is critical to understanding groundwater recharge and discharge. In all these scenarios, the relative elevations of groundwater and surface water are important and can change due to groundwater or surface water management activities and infrastructure changes.

White arrows denote the movement of water, either from groundwater to the channel or from the channel to groundwater.

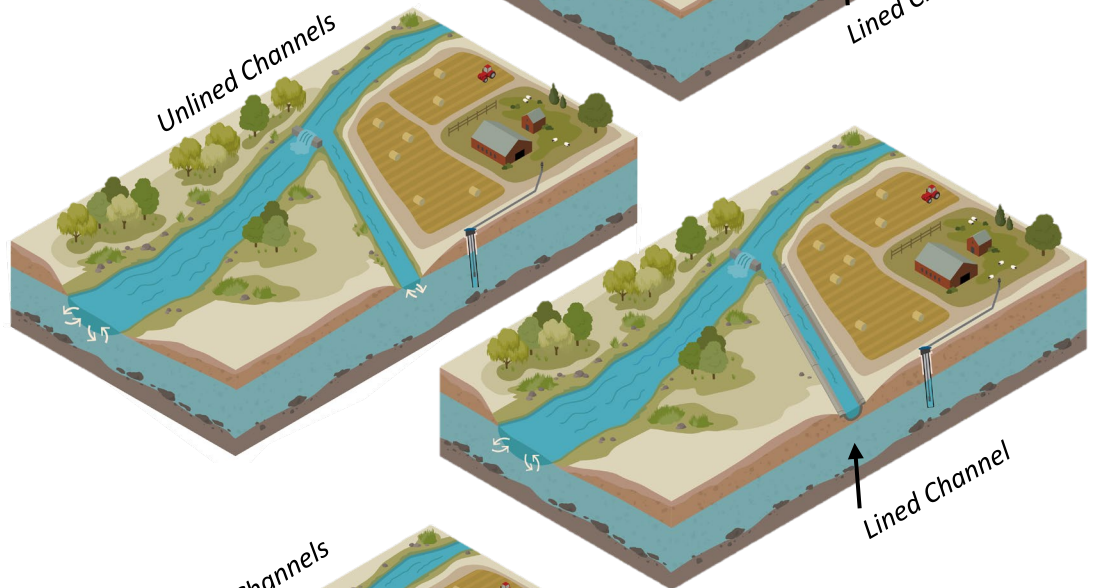
GAINING

A gaining stream reach is where groundwater flows into the stream, increasing streamflow. Thus, groundwater adds water to the stream. This occurs when the groundwater level is higher than the stream, causing groundwater to move into the stream. A shallow well can “capture” or intercept groundwater that feeds the stream.



