STATE OF THE WATER

Overview of Water Quantity Challenges in Morrow County

October 2023

Introduction

This briefing paper provides an overview of the major sources of water supply and the water quantity challenges affecting Morrow County, Oregon. Residents and businesses in the County depend on a variety of groundwater and surface water sources for water supply. The primary water supply is groundwater from basalt aquifers of the Columbia River Basalt Group and the alluvial aquifer. Sources of surface water supply include the Columbia River, Umatilla River, Willow Creek, and Butter Creek.

The Umatilla Basin in Oregon is facing significant long-term water quantity and quality issues that are affecting the environment, the health of Morrow County's residents, and the ability for the area to support existing and future agricultural and industrial operations as well as growing drinking water demands. State and local agencies, local water providers, landowners, and other stakeholders have been working under a regulatory framework and through voluntary activities to address these issues. Morrow County is committed to supporting actions where appropriate to address these wide-ranging water issues. This briefing paper is part of a set of four State of the Water briefing papers prepared by the County to provide context for this effort and to help communicate with policymakers, local stakeholders, and the public as the County works to identify policies and actions on these water issues.

Throughout Morrow County, the major sources of water supply are subject to a variety of restrictions on new appropriations (diversion or use of water from the natural streams or groundwater). Except for use of the Columbia River during the winter months, development of new surface water supplies is not allowed. Water levels in the shallow and deep basalt aquifers have declined over the past 50 years. The capacity of the alluvial aquifer is variable, and there are water quality concerns surrounding the use of the shallow aquifer as a source of potable water supply (refer to companion briefing paper entitled "State of the Water: Overview Water Quality Challenges in Morrow County," dated October 2023).

Key Takeaways

- ✓ Water levels in the shallow and deep basalt aquifers have declined significantly over the past 50 years. The capacity of the alluvial aquifer is variable, and the shallow aquifer has water quality concerns.
- ✓ Surface water from the Columbia River is plentiful, but the state severely restricts new appropriations during the irrigation season, and new water use permits during the fall and winter have limitations.
- ✓ Water users continue to rely on over-appropriated groundwater supplies, further compromising the resource and increasing pumping costs.
- ✓ To plan effectively, Morrow County will need to better understand unmet water supply needs and track those unmet needs on an ongoing basis.
- ✓ Morrow County has an opportunity to support the private water supply projects in the Umatilla Basin, including aquifer recharge, aquifer storage and recovery, and mitigation efforts.

Groundwater

Groundwater levels in the basalt aquifers of the Columbia River Basalt Group and in the alluvial aquifer in certain areas began to show declines soon after development of groundwater for irrigation in the 1950s. The Oregon Water Resources Department (OWRD) has the authority to designate an area of the state as a Critical Groundwater Area (CGWA) or a Classified Area to address or prevent excessive groundwater declines. The designation is based on documentation of excessive groundwater quantity or quality declines, well interference, groundwater supply overdraws, or thermal issues within a specific groundwater reservoir. The designation of a CGWA allows OWRD to make corrective rules, including closing the area to any further groundwater appropriations and limiting the total amount of groundwater that may be withdrawn each year.

