Groundwater Quality Protection in Oregon

2023-2024 Report

Submitted to:
Governor Tina Kotek
2025 Oregon Legislative Assembly
Oregon Environmental Quality Commission

State of Oregon
DEQ Department of Environmental Quality

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Executive summary

The Oregon Department of Environmental Quality's overarching goal is to ensure equitable access to clean water for everyone in Oregon. Groundwater is an essential Oregon resource. It makes up 95% of Oregon's available fresh water and about 45% of Oregon residents rely solely on groundwater as their primary drinking water source, according to Oregon Health Authority. Most, 80%, Oregon residents rely on groundwater for at least some of their drinking water.

To protect this valuable resource, Oregon passed laws to prevent groundwater contamination, conserve and restore groundwater, and maintain the high quality of Oregon's groundwater. DEQ has the critical role of monitoring the water quality and ensuring water quality protections are implemented wherever needed.

DEQ is the lead agency, in partnership with other state natural resource agencies, responsible for implementing Oregon's groundwater protection program. This program includes monitoring, assessing and protecting groundwater quality in Oregon. Since groundwater aquifers can extend across jurisdictional boundaries, DEQ partners with local, state and federal agencies, as well as private and public organizations and individuals, to improve and protect groundwater.

DEQ's limited staffing and resources currently restricts the agency's ability to investigate and assess groundwater quality in new areas of the state. DEQ can only evaluate one new area of the state every two years, in addition to continued monitoring in the three groundwater management areas.

Status of Groundwater Quality

DEQ evaluates and protects groundwater through its work in groundwater management areas, biennial groundwater studies, technical assistance, and permitting.

Groundwater management areas

DEQ designates groundwater management areas when groundwater in an area has elevated levels of nonpoint source contaminants above a designated percentage of the drinking water standards per ORS 468B.180. Oregon has three such areas: Northern Malheur County, Lower Umatilla Basin, and Southern Willamette Valley. In each area, DEQ monitors groundwater quality, provides technical assistance, and engages communities through a local advisory committee to implement actions to reduce groundwater contamination. Highlights groundwater management area activities in the past two years are:

- **Northern Malheur County:** DEQ continued annual sampling of the existing well network of about 35 wells for nitrate. In August 2024, the Oregon Department of Agriculture prohibited the distribution, sale, or use of all products containing the pesticide Dacthal following an EPA order. This pesticide caused arsenic and related contaminants to show up in several wells.
- **Lower Umatilla Basin Groundwater Management Area:** DEQ continued sampling the existing long-term well network of about 30 wells four times per year for nitrate. DEQ's continued extensive work to update and modernize wastewater permits in the area to minimize nitrate leaching to groundwater. In September 2024, state agencies published the Oregon Nitrate Reduction Plan for the area. This is an unprecedented collaborative effort to outline the state's key strategies to reduce groundwater nitrate concentrations and protect public health in the immediate term. DEQ's LUBGWMA web page is updated regularly and includes information in English and Spanish.
- **Southern Willamette Valley Groundwater Management Area:** DEQ continued sampling 12 wells quarterly and a well network of 15 water wells, 22 monitoring wells, and 6 surface water locations once a year for nitrate, chloride, and field parameters. DEQ provides nitrate results, educational explanations, and Spanish translations to well users in the well sampling network each year. DEQ gives regular updates to the local planning committee.

Biannual project

In this biennium, DEQ conducted a study of groundwater quality in southern Deschutes County, an area that previous modeling and data collection efforts suggested is vulnerable to nitrate contamination. Nitrate concentrations have been shared with residents and DEQ will continue to evaluate nitrate trends in the area. DEQ also continues to assist Deschutes County and work with local groups on the South Deschutes/North Klamath Groundwater Protection Project to identify and implement measures to protect groundwater quality.

Technical assistance

With funding from the Safe Drinking Water Act, DEQ and OHA Source Water Protection programs provide data and technical assistance to public water systems using groundwater as a drinking water source. The agencies provided source water assessments to public water systems identifying risks to the water supply, which the water systems can use to develop and implement strategies to protect the groundwater supply.

During 2023 and 2024, DEQ's Source Water Protection Program focused on providing technical assistance to small groundwater systems, particularly manufactured home communities. DEQ helped build their capacity and minimize risks through education, technical assistance, and relationship building. In addition, the program updated the Groundwater Resource Guide which provides additional information, tools to determine local priorities, and strategies for protecting source water areas.

Permits

DEQ also protects groundwater quality by evaluating applications for permits to discharge to the ground as well as providing required technical reviews to support sister agencies via permits for aquifer storage and recovery, artificial groundwater recharge, and for mining projects.

Groundwater Protection Grant Project Funding

The Groundwater Protection Act of 1989 (ORS 468B.169) authorizes a grant fund and methods for distribution of those funds, however funds have never been appropriated to DEQ for these purposes. Instead, groundwater research, best management practice implementation, public education, and drinking water protection projects been funded in an inconsistent and sometimes ad-hoc manner by a variety of other grant programs implemented by various state agencies.

Several of the early grant programs were large funders of groundwater protection projects in the 1990s and early 2000s but funding for groundwater projects has waned in recent decades. This limits DEQ and its partner agencies' ability to monitor and protect groundwater.

Emerging Issues

While the tasks assigned to DEQ and partner agencies in 1989 under the Groundwater Protection Act are still important and far from completed, new pressures related to drought, fires, and climate change have led the agency in recent years to stretch its groundwater protection resource to attend to the following issues.

- **Environmental justice.** Climate change is having a significant impact on groundwater quality in Oregon, and poor water quality is impacting communities of color and those who are rural, low income and speak a language other than English.
- **Aquifer storage and recovery/artificial groundwater recharge.** Due to declining water levels and recent changes in Oregon's water allocation rules, DEQ is expecting an increase in requests for permits to recharge groundwater aquifers with treated wastewater. Treated wastewater is a different type of source water than a natural river system and requires more complex technical reviews. DEQ may also need to better clarify policy and rule around these projects to help applicants better understand the requirements. DEQ has limited resources to do this type of work currently, but we are increasing coordination with other agencies and beginning a needs analysis.

- **PFAS.** The U.S. Environmental Protection Agency declared per- and poly-fluoroalkyl substances (PFAS) an urgent public health and environmental issue facing communities across the United States. The Groundwater Program is evaluating available data on PFAS in Oregon to determine where it may be a threat to groundwater resources and working collaboratively with other DEQ programs to develop a strategic plan to address PFAS issues**.**

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1. Introduction

Groundwater is underground water. Water at the surface that seeps into the ground becomes groundwater. Over 95% of all liquid freshwater on Earth is groundwater.

Groundwater in Oregon has many valuable uses and functions. It is the primary source of drinking water for people in Oregon, making up 80% of drinking water in private wells and in public water systems. Oregon businesses require clean groundwater for industries such as food processing, dairies, manufacturing, and computer chip production. Groundwater provides irrigation water for Oregon agriculture and water for livestock. It also serves an important environmental role, flowing into rivers, lakes, streams and wetlands, cooling them down to temperatures required for sensitive fish species.

Groundwater is present beneath almost every land surface and sometimes occurs at very shallow depths. It is vulnerable to contamination from activities taking place on land as well as from discharges of waste and pollutants at or below ground surface. Once groundwater becomes contaminated, it is very difficult and expensive to restore. Because groundwater moves slowly, contamination may persist for tens, hundreds or even thousands of years. Likewise, groundwater contamination may not show up and have a detrimental effect until sometime far into the future. This contamination may impair groundwater for use as drinking water and may affect the quality of surface waters where it joins with rivers, lakes and streams.

Since it's used so often as drinking water, contamination of groundwater can lead to severe negative human health consequences. Although more toxic contaminants can severely impact human health at lower concentrations, much attention is paid to nitrate because it is widespread in Oregon, indicates that groundwater contamination from human activities is occurring, and presents health concerns above the drinking water standard of 10 mg/L. In infants and developing fetuses, nitrate concentrations above 10 mg/L can interfere with the ability of blood to carry vital oxygen to body tissues resulting in methemoglobinemia (aka. "blue baby") syndrome. The condition can progress rapidly to coma and death if not treated properly. Other health risks are linked to lower levels of nitrate in drinking water and other contaminants such as pesticides, volatile organic compounds, and bacteria. Additional information is available on OHA's Nitrate in drinking water information website.

The Oregon Groundwater Quality Protection Act of 1989 (Oregon Revised Statute 468B.150-190) sets broad goals – to prevent contamination of Oregon's groundwater resource, to conserve and restore this resource, and to maintain the high quality of this resource for present and future uses. The act established a policy that all state agencies' rules and programs are to be consistent with the goal of protecting drinking water resources and public health.

DEQ has primary responsibility for implementing groundwater quality protection in Oregon. DEQ has a suite of programs and responsibilities to help prevent groundwater contamination from point and non-point sources of pollution, to clean up pollution sources, and to monitor and assess groundwater quality.

DEQ coordinates groundwater protection and restoration efforts with other state agencies that have overlapping responsibilities for groundwater regulation, involvement, or oversight. DEQ implements some programs through partnerships with the OHA, OWRD, and ODA.

DEQ also works collaboratively with interested parties to assess the situation, share information, identify funding sources, and find common-ground solutions. Partners include state, local and private organizations, businesses and individuals.

As surface water resources are used to capacity, people in Oregon become more dependent on groundwater resources and they expect those resources to remain clean, available and usable. As Oregon's population grows, the importance of groundwater to meet the demands of that population will increase. There are more wells are present in Lane, Multnomah, Washington, Columbia and Deschutes counties now than in all counties in 2017.

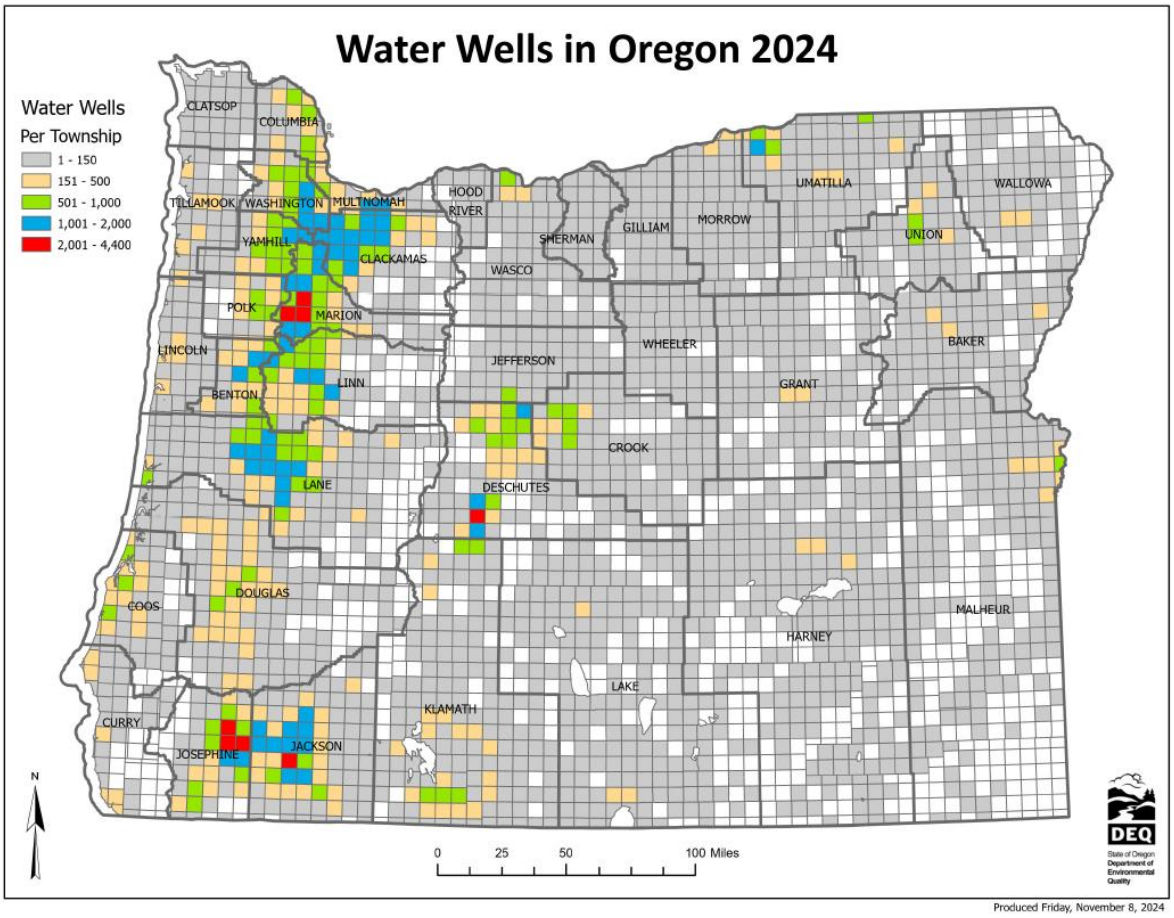
This report was prepared in response to the Oregon Revised Statute 468B.162 (3) requirement for DEQ to report to the legislature biennially on the groundwater-related activities and presents information on the following topics:

- Status of groundwater quality.
- Groundwater management areas and regulatory programs.
- Grants and loans awarded.
- Emerging issues.

2. Status of Groundwater Quality

Climate change and population growth are putting new strains on Oregon’s water resource capacity. Most surface water resources are already fully allocated. As a result, more wells are being used to access groundwater for homes, gardens, farms and other commercial and industrial uses. Groundwater allocations are overextended in some areas of the state. As more people rely on groundwater, it is important that the quality of the resource is measured, monitored and protected, as well as ensuring that environmental justice policies are in place to ensure equitable access to clean water.

Figure 1. Distribution of drinking water, irrigation and industrial water wells in Oregon



A. DEQ's Groundwater Monitoring and Assessment Program

One requirement of Oregon's Groundwater Quality Protection Act of 1989 (ORS 468B.160 and .190) is for DEQ in cooperation with WRD and Oregon State University Agricultural Experiment Station to conduct statewide groundwater quality monitoring to identify and characterize the quality of the state's groundwater resources. When possible, DEQ coordinates groundwater quality investigations with an accompanying hydrogeologic evaluation by WRD and/or the U.S. Geological Survey to enhance understanding of groundwater conditions. Specific monitoring and assessment requirements of the Act (468B.190) include identifying:

- Areas of the state that are especially vulnerable to contamination.
- Long-term trends in groundwater quality.
- Ambient quality of groundwater resources.
- Emerging groundwater quality problems.

Since the cost of installing and maintaining monitoring wells is high, DEQ primarily relies on testing the wells of domestic well owners for the statewide monitoring program. While there is no regulatory program for private drinking water wells, the testing can help DEQ understand the

condition of aquifers and the information gathered can be a resource for public organizations and help well users learn more about their water. Groundwater monitoring is conducted by DEQ's Laboratory and Environmental Assessment Division, which also collects and analyzes surface water data. Lab staff perform quality assurance, analysis, and quality checks on the data before entering the data into DEQ's water quality database.

Statewide groundwater quality monitoring 1980 to 2024

Groundwater quality in various areas of the state was evaluated before the Groundwater Quality Protection Act was passed in 1989 and monitoring increased once DEQ was directed to "Identify and characterize groundwater quality" in the state. Figure 2 shows the number of wells sampled per year from 1980 to 2024.