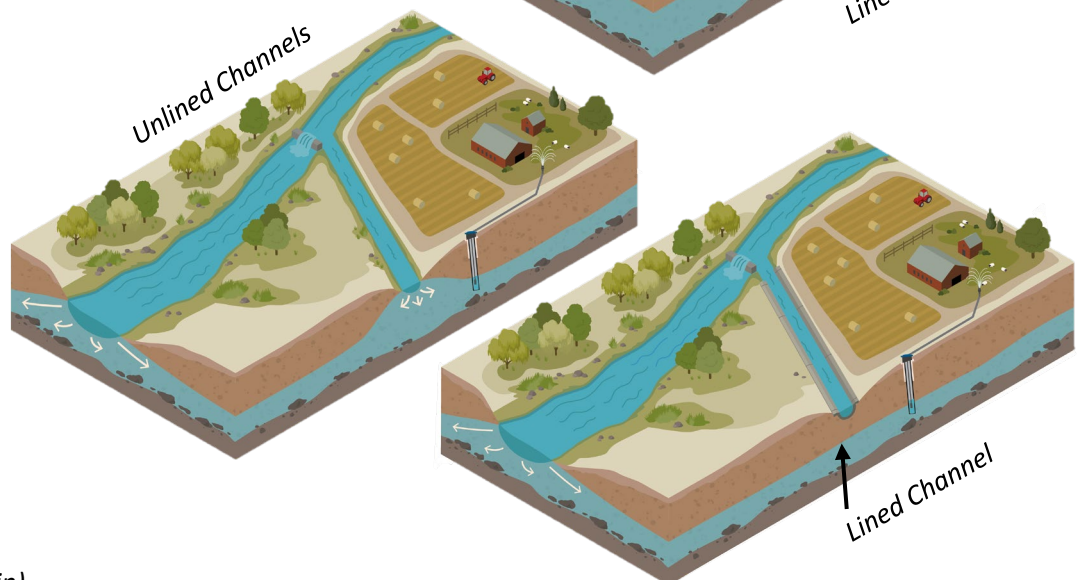
NEUTRAL

A neutral stream reach is where there is little or no net gain or loss overall. This can happen when groundwater levels are like the stream level. A shallow well next to a neutral reach may cause it to become a losing reach by lowering nearby groundwater levels.



LOSING

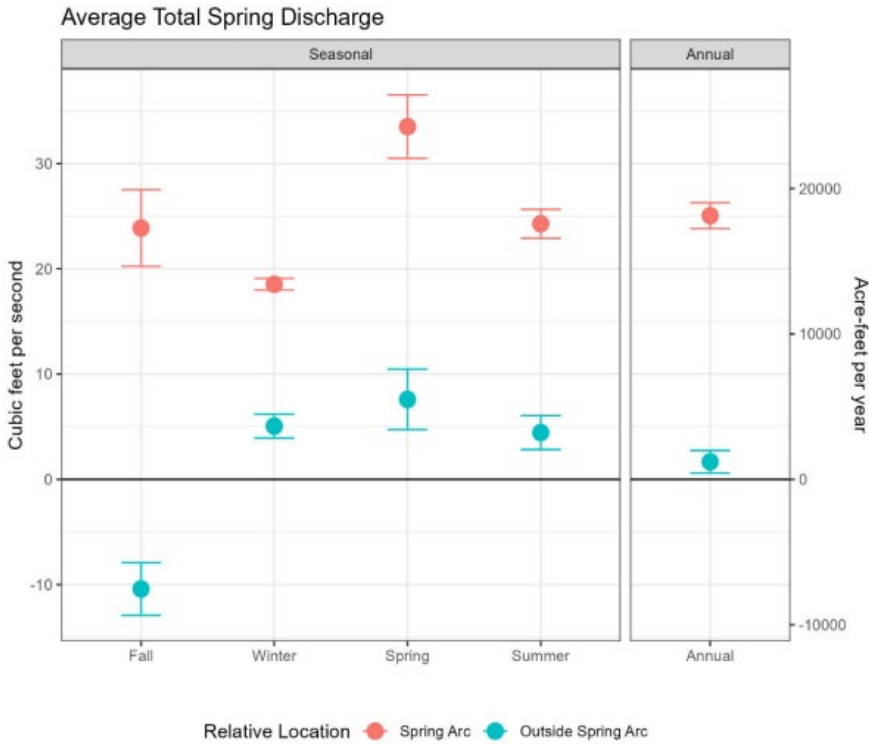
A losing stream reach is where water flows from the stream into the ground, recharging groundwater. This happens when the groundwater level is lower than the stream, so surface water moves into the ground. A shallow well next to a losing stream may receive water from the stream, increasing channel losses.





KEY FINDING 1: Spring discharge represents a significant surface-water source on the Oregon side of the Walla Walla River Valley.

Values are the sum of average seasonal measurements from 2021 –2023, with estimated diversion add-backs shown by relative location within or outside the primary spring arc



Error bars reflect uncertainty in measurements only.

Springs nearest the Walla Walla River account for the highest rates (cfs) of groundwater discharge (for example, the Big Springs area). Average annual groundwater discharge by springs to the distributary channels was about 32.4 cfs (about 23,500 acre-feet/year), with most occurring in the primary spring arc (about 25.0 cfs or 18,100 acre-feet/year). See “Spring Arc” hatched area in the Basin Location and Study Area map on page 4 of newsletter.

Discharge from springs generally peaks in the spring season, when irrigation diversions through the Little Walla Walla River and in the mainstem Walla Walla River are relatively high. Conversely, discharge from springs in summer and fall is lower as diversions and streamflow are decreasing.