Well drilling (at Farm 4) for Port of Morrow

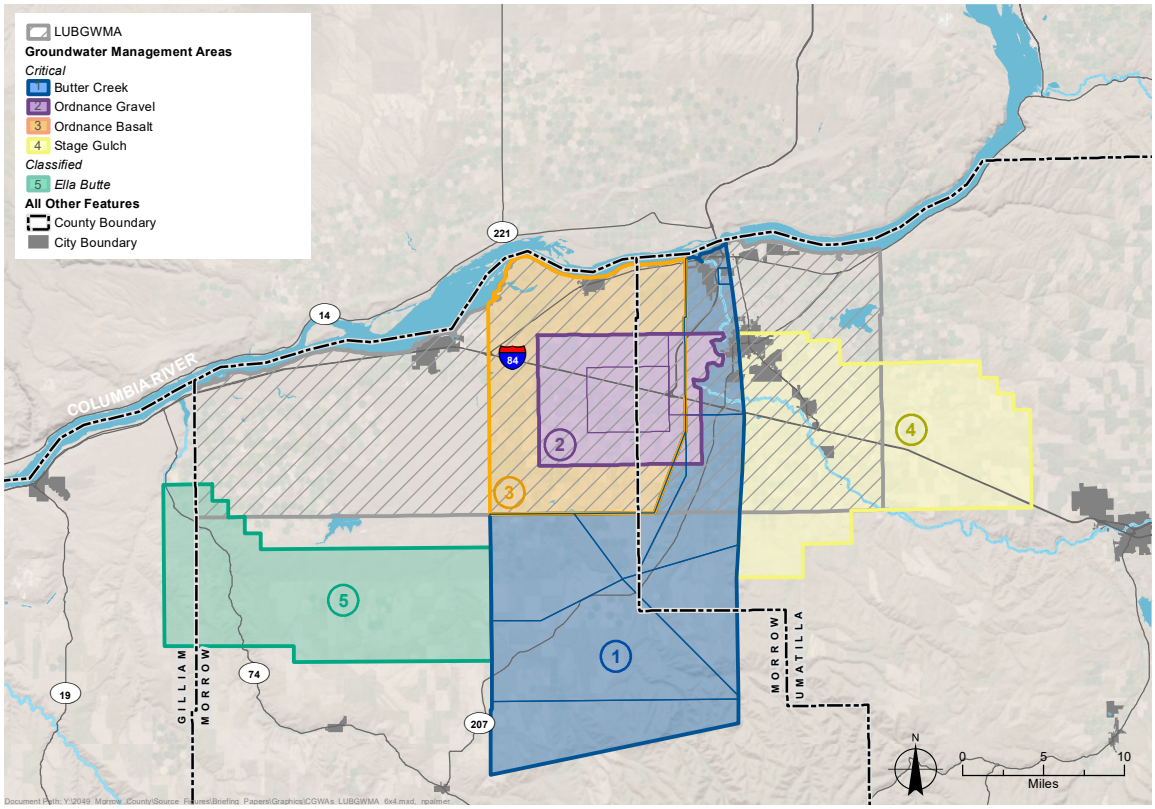
In response to the groundwater level declines, OWRD declared four groundwater administrative areas in Morrow County to regulate or restrict the use of groundwater. Of these four areas, the Ordnance Basalt, Ordnance Gravel, and Butter Creek areas were designated as CGWAs, and Ella Butte was designated as a Classified Area. The three CGWAs in Morrow County are regulated by the Umatilla Basin Program Rules (Oregon Administrative Rules [OAR] 690-507). These rules define an annual allocation process that limits groundwater pumping to a fraction of what is permitted under existing water rights. The Ella Butte Classified Area has similar restrictions on new appropriations. In general, except for small-scale exempt uses, it is not possible to obtain regulatory approval to pump groundwater throughout much of Morrow County. It should be noted that the Stage Gulch area was also declared a CGWA, but it is entirely in Umatilla County. While most of the same issues apply, it is not included in this paper.

Morrow County Groundwater Administrative Areas

Note: Effective date is the when the administrative area was established to regulate groundwater withdrawals.

Administrative Area	Effective Date	Affected Aquifer	Allowable Uses	Affected Area (square miles)
Ordnance Basalt Critical Groundwater Area	4/02/1976	Columbia River Basalt	Exempt uses only	175
Ordnance Gravel Critical Groundwater Area	4/02/1976	Alluvial Aquifer	Exempt uses only	82
Butter Creek Critical Groundwater Area	1/27/1986	Columbia River Basalt	Exempt uses only	274
Ella Butte Classified Groundwater Area	1/25/1990	Columbia River Basalt	Exempt uses only	151

Location of the Critical Groundwater Management Areas



Note: The Lower Basin Umatilla Groundwater Management Area (LUBGWMA) is the groundwater management area declared by Oregon Department of Environmental Quality (DEQ) in response to elevated nitrate concentrations in groundwater. Refer to companion briefing paper entitled "State of the Water: Overview of Water Quality Challenges in Morrow County," dated October 2023.

Except for exempt uses of groundwater (see table below), the designation of these areas as CGWAs closed the aquifer within the respective boundaries of each CGWA to any new appropriations and established a sustainable annual yield for existing users of the resource. In Oregon, "exempt uses" of water refers to specific types of water uses that do not require a permit from OWRD. Most of the exempt uses have volume limits.

