

USGS National Water Quality Data and Maps on the Web

Sandy (Alex K.) Williamson¹ and Nate Booth²

¹USGS, National Database Team Leader, Tacoma, WA, akwill@usgs.gov, 253-428-3600x2683

²USGS, Database Developer, Madison, WI, nlbooth@usgs.gov, 608-821-3822

Biographical Sketches of Authors

Since 1996, Sandy Williamson has been team leader of the National Water Quality Assessment database activities (water.usgs.gov/nawqa/data). From 1991-97, he led the Central Columbia Plateau NAWQA study unit team, who produced 25 publications with a combined distribution of nearly 100,000 (wa.water.usgs.gov/ccpt). He has worked for the USGS since 1976, previously in Austin, and Sacramento. He completed regional modeling on 2 Regional Aquifer System Analysis (RASA) studies, reported in 2 USGS Professional Papers, as well as dozens of other reports and journal articles. He has a M.S. in Civil Engineering-Water Resources from California State University, Sacramento (1981), and a B.S. in Applied Geomorphology from Western Washington State University (1976). His interests are in web-based presentations of scientific studies and data, effective use of statistics, systems analysis, and ground-water flow and quality. Since 1999, Nate Booth has worked as a principal information systems analyst within the Database Applications Unit of the USGS Wisconsin District Office. His main focus has been in designing, developing, and hosting the National Water Quality Assessment's data warehouse. Other project areas include USGS Environmental Vulnerability Portal, USGS Mobile Computing System, USGS Publications Data Warehouse, USFWS/USGS Wetlands Mapper, USGS National Map, State of Wisconsin Fish and Habitat Data System. He has worked for the USGS since 1997. He has a B.S. in Civil/Environmental Engineering from University of Wisconsin – Madison (1998). His interests are in applying data warehousing architecture and technology to meet today's environmental research needs.

Abstract

The U.S. Geological Survey's National Water-Quality Assessment (NAWQA) Program began collecting chemical, biological, and physical water-quality data from 51 large watersheds across the Nation in 1991. In 1999, USGS developed a data warehouse (DWH) for national and regional analysis of data, making most of it available to the public in 2000. Several mapping capabilities were added in 2001. The 2nd decade of NAWQA, in which 42 basins will be resampled, began in 2002. Graphing capabilities and more ecological data were added to the DWH in 2003. The DWH currently contains and links the following data:

- Chemical concentrations in water, sediment, and aquatic tissues
- Ecological data on stream habitat and community data on fish, algae and invertebrates
- Related quality control data
- Stream site, basin, well and surrounding area characteristics, including thousands of variables such as land use, soils, population density.
- Daily stream flow and temperature for several sites in each basin

These data were collected from about 6,100 stream sites and 7,000 wells selected to represent various land uses. About 52,000 water samples were analyzed for nutrients, 34,000 for pesticides, and 11,000 for volatile organic compounds. At about 2,000 sites, streambed sediment and aquatic tissue samples were analyzed for trace elements, pesticides and other organic compounds. About 2,000 fish and 5,000 invertebrate community counts are in the DWH. Most samples were analyzed for 40 to over 100 compounds. Collectively they represent over 10 million water-quality results. The current data set is the largest, nationally consistent water-quality data set for streams and ground water ever assembled. Selected water-quality data can be retrieved in a file or mapped on a web browser for any (or several) county, basin, state, or for all of the U.S. in seconds. These data are readily available to government agencies, universities and the general public to address critical questions about the nation's water quality.

Development principles to maximize functionality while staying on time and on budget included maximum use of state-of-the-art off-the-shelf Oracle and MapInfo software [no product endorsement implied], and development by USGS staff with outside consultants.

More information, data retrieval and mapping tools are at <http://water.usgs.gov/nawqa/data>.