Figure 2. Number of wells sampled per year 1980 to 2024

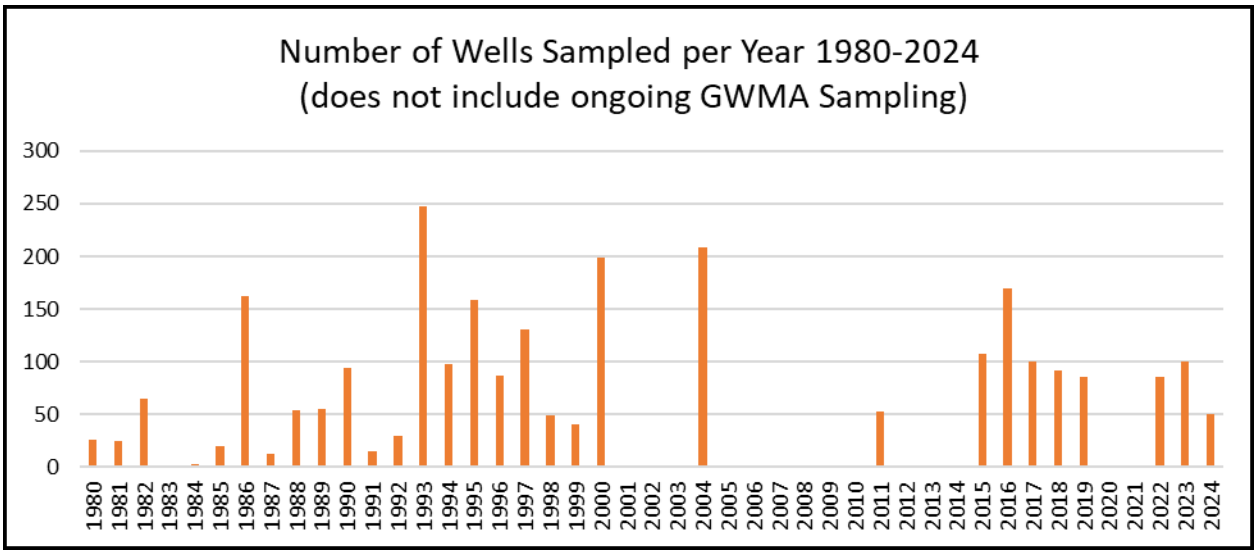


Figure 2 does NOT include repeat sampling in the three Groundwater Management Areas, or GWMAs, which has continued in each GWMA since DEQ established them. Funding for groundwater monitoring was reduced over time until 2013, when the Oregon Legislature authorized two positions to renew the statewide groundwater quality monitoring and assessment program at DEQ. Initially, these positions allowed DEQ to sample two new areas of the state per year but funding cuts to this General Fund program in 2017 reduced program capacity. At present, groundwater quality monitoring is generally only conducted in one new area of the state per biennium in addition to continued monitoring of water quality in the state's three GWMAs.

Since 2015, each new groundwater quality study has included two sampling events to study seasonal and climatic difference in groundwater quality. The study areas are selected based on a variety of screening criteria including past studies as well as nitrate data collected during real estate transactions. Recent study areas have included the Mid-Rogue Valley Basin in 2015, the North Coast Basin in 2015 and 2016, the Walla Walla Basin in 2016, the Mid-Willamette Basin in 2017, Harney County in 2018, the Klamath Basin from 2019 to 2022, and the Southern Deschutes County study in 2023 and 2024. Completed study reports are available on DEQ's Groundwater Protection page.

Appendix 1 summarizes the groundwater studies in DEQ records and gives a “Groundwater Quality Rating” of 1 to 4. A rating of 1 means 10% or less of the area’s wells showed contamination over the drinking water standard. A rating of 4 means more than 25% of the area’s wells showed contamination over the drinking water standard. The table also lists contaminants of concern in the area and suspected sources of contamination.

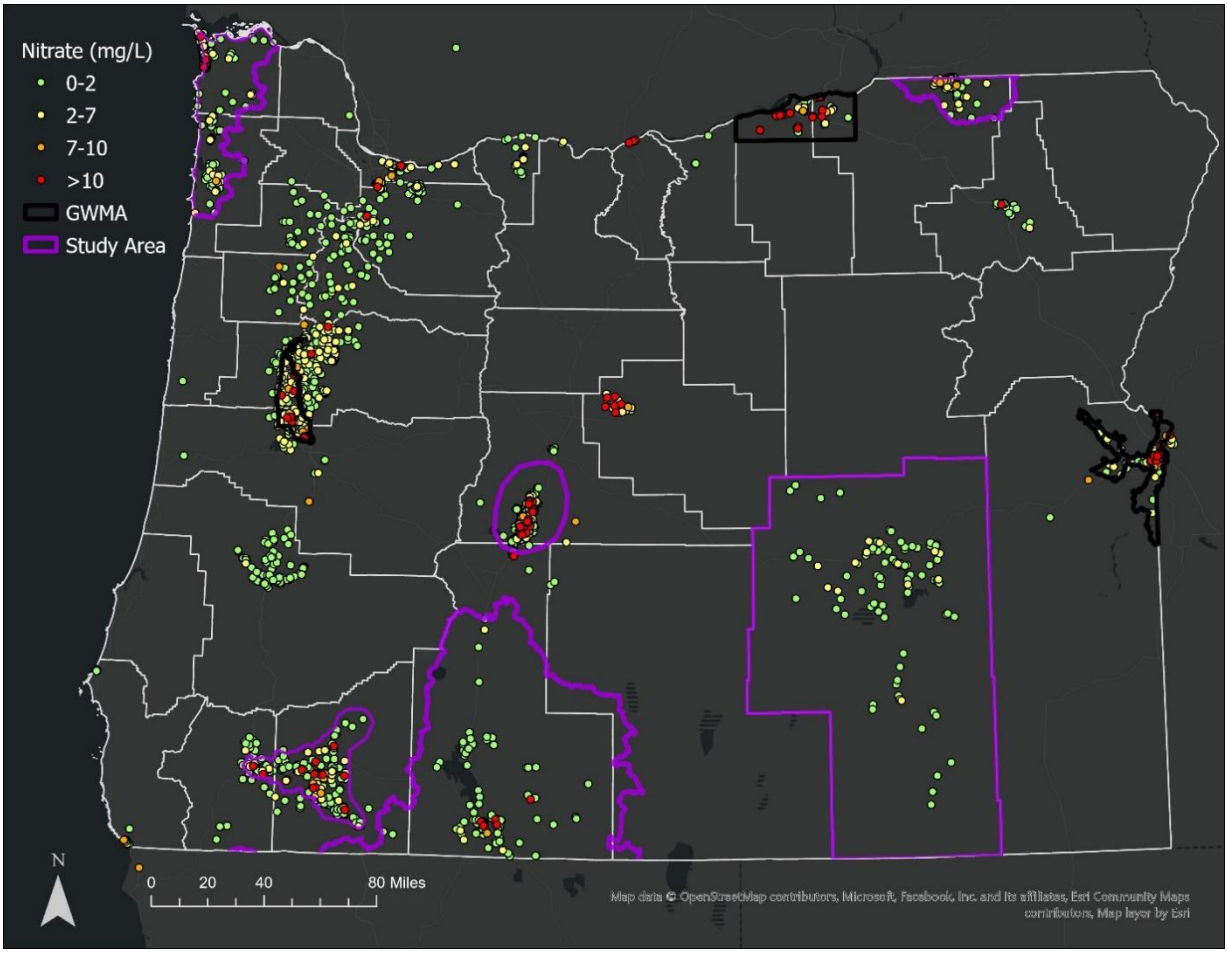
Statewide groundwater quality findings

DEQ evaluates water quality in aquifers by comparing levels of detected contaminants to federal drinking water standards. However, many organic chemicals and pesticides do not have drinking water standards and simply the detection of contaminants in groundwater may indicate a potential concern.

Between 1980 and 2024, DEQ conducted multiple groundwater quality assessments. Nitrate and arsenic results from these assessments are shown below in Figures 3 and 4, respectively. The Real Estate Transaction testing OHA requires provides even more well water data points for nitrate and arsenic contamination which could be further evaluated by in depth DEQ studies. These data are shown in Figures 5 and 6 below. The wells detected nitrate most often, followed by pesticides and arsenic. A list of assessments is presented in Appendix 1.

Figure 3 demonstrates areas of the state where DEQ has conducted groundwater monitoring and the nitrate concentrations detected in wells. The three areas outlined in black are the areas designated as GWMAs. Areas outlined in purple are statewide monitoring areas, DEQ has been assessing since 2015. Other wells not in these outlined areas are ones DEQ tested after 2015.

Figure 3. Nitrate concentrations in areas sampled by DEQ, 1980-2024

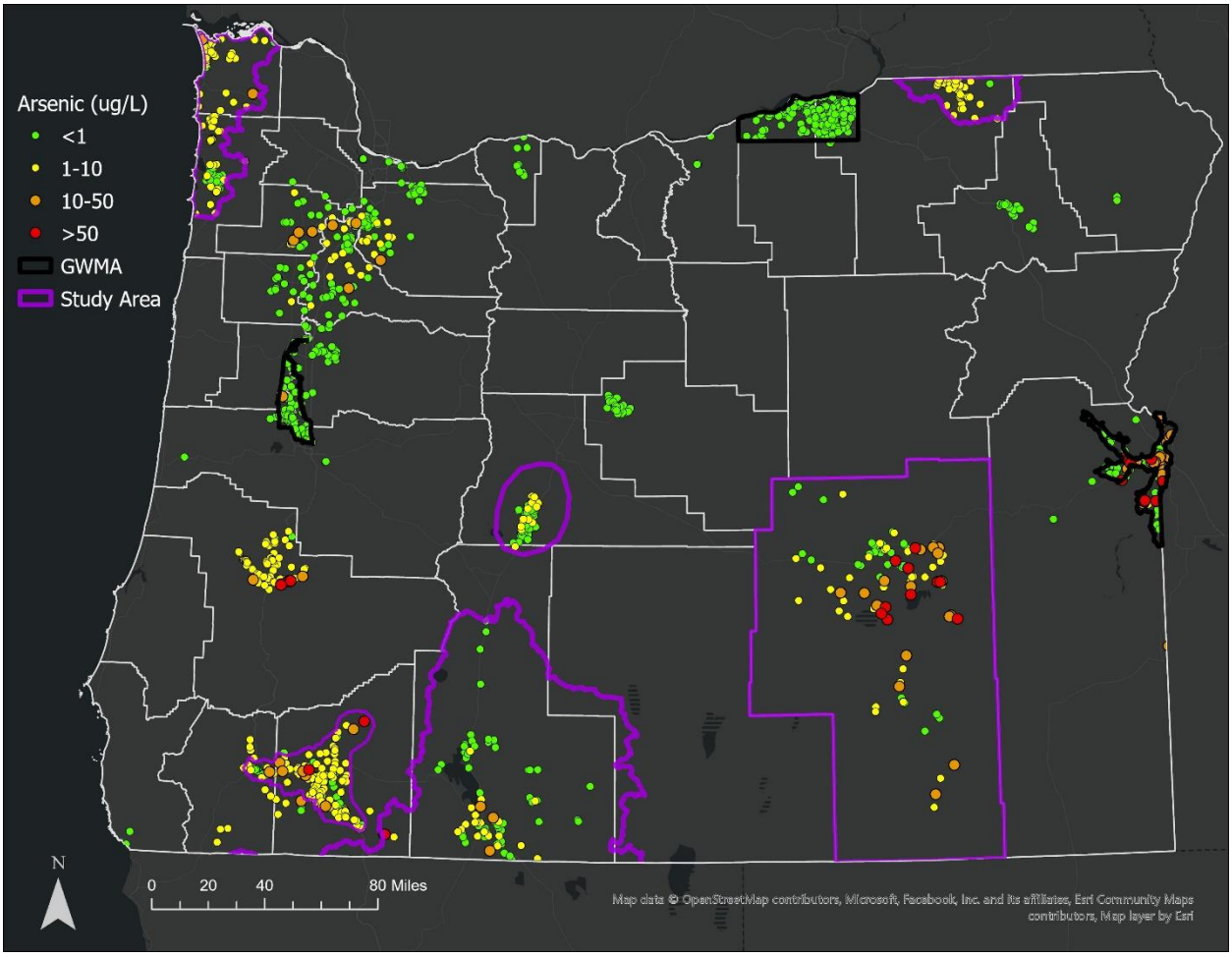


Comparison of Figure 3 with the map of well distribution, Figure 1 shows that DEQ has sampled water quality in many areas with high well density. Exceptions are rural Washington County, Clackamas, Columbia, central Lane and northern Deschutes Counties.

Comparison of Figure 3 with the map of nitrate detected in RET tests, Figure 5 shows that DEQ has sampled water quality in several areas with area-wide nitrate concentrations. Groundwater monitoring is needed in Clackamas, Columbia, central Lane, northern Deschutes, southern Douglas, Josephine and Lake Counties, and the Eastern Oregon counties of Union, Sherman, and Gilliam. In addition, it would be useful to re-evaluate groundwater quality conditions in some of the areas not sampled (areas not outlined in purple or black) in the past 10 to 40 years.

Figure 4 demonstrates areas of the state where elevated arsenic levels have been detected through DEQ statewide monitoring. These areas correlate with some of the arsenic data collected through OHA's RET testing program as shown in Figure 6. Comparison of Figures 4 and 6 show certain areas of Oregon with elevated arsenic, such as in Crook, Lake, Marion, Linn, Clackamas and Yamhill Counties, that would benefit from further public education about arsenic concerns in drinking water.

Figure 4. Arsenic concentrations in areas sampled by DEQ 1980-2024



Other areas of the state, with elevated boron, manganese, fluoride, or other parameters have been identified in part, but maps have not yet been created.

Full summary reports of available past and recent published studies are located on DEQ's Groundwater webpage.

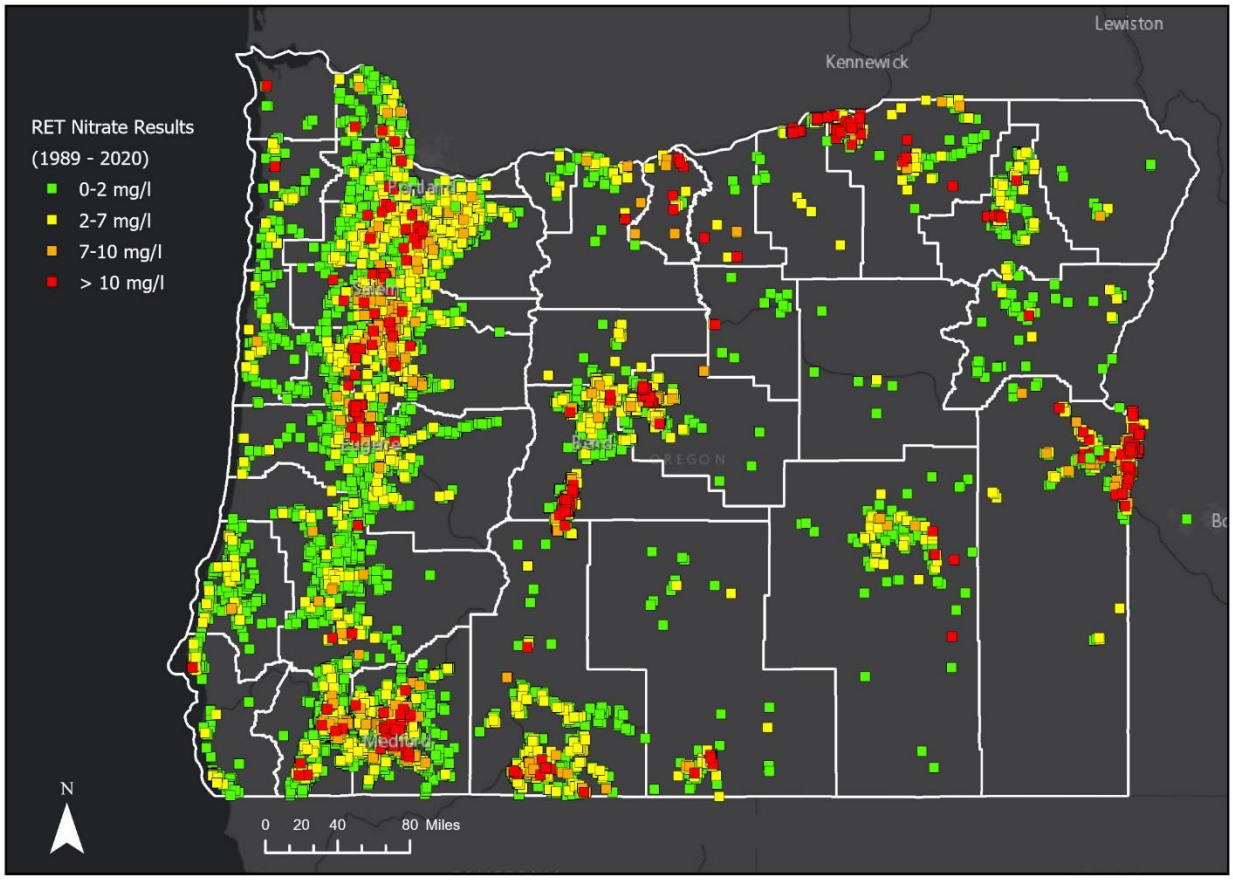
B. Real Estate Transaction Testing

The Groundwater Protection Act of 1989 included a provision requiring well water testing for nitrate and total coliform bacteria at the time of a Real Estate Transaction (ORS 448.271). A 2009 amendment requires that a homeowner selling a property with a private domestic well must also test the water for arsenic, using an accredited laboratory, and provide those RET results to the OHA Domestic Well Safety Program and the buyer within 90 days of receiving the test results.