Exempt Uses of Groundwater (Oregon Revised Statute 547.545)

Use	Allocation/Limit
Statutorily Exempt Uses	
Stock watering purposes	No daily volume limit
Irrigation (lawn or non-commercial garden)	0.5 acre from any well or water system (all groundwater use on one tax lot is considered one water system)
Single or group domestic	15,000 gallons per day
Industrial or commercial	5,000 gallons per day
Emergency firefighting	No daily volume limit
Down-hole heat exchange purposes	No daily volume limit
Exempt Uses Specific to Morrow County (defined in the Umatilla Basin Program Rules)	
Schools within the Butter Creek CGWA using water from the basalt aquifer	Watering lawns, grounds, and fields that are 10 acres or less

Groundwater Level Trends

The following groundwater level trends in Morrow County illustrate the impacts of water use in the region.

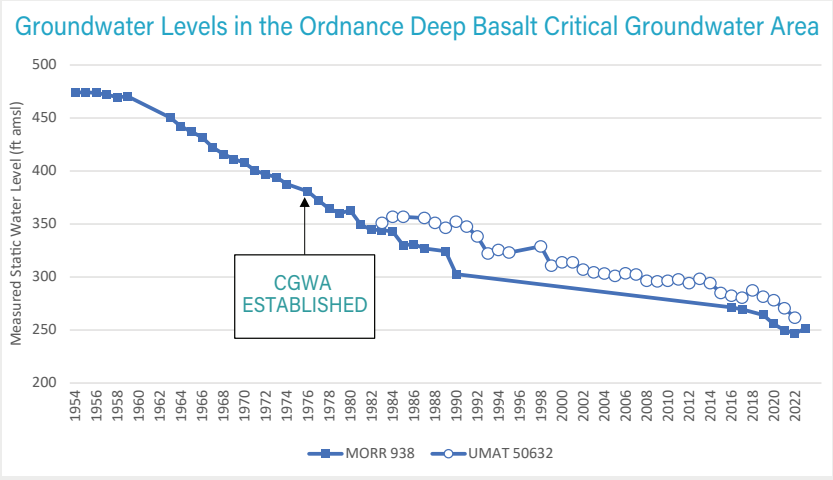
ORDNANCE CRITICAL GROUNDWATER AREAS

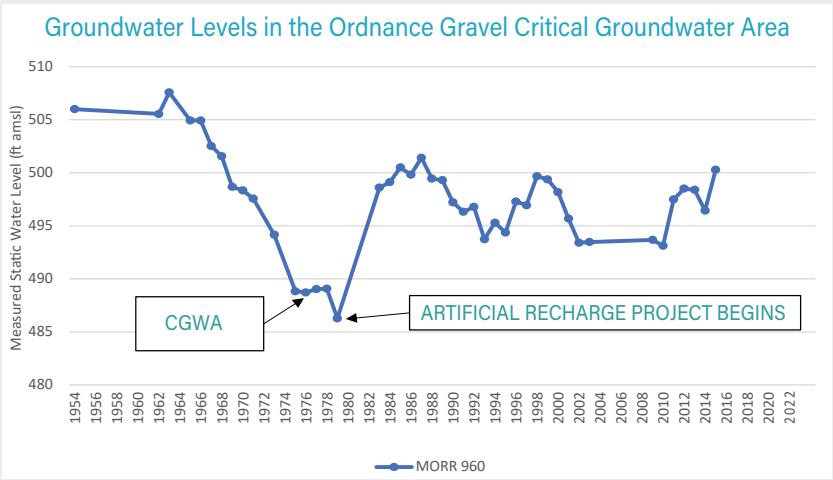
There are two CGWAs in the Ordnance area: the Ordnance Basalt CGWA and the Ordnance Gravel (alluvial aquifer) CGWA.

Within the Ordnance Basalt CGWA, two basalt aquifers have been identified: a "shallow" zone less than 400 feet deep and a "deep" zone between 400 and 900 feet deep.

The former Umatilla Ordnance Depot is within the extent of the Ordnance Basalt CGWA. Since the 1950s, when groundwater development began in this area, the total groundwater decline in the deep basalt aquifer has exceeded 200 feet. Water levels for wells drilled into the shallow basalt aquifer show relatively stable trends and have declined less than 20 feet since the 1940s.

