

Groundwater Basics For Drinking Water Protection

What is groundwater?

Groundwater can be found at various depths at any location on the Earth's surface. It is the water that fills the natural open spaces (e.g., fractures or pore spaces between grains) in soil and rocks underground in much the same way as water fills a sponge.

Groundwater begins as precipitation and soaks into the ground, where it is stored in underground geological water systems called aquifers. An aquifer is any geologic material (like sand and gravel or fractured bedrock) that is filled with water and will yield that water to a well. Groundwater can move sideways as well as up or down in response to gravity, differences in elevation, and differences in pressure. The movement is usually quite slow — frequently as little as a few feet per year — although it can move as much as several feet per day in more permeable zones. Groundwater does not occur as underground lakes or streams.

Potential sources of contamination

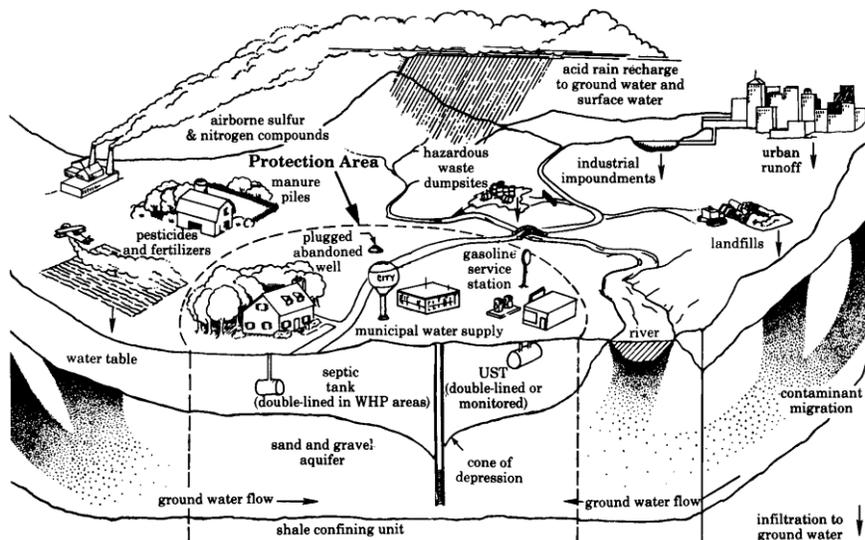
- Household chemicals and cleaning products
- Excess nitrogen fertilizers including manure and lawn fertilizers
- Industrial solvents and automotive fuels and chemicals
- Chemical spills from highway or railroad accidents, or spills from business or manufacturing sites
- Improperly applied pesticides or pesticide spills
- Above-ground storage tanks with petroleum products or chemicals
- Improperly installed or old domestic wells

- Poorly maintained septic systems
- Urban runoff
- Waste disposal sites or dumps

How groundwater gets contaminated

With increased use of chemicals in the 20th century, contamination of groundwater has become a growing concern. When rainwater comes in contact with any source of contamination at the surface or in the soil, it dissolves some of that contaminant and carries it to the aquifer. Groundwater moves from areas where the water table is high to where the water table is low. Consequently, a contaminant may enter the aquifer some distance upgradient or "upstream" of a public or private drinking water well and move toward the well. When a well is pumping, it lowers the water table in the immediate vicinity of the well, increasing the tendency for water to move toward the well

Although it is common to associate contamination with highly visible features such as landfills, gas stations, industry or agriculture, potential contaminants are widespread and often come from common everyday activities as well, such as septic systems, lawn and garden chemicals, pesticides applied to highway right-of-ways, fertilizers applied to managed forests, stormwater runoff, auto repair shops, beauty shops, dry cleaners, medical institutions and processing labs. It takes only a very small amount of some chemicals in drinking water to raise health concerns (e.g.: one gallon of pure trichloroethylene, a common solvent, will contaminate about 292 million gallons of water to the health-based limit for drinking water.)



State of Oregon
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Environmental
Quality

Water Quality Division Drinking Water Protection Program

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<http://www.deq.state.or.us/wq/dwp/dwp.htm>



Oregon Health Authority Drinking Water Program

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Contact: Tom Pattee
<http://www.healthoregon.org/dwp>

Alternative formats

Alternative formats of this document (Braille, large type) can be made available. Contact DEQ's Office of Communications & Outreach, Portland, at (503) 229-5317 or call toll-free in Oregon at 1-800-452-4011, x5317, for more information. Hearing-impaired persons may call 711.

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Who uses groundwater?

Of all groundwater used in Oregon, the majority is used for irrigation. Future population growth and land development is increasingly dependent on groundwater resources. Prior allocation and rising treatment costs limit future use. More than 70 percent of all Oregonians -- more than two million people -- are at least partially dependent on groundwater for their drinking water supplies. About 95 percent of Oregonians in rural areas depend on groundwater. In many areas, groundwater is the only source of drinking water. Protecting our water supply from contamination now will help maintain a clean and safe water supply for generations to come.

