

Quality of the Nation's Groundwater Plans and Products for the Next Decade

Every day, millions of gallons of groundwater are pumped to supply drinking water for about 142 million people. Understanding how our use of groundwater and the application of chemicals can alter the quality of this valuable resource can help develop groundwater protection strategies. Over the last two decades, about 6,600 wells were sampled by the U.S. Geological Survey National Water-Quality Assessment (NAWQA) program to document where contaminants occur, and to develop an understanding of the natural and human factors that affect the occurrence of contaminants in the Nation's groundwater (See USGS Circular 1360).

Over the next decade (2013-2023), the NAWQA program will evaluate the quality and availability of groundwater for drinking, improve our understanding of where and why water quality is degraded, and assess how groundwater quality could respond to changes in climate and land use. NAWQA plans to focus on the following questions:

What is the quality of water in deep aquifers that supply over two-thirds of the population that relies on groundwater for drinking water?

How long does it take water and contaminants in shallow parts of the Nation's principal aquifers to reach drinking-water sources?

Could contaminant concentrations in such sources reach levels that might challenge communities in different regions of the country?

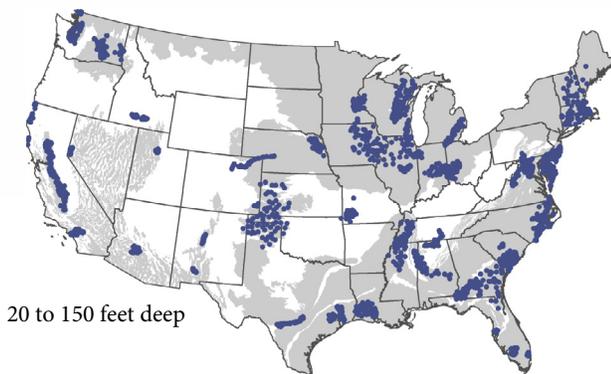
Groundwater-Quality Monitoring

About 2,500 shallow to intermediate depth wells will be resampled over the next decade to evaluate how groundwater quality is changing beneath urban and agricultural lands and in deeper domestic wells, and more importantly, how natural factors and human actions are influencing observed trends. About 1,500 deep public-supply wells will be sampled and analyzed for a large number of regulated and unregulated contaminants, selected emerging contaminants, geochemical indicators, and tracers of groundwater age.

Groundwater-Quality Monitoring (2013-2023)

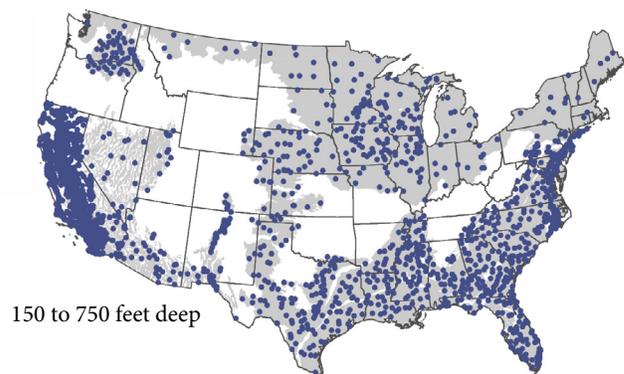
Shallow and Intermediate Depth Groundwater

2,500 wells to be sampled nationwide



Deeper Groundwater Used for Public Supply

1,500 wells to be sampled nationwide



* wells in California will be sampled by the USGS Groundwater Ambient Monitoring and Assessment Program in cooperation with the California Water Board

National Contaminant Maps

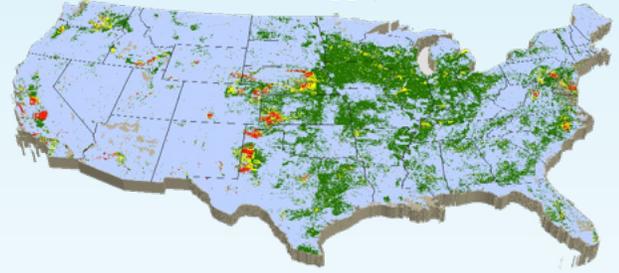
National scale maps of selected contaminants will be produced using statistical models to predict where a contaminant is likely to occur and at what concentration. These maps can be used by water resource managers to (1) anticipate water quality in unsampled areas or depth zones, (2) design targeted monitoring programs, (3) inform groundwater protection strategies, and (4) evaluate sustainability of groundwater sources of drinking water. These national contaminant maps will be developed for the shallow groundwater system used for domestic supply and for the deeper groundwater system used for public-supply. The NAWQA program is planning to produce national maps for the following contaminants:

Trace Elements (arsenic, uranium, boron),
Nutrients (nitrate, phosphorus), and
Nuisance constituents (iron, dissolved solids, manganese).

Nitrate
High 

Low 

Shallow to Intermediate Depth
Used for Domestic Supply



Deep Groundwater
Used for Public Supply



Groundwater Vulnerability to Contamination and Forecasting

Three-dimensional depictions of groundwater vulnerability to contamination will be developed for four priority aquifer systems: Glacial aquifer; Northern Atlantic Coastal Plain aquifer; Central Valley aquifer; and the Mississippi Embayment aquifer. Groundwater-flow information will be combined with contaminant inputs, groundwater-quality data, geochemical information, and age-dating information using statistical models to assess how quickly contaminants move from recharge areas to wells or streams and if they are likely to reach levels that threaten drinking-water supplies or aquatic ecosystems. This three-dimensional understanding can be used to forecast groundwater-quality conditions under different contaminant input and climate scenarios.



Trends in Groundwater Quality

Over the next decade, the NAWQA program will be resampling shallow to intermediate depth wells to get a better picture of where and how quickly groundwater is changing. An online tool is being developed to show how groundwater-quality conditions are changing across the Nation.

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