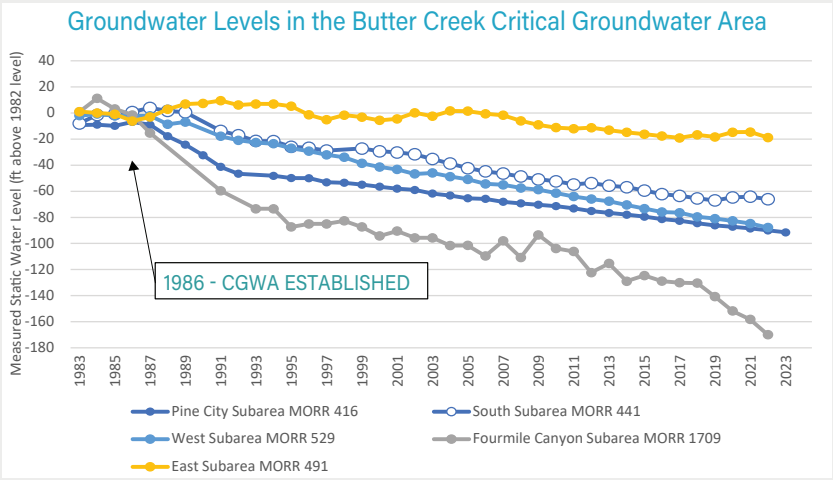
Groundwater levels in the Ordnance Gravel CGWA have stabilized over time with the implementation of the County Line aquifer recharge project.





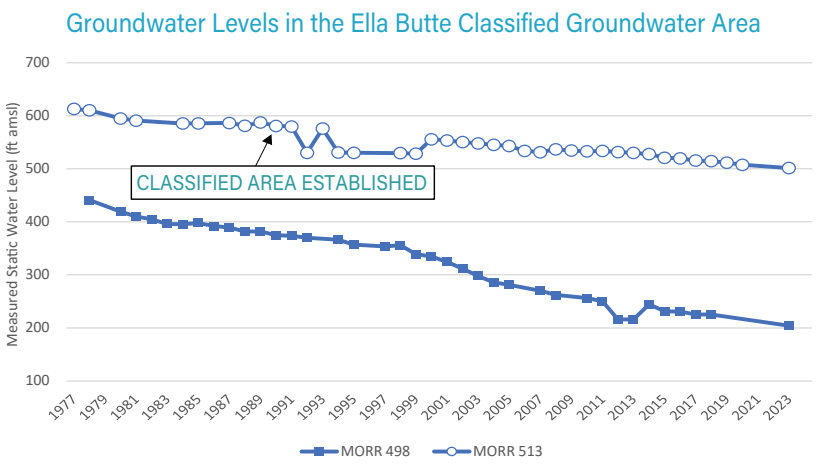
BUTTER CREEK CRITICAL GROUNDWATER AREA

The Butter Creek CGWA is made up of predominantly basalt aquifers, some of which reach depths of more than 2,500 feet. Water levels in domestic and irrigation wells within the Butter Creek CGWA have declined since the 1950s. Regional studies indicate that water levels declined 100 feet or more from 1965 to 1980 in much of the area. Groundwater levels stabilized in the East Subarea following the establishment of the CGWA in 1986, but have continued to decline in the rest of the CGWA.