Between 1989 and July 2020, more than 26,250 nitrate tests have been reported to OHA. These data provided a broad overview of groundwater quality in the state. Most of the domestic

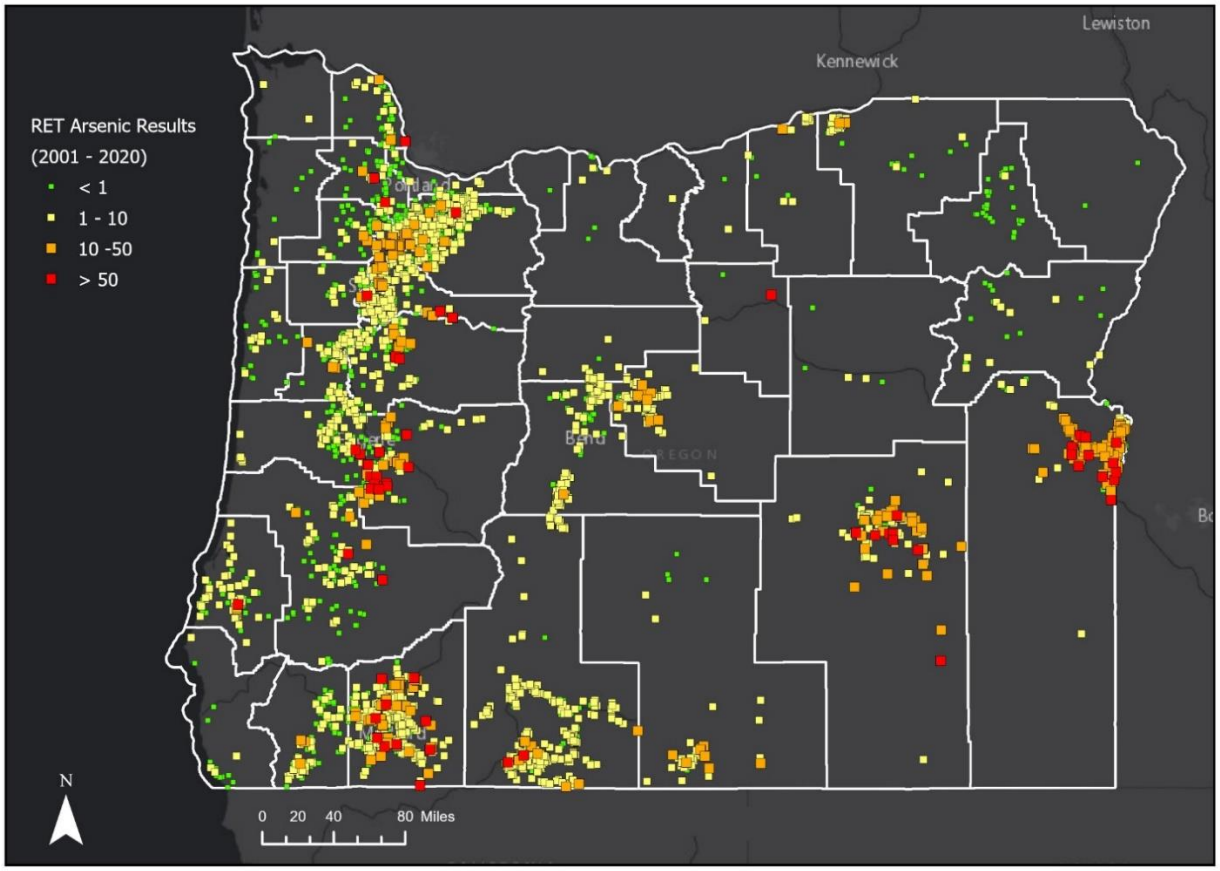
well tests (82.6%) show nitrate levels below 2 mg/L, indicating background groundwater quality. Over 17% of the tests showed nitrate levels above 2 mg/L, indicating some contamination from anthropogenic sources. About 1.5% of the wells tested had nitrate concentrations above safe drinking water levels (the federal drinking water standard for nitrate is 10 mg/L). A map of the RET nitrate data is provided in Figure 5.

Figure 5. Map of Nitrate results from Real Estate Transaction Testing 1989-2020



OHA has received 4,570 RET arsenic results from homeowners as of July 2020. Approximately 8.8% of arsenic test results exceed the federal drinking water standard (10 ug/L), and about 1.6% could be considered very high concentrations (more than 50 ug/L). These data are presented in Figure 6.

Figure 6. Map of Arsenic results from Real Estate Transaction Testing, 2001-2020



These data from private wells help identify areas of groundwater contamination or risk and can help focus monitoring resources. DEQ works closely with OHA, ODA, Oregon Water Resources Department, and other agencies to communicate monitoring results to domestic well owners to ensure they understand any health risks to which they may be exposed. These communications have been translated into Spanish in areas with Hispanic communities.

Recent studies indicate that a significant proportion of applicable real estate transactions do not collect and/or submit domestic well groundwater quality data to OHA , as required by ORS 448.271. Recent efforts to improve reporting compliance and accessibility of these data, including proposals in 2019 (HB 2860) and 2023 (HB 3207) have received considerable attention from legislative committees, but ultimately have not been enacted. Improving the rate at which these tests are conducted and that the data is made available is important for public health awareness and would also enhance state groundwater quality assessment and monitoring capacity, more generally.

C. Public Drinking Water Source Assessment

In 1996, the federal Safe Drinking Water Act required states to develop source water assessments for Public Water Supply systems (surface water and groundwater sources). In general, PWS serve 10 or more individuals per day (or more than three service connections) for

a total of at least 60 days per year (full definition in OAR 333-061-0020). DEQ and OHA's Drinking Water Program jointly implement the Drinking Water Protection Program designed to protect distinct areas that supply groundwater to public water wells and springs. The Safe Drinking Water Act funds positions at DEQ through an interagency agreement between DEQ and OHA. DEQ's staff provide technical assistance for groundwater protection for PWS. This program does not address private domestic wells or springs.

Over the last biennium, DEQ assisted OHA in completing a significant number of new "Updated Source Water Assessments" for groundwater systems in Oregon. Source water assessments provide PWS information on the recharge area that supplies the well or spring, the geographic setting, and point and non-point pollution risks to drinking water supplies. OHA and DEQ encourage and assist PWS and local communities to use the information in the assessments to voluntarily develop place-based plans and implement local drinking water protection strategies so that they can continue to have high quality sources of drinking water. Contaminant source inventories in the delineated source areas provide useful information as communities or agencies evaluate risks and prioritize protection strategies. Typical contaminant sources identified in groundwater source areas include high-density and rural housing, septic systems, auto repair shops (e.g., drywells, drill holes, floor drains and sumps), gas stations, crops, managed forest land, grazing animals, and transportation corridors. DEQ developed a database referencing best management practices for the 88 most common potential contaminant sources in Oregon. In addition, DEQ's Groundwater Resource Guide for PWS provides information and strategies for place-based planning to protect groundwater supplies.

D. Assessing Emerging Chemicals of Concern

In 2019-20 the leadership teams at DEQ, OHA and other state agencies initiated a workgroup to address and share information related to PFAS (per- and poly- fluoroalkyl substances), as part of a broader effort to evaluate emerging chemicals of concern in Oregon. PFAS are a group of toxic chemicals of growing concern for human health risks. PFAS are a suite of anthropogenic chemicals that have a wide range of applications in fire suppression, industrial processes, and consumer products that are very long-lived and difficult to fully destroy. Many are known to be toxic to human health at very low concentrations.

As part of the interagency workgroup, the OHA and DEQ drinking water programs developed and implemented a PFAS Screening and Assessment Project Plan between 2020 and 2023 as a first step in efforts to make sure customers of PWS are not being exposed to potentially harmful PFAS chemicals in their water. The monitoring focused on small PWS serving fewer than 10,000 people that were identified as potentially at risk because of their proximity to a known or suspected PFAS use or contamination site. In order to prioritize water systems for sampling, DEQ collected available GIS mapping data to evaluate potential sources of PFAS in the environment. In 2021 and 2022 the DEQ Lab coordinated the sampling and analysis of 143 small PWS identified by the OHA and DEQ to be at risk for PFAS contamination. A number of these water systems were resampled in 2022-23 to achieve lower reporting limits so that PFAS detections could be compared to EPA's proposed Maximum Contaminant Levels which were

subsequently promulgated in April 2024. Of the 143 PWS sampled, 123 were from groundwater sources.

PWS that serve 3,300 people or more are required to sample for 29 PFAS under EPA's unregulated contaminant monitoring rule (UCMR5) which was published in December 2021. UCMR 5 sampling and analysis started in 2023 and will be completed in 2025.

DEQ tracks data from all PWS sampled and provides support for source water protection where feasible. DEQ's laboratory also conducts sample collection and monitoring at PWS for OHA. As of November 2024, approximately 18% of PWS have been sampled (218 sampled out of 1190 PWS subject to the PFAS rule). Considering all data sources (OHA's PFAS sampling project, UCMR5, and voluntary monitoring) as of November 2024 there are:

- 32 PWS with measurable PFAS detections in Oregon (representing roughly 52 groundwater wells and 1 surface water source).
- 23 of the 32 PWS tested for PFAS to date exceed EPA Maximum Contaminant Levels.
- 11 different PFAS chemicals have been detected in drinking water at PWS in the state with the highest frequency for PFOS.

OHA in collaboration with DEQ's laboratory will be sampling approximately 900 additional water systems that serve less than 3,300 people beginning in Summer 2025.

Due to the absence of a regulatory program or requirements for testing, the high cost for analysis and the fact that focus on this category of pollutants has been fairly recent, there is very limited PFAS sampling and associated data for domestic/private drinking water wells in Oregon.

In Oregon, PFAS have also been detected in soil, surface water, stormwater, sediment, and fish tissue, mostly in association with known contaminated sites, such as Portland International Airport, Kinglsey Field, and Umatilla Chemical Depot. However, investigations of the presence, magnitude, and potential sources of PFAS in Oregon are still in their infancy. EPA designated perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) as CERCLA hazardous substances in April 2024 and has indicated that additional compounds may be proposed. DEQ has initiated rulemaking to match EPA's rules and clarify the requirements for investigation and remediation of PFAS. Prior to finalizing rulemaking, DEQ is asking potential sources to voluntarily collect samples for PFAS analysis.

3. Protect, Conserve, Restore

The Groundwater Protection Act was primarily written to address sources of contamination from landscape-scale activities such as farming, densely located septic systems, stormwater discharges and activities such as land application of wastewater or biosolids. Some of these sources are addressed through programs like the Groundwater Management Area designations and related Action Plans. Other sources are addressed through water quality permit conditions and monitoring requirements. Public education, outreach, and technical assistance are provided, as possible, by agency staff. Currently, however, public education and research and development of best management practices are primarily conducted by organizations such as Oregon State University Extension and Experiment Stations, Soil and Water Conservation Districts, and Watershed Councils, and funded by state and federal grants. More information on grants and loans is provided in Section 4 and Appendix 3. Responsibilities of various Oregon agencies for groundwater protection are listed in Appendix 2.

In addressing sources, DEQ is tasked under 468B.167 to

- Coordinate projects and activities of other agencies designed to reduce groundwater impacts [468B.167(1)(a)]
- Provide public education and outreach to protect groundwater resources [468B.167(1)(b)]
- Develop drinking water protection programs [468B.167(1)(c)]
- Maintain a central repository of groundwater resource information [468B.167(1)(e)]
- Identify groundwater related information and research needs [468B.167(1)(f)]
- Assist in reduction of hazardous waste [468B.167(1)(h)]

A. Groundwater Management Areas

In Groundwater Management Areas, DEQ is tasked with designating a lead agency to develop an action plan and appoint a groundwater management committee to advise the state agencies regarding local elements of the plan to reduce groundwater contamination in the area. The action plan shall include:

- Identification of practices contributing to the contamination [468B.184(1)(a)]
- Consideration of reasonable alternatives for reducing the contamination [468B.184(1)(b)]
- Recommendations of mandatory actions to reduce contamination [468B.184(1)(c)]
- Recommendations for research and demonstration projects needed in the area [468B.179(2)(d)]
- Recommendations for public education and research projects [468B.179(2)(e)]
- Methods of implementing best management practices to improve groundwater quality [468B.179(2)(f)]

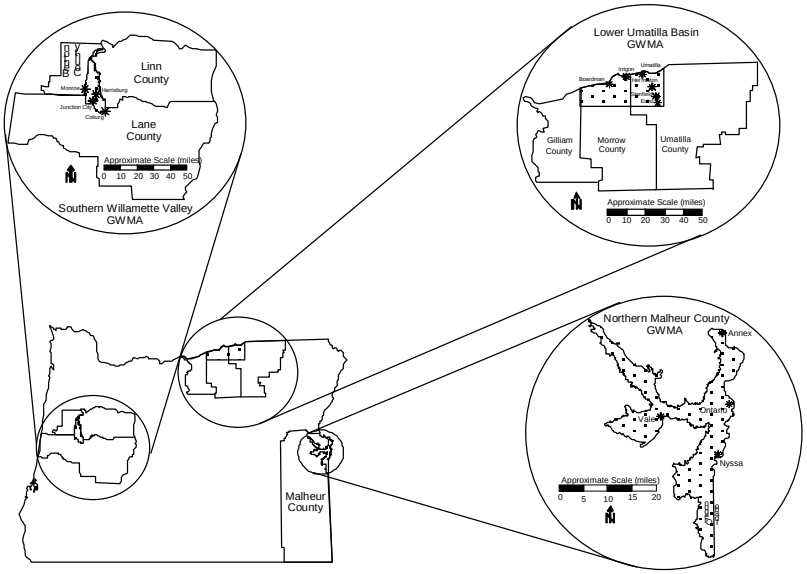
Oregon Revised Statute 468B.180 authorizes DEQ to declare a Groundwater Management Area when DEQ groundwater monitoring and assessments confirm area-wide groundwater contamination above certain concentration thresholds as a result of suspected nonpoint source activities. ORS 468B.175 to 468B.188 comprises components of the Groundwater Quality Protection Act of 1989 related to Groundwater Areas of Concern and GWMAs.

Oregon currently has three GWMAs (Figure 7): Northern Malheur County, Lower Umatilla Basin, and Southern Willamette Valley. All three areas were designated for widespread nitrate contamination.

Nitrate is a common groundwater pollutant in many areas throughout the state and country. The most common sources of nitrate contamination are agricultural fertilizer, manure, septic systems, and wastewater that travels through sediment and into groundwater. High levels of nitrate in drinking water can cause serious health effects and are particularly dangerous for formula-fed infants and pregnant women. People who drink water from private wells are the ones at highest risk. While water from public water systems is regularly tested and required to meet drinking water standards, private wells are not regulated. Under both federal and state law, private well users are generally responsible for monitoring their well water and ensuring it is safe to drink. The OHA recommends that private well users regularly test for nitrate, bacteria, and arsenic, all of which are common pollutants in Oregon.

Find more information about groundwater management areas on DEQ's website.

