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National Water-Quality Assessment Program

# Water Quality in the Columbia Plateau, Snake River Plain, and Hawaiian Basaltic-Rock and Basin-Fill Aquifers, 1992—2005

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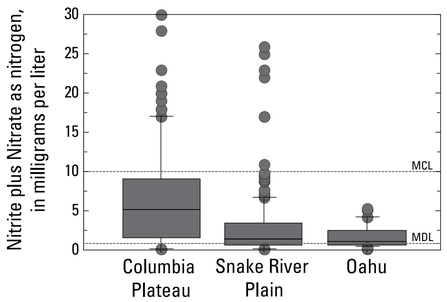
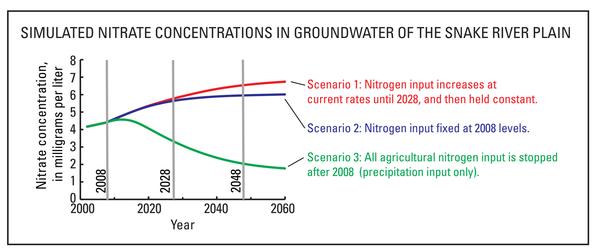
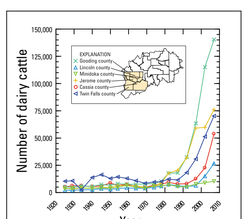



**Nitrate concentrations in Columbia Plateau water samples were about 5 times higher than in samples from Oahu.**

- Nitrate concentrations were above the 2012 drinking water standard (USEPA Maximum Contaminant Level, MCL) of 10 mg/L in water from 20 percent of wells sampled in the Columbia Plateau, and 4 percent of wells sampled in the Snake River Plain.
- Although nitrate concentrations are the highest in groundwater in the Columbia Plateau, they are stable or decreasing for the most part, because nitrogen application has declined since 1980.
- In contrast, nitrate concentrations in groundwater in the Snake River Plain have continued to rise, reflecting a near doubling of nitrogen input from nitrogen fertilizer and cattle manure between 1987 and 2007.
- Computer modeling forecasts that, if nitrogen inputs remain at current (2008) levels, nitrate concentrations in Snake River Plain groundwater will continue to increase for at least 50 years.

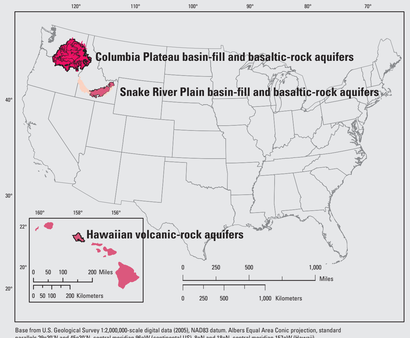


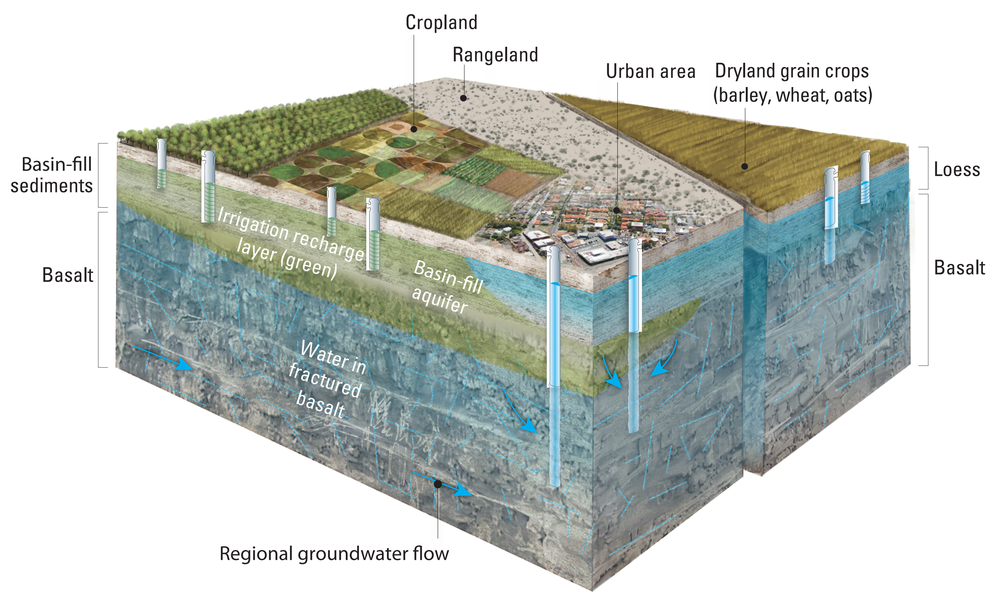

The number of dairy cattle in this region of the Snake River Plain has increased over 300,000 head between 1987 and 2007. This increase in nitrogen input is roughly equivalent to an increase of 4.6 million to 6.2 million humans.

Dairies (foreground) and agricultural fields (background) can be major sources of nitrate to groundwater in the Snake River Plain.

*The Columbia Plateau, Snake River Plain, and Hawaii are large volcanic areas in the western United States and mid-Pacific ocean that contain extensive regional aquifers of a hard, gray, volcanic rock called basalt. Residents of the Columbia Plateau, the Snake River Plain, and the island of Oahu, depend on groundwater as their primary source of drinking water. Although the depth to the water table can be several hundred feet, the groundwater is highly vulnerable to contamination because the permeable aquifer materials allow many contaminants to move readily down to the water table. Intense agricultural and urban activities occur above the drinking water supply and are increasing in some areas. Contaminants associated with such agricultural and urban activities have adversely affected groundwater quality.*




Base from U.S. Geological Survey 1:2,000,000-scale digital data (2005), NAD83 datum. Albers Equal Area Conic projection, standard parallels 29o30'N and 45o30'N, central meridian 96oW (continental US), 8oN and 18oN, central meridian 157oW (Hawaii).




**Chemicals that have been banned for over 30 years are still a potential human-health concern.**

- Several soil fumigants and the pesticide dieldrin were banned more than 30 years ago, yet were detected at concentrations exceeding human-health benchmarks in some groundwater samples.
- These chemicals are still detected because they do not readily break down in groundwater, and because several decades are required to flush the chemicals through the aquifers.
- Tracking changes in concentrations of legacy contaminants could require decades of groundwater monitoring.

Water treatment systems are required to remove soil fumigants from drinking water on Oahu (photo by Michael G. Rupert).

**One image of Oahu might be of a pristine tropical environment, but groundwater in many areas is contaminated with soil fumigants and solvents, in some cases at concentrations of concern for human health.**

- At least one fumigant or solvent was detected in water from more than one-half of the wells sampled on Oahu.
- These contaminants are present in groundwater on Oahu because of intensive application of fumigants to control insect pests in a tropical climate, and because of releases of solvents from military installations.
- Discovery of fumigant and solvent contamination on Oahu in the 1980s led to closures of public supply wells and installation of water treatment facilities.
- Wellhead protection programs can reduce groundwater contamination from anthropogenic sources, but the decades-long persistence of contaminants from former chemical releases and application can adversely affect drinking water resources many years after the source of contamination is removed.