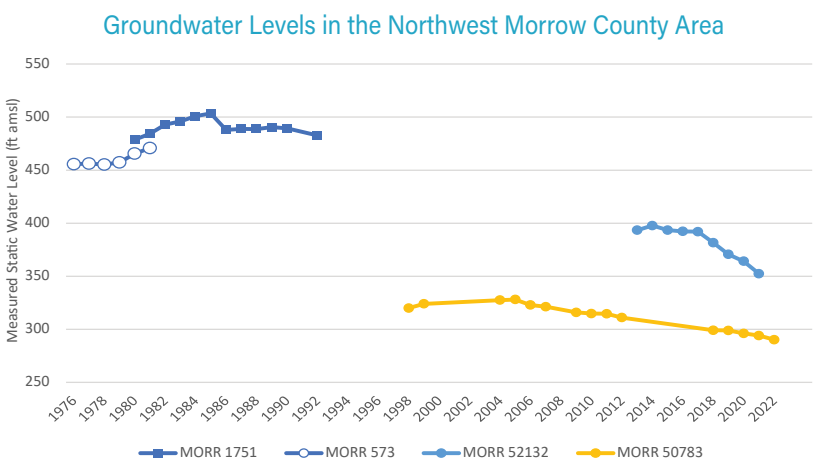
ELLA BUTTE CLASSIFIED GROUNDWATER AREA

Groundwater development within the Ella Butte Classified Area began in the late 1960s. Due to groundwater declines, OWRD initiated CGWA proceedings in 1987, but no critical area was established. Instead, the area was restrictively classified for exempt uses only in 1990. No new groundwater permits can be issued within the Classified Area. Groundwater levels have declined 100 to 200 feet since wells began to be measured regularly in the 1970s.



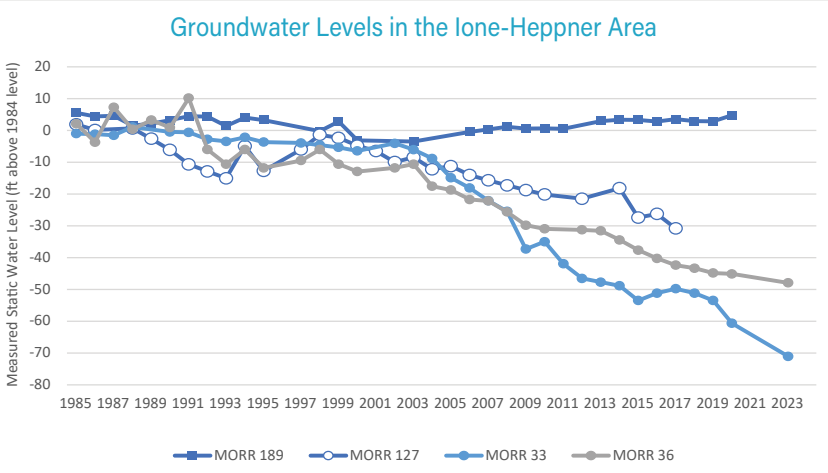
NORTHWEST MORROW COUNTY AREA

The Northwest Morrow County area is outside of any restricted groundwater areas and is generally west of the Ordnance area.
The publicly available record of groundwater level measurements in this area is inconsistent. This is attributable to less concentrated groundwater development and a lack of complaints of persistent groundwater declines. However, groundwater declines have been observed in wells in the area.



IONE-HEPPNER AREA

The Ione-Heppner Area extends from Ione, south of the Ella Butte CGWA, to south of Heppner. Trends within this broad area are variable depending on the location and depth of the wells, but also show declining trends. Select wells shown in the chart (MORR 33 and MORR 36) are deep basalt wells west of Ione, and a deep basalt well south of Lexington (MORR 127). MORR 189 is a shallower basalt well south of Heppner.



Surface Water

Major sources of water supply in Morrow County include the Columbia River, Umatilla River (via West Extension Irrigation District canal), Butter Creek (in the vicinity of Pine City), and Willow Creek (in the western portion of the County).

Columbia River

Water in the Columbia River is plentiful, with average flows of approximately 180,000 cubic feet per second measured at The Dalles. However, OWRD, in consultation with the Oregon Department of Fish and Wildlife (ODFW), applies special standards to new permit applications for the Columbia River above the Bonneville Dam. With few exceptions, OWRD does not allow new appropriations of water from April 15 to September 30 without mitigation consistent with ODFW's Fish and Wildlife Habitat Mitigation Policy. In effect, these rules have required new uses of water from the Columbia River during the irrigation season to provide an equivalent daily rate and annual volume of surface water mitigation from another source. Permanent mitigation has generally been difficult to obtain, which has, in essence, resulted in a moratorium on issuance of new water rights, negatively impacting agriculture, industry and municipalities.