This matters because it shows where and when groundwater adds water to local channels. Groundwater discharge from springs is highest in the spring and drops in summer and fall, which affects water available for farms and communities to divert during the driest months.

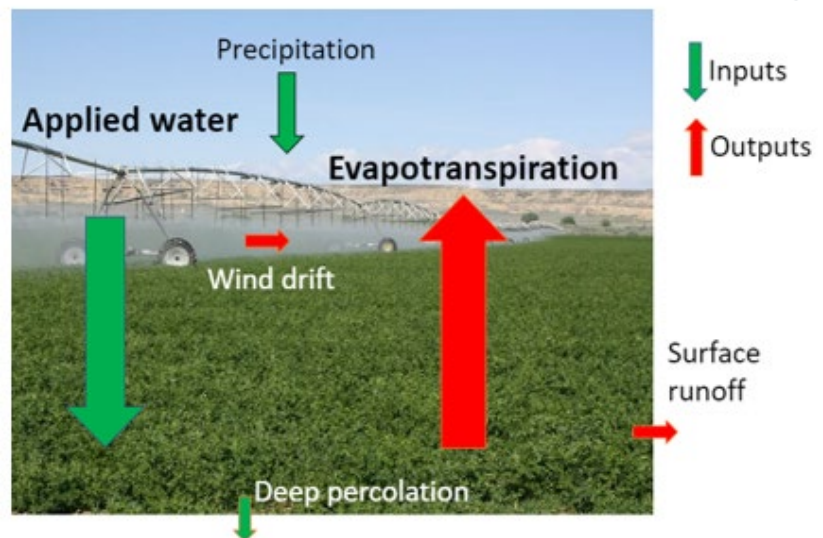
NEXT REPORT RELEASE:

[Water use and groundwater pumpage estimates in the Walla Walla River Basin Oregon and Washington](#)



KEY FINDING 1 (as described above) includes diversion add-backs (estimated water use between measurement sites) based on evapotranspiration (ET) estimates. This means it accounts for water diverted and lost to evaporation and plant use before reaching the flow measurement location.

There are multiple aquifers in the Walla Walla River Basin. An upcoming study report will look at the amount of water used and pumped from each aquifer for irrigation, municipal, community, livestock, commercial, and other uses in the Walla Walla River Basin, including how the amount has changed through time. ET, as shown in the right figure, will be a key tool in this report.

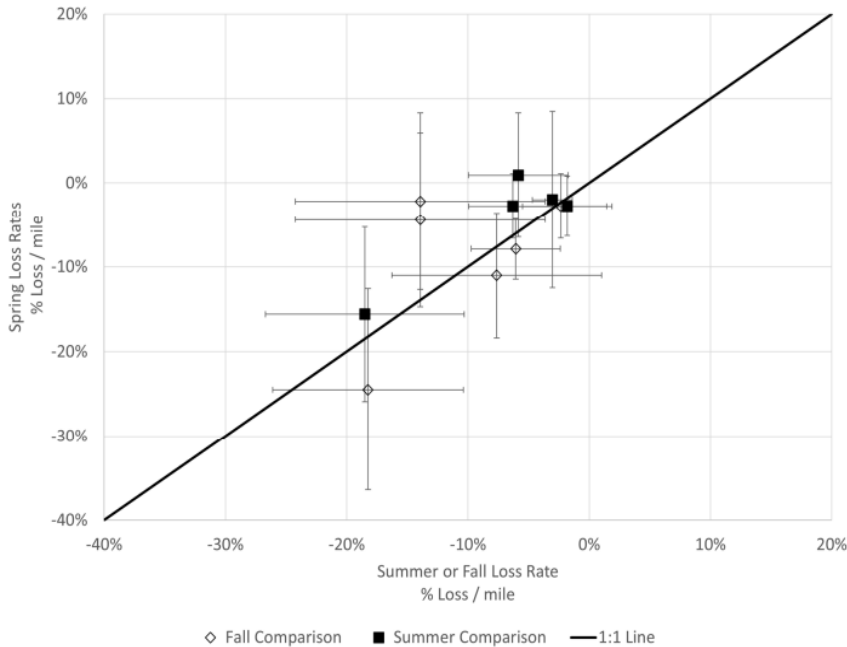


Graphics: OWRD, 2025 (public domain)



KEY FINDING 2: Channel seepage losses upgradient of the primary spring arc are a significant source of groundwater recharge and historically were likely much higher.