Figure 7. Location of Oregon's Groundwater Management Areas

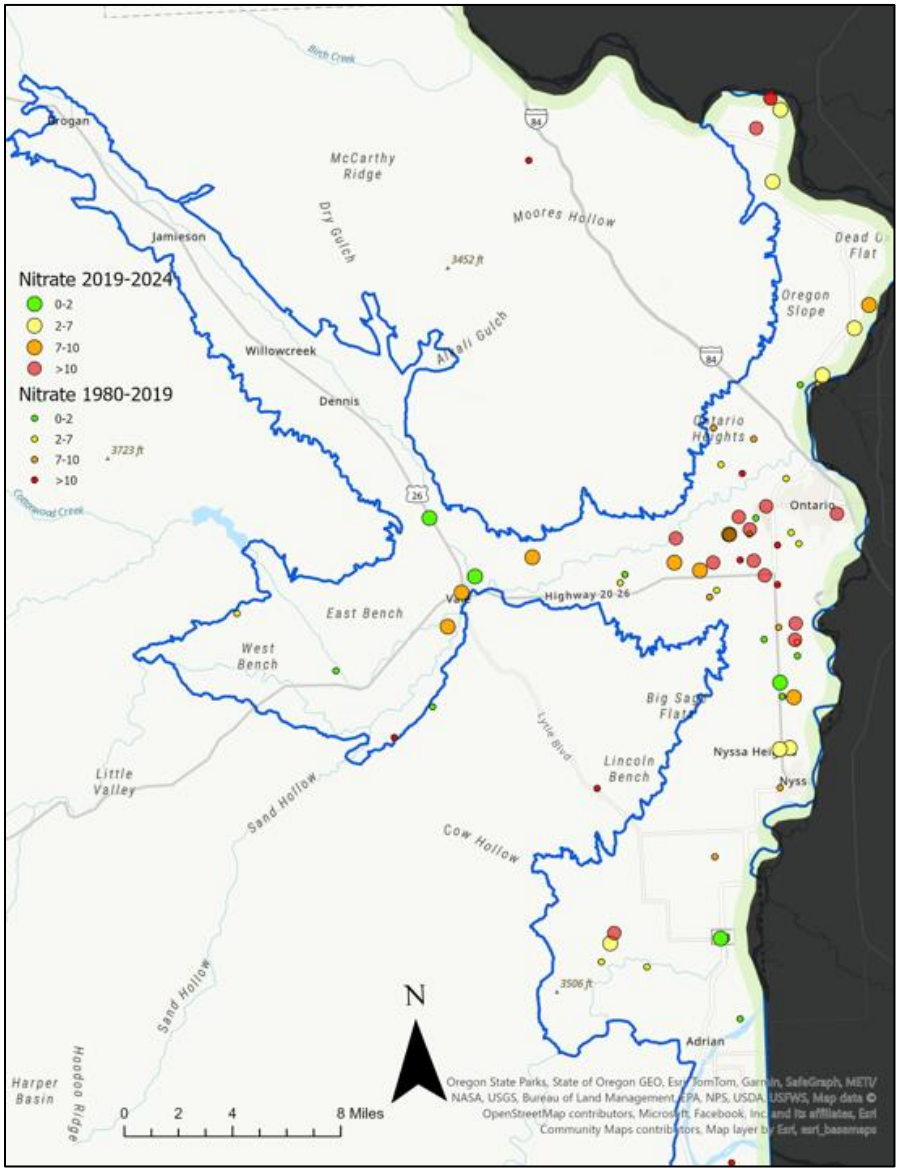


Northern Malheur County Groundwater Management Area

The Northern Malheur County GWMA was declared in 1989 after DEQ identified significant groundwater contamination in the county's 115,000-acre northeastern portion. In 1985, DEQ sampled 107 wells in northern Malheur County. At that time 34% of the wells had nitrate levels above the drinking water standard of 10 mg/L. In 2024, 33 wells were sampled, 42% of the wells had nitrate levels above the drinking water standard of 10 mg/L. The last analysis of trends in this GWMA was completed in 2015 and concluded that although not all monitoring stations in the GWMA exhibit decreasing nitrate trends, there is a statistically significant decreasing area-

wide trend and multiple lines of evidence indicating there has been an overall improvement in groundwater nitrate concentrations from 1991 through 2012. Continued implementation of best management practices and ongoing monitoring is needed to bring the areawide concentrations to an acceptable level. Figure 8 shows the current nitrate distribution.

Figure 8. Nitrate distribution in the Northern Malheur County GWMA



Breakdown products of the pesticide Dacthal have also been detected in groundwater in the NMC GWMA. Many growers switched from Dacthal to alternatives promoted by the OSU's Malheur Agricultural Experiment Station in the 1990s and in 2024, EPA prohibited the use of Dacthal so concentrations should continue to drop, but it may take many years to reach acceptable levels everywhere in the area.

Arsenic has been detected at up to 32 times the drinking water standard (322 ug/L) in the area. The highest concentration of arsenic detected in the most recent sampling (2015) was 155 ug/L. DEQ currently samples a small well network once per year for analysis of nitrate only. Arsenic and Dacthal analyses have not been conducted since 2015 but are still issues DEQ tracks for the GWMA and will be part of future sampling as appropriate.

Sampling confirmed that most of the contaminated groundwater is present in the shallow alluvial sand and gravel aquifer, which receives a large proportion of its recharge from infiltration of irrigation canal leakage and irrigation water. Agriculture dominates land use in this groundwater management area.

In August 1989, the Oregon Strategic Water Management Group, a former committee of directors of state agencies involved in water management, selected the members of the Northern Malheur GWMA Committee from local organizations and private citizens and state agency representatives. DEQ finalized the NMC GWMA Action Plan in 1991. The committee chose to implement the action plan on a voluntary basis recognizing that individuals, businesses, organizations and governments will, if given adequate information and encouragement, take positive actions and adopt or modify practices and activities to reduce contaminant loading to groundwater. The success of the action plan is gauged by both adoption of best management practices and improved water quality within the management area.

The committee is not currently active since DEQ's limited resources have been more focused on the Lower Umatilla Basin. In the next biennium, DEQ expects to have a slight increase in capacity to revisit the Northern Malheur area.

Recent collaborative efforts

The Oregon Department of Agriculture has three focus areas in the NMC region. While efforts in these areas are primarily focused on surface water concerns, some of the actions taken will benefit groundwater quality as well. Progress is being made on the land surface through implementation of best management practices. However, it may take years or even decades for groundwater quality to return to natural background levels.

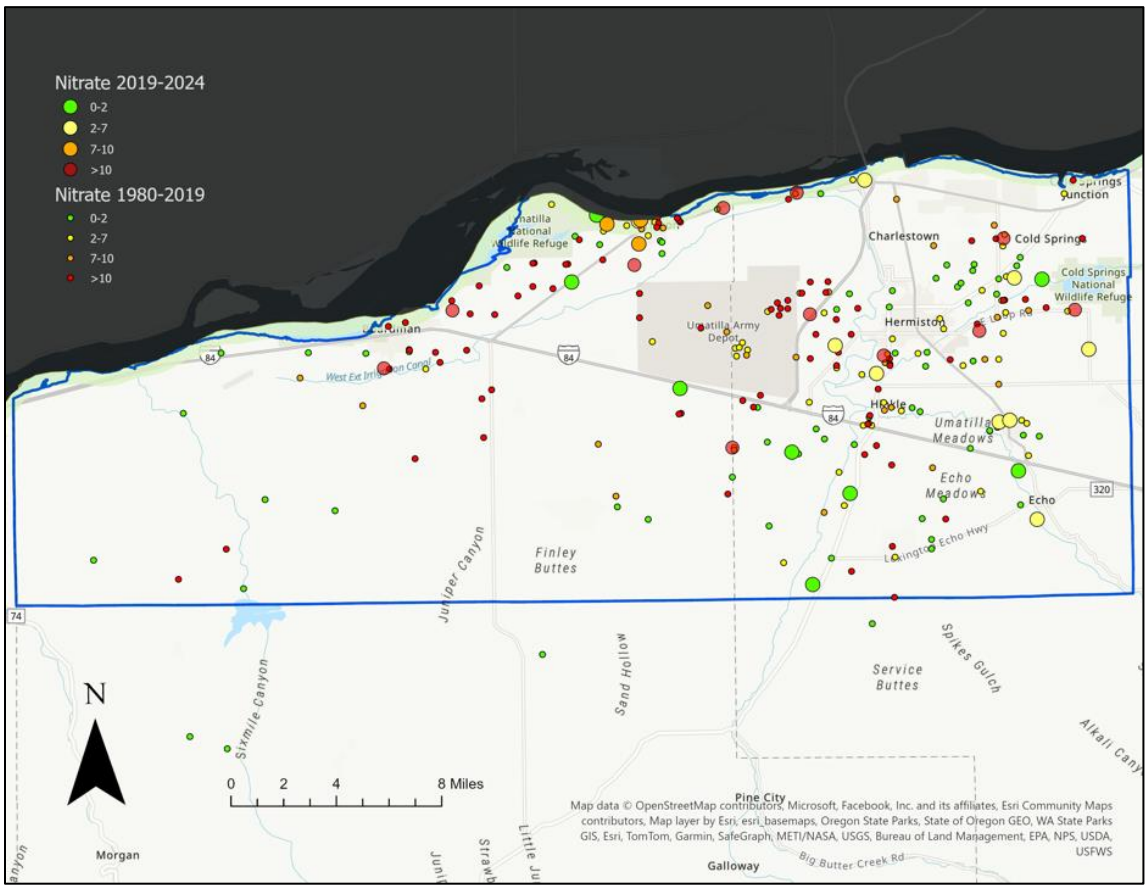
Lower Umatilla Basin Groundwater Management Area

Background

The Lower Umatilla Basin Groundwater Management Area, or LUBGWMA, is about 550 square miles in northern Morrow and northwestern Umatilla counties that includes the communities of Hermiston, Boardman, Irrigon, Stanfield, Echo, and surrounding areas. DEQ declared the LUBGWMA in 1990 and was working with extremely limited resources to monitor groundwater nitrate levels, assess contamination sources, conduct education and outreach about the issue, and coordinate cross-agency activities to reduce nitrate contamination in the area.

DEQ samples a network of about 30 wells four times each year and has conducted four larger scale sampling events since the 1990s, with the most recent results shown in Figure 9. DEQ is planning the next large scale sampling event of approximately 120 wells in Spring 2025.

Figure 9. Nitrate distribution in the Lower Umatilla Basin GWMA



Current Status

A confluence of events in the past several years has brought renewed attention and increased resources to the LUBGWMA – within the local community as well as from state and federal government agencies.

In September 2024, Oregon state agencies published a Nitrate Reduction Plan for the LUBGWMA. This plan represents an unprecedented collaborative effort between the Oregon Health Authority, Department of Environmental Quality, Department of Agriculture and Water Resources Department to outline the state's key strategies to reduce groundwater nitrate concentrations to less than 7 mg/L in the LUBGWMA and protect public health in the immediate term. The state agencies will update the plan based on changing information, resources, and strategies, and will publish an annual report detailing progress.

This contamination accumulated from multiple sources over many years and there are no simple or quick solutions. The most effective and feasible way to clean up groundwater

contamination of this scale is to control the sources of pollutants so that, over time, clean water cycles into the groundwater system, diluting and eventually replacing contaminated water.

Nitrate Reduction Plan Highlights

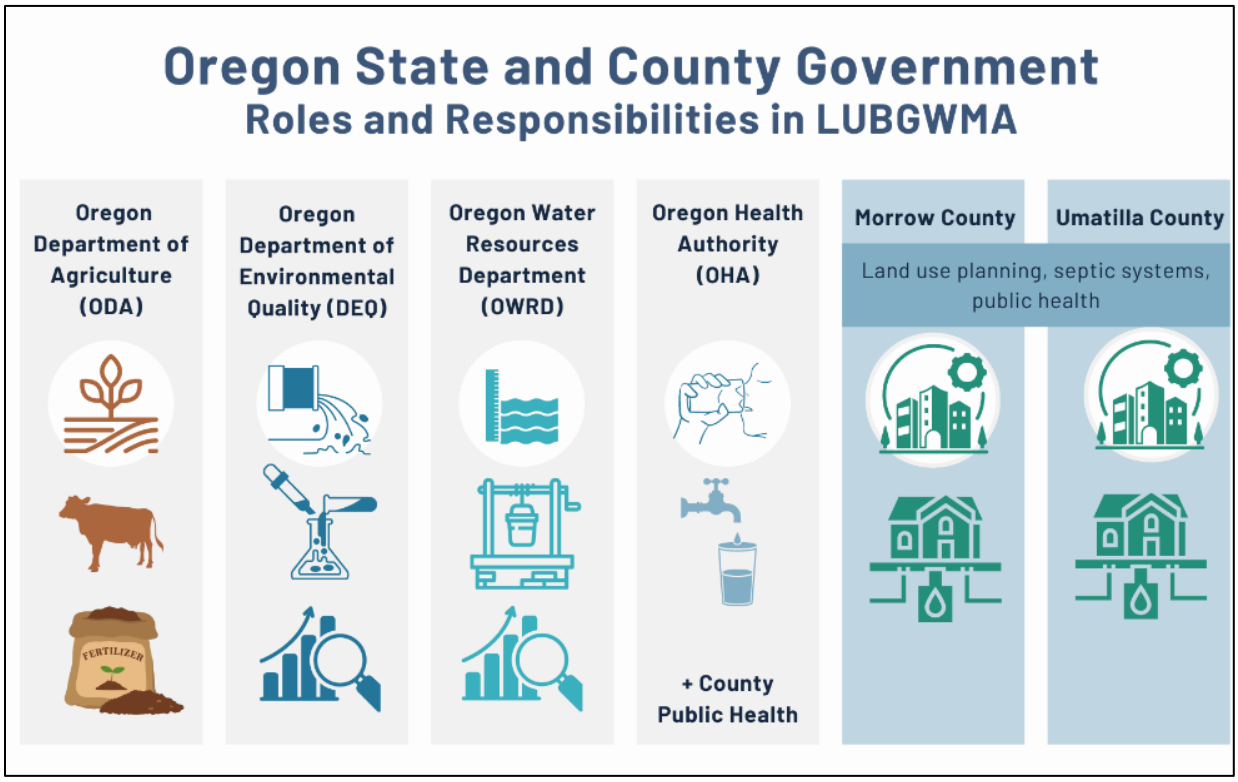
- Oregon Department of Agriculture:
    - Agriculture Water Quality Program: Develop new compliance benchmarks to address nitrate levels potentially linked to irrigated agriculture. The process will be collaborative and include partner engagement. The estimated implementation date is 2026.
    - Confined Animal Feeding Operation: Strengthen state regulations, including implementing new nutrient application permits for manure exports and update existing CAFO permits to prevent groundwater contamination.
    - Strategic Implementation Areas: Implement new initiatives to prevent additional nitrate contribution by developing assessment methodologies to understand groundwater and surface water impacts better.
- Oregon Department of Environmental Quality:
    - Update and modernize wastewater permits in the LUBGWMA to ensure operations that reuse nitrogen-rich wastewater to irrigate crop fields protect groundwater. DEQ has been updating permit requirements via permit renewals and modifications and will continue to monitor and adapt requirements to ensure operations maintain compliance and minimize potential nitrate leaching.
    - Partner with Umatilla County to regulate septic systems in the area and partner with a nonprofit lender to offer affordable financing options for homeowners to repair or replace failing septic systems.
    - Test a long-term well network of about 30 wells four times each year and complete an updated analysis to evaluate nitrate trends over time. The information can inform land use decisions and supplements site-specific groundwater monitoring and trends analyses required by wastewater permits.
- Oregon Water Resources Department:
    - Expand its inspection program to ensure that new, abandoned, and altered wells in the LUBGWMA are constructed properly to ensure that groundwater resources are protected. Staff will be conducting additional well assessments to develop a better understanding of how well construction and aquifer characteristics may be influencing water quality.

- Collaborate with Morrow and Umatilla counties to provide technical assistance for the Drinking Water Investigation project which is evaluating opportunities to connect well owners to existing municipal water systems.
- In collaboration with DEQ and ODA, update the conceptual model for the alluvial aquifer system within the LUBGWMA. The model was last released in 1995 and this update will include new data that has been collected in the three decades since the original report was released.
- Continue to collect quarterly groundwater elevation data through OWRD's well monitoring network to monitor water level decline. Staff will also look for opportunities and partnerships to expand the network.

- Oregon Health Authority:
  - Provide free laboratory tests of domestic well water to LUBGWMA residents, as it has since 2023, and offer re-testing opportunities to ensure well users have safe drinking water.
  - With the Oregon Department of Human Services, continue to provide well users whose water has unsafe levels of nitrate (10 milligrams per liter of water or higher) with free water delivery, and for well users with nitrate test results between 10-25 mg/L, free installation and maintenance of one in-home reverse-osmosis water treatment system.
  - Continue to inform and educate well users about the negative health effects of nitrates in drinking water through direct outreach in collaboration with Morrow and Umatilla County Health Departments and several community partners.
  - Continue to provide data and technical support to Morrow and Umatilla County Planning Departments working to identify options to extend existing or establish new public water systems to provide a more durable source of safe drinking water to LUBGWMA residents.

The State of Oregon is seeking feedback on an ongoing basis from community members on the plan. Feedback on the plan can be submitted here.

Figure 10. Roles and responsibilities of various state and local agencies in the LUBGWMA



Southern Willamette Valley Groundwater Management Area

Background

In May 2004, based on findings of area-wide nitrate contamination above action levels, DEQ declared the Southern Willamette Valley Groundwater Management Area (SWV GWMA). The area encompasses 230 square miles in the southern Willamette Valley including portions of Lane, Linn, and Benton counties and five cities (Corvallis, Harrisburg, Monroe, Junction City, and Coburg). Pesticides were also detected, although below health advisory standards. Nitrate contamination in this area is related to human activity such as use of fertilizers, industrial and municipal wastewater facilities, animal waste, and septic systems

DEQ convened a groundwater management area advisory committee which met quarterly for many years, had large public interest and local government participation. An action plan developed in 2006 has been partially implemented. A story map available on OSUs Well Water Website presents excerpts from the action plan, descriptions of contaminant sources, and resources for well owners.