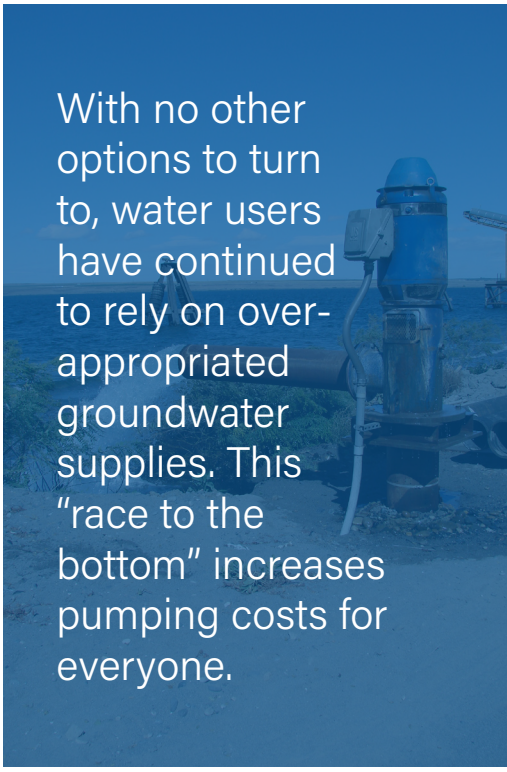
In addition, new water use permits for October 1 through April 14 are typically conditioned to limit water use during periods when targets for Columbia River stage or temperatures have been missed. This has primarily affected the availability of water during October, limiting late-season use of the Columbia River under shoulder- and off-season water rights.

Other Surface Water Sources

Except for the southwest corner of Morrow County along Rock Creek, the County is within the Umatilla Basin. The Umatilla Basin Program (OAR Chapter 690, Division 507) limits new uses of surface water from heavily appropriated streams. Butter Creek, Willow Creek, and the lower Umatilla River are generally closed to future appropriations, except for aquifer recharge or storage uses outside the low-flow season (late spring to early fall). These sources are also closed to new appropriations for commercial irrigation. These sources were developed early in the settlement of the region and are over-appropriated compared to existing uses.

Key Issues/Impacts

Water scarcity has important social, economic, and environmental consequences for Morrow County. Together, Morrow and Umatilla counties account for 19 percent of all agricultural sales in Oregon.[1] The challenge of obtaining regulatory access to year-round water supplies restricts opportunities for new investments in industry and agriculture and limits the ability to meet municipal and domestic water demands. While there have been some efforts to develop new water supplies, including aquifer storage and water reuse, the high capital costs of such projects have increased reliance on existing supplies.



As shown in groundwater level trend charts, over-appropriation of groundwater supplies has continued despite CGWA designations. Without alternative sources of water supply, water users have continued to rely on groundwater supplies, including through reallocation (i.e., transfer of water rights) to new uses. The resulting "race to the bottom" increases pumping costs for all users of the aquifer, as increased (hydraulic pumping) lift is required to pump groundwater from greater depths. This has also rendered some uses of groundwater uneconomical, as only higher-value crops can justify the increased pumping and operational costs.

Groundwater declines affect all users of the resource, putting domestic well users, particularly those with basalt wells, in competition with agricultural and industrial water users. The increased well depth required to access the declining basalt aquifer creates additional costs for domestic users to construct and maintain their wells. The increased cost of accessing the basalt aquifer could also close off potential solutions to high levels of nitrates in the shallower alluvial aquifer near population centers.

Finally, groundwater discharges to the lower reaches of surface water bodies provide a valuable source of cold-water inflows, particularly in late summer. As groundwater levels have declined, this source of cold water inflows has diminished and has effects on fisheries and the environment.

Morrow County's Opportunities to Address Water Quantity Challenges

Morrow County is one entity in a region with many water stakeholders and has not traditionally taken on a proactive water management role. However, it has an opportunity to facilitate progress in addressing water quantity issues in the region. A primary driver for this is Morrow County's role to promote orderly growth while protecting and enhancing the environment.