Seasonal comparison of loss rates for reaches evaluated in the fall and summer of 2023 and remeasured in spring 2024.



If seasonal losses for sampled reaches were exactly the same, points would fall on the solid line. Within measurement uncertainty (error bars), there was no discernible seasonal difference in losses. Including uncertainty analysis is key to interpreting results from the study.

The loss rate (percent of water lost per mile) varied significantly by channel but remained relatively consistent across seasons. The average loss rate upgradient of the spring arc was about 5.2% per mile. This is equivalent to about 21% total loss across this portion of the alluvial fan and roughly 8,400 acre-feet/year of groundwater recharge under current annual diversion volumes.

The total volume of water lost each year depends on how much water was diverted into the Little Walla Walla River and its distributaries and irrigation channels. Historically, diversions into the distributary system in the 1930s exceeded 90,000 acre-feet per year, about twice today's volume. Applying the generalized loss rate from this study suggests channel losses historically exceeded about 25 cfs (about 18,000 acre-feet per year).

This matters because reduced diversions, and the accompanying channel leakage, likely reduced an important source of groundwater recharge on the fan. This helps explain long-term changes in groundwater levels and spring discharge.

NEXT REPORT RELEASE:

Sources and timing of recharge to the groundwater system in the Walla Walla River Basin, Oregon and Washington

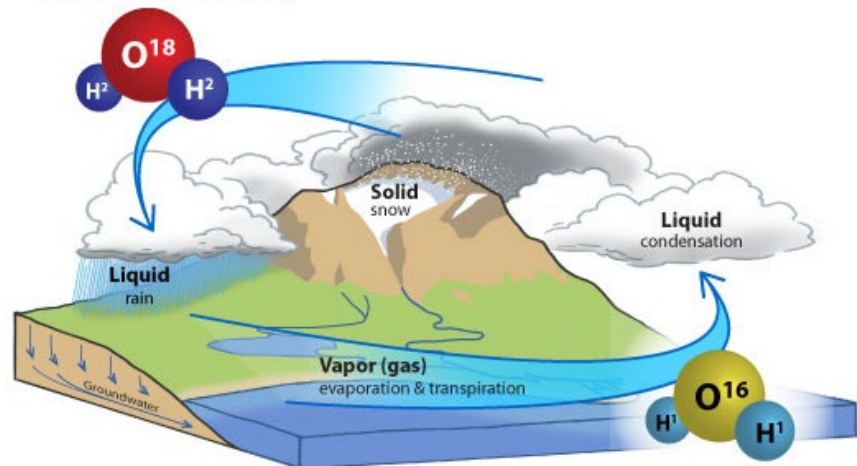


KEY FINDING 2 (as described above) may be informed by upcoming isotopes data that could help identify the source and age of water recharging the aquifer.

An upcoming study report will summarize water chemistry data from surface and groundwater samples. These data are analyzed to address questions about the timing, location and amount of recharge to alluvial and basalt groundwater.

Isotopes are atoms of an element that have the same number of protons and electrons, but different numbers of neutrons. Naturally occurring in water, the ratios of certain isotopes help scientists figure out where the water came from. These isotopes that help determine the source and pathway of water are called *isotope tracers*.

Heavy water isotopes rain and snow more readily



Graphic: USGS (public domain)