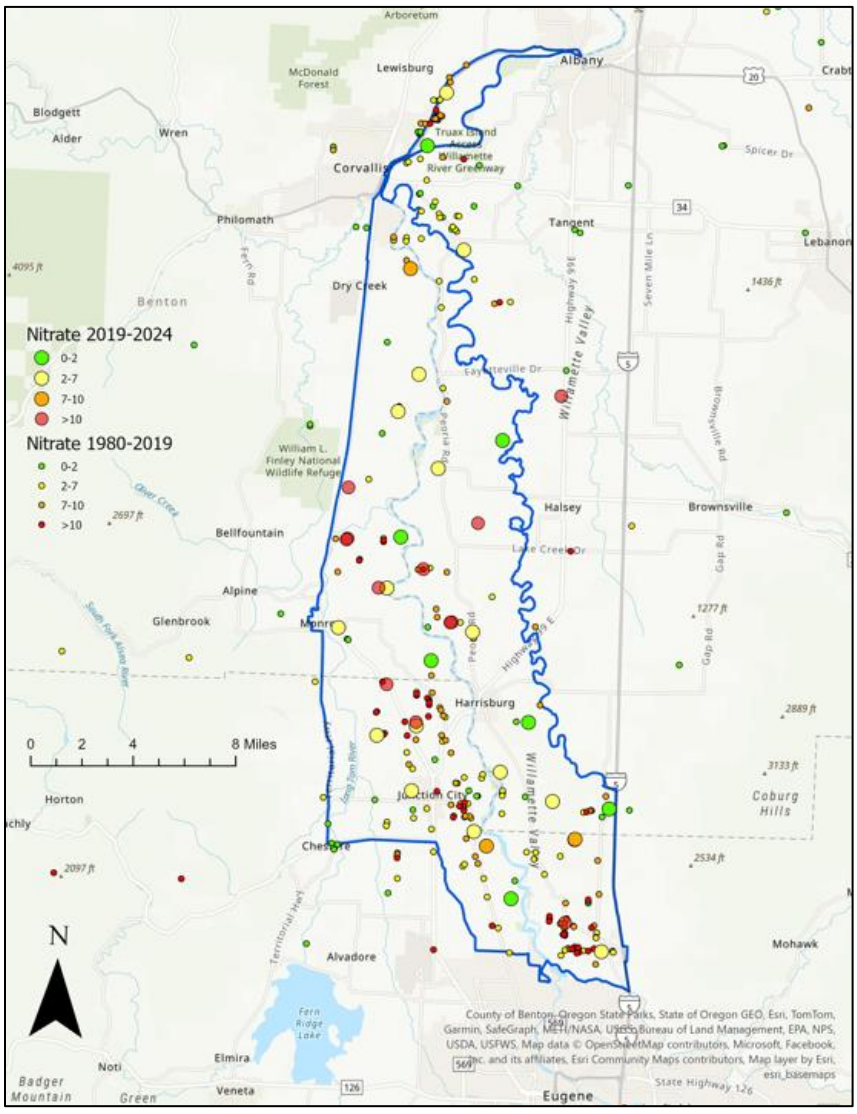
In recent years, DEQ's limited GWMA resources have been diverted to the Lower Umatilla Basin, but the committee met twice in 2023 and once in 2024. Also, an update meeting was held in November 2024 to present research findings from the EPA Corvallis team, state

agencies and OSU Extension. More information is at the [Oregon State University Groundwater Management Area web page](#).

DEQ continues to collect and analyze samples to track changes in groundwater nitrate levels over time. The current monitoring network consists of 15 domestic wells, 22 monitoring wells, and six surface water locations. DEQ monitors 11 wells on a quarterly schedule and the entire network of 37 wells and six surface locations each May.

In 2024, 30% of the wells sampled had nitrate levels above the drinking water standard of 10 mg/L and an additional 8% had nitrate concentrations above 7 mg/L. 30% were between 7 and 3 mg/L and 32% were below 3 mg/L.

Figure 11. indicates nitrate concentration distribution in network wells within the GWMA



OSU Extension outreach

OSU Extension continues extensive outreach accompanied by free field nitrate testing at local community events. They recently published guides to nitrate and arsenic in well water and maintain a useful webpage at wellwater.oregonstate.edu.

Recent collaborative monitoring and research

Tracking changes in nitrate concentrations over time has shown that groundwater is often heterogeneous with significant variations over short horizontal and/or vertical distances. In collaboration with the DEQ laboratory, EPA used stable isotopes of water and nitrate to better understand the source and processing of nitrogen within the soil and groundwater. EPA used the isotopes to identify sources and transformations of nitrogen in groundwater, ultimately providing an effective means for classifying wells based on unique patterns associated with water and nitrogen source and processing. The results show that, in the research study plots, nitrate fertilizer applied that year on the crop showed up in groundwater as well as nitrate previously stored in soils. The results are published in the June issue of Vadose Zone Journal.

Oregon Department of Agriculture (ODA) works with growers and confined animal feeding operation (CAFO) managers to encourage volunteer implementation of best management practices and use of agronomic rates of fertilizer and irrigation for specific crops. The substitution of hazelnut groves for some previously common crops in the valley may eventually result in lower nitrate contributions to groundwater since, once established, hazelnut trees require less fertilization.

B. South Deschutes/North Klamath Groundwater Protection Project

Background

Nitrate levels in the shallow groundwater aquifer underlying the city of La Pine and surrounding area are increasing due to contamination from a high density of residential septic systems. This contamination has public health implications because groundwater is the sole source of drinking water for area residents.

The area's groundwater table is shallow, sometimes only three feet below surface, and the soils are very porous, meaning nitrate and other contaminants can easily travel through the soil to the groundwater. Compounding the risk in this area is the development pattern, which includes 14,000 properties, over 75% of which are two acres or less. With this high density and relatively little precipitation to dilute contaminants, along with the data that has been collected over time, it is becoming evident that too many septic systems are discharging to porous soil and, absent additional intervention strategies, nitrate contamination is likely to increase in the shallow, vulnerable aquifer that many people use as their only drinking water supply.

Studies of groundwater contamination, hydrology and the effects of nitrates were conducted in southern Deschutes County beginning in the late 1970s. The early well monitoring and analysis in the City of La Pine was performed in response to very high nitrate concentrations in drinking water. Nitrate concentrations in drinking water wells commonly exceeded the drinking water standard of 10 mg/L and were elevated as high as 42 mg/L. Other surveys and studies over the years all point to increasing groundwater contamination throughout the region. A survey of groundwater data in 1993 and mathematical modeling in 1995 by DEQ indicated elevated nitrate concentrations and concern for future aquifer-wide increases. The U.S. Geological Survey completed a La Pine National Demonstration Project and Mathematical Modeling survey in 2007. The demonstration project was designed to test innovative treatment technologies that would reduce nitrogen loading to groundwater from onsite systems. USGS produced a three-dimensional mathematical model to estimate fate and effects of nitrates in the shallow aquifer of a large area in southern Deschutes and northern Klamath Counties. These studies have generally reached the conclusion that the groundwater aquifer is vulnerable to increasing concentrations of nitrates and other contaminants associated with domestic sewage. The USGS study predicted nitrate concentrations increasing above the federally adopted drinking water standard throughout the area over time. The USGS published several reports and papers on research conducted during the demonstration project which can be found at the USGS website.

Area-wide assessment and concern

This situation in La Pine is both evidence of the vulnerability of the local groundwater aquifer and a cause for concern for much of southern Deschutes and northern Klamath Counties since the soil and groundwater conditions in La Pine are similar to those elsewhere in the region.

Groundwater assessments of the unincorporated residential areas of Southern Deschutes and Northern Klamath Counties in the 1990s found nitrate concentrations in drinking water wells that approached unsafe levels (10 mg/L) in several of the oldest and most densely developed areas. In 2023 and 2024, samples were collected from around 100 wells in Southern Deschutes County and analyzed for over 200 chemicals. A report of this assessment is expected to be complete in 2025 and will be available on DEQ's Groundwater Protection web page.

Work toward solutions

Groundwater contamination in the downtown core of La Pine offers a good illustration of the challenges facing much of the region. Contamination in La Pine became so severe in the early 1980s that the city constructed a sewer system providing better treatment and land disposal of wastewater to reduce nitrogen concentrations in drinking water supplies. The operation of this sewer system resulted in markedly improved groundwater quality in town. Monitoring wells for the wastewater treatment plant have demonstrated steadily improving groundwater conditions in this area following improved treatment and disposal.

Outside of that core La Pine area, DEQ and Deschutes County have been working cooperatively for more than two decades to find an appropriate solution to this growing concern,

without much success. In 2008, the county adopted ordinances effectively requiring alternative treatment technology (ATT) onsite systems that would reduce nitrate concentrations in wastewater. These ordinances were repealed by the county in 2011 as the result of a successful citizens' referendum in 2009 to overturn the ordinances. In October 2009, Deschutes County Commissioners requested DEQ take over the effort to find appropriate solutions to the increasing groundwater contamination caused by wide use of onsite wastewater treatment and disposal.

DEQ then engaged a steering committee comprised of Deschutes County citizens to consider local circumstances and make recommendations for a long-term solution. DEQ received the recommendations from the committee in summer 2013. The lynchpin of the recommendations was for the state to pursue a Goal 11 exception to allow wastewater infrastructure outside of the urban growth boundary, a move the committee felt was necessary to protect public health. The state agreed and pursued the exception, but legal intervention from local community groups derailed this effort.

The effort underscores the difficulty of agreeing on and ultimately executing long-term efforts to protect groundwater and public health. State land use laws, county plats that precede state planning goals, environmental justice issues, complexities of the problem, funding shortfalls, a lack of state resources, jurisdictional gaps in groundwater regulation, and legal pitfalls all make these particular groundwater issues difficult to address. DEQ is continuing to work with the County Commissioners and local partners to make improvements when and where possible. More information about the South Deschutes/North Klamath Groundwater Protection Project and the report can be found on the Deschutes County website.

C. Drinking Water Source Protection

Drinking water protection is implemented in Oregon through a partnership between DEQ and OHA. The program addresses over 2,500 public water systems serving approximately 75% of Oregonians. Under an interagency agreement with OHA and with funding from the Safe Drinking Water Act, DEQ is responsible for source water protection which includes minimizing the risk to the source water before it reaches the surface water intake or groundwater well for a public drinking water system.

DEQ's program activities in 2023 and 2024 that address groundwater sources include the following:

- Provided technical assistance to public water systems, local partners, and their communities to improve or protect drinking water quality while focusing resources and outreach to address needs of disadvantaged and environmental justice communities. As of June 30, 2024, a total of 202 community water systems using groundwater (29.5% of Oregon's community water systems) have "substantially implemented" a strategy to protect their drinking water. These water systems serve approximately 356,000

Oregonians and account for 59% of the community water system population served by groundwater.

- Developed and implemented a Small Systems Outreach Project designed to build the capacity of small (serving fewer than 500 people) public water system operators and reliant communities to protect their groundwater sources of drinking water through education, technical assistance, and relationship building. Contacted 223 small systems that are manufactured home communities through emails, phone calls, and site visits. This effort has resulted in 56 manufactured home communities taking initial or substantial steps toward implantation of source water protection initiatives and groundwater protection
- Updated the statewide "Groundwater Resource Guide" which expands on updated Source Water Assessment content and provides additional information and tools to determine local priorities and strategies for protecting source water areas.
- Prepared data on drinking water sources and water quality issues for 15 Agricultural Water Quality Management Plans to highlight this information for ODA.

D. Nonpoint Source Coordination

While DEQ and other agencies have direct oversight of point sources which typically require either individual permits or are regulated under a general permit, DEQ and other state and local agencies rely on a combination of regulatory, voluntary and funding programs to evaluate, define, and control impacts from non-point sources which rely more on best management practices, technical assistance, funding and dissemination of research, public education and outreach and prevent impacts to water quality. Goals for the program are outlined in the 2022 **nonpoint source management plan.**

DEQ's watershed and nonpoint source programs interact with watershed councils, soil and water conservation districts, and other community organizations to address area-wide sources of contamination to surface water bodies such as erosion, nutrient runoff from agricultural fields, and temperature issues. Nonpoint sources which impact both surface and groundwater quality often include agriculture-related activities. DEQ provides information used in the prioritization of ODA agricultural water quality management areas and provides input to the biennial review of agricultural management area plans and rules. In the future biennium, DEQ will improve coordination of these programs to increase efficiencies in technical and grant assistance to work on both groundwater and surface water improvement.

Much of DEQ's groundwater nonpoint source program takes place in the Groundwater Management Areas, but DEQ staff also provide technical assistance, educational materials and training, and grant funding through communities and local partners to:

- Implement management practices for rural landowners, septic systems, forestry, agriculture, and stormwater that are likely to be protective of drinking water quality.
- Assist local communities with questions about pesticide applications
- Provide recommendations for ODA's Agricultural Water Quality Management Plans
- Coordinate with Oregon USDA Natural Resource Conservation Service on National Water Quality Initiative projects addressing agricultural lands within watersheds used for drinking

water.

E. Pesticide Stewardship Partnership

Pesticide detections have been found in several areas of Oregon but are not generally widespread. Many pesticides are known to be hazardous to human health and/or aquatic organisms and many others do not yet have water quality standards. ODA, DEQ and other state agencies have formed a partnership to proactively reduce pesticide use and promote proper pesticide disposal to limit the volume of pesticides available to enter surface waters and groundwater. Developed as an alternative to regulatory programs for protecting water quality from pesticide impacts, the Pesticide Stewardship Partnership encourages pesticide users to adopt best management practices in applying, storing, and disposing of pesticides and provides free opportunities for local community members to safely discard unused or waste pesticide products. Since 2015, over 325,203 pounds of pesticides have been collected from pesticide collection events, in coordination with Pesticide Stewardship Partnership projects and other collaborative water quality improvement programs.

F. Other Groundwater-Related Regulatory Programs

Although not part of the Groundwater Protection Act for nonpoint sources, DEQ administers several programs that contribute to groundwater protection through registering, permitting, licensing, inspecting, and enforcement activities. A few of the programs are highlighted here.

Underground Injection Control

The Underground Injection Control program is a federal program governed by federal Safe Drinking Water Act requirements and additional provisions under state law. This program is responsible for regulating the construction, operation, permitting, and closure of injection wells that place fluids underground for storage or disposal. An underground injection control system places fluids (mainly stormwater, but also low temperature geothermal return water, fluids intended to remediate petroleum contaminated soil and groundwater, and other fluids) below the ground. The most common systems in Oregon are stormwater drywells, which are usually found at large parking lot surfaces, and along roadways.

In recent years, with an increasing number of applications for aquifer storage and recovery or artificial groundwater recharge, the UIC program has been involved in reviewing applications and the potential for groundwater degradation from these discharges. More about this program is discussed in Section 5 – Emerging Issues. There are over 46,000 registered UICs throughout Oregon.

Onsite Septic Systems

DEQ’s onsite wastewater treatment system program administers and oversees the permitting of hundreds of thousands of septic systems throughout Oregon. About one-third of all Oregonians

rely on septic systems to treat residential wastewater. DEQ delegates authority for regulation of residential and smaller commercial onsite septic systems to 31 contract counties and retains administration of the program in five counties. In addition, DEQ is responsible for developing and issuing Water Pollution Control Facility permits statewide that are required for large or high waste strength systems. This program helps protect groundwater resources by requiring systems to be designed and installed according to state regulations that include prescriptive siting and performance standards. In some areas of the state, Alternative Treatment Technology (ATT) systems are required due to limited space, shallow water tables, or sensitive water systems. Limited funding for repair and replacement of failing systems has been provided by various grants and loans with new funding available through the Infrastructure Investment and Jobs Act of 2021.

Wastewater permitting

Many domestic, municipal and industrial wastewater and stormwater facilities discharge wastewater to land using lagoons, land application, or other systems. Municipal and domestic facilities generally collect and treat sewage from residences and commercial facilities, while industrial facilities treat manufacturing and processing wastewater they generate. DEQ protects groundwater resources through both National Pollutant Discharge Elimination System and state Water Pollution Control Facility permits. DEQ's wastewater permitting program issues permits, performs inspections, and assures compliance for wastewater treatment facilities. There are 498 individual domestic and industrial permits, and 1,056 facilities registered under a general permit as of November 2024.