How to protect drinking water

In Oregon, the state Department of Environmental Quality and Oregon Health Authority have completed "source water assessments" for all public water systems. These assessments include identification of the source area supplying the well (commonly called the Drinking Water Source Area) and information on risks to the water within this area. Using assessment results, members of the local community, local businesses or the water system can develop strategies to reduce risks of contamination from those sources.

Some strategies for protection can be implemented right away; others may require forming a "Drinking Water Protection Team" to develop a plan for action. DEQ and OHA offer technical assistance in drinking water protection strategy development and implementation. Management options implemented to reduce risk are highly individualized and should be developed by the community to meet its specific needs. Cooperative decision-making by public officials, water systems, public interest groups, business, agriculture and individual citizens can create a powerful, long-lasting partnership that will facilitate implementation and public acceptance of drinking water protection.

Communities with groundwater systems interested in developing drinking water protection strategies or a plan can get assistance from Tom Pattee at OHA (541-726-2587) or Julie Harvey at DEQ (503-229-5664 or toll-free in Oregon at 1-800-452-4011, x5664).

Oregon drinking water protection success stories

Several Oregon water purveyors already have Drinking Water Protection Plans certified by DEQ, and many others have started drinking water protection activities in their communities. For example, between 1995 and 1998, members of local governments, the commercial/industrial

sector, agricultural growers and residents in **Coburg** and **Junction City** worked together to develop a plan that fit each city's local conditions and priorities. Nitrate (a common product of septic systems and agricultural practices) was identified in the local groundwater. This served as a "flag" to both communities that their water was also vulnerable to other potential sources of contamination. These cities are now in the process of implementing management efforts which include a highly successful citizen, agriculture and business involvement/outreach plan and a recognition program for growers and businesses that voluntarily apply practices that are in the best interest of drinking water protection and the community. Coburg is also minimizing the risk from failing individual septic systems by developing a community sewer system.

Several cities, including **Cave Junction**, **Springfield**, **Fairview**, **Gresham** and **Portland** have adopted ordinances which prohibit certain uses and/or provide performance standards for others within the groundwater drinking water source areas. These cities also have strong public education programs to provide residents, business owners and other land owners information on what they can do (or should not do) to protect the resource.

Other city officials use information obtained during the planning process to make informed choices for land use, decide the best location to site new wells, and focus pollution prevention efforts on areas mattering the most to the community's drinking water supply. Not only cities protect drinking water. **Rogue Lea Estates** and **Rainbow Park**, manufactured home parks in Josephine County and Lane County, respectively, have implemented drinking water protection plans addressing potential spills and high-density housing in their protection area.

Community members can become involved as well. Contact your public water system to find out about where your water comes from, its quality, and what is being done to protect it.



Things You Can Do To Protect Groundwater

One person can make a difference. By making small changes, we can make our environment better. We can also encourage our friends, relatives, co-workers, and neighbors to help prevent pollution. Some of the things you can do to protect groundwater in your community are listed below.