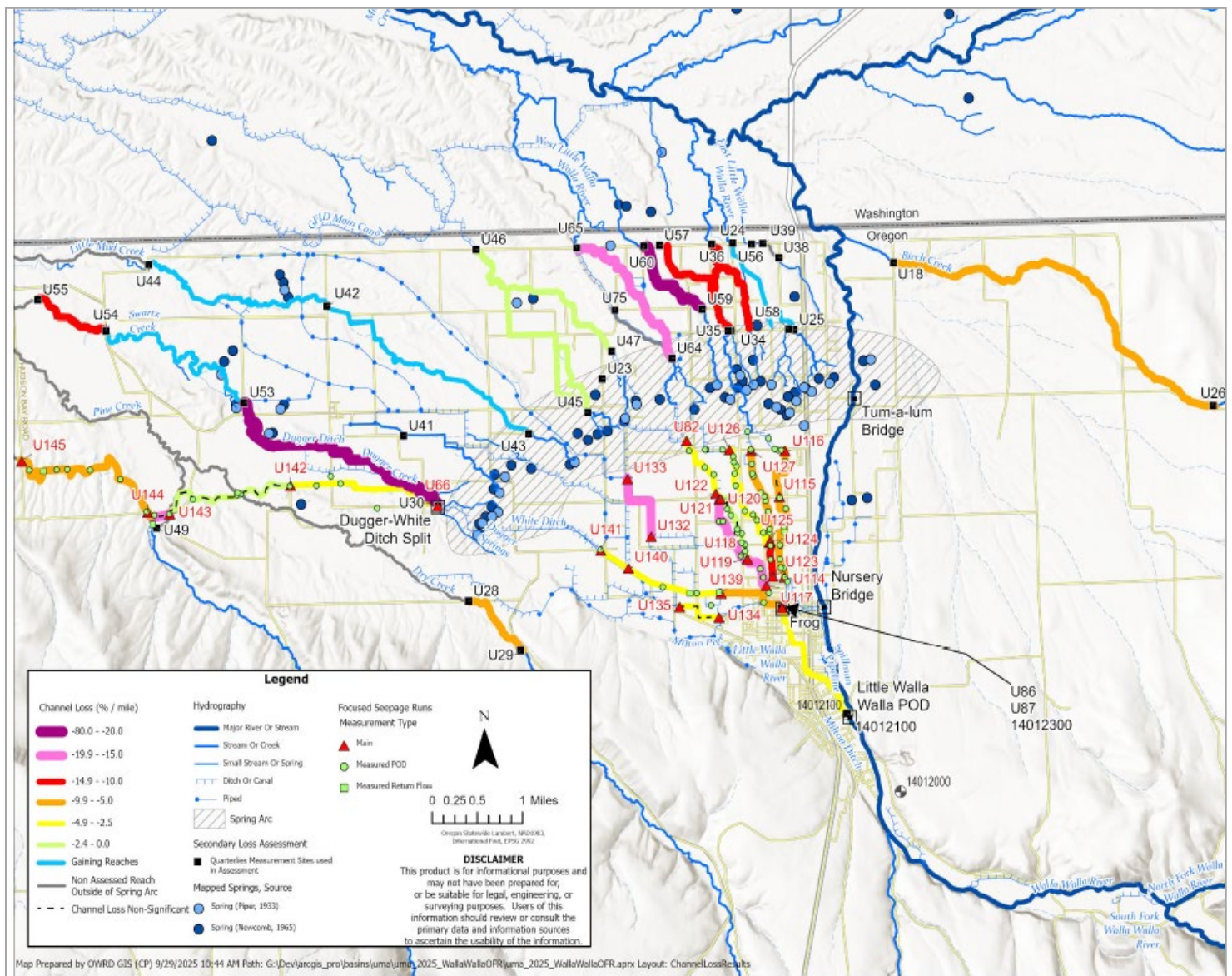


KEY FINDING 3: Downgradient of the primary spring arc, some channels lose water to groundwater while others gain water from groundwater (mixed gaining and losing reaches).

Upgradient of the spring arc, all measured reaches lose water. Elsewhere on the fan (including Birch and Dry Creeks), some channels lose water to the groundwater system while others gain flow from groundwater. In aggregate, the study estimates that annual losses from the assessed losing reaches downgradient of the spring arc were 11.2 cfs (8,000 acre-feet per year), equivalent to a loss rate of 13.8% per mile. Total volume of water lost was similar to upgradient reaches but concentrated over fewer miles (so the loss rate is higher). Several gaining reaches were also identified north of the spring arc and gained about 7.4 cfs (5,400 acre-feet/year) of water.

This matters because the mix of gaining and losing reaches means that surface water availability can change from place to place, and management actions (diversions, groundwater pumping, and infrastructure changes) can affect both water users and habitat conditions over time. In addition, channel losses help recharge shallow groundwater that supports seeps and springs.