Water reuse

The reuse program prescribes treatment and monitoring requirements for the beneficial use of wastewater. DEQ currently administers 296 industrial water reuse permits, 142 municipal water reuse programs and 70 private residential graywater permits. Recycled water and industrial process water reuse plans are incorporated into wastewater discharge permits issued by DEQ.

Biosolids management

Seventy-six percent of the solids derived from domestic wastewater treatment facilities in Oregon are used to produce biosolids and applied to agricultural fields as a soil amendment. The biosolids program encourages the beneficial use of properly treated wastewater solids while protecting public health and the environment. Land application of biosolids is regulated through biosolids management plans that are reviewed and approved by DEQ, and through detailed site authorization letters issued by DEQ. There are over 1,100 sites in Oregon authorized to receive biosolids.

Cleanup

The agency's cleanup program investigates and cleans up historical releases of hazardous substances at sites throughout Oregon. Many of these sites have historically contributed to

groundwater contamination. Cleaning these sites protects the current and future beneficial use of groundwater and prevents further release of chemicals or pollutants that would affect those uses. Some key cleanup program projects designed to protect groundwater resources in Oregon include leaking underground storage tank and Solid Waste Orphan Site Account prioritization of sites, a groundwater vulnerability model to help Site Assessment in determining leaching in areas of concern and working with the Oregon Military Department on their properties to help with a determination of potential PFAS impacts.

Underground storage tanks

The underground storage tank program helps protect groundwater by managing issues related to petroleum and home heating oil tanks. The program regulates tank registration, permits registered tanks, licenses service providers and investigates and remediates petroleum leaks. Oregon has decommissioned more than 27,100 tanks with about 5,350 operating under permits. Over 6,970 regulated tank sites contaminated with petroleum have been cleaned up.

Solid waste

DEQ's solid waste program permits several different types of solid waste disposal facilities including 26 active municipal solid waste landfills, 15 active industrial solid waste landfills, and 50 active compost operations. Requiring liners and adherence to other standards to control liquids leaching from these facilities helps protect groundwater resources. In total, DEQ currently permits over 250 solid waste disposal facilities, which includes solid waste transfer stations, closed solid waste landfills that are no longer accepting waste, and facilities that treat solid waste.

Hazardous waste

The hazardous waste program regulates and permits the generation, storage, transportation, treatment and disposal of hazardous waste. In 2023, three were 8 permitted facilities 498 regulated generators of hazardous waste in Oregon. The program strives to prevent toxic and hazardous waste from contaminating Oregon's rivers and groundwater by promoting safe management practices and chemical alternatives through technical assistance, education, outreach, compliance and enforcement initiatives.

4. Groundwater Protection Funding

The Groundwater Protection Act of 1989 (ORS 468B.169) authorizes a grant fund and methods for distribution of those funds, however funds have never been appropriated to DEQ for these purposes. Groundwater research, best management practice implementation, public education, and drinking water protection projects have instead been funded in an inconsistent and sometimes ad-hoc manner by a variety of other grant programs implemented by various state agencies.

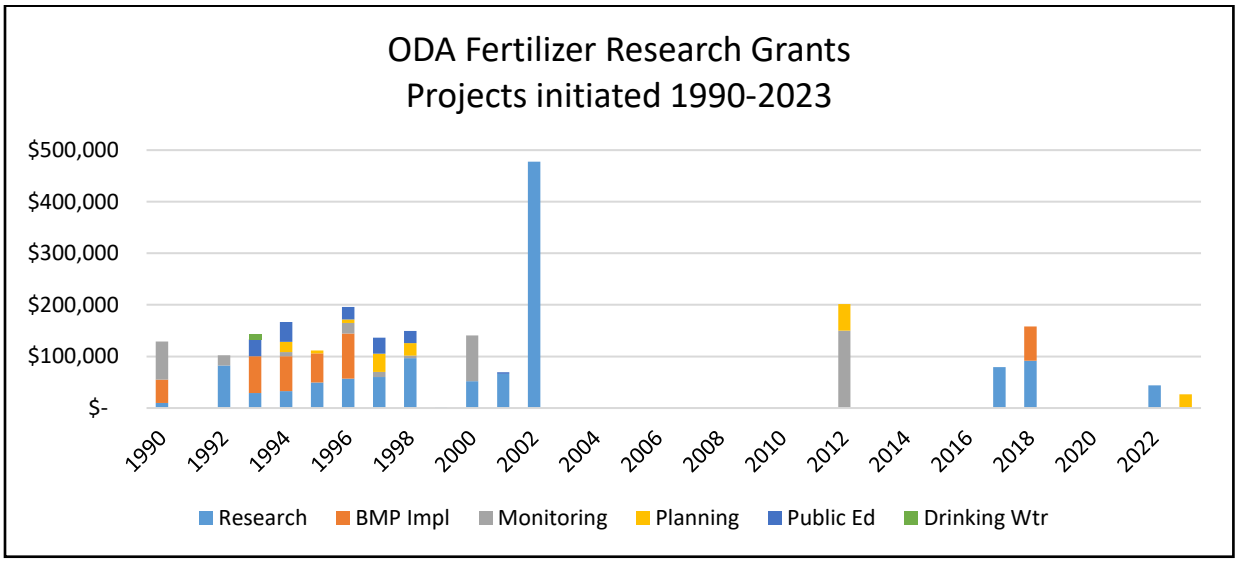
Several of the early grant programs were large funders of groundwater protection projects in the 1990s and early 2000s but funding for groundwater projects has waned in recent decades. Some new grant programs such as the ODA Agricultural Water Quality Support Grants and the WRD Feasibility Study Grants and WRD Water Project Grants and Loans have been initiated since 2000 that fund surface and groundwater protection actions. A majority of this funding, however, has been dedicated to protection of surface water sources and not groundwater.

ODA, OHA, OWRD and OWEB and DEQ have funding sources that can be used to provide grants or loans for projects that at least partially address groundwater quality protection. Appendix 3 summarizes some recent representative groundwater quality related protection projects funded by ODA, and OHA, OWRD, OWEB and DEQ grants and loans.

A. Fertilizer Research and Development Grants - ODA

This Oregon Department of Agriculture grant program is funded through fertilizer product registration fees for fertilizer distributed into or in Oregon and was initiated in 1990 to fund groundwater quality research associated with the interaction of pesticides or fertilizer and groundwater. In previous biennia, the grant fund was used for research projects in the first two declared groundwater management areas (Northern Malheur County and Lower Umatilla Basin) in the state. Revisions to the fertilizer law in 2001 expanded use of the fund to include research related to the interaction of fertilizer, agricultural mineral or agricultural amendment products and groundwater or surface water and split into a distinct program separate from the Pesticide Program. In addition, a committee was established to advise ODA research grant funding. A chart of Fertilizer Research Grant Funded projects in Figure 12 shows the reduction of projects funded by this program in recent years. More information on this grant is available on the ODA website.

Figure 12. ODA Fertilizer Research Grants 1990-2023



B. Agricultural Water Quality Support Grant - ODA

These grants are intended to provide capacity to support voluntary agricultural water quality work in small watersheds and to meet the goals of the Agricultural Water Quality Management Area Plans and SIA Initiatives. This includes funding for watershed assessments, technical assistance, outreach and engagement, monitoring, and collaboration. Soil and Water Conservation Districts and Watershed Councils can receive support from these grants. At present, the only SIA in Oregon working specifically toward groundwater quality improvement is in Umatilla County. The Morrow County SWCD received an AgWQ support grant this biennium for $21,333 to conduct a crop and sprinkler system inventory specifically related to groundwater quality.

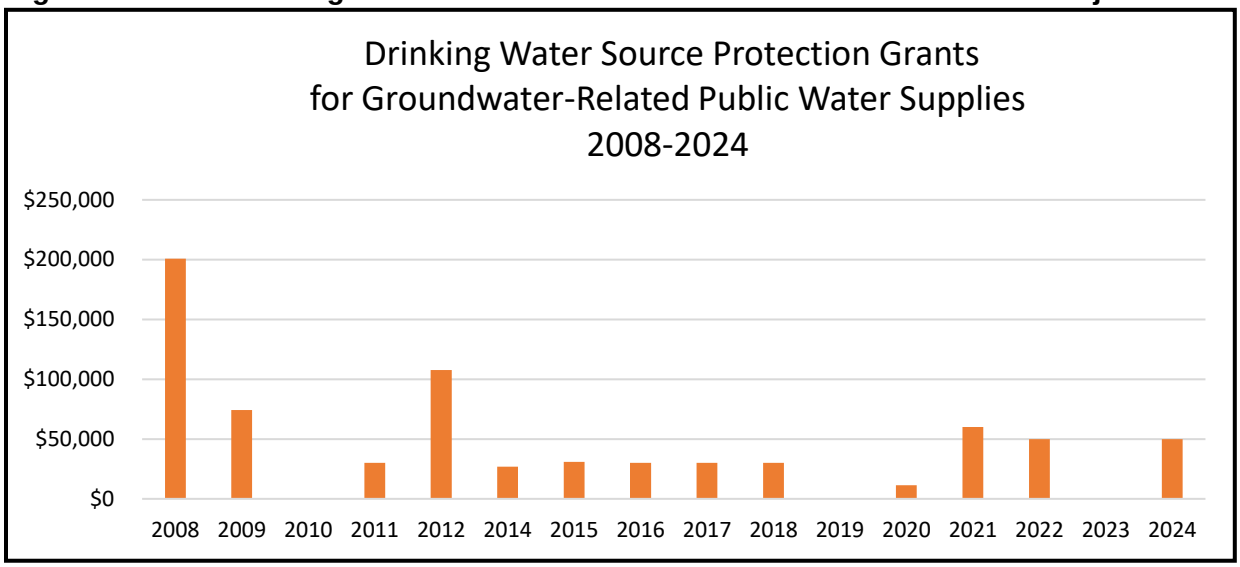
C. Pesticide Stewardship Partnership grants - ODA

The PSP grants create capacity for local partners to implement the PSP in their basin. This includes monitoring, technical assistance, education, outreach and behavior change projects. While this grant program is for surface water related projects, groundwater quality will benefit from better pesticide management.

D. Drinking Water Source Protection funding - OHA

DEQ and OHA's Source Water Protection program is funded by the Local Assistance and Other State Programs set-aside in the Drinking Water State Revolving Fund. This fund supports drinking water source protection grants and loans available for public water system projects directed at activities such as drinking water source area delineations, enhanced potential contaminant source inventory and/or evaluation, drinking water source protection planning, implementation of protection strategies, and implementing security strategies for highly sensitive aquifer/watershed areas near drinking water intakes and/or wells. Through an interagency agreement, OHA also funds positions at DEQ to provide direct technical assistance to public water systems across the state. DEQ reviews and assists with scoring of project applications. From 2021 through 2024, groundwater protection projects included source water protection planning, delineation updates, public education, oil storage tank removal, nitrate reduction efforts, septic and private well decommissioning, and fencing of highly sensitive aquifer areas. Figure 13 illustrates the funding provided for groundwater protection projects from 2008-2024.

Figure 13. OHA Drinking Water Source Protection Grants for Groundwater Projects



Note: Dates indicate project initiation date. Some projects extended for multiple years.

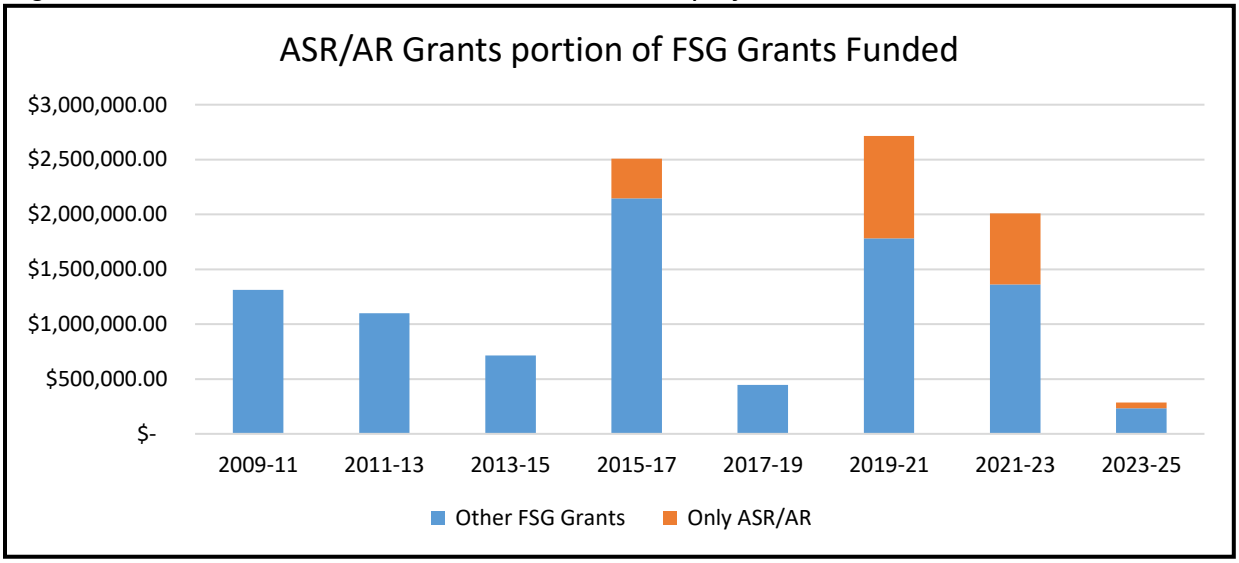
E. Feasibility Study Grants - OWRD

These grants, provided under the Water Conservation, Reuse, and Storage Grant Program established by Senate Bill 1069 in 2008, support studies to evaluate the feasibility of water conservation, reuse, and storage projects.

Since 2015, $6,320,290 in FSG grants have been funded for feasibility projects involving water storage, beneficial reuse of treated wastewater, irrigation canal conservation and ASR/AR. Of those grants, $1,993,549 (32%) went to 14 ASR/AR feasibility studies. Figure 14 illustrates the recent increase in OWRD FSG Grants awarded for ASR/AR projects. More information on these grants is available on the WRD Funding Opportunities Web page.

ASR/AR projects are primarily designed to either recharge an aquifer with declining water levels or to temporarily store water (typically in winter) for later use (typically in summer). These projects do not have a primary purpose of groundwater quality protection.

Figure **14**. OWRD FSG Grants awarded for ASR/AR projects 2009-2024



F. Water Project Grants and Loans and Irrigation Modernization - OWRD

In 2013, the Oregon Legislature passed Senate Bill 839, establishing the Water Project Grants and Loans funding opportunity. The purpose of WPGL is to provide funding to implement water supply projects which meet instream and out-of-stream needs and achieve economic, environmental, and social/cultural public benefits. In 2023, House Bill 5030 provided $50 million for irrigation modernization projects including canal improvements and piping projects. These projects are primarily related to water conservation and/or augmentation of stream flows although projects which reduce irrigation canal seepage and convert irrigation systems from flood to sprinkler can benefit groundwater quality. OWRD has awarded over $95 million in grants through this program, including the irrigation modernization funding, since inception. More information about projects is available on the WRD Funding Opportunities Web page.