In response to the challenge of obtaining regulatory access to new water supplies, investments in creative water supply solutions have found fertile ground in the Umatilla Basin, especially aquifer recharge and aquifer storage and recovery projects. **The Umatilla Basin Program specifically promotes aquifer recharge as a tool for supplementing municipal groundwater supplies and offsetting declining groundwater levels.**

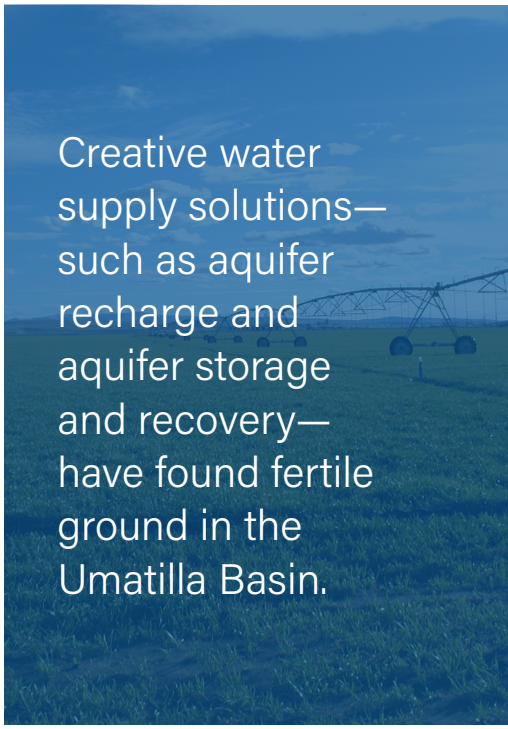
The County Line Improvement District Ordnance Gravel Recharge Project—the longest-running aquifer recharge project in the area—was implemented in the late 1970s coincident with the CGWA designation for the Ordnance aquifers. This project uses water diverted from the Umatilla River via the Westland Irrigation District canal outside the irrigation season to recharge the Ordnance Gravel aquifer. This has reversed groundwater level declines in the Ordnance Gravel CGWA by offsetting the volume of water pumped for irrigation with winter recharge. Umatilla County is currently in the process of developing an expanded recharge project in the area using water from both the Umatilla and Columbia Rivers.

1. USDA National Agricultural Statistics Service. https://www.nass.usda.gov/Data_and_Statistics/index.php

An initial feasibility study for deploying aquifer recharge on a larger scale was initiated in 2008. The feasibility study was a preliminary step toward a large-scale effort that envisioned 100,000 acre-feet of annual recharge, including through use of injection wells in deeper basalt aquifers. The feasibility study revealed that the capacity for recharge was lower than expected at 25,000 acre-feet per year. Furthermore, anticipated environmental benefits from raising aquifer levels and increasing discharge of groundwater to surface water bodies were less than predicted. However, smaller-scale aquifer recharge projects continue to be pursued within the Umatilla Basin. The Umatilla Basin Commission, which oversaw the initial pilot study, dissolved in 2013, and the Northeast Oregon Water Association took on the role of water management and water supply planning in the area.

In addition to aquifer recharge and aquifer storage and recovery, there are two major surface water storage projects in Morrow County: Carty Reservoir south of Threemile Canyon and Willow Creek Lake near Heppner. Numerous small-scale water supply reservoirs are also in use throughout the basin.

Other pursuits of new water supply have focused on obtaining mitigation from upstream sources on the Columbia River. Northeast Oregon Water Association has taken a leading role in this ongoing work.



These are examples of opportunities to leverage and support the private water supply projects underway within the Umatilla Basin, including aquifer recharge, aquifer storage and recovery, and mitigation efforts. Given limited opportunities to develop new water supplies, it is also important to take a comprehensive look at unmet water supply needs and track those unmet needs on an ongoing basis for effective planning. With this information, water users can proactively develop water supply projects that create multiple benefits. Finally, OWRD is in the process of revising groundwater allocation rules statewide. It will be important to track these ongoing processes to understand how they may change OWRD's management of existing CGWAs, particularly considering continuing water level declines.

The accompanying briefing paper, "State of the Water: Addressing Water Quantity and Quality Challenges in Morrow County" (October 2023), includes other efforts that parties in the region have been implementing to help address water supply access and sustainability, and how Morrow County can support these efforts. The next steps for Morrow County in 2024 will include developing water-related policies and actions consistent with the County's mission, responsibilities, and resources to help address the water quantity and water quality issues of the region.

This briefing paper was prepared by GSI Water Solutions, Inc., under contract with Morrow County.

Aquifer storage and recovery helps farmers in Umatilla County to meet irrigation needs.