The map below shows where channels lose water to groundwater and where they gain water from groundwater.



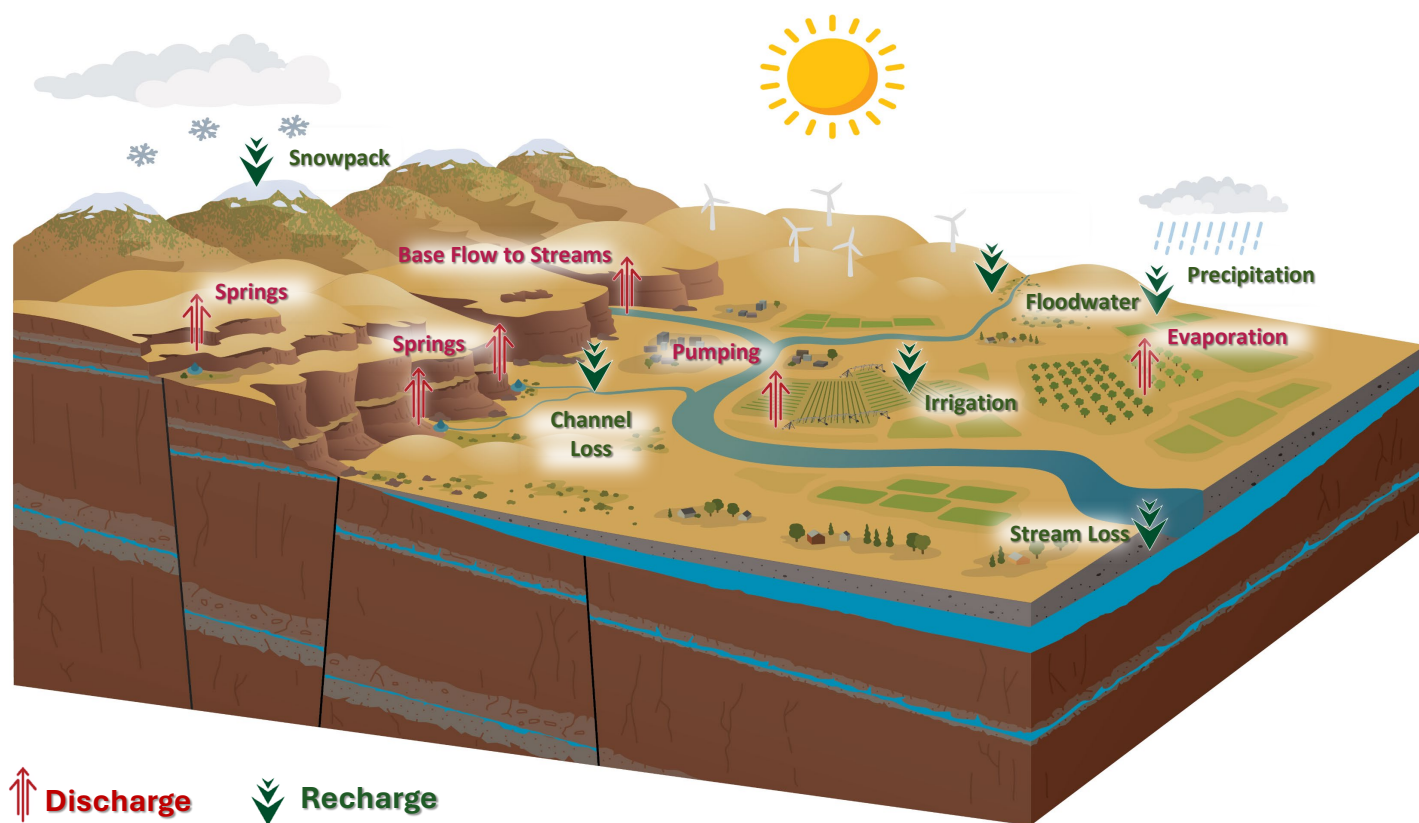
Map: Channel losses and gains (percent per mile).

Building a Conceptual Model of a Groundwater System



Study reports build onto each other to inform a conceptual watershed groundwater model.