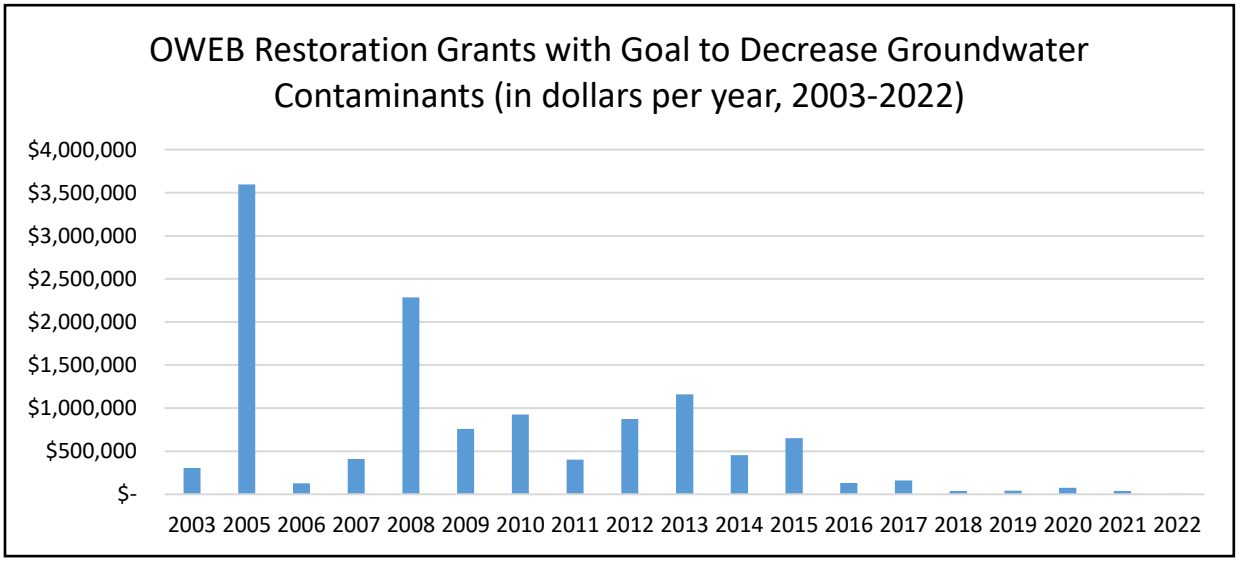
G. Oregon Watershed Enhancement Board

The Governor's Watershed Enhancement Board was established in 1987 by the legislature and evolved over the years into the Oregon Watershed Enhancement Board. OWEB's mission is to protect and restore healthy watersheds and natural habitats that support thriving communities and strong economies. OWEB's Strategic Plan priorities align with many groundwater protection priorities. More information is available on the OWEB Grant Programs web page.

Since its inception OWEB has funded over $1 billion in grants to more than 20,000 water restoration projects (data from OWRI Excel database). Funding for the 2023-2025 biennium included $52.5M general fund, $9.3M lottery funds, $29.9M other funds, and $48.3M federal funds.

Out of over $1 billion in grants, a total of $13.2 million (1.3%) of OWEB funds were allocated to 218 restoration projects with at least one goal identified as Goal ID #45, to “decrease groundwater contaminants”. These projects primarily included best management practice implementation such as flood to sprinkler irrigation transitions, canal piping, and manure management. Others included weed eradication and upland fencing. Figure 15 illustrates OWEB grants for groundwater projects by year are provided below.

Figure 15. OWEB restoration grants for groundwater projects 2003-2022

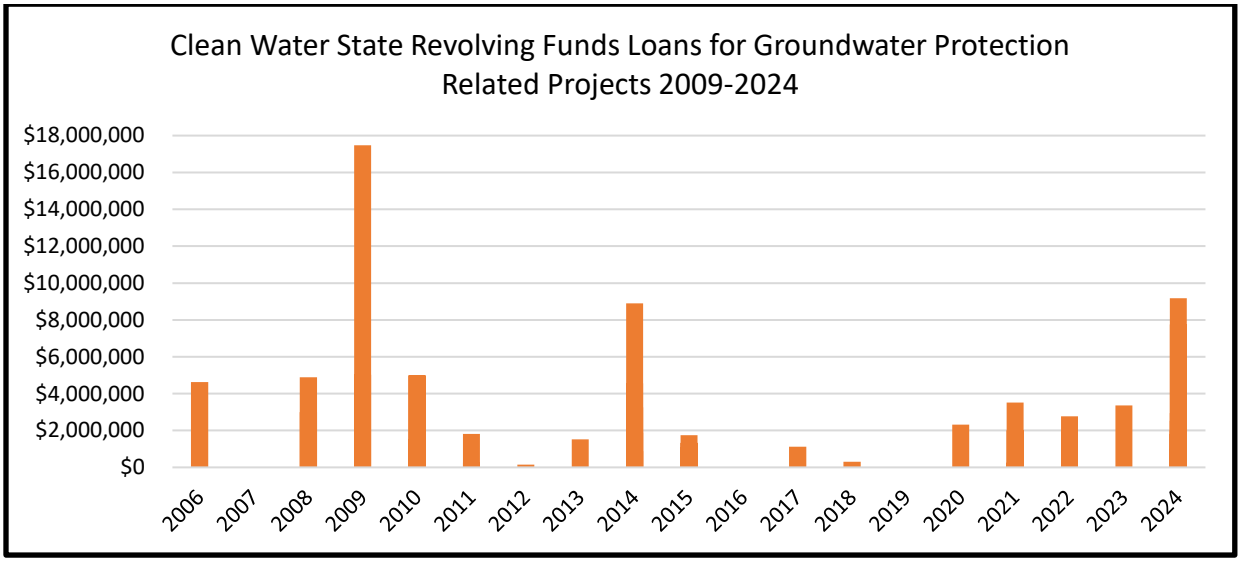


H. Clean Water State Revolving Fund - DEQ

The loan program offers below-market rate loans and bond purchases to public agencies for planning, design, construction and implementation of water quality improvement projects including wastewater collection, treatment, water reuse and disposal systems, nonpoint source water pollution control projects, and development and implementation of management plans for federally designated estuaries in Oregon. Since 2010, DEQ has provided over $61 million in low-interest loans to public agencies through the fund for groundwater protection projects such as replacing failing onsite disposal systems with sanitary sewer collection systems and replacing stormwater dry wells with green infrastructure facilities. Additional program information is available on DEQ’s Clean Water State Revolving Fund web page.

The most recent projects, including those with improvements or impacts to groundwater, are included in the Intended Use Plan, which is regularly updated during the state fiscal year, and includes all projects for which applications have been received and the amount of loan funds available to the program. Figure 16 graphs CWSRF funding over the years 2006-2024.

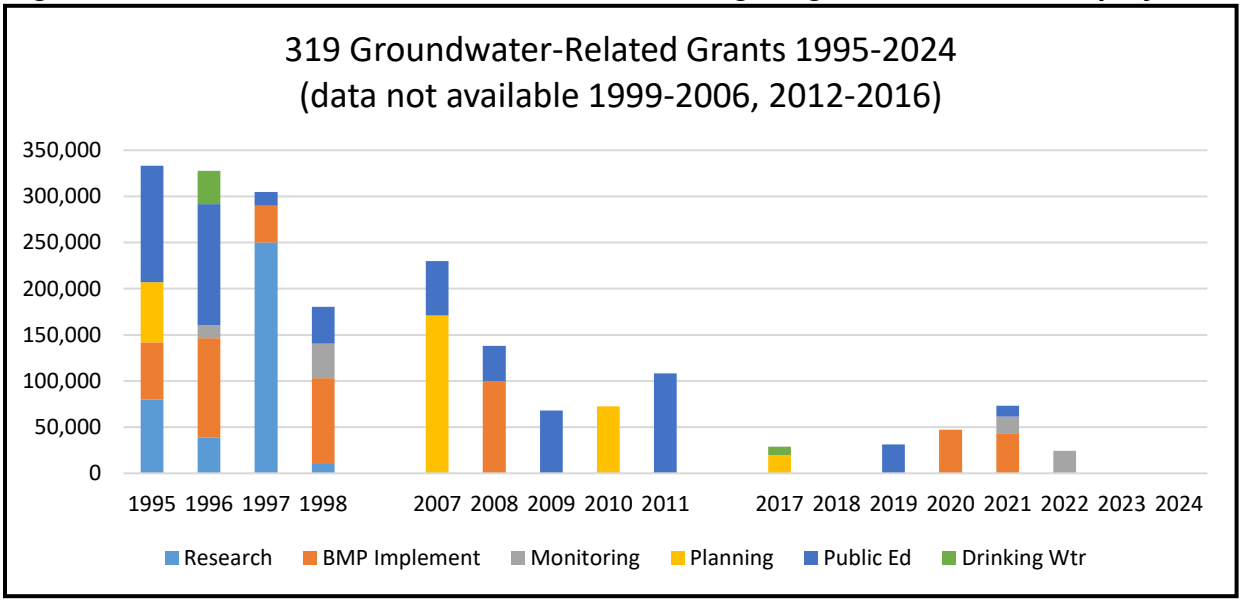
Figure 16. CWSRF funding for groundwater-related projects 2006-2024



I. Clean Water Act Section 319 Grants - DEQ

DEQ's 319 grant program supports community-driven planning and implementation projects that address water quality problems in surface and groundwater resources resulting from nonpoint source pollution. The program is wholly funded by EPA pass-through funds appropriated under Section 319 of the Clean Water Act. Additional program information is available from the 319 program website. Figure 17 shows a large drop off in funding of groundwater projects from the 319 grant program in recent years. There have been substantial reductions in 319 grant funding due to a 2015 finding that the State of Oregon's Coastal Nonpoint Control Plan must be disapproved, resulting in a 30% reduction to the CWA section 319 allocations to Oregon. DEQ and other involved state natural resource agencies are actively working with EPA/NOAA towards a fully approved plan. Once approved, those federal funds will be restored and available for a breadth of eligible funding activities, including groundwater protection related efforts.

Figure 17. Clean Water Act Section 319 Grant funding for groundwater-related projects



5. Emerging Issues

While the tasks assigned to DEQ and partner agencies in 1989 under the Groundwater Protection Act are still important and far from completed, new pressures related to drought, fires, and climate change have led the agency in recent years to stretch its groundwater protection resource to attend to the following issues.

A. Advancing Environmental Justice

Work to incorporate environmental justice, or EJ, principles and address environmental injustices in Oregon is ongoing. DEQ is in the process of developing an agency-wide framework that defines best practices to implement environmental and public health laws and regulations consistently and efficiently across DEQ programs. DEQ staff and leadership participate in DEQ's three EJ work groups that focus on technical, policy, and education and outreach work.

As Oregon moves forward with the development of an Oregon-specific EJ mapping tool (per Oregon House Bill 4077), many programs at DEQ are developing and providing data. House Bill 4077 expanded the definition of EJ and also created a mandate to develop methodology, aggregate relevant spatial data, and create an EJ mapping tool focused on Oregon.

As we grow our knowledge base about EJ policy and disadvantaged communities we are striving to identify and prioritize EJ communities for outreach and technical assistance. For example, DEQ and OHA have developed initial screening tools for EJ communities that incorporate state and federal guidance principles. DEQ's CWSRF and 319 Nonpoint Source programs have developed environmental justice metrics and affordability criteria. DEQ staff

prioritize underserved communities for technical assistance by incorporating EJ screening tools to identify areas for engagement.

DEQ is committed to incorporating EJ best practices into its programs and decision-making to ensure all people in Oregon have equitable environmental and public health protections. More detail about this work can be found throughout this section.

B. Aquifer Storage and Recovery/Artificial Groundwater Recharge

DEQ works closely with WRD and OHA to review Aquifer Storage and Recovery/Artificial Groundwater Recharge, or ASR/AR, Limited License applications and consider potential impacts to groundwater quality from these water storage or water recharge proposals. OAR 690-350 sets out the ASR/AR rules and conditions managed by OWRD. OAR 340-040 sets out the groundwater quality protection rules and conditions managed by DEQ. OAR 333-061 defines the drinking water protection rules and conditions managed by OHA. A limited license application is always required for the testing phase of ASR/AR projects. This limited license application is valid for five years. A Water Pollution Control Facility permit for the injection may also be required, including accompanying hydrogeologic evaluation and a groundwater monitoring plan. Oregon has an anti-degradation policy for groundwater quality so the intention of the permitted injections would be to allow the process so long as groundwater quality is not impacted. These types of waters can contain chemical and microbial contaminants that could be detrimental to the receiving groundwater, posing significant risk of groundwater contamination. Therefore, it is important to carefully assess the quantity of water that can be replenished and all potential impacts to aquifer water quality.

C. Nutrient Reduction Strategy

In 2024, DEQ initiated a process to evaluate and identify gaps in DEQ programs and policies to address and prevent nutrient pollution in surface and groundwater. The resulting product will be a locally supported, multi-interest and science-based strategy that supports nutrient reduction goals in waterways and in groundwater and that DEQ will apply in its various programs dealing with water quality permitting, biosolid applications, and groundwater management areas. A parallel process will reach out to learn what concerns Oregonians have around nutrient issues such as harmful algae blooms (HABs), nitrate in drinking water, recreation, aesthetics, economics, etc. The process hopes to understand barriers and solutions to managing nutrients and keep them from degrading surface and groundwater resources.

D. PFAS in Groundwater

DEQ is working with the Oregon Health Authority and other federal, state, and local agency partners to develop a greater understanding about the implications of PFAS for Oregon as emerging chemicals of concern. The agencies are developing and sharing information with the

public about how these chemicals may pose risks to human health and the environment in Oregon.

DEQ is also currently developing a Strategic Plan for addressing PFAS which will outline how agency programs plan to work with facilities and the public and appropriate policy responses to protect public health and the environment from PFAS contamination.

Although PFAS can be found in air, water, tissue, sediments and soil, the primary current concern for human exposure to this class of chemicals in Oregon is from potential drinking water contamination primarily of groundwater sources. DEQ air, land and water programs, as well as the DEQ lab, are taking the following steps to address PFAS:

- Identifying sites that may use PFAS in their operations.
- Overseeing site testing and assessment of impacts.
- Using newly developed analytical methods for testing for PFAS in water.
- Initiating rule development to designate certain PFAS as hazardous substances in Oregon.
- Using Cleaner Air Oregon's data on requested toxic pollutant emissions reports from industries that included PFAS.
- Carefully evaluating the source and receiving waters in ASR and AR projects to ensure PFAS are not spread inadvertently.
- Coordinating with federal, state, and local agency partners.

E. Groundwater Protection Program Staffing

DEQ groundwater program funding and staffing resources have declined significantly since the establishment of the Groundwater Protection Act in 1989. DEQ program staffing levels, including laboratory staff, dedicated to groundwater protection ranged as high as 12 FTE in the early 1990’s but were reduced by more than half (to 5.0 FTE statewide) by 2005-07 and remained roughly at that level until 2023. Recently, two new positions were authorized by the 2023 Legislature and filled in 2024: a program coordinator and a soil scientist. Despite these enhancements, the program remains under-resourced to adequately address groundwater quality concerns across Oregon.

Activities demanding increased attention include but are not limited to: issuing and renewing protective wastewater discharge permits; conducting groundwater quality studies and evaluating statewide data trends; promoting and supporting grant opportunities for public education, outreach and research projects; implementing actions in GWMAs to ensure contamination issues are addressed; adequately leading GWMA Committees and engaging with other agencies and local communities, tribes, and interested parties to identify needed action where monitoring indicates concerning trends.