In Your Community	<ul style="list-style-type: none">  Learn more about where your water supply comes from, potential sources of contamination, and local and state water protection efforts.  Organize a groundwater forum, community water festival, water testing or other educational event.  Support groundwater education in local schools.  Volunteer to help develop and implement your community's Drinking Water Protection Strategies.  Encourage your community to become active in the "Groundwater Guardian" program, a national non-regulatory program that recognizes local groundwater protection efforts. Contact the Groundwater Foundation for information 1-800-858-4844 or visit: http://www.groundwater.org/gg/gg.html.
In The Home	<ul style="list-style-type: none">  Properly dispose of household hazardous wastes. Take toxic chemicals like weed killers, pesticides, paint, thinners, strippers, wood preservatives, furniture polish, cleaning chemicals, and bleach to a hazardous waste collection center. Do not dump toxic chemicals down the drain or on the ground. Call your local garbage hauler for more information. For household hazardous waste information, visit http://www.deq.state.or.us/lq/sw/hhw/index.htm.  Properly dispose of pharmaceuticals and personal care products including out-of-date and other leftover prescription and non-prescription medications. For options see OHA's website on Takeback Programs or DEQ's factsheet on Household Pharmaceutical Waste Disposal.  Find out if you have underground storage tanks (USTs) or aboveground storage tanks (ASTs) on your property. Residential USTs and ASTs typically are used to store heating oil. Rural properties and farms may have USTs or ASTs for gasoline, diesel, chemical, and waste oil storage. Active USTs and ASTs should be checked for leakage, which can increase with tank age. DEQ strongly recommends inactive USTs be properly removed or closed in place to prevent expensive leaks that endanger public health or damage the environment. Homeowners that replace or decommission a heating oil tank may be eligible for free technical assistance and grants from DEQ. Contact DEQ's Tank Helpline at 1-800-742-7878, or visit http://www.deq.state.or.us/lq/tanks/hot/homeowners.htm.  Conserve Water — Turn off the faucet when you are brushing your teeth, shaving, or washing your face and you will save 2–3 gallons of water each minute. Install low flow faucets and fix leaky faucets right away. Clean vegetables and fruits in a pan of water — not under a running faucet. Keep a container of drinking water in the refrigerator instead of letting the faucet run until the water is cold enough to drink. Run the dishwasher and washing machine only when fully loaded. Make every drop count!
In Your Garage/ Workshop	<ul style="list-style-type: none">  Recycle or properly dispose of used motor oil, grease and parts cleaners, and antifreeze. Solid and hazardous waste laws prohibit land spreading of waste oil for dust or weed suppression. Call your local garbage hauler for more information.  Check for leaking fluids from vehicles. Clean up drips with an absorbent like kitty litter or sawdust and properly dispose of contaminated absorbent. Do not use water to wash spills since water percolates into the ground or discharges to storm drains in the street (which typically lead to streams and rivers).  Inventory your hazardous household products like thinners, solvents, oil based paints, stains and finishes, paint and finish preparation products, photographic chemicals, and art supplies. Store only what you will use; properly dispose of waste materials; and give extras to a neighbor for their use. Use less toxic alternatives whenever possible.
In The Yard	<ul style="list-style-type: none">  Carefully follow label directions for use and disposal of fertilizers and pesticides and use less toxic alternatives whenever possible.  Select disease and pest resistant plants and learn about biological controls. Call your local County Extension Service Office for free information.  Go easy on fertilizers and pesticides. Test your soil to help determine fertilizer and compost needs for your lawn and garden to avoid over fertilization.  Water Wisely — Water during the cooler parts of the day (late evening and early morning). Water slowly and evenly with 1 to 1½ inches of water per week so that moisture soaks down to the roots. If it doesn't grow, don't water it! Use a broom (not a hose) to clean driveways, sidewalks, and other hard surfaces. Check for leaks in pipes, hoses, faucets, and couplings.

Things You Can Do to Protect Groundwater *(Continued)*

For Well & Septic System Owners	<ul style="list-style-type: none">  The Oregon Well Water Program website is an excellent resource for private well and septic system owners. http://wellwater.orst.edu/  Never store pesticides, fertilizers and other chemicals adjacent to your well to avoid direct well contamination.  Properly abandon old wells and never use them as disposal pits. For information on abandoning wells, or to order well records (logs), contact the Oregon Water Resources Department at 503-986-0900.  Ensure your well construction and surface seal is adequate to minimize the chance of chemicals wicking through the soil down the outside of the casing or entering the well directly. Find information on the OSU Extension Well Water Program website (http://wellwater.orst.edu/).  Regularly test your well water for nitrates, bacteria and other contaminants, as necessary.  Properly maintain your septic system by having the septic tank pumped out every two to three years.  Don't put improper materials down the household drains (such as garbage disposal food wastes, drain cleaners, household chemicals and other toxic-cleaning agents).
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Who to Call for Help

<p>For local assistance, check the government section of your phone directory for telephone numbers.</p> <ul style="list-style-type: none"> • Water Utility or Public Works Department • County Environmental Health Department • Waste Disposal and Recycling Facility (check your monthly garbage bill for name and number) • County Development or Planning Office • County Extension Service 	
Contact	What
Oregon Department of Environmental Quality (DEQ) 1-800-452-4011 or 503-229-5630 http://www.deq.state.or.us/	Drinking water protection planning, groundwater contamination, septic tanks, underground storage tanks, toxic wastes, pollution prevention, and hazardous waste reduction, collection and disposal.
Oregon Health Authority (OHA) 971-673-0405 or 541-726-2587 http://www.healthoregon.org/dwp	Public water system water quality testing results, groundwater issues, health effects, water quality concerns, drinking water testing laboratories, groundwater susceptibility and drinking water protection.
Oregon Water Resources Department (WRD) 503-986-0900 http://www.wrd.state.or.us/	Abandoned wells, well construction, well logs, well maintenance, water rights and water master.
Oregon State University Extension Service / Home*A*Syst The Oregon Well Water Program: http://wellwater.orst.edu/	Groundwater quality assessment for rural homeowners, farmers and private well owners, groundwater friendly gardening, and lawn care.
Oregon Department of Agriculture (ODA) 503-986-4700 http://oregon.gov/ODA/NRD/index.shtml	Technical assistance regarding agricultural practices, effect of soil type on groundwater vulnerability, pesticides, fertilizers, best management practices and permits.