Integrating these results from OFR 2025-02 with ongoing work will lead to a more complete understanding of the basin-wide groundwater system. Scientists use multiple tools to learn more about how groundwater moves and changes over time. These include measuring groundwater levels in wells, measuring flow in springs, streams and rivers, analyzing water chemistry to identify the source and age of groundwater, and looking at the layers of rocks across the basin to understand the factors controlling groundwater flow. These different data sets help scientists understand how water resources are changing within the Walla Walla River Basin and develop a conceptual groundwater model—a comprehensive way of understanding how water moves through the watershed.



↑ Discharge ↓ Recharge

The conceptual model will provide needed information that supports decision-making for planning and managing groundwater resources in the Walla Walla River Basin.

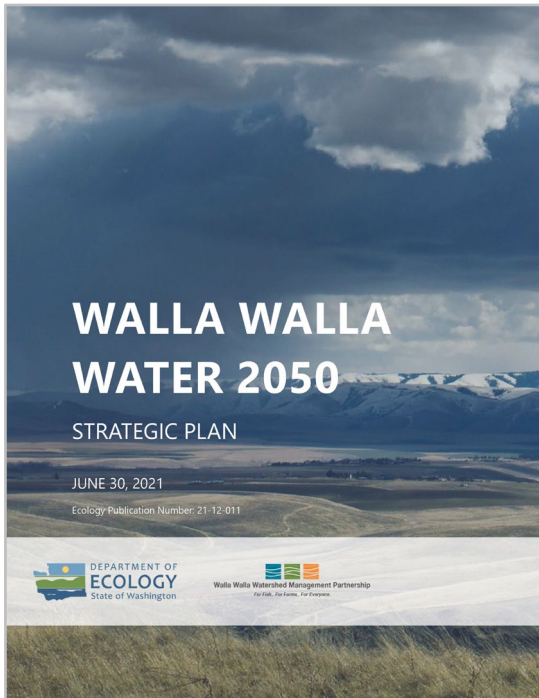
Water Availability: Shows how much water might be available in the aquifers for drinking, farming, and other needs.

Recharge Areas: Identifies areas where water enters the ground, which helps communities protect these areas to ensure a steady water supply.

Contamination Risks: Locates where potential pollutants might enter the groundwater system, so communities can work to prevent contamination.

Sustainability: Helps communities plan for how much water can be used over time without running out, supporting long-term water management.

How will the Study Inform Community Actions Around Water?



This report (OFR 2025-02) complements the Walla Walla 2050 Water Strategy by providing site-specific scientific data that improves understanding of groundwater, surface water, irrigation system, and spring connections on the Oregon side of the basin. The strategy's focus on long-term water sustainability, drought resilience, and balancing agricultural, ecological, and community needs depends on accurately characterizing these interactions. The findings support the bi-state water planning by supplying measured stream gains, losses, and spring contributions that explain observed flow conditions across the state line.

By grounding basin-wide planning in local measurements, the report strengthens the technical foundation for future management actions, collaborative decisions, and the U.S. Bureau of Reclamation's Walla Walla Basin study evaluations of water supply reliability, flow enhancement options, and infrastructure or management actions.

Through a collaborative community process, 60 actions were identified across six focus categories. Strategies are grouped into three tiers. Twenty-three (23) actions were identified as Tier 1 and are summarized below.

Over the next 30 years, the community is committed to employing this integrated water resource management approach. By integrating the goals and solutions from the basin's diverse stakeholders in both Oregon and Washington we're confident the Walla Walla basin will achieve holistic and viable long-term solutions for sustainable water use in the basin.

An explicit goal of the planning process was to generate strategies that, when fully implemented, meet multiple water resource benefits.



Learn more about Walla Walla River Basin community water planning efforts

Find more information at: www.WallaWallaWater.org





Communities can explore different types of projects to reduce water loss and improve management.

Managed Aquifer Recharge (MAR) is used in some locations in the Walla Walla River Basin, to intentionally add water back into the groundwater system during times of higher streamflow.

Understanding the effects of MAR was outside the scope of this report and was not evaluated by the science team.