Appendix 1: Statewide Groundwater Monitoring Projects

Basin	Project Name	Groundwater Quality Rating[I]	Contaminants Of Concern [II]	Suspected Contaminant Sources	Date Last Monitored	Report Title
North Coast	Clatsop Plains, Tillamook	2	Arsenic, Lead, Manganese, VOCs, Bacteria	CAFOs, Septic/Municipal	1980-1998	North Coast Basin GW Report 2004
North Coast	N. Coast Groundwater Study	2	Nitrate, Arsenic, Lead, Manganese, Pesticides, Pharmaceuticals,	Natural, Agriculture, Septic	2015-2016	North Coast GW Monitoring Report 2018
Mid-Coast	Florence-Clear Lake Aquifer	1	None	-	1981	
South Coast	Harbor Bench	3	Nitrate, 1,2-DCP, Aldicarb	Agriculture	1991	
Deschutes	La Pine	4	Nitrate	Septic	1978-1999	Deschutes Basin GW Report 2006
Deschutes	La Pine	1 to 3	Nitrate	Septic	2000-2024	Deschutes Basin GW Monitoring Report - TBD
Deschutes	Prineville	3	Nitrate, Arsenic, Fluoride, Manganese, VOC, Benzene, Atrazine	Natural, Unknown, Septic, Agriculture	1990-1993	
Deschutes	Mosier	1	None	-	1987	
Deschutes	Rufus	4	Nitrate	Septic/Agriculture	1993, 1996	
Grande Ronde	City of Imbler	4	Nitrate	Varied	1986	
Grande Ronde	Upper Grande Ronde	1	Nitrate, VOC	Varied	1993	
Hood	Hood River	1	Nitrates	Varied, Septic	1993, 1995	
Klamath	Klamath Falls	3	Nitrate, Ammonia	Agriculture, Industry	1987-2001	Klamath Basin GW Report 2006
Klamath	Klamath Falls	2	Nitrate, Arsenic, Boron, Lead, Manganese, Pesticides, VOCs,	Natural, Agriculture, Industry	2019-2022	Klamath Basin GW Monitoring Report - TBD

Basin	Project Name	Groundwater Quality Rating[I]	Contaminants Found [II]	Suspected Contaminant Sources	Date Last Monitored	
Malheur	Harney County	4	Arsenic, Boron, Manganese, Pesticides, Bacteria	Natural, Agriculture	1994, 2004, 2018	Harney County GW Monitoring Report - 2021
Malheur	N. Malheur Co. GWMA[III]	4	Nitrate, Arsenic, Dacthal	Agriculture	1980s-2024	Northern Malheur County GWMA Trend Analysis - 2020
Powder	Haines	1 to 2	Nitrate, VOCs, Picloram	Septic, CAFO, Industrial, Roads	1989, 1998	
Mid-Rogue	Mid-Rogue Groundwater Study	1 to 3	Nitrate, Arsenic, Pesticides, VOCs	Natural, Agriculture, Septic	1992-2011	2011 Rogue Basin GW Investigation - 2012
Mid-Rogue	Mid-Rogue Groundwater Study	1 to 2	Nitrate, Arsenic, Manganese, Pesticides, Pharmaceuticals,	Natural, Agriculture, Septic	2015	Mid-Rogue Basin GW Monitoring Report - 2016
Umatilla	Lower Umatilla Basin GWMA	4	Nitrate, EDB, Atrazine, Dacthal, Dicamba, Picloram	Natural, Agriculture, Indus. Wastewater,	1980s-2024	Hydrogeology, Groundwater Chemistry, and Land Uses in the Lower Umatilla Basin Groundwater Management Area - 1995
Umatilla	Milton-Freewater	4	Bacteria	Septic, Agriculture	1988, 1999	Milton-Freewater GW Quality Study - 2000
Umatilla	Walla Walla Basin Groundwater Study	2	Nitrate, Lead, Pesticides, Perchlorate, Bacteria	Natural, Agriculture	2016	Walla Walla Basin GW Monitoring Report - 2020
Willamette	Milwaukie to Coburg	2	Nitrate, Pesticides, Dacthal, Atrazine, EDB, VOCs, PCE	Agriculture, Urban, Septic	1984-2003	Willamette Basin GW Report 2004
Mid-Willamette	Mid-Willamette Groundwater Study	2	Arsenic, Lead, Manganese, VOCs, Pesticides, Pharmaceuticals, Bacteria	Natural, Agriculture, Industry, Septic	2017	Mid-Willamette GW Monitoring Report TBD
S. Willamette	Southern Willamette Valley GWMA	2	Nitrate, Pesticides	Agriculture, CAFOs, Septic	1990-2024	Southern Willamette Valley GW Summary Report - 2004
Statewide	Department of Human Services Real Estate	Not rated	Nitrate, Arsenic, Bacteria	Various	Ongoing	

Notes:

I. Groundwater Quality Rating:

1 = Means less than 10% of wells had a contaminant level over the drinking water standard.

2 = Means 25% or more of wells had nitrate levels between 5 to 10 mg/L, or any well had an organic compound detected.

3 = Means 10% to 25% of wells had a contaminant level over the drinking water standard.

4 = Means more than 25% of wells had a contaminant level over the drinking water standard.

II. DEQ lab studies include large lists of analytes. Not all are listed here. Acronyms: 1,2 DCP = 1,2 dichloropropane; EDB = Ethylene dibromide; PCE = Perchloroethylene or tetrachloroethylene; PCP = Pentachlorophenol; VOC = Volatile organic compound.

Appendix 2: Oregon Groundwater Quality Protection Responsibilities

AGENCY	GROUNDWATER PROTECTION RESPONSIBILITIES
Department of Environmental Quality (DEQ)	Designs and conducts targeted groundwater quality investigations statewide.
	Maintains a groundwater quality database and data repository.
	Responds to area-wide groundwater contamination by working with agencies and local citizens to develop an action plan to address sources and adopt rules necessary to carry out the agency's duties under the action plan.
	Promotes public education and community involvement in groundwater protection programs and citizen monitoring.
	Establishes groundwater quality reference levels and concentration limits.
	Issues water quality and underground injection control WPCF permits that include groundwater protection requirements.
	Administers federal NPDES program and issues wastewater discharge permits that include groundwater protection requirements.
	Administers onsite sewage system program, contracting with some counties.
	Shares implementation of the drinking water source water assessment and protection program with OHA.
	Certifies drinking water protection plans for public water supply systems.
	Administers federal Underground Injection Control program.
	Administers a federally funded (Clean Water Act 319) nonpoint source grant program.
	Administers solid waste and hazardous waste management programs.
	Administers and implements federal Resource Conservation and Recovery Act program.
	Administers Underground Storage Tank program.
	Administers state environmental cleanup program.
	Administers Oregon Dry Cleaner program.

AGENCY	GROUNDWATER PROTECTION RESPONSIBILITIES
Water Resources Department (WRD)	Characterizes aquifers and groundwater availability.
	Approves water right applications for withdrawals of groundwater.
	Implements regulations regarding well construction and decommissioning.
	Maintains database of location and construction of wells.
	Coordinates reviews issues permits for aquifer storage and recovery projects.
Oregon Health Authority (OHA)	Administers public water system monitoring programs.
	Administers real estate transaction well-testing program.
	Administers and shares implementation of the drinking water source water assessment program with DEQ.
	Certifies delineation of drinking water protection areas.
	Provides technical assistance to public water systems on well construction issues.
Oregon Department of Agriculture (ODA)	Administers programs regulating farming practices to protect groundwater, drinking water source areas groundwater management areas, and areas of groundwater concern.
	Develops and implements water quality management plans for groundwater protection.
	Reviews and enforces nutrient management plans for groundwater protection through Confined Animal Feeding Operations (CAFO) regulations.
	Administers a fertilizer and groundwater research grant program funded by fee on fertilizer product distribution.
	Develops and implements a pesticide management program.
	Develops or assists in development of management plans for agricultural areas per ORS 468B.184.
	Organizes periodic waste pesticide collection events across Oregon

AGENCY	GROUNDWATER PROTECTION RESPONSIBILITIES
Oregon State University (OSU), Agricultural Extension Service and Experimental Stations	Assists with identification of areas vulnerable to groundwater contamination and conducts nitrate testing of local wells.
	Conducts research regarding soil and groundwater contamination and BMPs to prevent contamination.
Department of Land Conservation & Development (DLCD)	Reviews comprehensive plans for communities to ensure they are consistent with goal of the Groundwater Quality Protection Act (ORS 468B.155).
Oregon Department of Transportation (ODOT)	Ensures that the goals of the Groundwater Protection Act are incorporated in all aspects of highway and road design and construction.
Department of Geology and Mineral Industries (DOGAMI)	Ensures that the goals of the Groundwater Protection Act are incorporated.
	Regulates drilling and permitting of geothermal wells.

Appendix 3 - Funding for Groundwater Quality Protection Related Projects

DATE	PROJECT	AMOUNT	DESCRIPTION
Oregon Department of Agriculture – Fertilizer Research Grant 2017-2024 Note: Other ODA Grant funds available for groundwater protection projects include the Agricultural Water Quality Support Grants and Pesticide Stewardship Grants			
2017-2020	Portland State University	$52,261	Precision Agriculture in Grass Seed Production: The Right Bang for your Buck in Protecting Groundwater?
2017	Oregon State University	$27,236	Nutrient cycling in Oregon carrot seed production
2017	Oregon State University	$52,261	Optimizing grass seed production in the southern Willamette Valley
2018	Oregon State University	$91,555	Updating hazelnut nitrogen requirements for modern production practices
2018	Oregon State University	$66,773	Reducing nitrate losses in onion production systems through soil moisture optimization methods
2022	Oregon State University	$43,969	Evaluating the effects of soil type and fertilizer application rates on nitrate leaching potential in annual ryegrass
2023	Oregon State University	$42,881	Identifying novel amendments to mitigate fertilizer leaching from bark substrates in nursery production systems
2023	Oregon State University	$26,753	Engagement, data collection, and analysis for addressing nitrate contamination in the Lower Umatilla Basin
DEQ Federal Clean Water Act 319 Grants 2017-2024			
2017	Oregon Coast Community Forest Initiative	$9,000	DEQ funded Sustainable NW for groundwater/drinking water activities
2017-18	A Tiered Approach for Assessing Pesticide Use and GW Vulnerability for DWP in Oregon WS	$20,000	DEQ funded OSU Phase 1, 2, and 3 activities in the SWV GWMA.
2018	Harney County	N/A	Harney County Planning Grant

2019	OSU Extension	$31,173	Community GW Protection education to domestic well users promoting land management – SWV GWMA
2020	OSU Extension	N/A	Southern Willamette Valley GWMA nitrate testing planning grant
2020	Jackson Co. SWCD	47,275	Little Butte Creek, Lower Antelope Creek Flood to sprinkler irrigation conversion
2021	Jackson Co. SWCD	43,502	Little Butte Creek, Lower Antelope Creek Flood to sprinkler irrigation conversion
2021	Walla Walla Basin Watershed Council	11,990	Education & Outreach-Water Quality in Milton Freewater area primarily
2021	Walla Walla Basin Watershed Council	17,800	Inventory of springs, streams, isotope, tritium analysis, community outreach regarding water supply and conservation
2022	Malheur Co. SWCD	24,200	Water quality monitoring to assess pollutant loads in agricultural areas
OHA Drinking Water Source Protection Grants 2017-2024 (Local Assistance and Other State Programs Set-Aside funding from Drinking Water State Revolving Fund)			
2017	Rivergrove Water District	30,000	Septic system/private well education & risk reduction program. Develop source protection and contingency plan.
2018	Walterville Elementary	30,000	Remove old, corroding above-ground oil tank and underground piping. Replace with propane source.
2019	City of Lakeview	30,000	Prevent/remediate groundwater contamination from USTs by identifying current & historic locations and evaluating contamination potential. Public outreach/education.
2019	Bear Creek Mobile Home Park	35,000	Develop a drinking water protection plan, provide public education, best management practice information.
2020	Jackson Creek Water Association	11,300	Decommission an inadequately constructed well within 2-year time-of-travel zone.
2021	City of Scappoose	30,000	Update drinking water source areas using data collected over last 20 years & new wells. Allow for planning of industrial area.
2021	Springfield Utility Board	30,000	Fund stormwater retrofits within DWSA to remove pollutants by raising public awareness, encouraging business retrofits to prevent groundwater pollution.

2022	Chateau Mobile Home Park	50,000	Enhanced assessment, source protection planning & implementation.
2024	City of Boardman	50,000	Develop a drinking water protection plan.
Oregon Water Resources Department Feasibility Study Grants for Aquifer Storage and Recovery/Managed Aquifer Recharge projects 2021-2024			
2021	Grant SWCD	293,895	Upper John Day ASR Study
2021	City of Silverton	15,000	Silverton/Mt. Angel ASR Study
2021	Wasco Co. SWCD	185,000	Fifteenmile Watershed Managed Underground Storage Study Phase II
2023	City of Silverton	250,000	Silverton ASR Feasibility Study
2023	Oregon State University	249,686	Drywell-MAR using winter flow and non-contact wastewater at Westland Irrigation District
2023	City of North Plains	94,727	City of North Plains ASR Study
2024	Morrow & Gilliam SWCDs	52,500	Lower Willow Creek MAR Feasibility Study
Oregon Watershed Enhancement Board (OWEB) Restoration Grants with partial goal to decrease groundwater contaminants - 2020-2022 (data from OWRI database provided by OWEB) ***(***Appropriation of $5,000,000 was made in 2023 for land acquisition grants to provide protection for drinking water supplies whether from surface and groundwater sources. The program will accept its first applications in the Fall of 2024)			
2020	Hood River SWCD	23,858	Livestock manure management.

2020	Marion SWCD	15,747	Construction of a waste storage facility for livestock manure previously uncovered.
2020	Jefferson SWCD	25,514	Flood to sprinkler conversion.
2020	Benton SWCD	8,565	Livestock manure management. Mud management, heavy use area protection.
2021	Morrow SWCD	5,000	Off-channel watering sites developed.
2021	Morrow SWCD	12,700	Nutrient management from cull onion feed.
2021	Morrow SWCD	5,927	Small pasture stock watering system installed.
2021	Morrow SWCD	13,580	Development of spring sites due to poor water quality concerns.
2022	Morrow SWCD	4,353	Development of spring sites due to poor water quality concerns.
Clean Water State Revolving Fund Loans* 2020-2024 ****Note: Dollar amounts may have been adjusted since loan application or during lifetime of loan***			
2020	City of Madras	$2,313,231	Sewer improvements in three areas to be able to connect to sewer for failing septic and protect groundwater.
2021	City of Bend	$3,521,141	Bend Septic Solutions Phase 1. Design and construct gravity sewer laterals to allow 160 homes on septic systems to connect to public sewer, which will help protect groundwater.
2021	Lone Pine Irrigation District	$2,000,000	LPID Irrigation Modernization Project. This project will modernize district-owned canals and laterals to conserve water, improve operational efficiency, reduce electrical and energy costs, reduce O&M for farmers through decreased pumping

			and improve habitat in the Deschutes River basin.
2021	City of Umatilla	$260,500	City of Umatilla Wastewater Facility Plan Update. The city needs a new planning document that takes into account the residential, commercial, and industrial growth over the last 20 years and future growth. The plan will analyze water reuse options to mitigate groundwater demand.
2022	City of Madras	$791,334	Mountain View and Skyridge Sewer Extension Project. The City of Madras will construct a gravity sewer collection system in the existing Mountain View and SkyRidge Subdivision, enabling residents with failing septic systems septic systems to connect to sewer.
2022	North Unit Irrigation District	$200,000	North Unit Irrigation District: Lateral 43 and Juniper Butte Piping Project for 8.2 miles of leaky canal and serves over 9,800 acres of agricultural land. The project will improve water quality by removing canal seepage and minimizing and eliminating return flow from agricultural lands.
2022	City of Bend	$2,778,120	Admiral & King Jehu Sewer Project, part of the city's Septic to Sewer program. The project will allow a total of 48 properties to decommission septic systems and connect to the recently completed Southeast Sewer Interceptor.
2022	City of Falls City	$2,000,000	The city of Falls City Septic Tank Effluent Gravity/Septic Tank Effluent Pump wastewater system causes public health issues from wastewater effluent surfacing on the high school football field. The city will construct a new facultative lagoon.
2023	City of Bend	$3,367,315	This project is the next phase of the City's Septic to Sewer program. The project will allow a total of approximately 35 properties to decommission septic systems and connect to the recently completed Southeast Interceptor.
2024	City of Madras	$750,000	The City of Madras is extending approximately 2000 linear feet of public sewer main to enable residents on septic systems to connect to city sewer and mitigate failure of septic systems, which will help protect groundwater.

2024	City of Bend	$997,740	The project is part of the City of Bend's Septic to Sewer Conversion Program. The scope includes design and construction of approximately 975 feet of gravity sewer main to allow a total of 16 properties to decommission septic systems and connect to public sewer.
2024	City of Bend	$2,535,060	This project is part of the City of Bend's Septic to Sewer Conversion Program. The scope includes design and construction of approximately 2,575 feet of gravity sewer main to allow a total of 47 properties to decommission septic systems and connect to public sewer.
2024	City of Hermiston	$2,947,000	The City of Hermiston will install approximately 5,300 linear feet of gravity sewer main to bring public sewer main past several hundred acres of other properties within the City's Urban Growth Boundary on septic systems.
2024	City of Ione	$2,000,000	The project will replace outdated and failing septic drain fields with a new community-wide wastewater collection system and drain field.
2024	City of Umatilla	$9,177,805	The project will extend sewer to the Power City and Brownell communities of the City of Umatilla currently served by septic systems, of which 47 are either unpermitted, installed prior to 1969, or not on record.
2024	City of Stanfield	$130,000	The City's existing Wastewater Facility Plan is 20 years old and needs an update to address capacity and National Pollution Discharge Elimination System (NPDES) requirements. The new Wastewater Facilities Plan (WWFP) will address system capacity and protection of water quality and groundwater in the Umatilla River basin.
2024	Crescent Sanitary District	$100,000	Crescent Sanitary District will conduct a preliminary engineering report to replace the collection system for the community of Gilchrist. The existing system is failing due to age and root encroachment and likely leading to contamination of the Little Deschutes River, residential yards and subsurface aquifers.

2024	Terrebonne Sanitary District	$7,745,480	The unincorporated community of Terrebonne, Oregon does not have a municipal wastewater system. The aging onsite wastewater disposal systems and limited soil depth and permeability are resulting in a high rate of onsite system failures. The project includes the design and construction of a Septic Tank Effluent Pump collection system and connection with the City of Redmonds Wetlands Complex.