Irrigation Modernization is also being used in the Walla Walla River Basin. This is the process of upgrading older irrigation systems to deliver water more efficiently and reliably, often by piping open ditches, lining canals, improving diversion structures, and adding better flow measurement and controls. Modernization can change where and how water moves between surface water and groundwater, especially by reducing seepage from channels into shallow groundwater. These upgrades can help farmers deliver water more efficiently while also influencing how and where water recharges the shallow aquifer that supplies local wells.

This report documents current seepage and spring-discharge patterns; it does not evaluate specific modernization projects, but it provides a baseline for understanding how infrastructure changes could affect recharge and streamflows.

Interested in learning more about Irrigation Modernization funding opportunities in Oregon?

Check out the Oregon Water Resources Water Project Grants and Loans website

www.owrd.info/wpgl

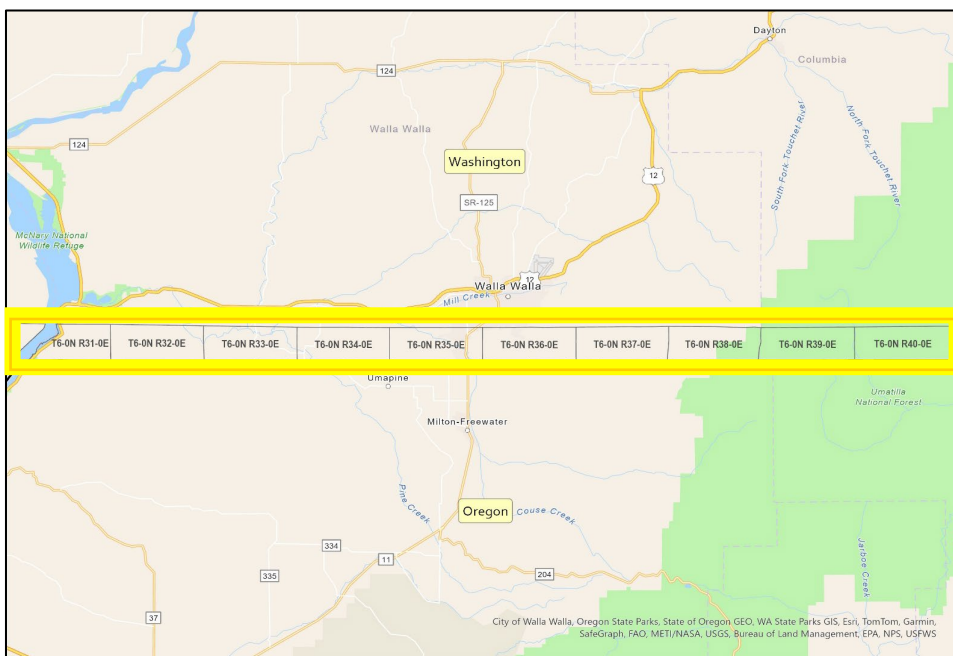


Photo: Little Walla Walla River

How You Can Get Involved in the Walla Walla River Study?

Community members, irrigators, Tribes, and local organizations all play a role in the future of water management in the Walla Walla River Basin. People can get involved in community water planning in many ways:

- **Stay informed** by reading the full report and future study updates from the Groundwater Study Team.
- **Participate in meetings and workshops** hosted by irrigation districts, watershed councils, or state agencies.
- **Share local knowledge** about water use, springs, and stream conditions to help refine future studies.
- **Support collaborative solutions** that balance agricultural needs, instream flows, and long-term groundwater sustainability such as those in the Walla Walla 2050 Strategy.



***Do you live in this area?
WE ARE STILL LOOKING FOR WELLS
in the Townships highlighted here.***

Using funds provided by Ecology as part of the Walla Walla 2050 project funds, OWRD has hired a limited duration staff person (working through mid-2027) to focus on gathering information about wells along the state line where the report identified data gaps.

Please contact us to find out if your well can help the groundwater study.

Online interest forms can be filled out online or downloaded and printed from here:

<https://forms.office.com/g/tXHn3R0ER6>

Printed forms can be mailed to:

Attn: Shauna Yeh TSD 725 Summer Street NE, Ste A Salem, Oregon 97301



OWRD and Ecology will be engaging with well owners to measure groundwater levels and perform pump tests between 2025 and late 2027.



For More Information Contact

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