ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

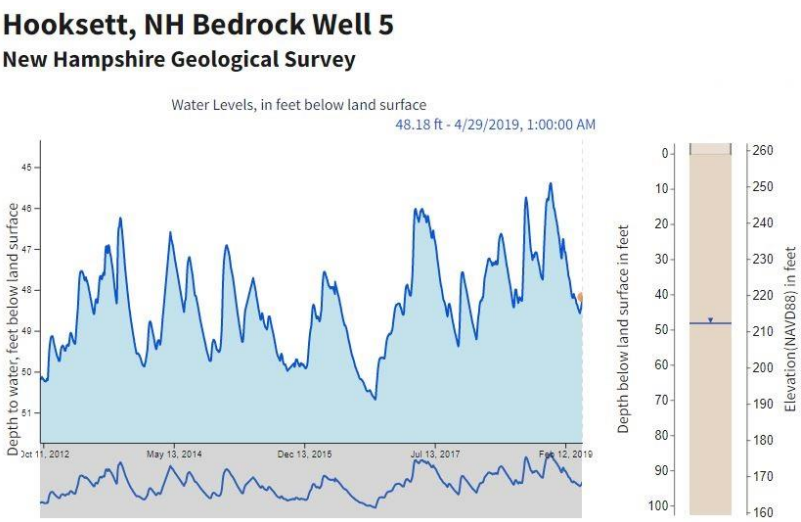
29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

GEO-8 2020

Groundwater Level Measurement Network

A cooperative program to monitor the availability of groundwater resources

The New Hampshire Department of Environmental Services (NHDES), in cooperation with the United States Geological Survey (USGS), monitors and maintains records of surface and groundwater conditions statewide. Groundwater levels in selected observation wells are measured every month on a year-round basis by staff and trained volunteers. NHDES provides volunteers with the necessary equipment and instruction to insure that recorded measurements are uniformly and accurately collected.



Rainfall, Runoff and Changes in Aquifer Storage

Each well serves as an indicator of regional hydrologic conditions, registering changes in the amount of water stored in underground reservoirs known as aquifers. This information can be used to compare conditions today with those existing at some time in the past or to predict future conditions, helping to inform water resources management decisions. For example, such comparisons enable the severity of droughts to be assessed. The record of water level measurements over time, displayed as a hydrograph (above), not only reveals general hydrologic trends but also contains detailed information about how aquifers with different characteristics respond to hydrologic events of various magnitudes and durations. Such information provides professional hydrogeologists and groundwater users with a better understanding of how groundwater functions in the hydrologic cycle.

A Brief History

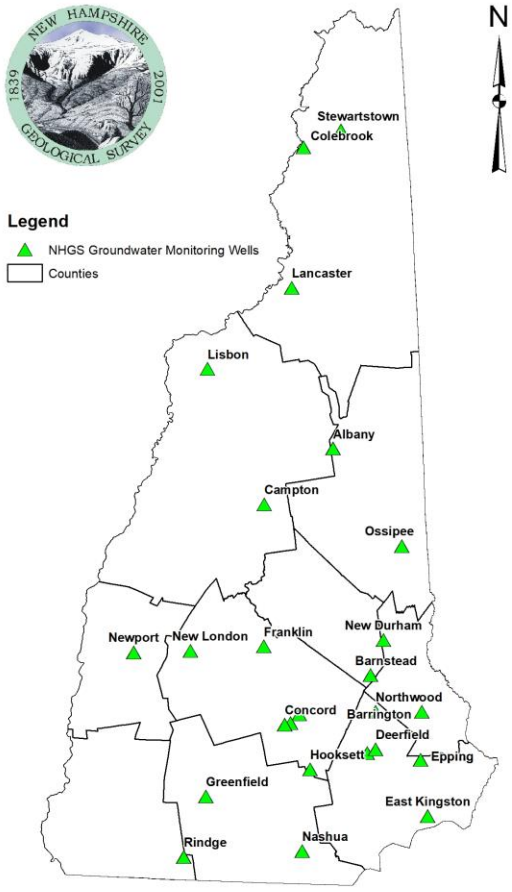
The observation well program was originally developed by the USGS and evolved slowly over the years. The oldest well currently in the network is a privately owned dug well (NLW 1) in New London, N.H., and was first measured on October 6, 1947. This well is a hand dug, rock-lined well constructed in glacial till deposits which overlie bedrock.

Additional wells were added to the observation well network over time in conjunction with other water resource programs conducted in cooperation with the former New Hampshire Water Resources Board and other agencies. Most of these are in glacial sand and gravel deposits, called stratified drift deposits. With the addition of a 12th well in 1966, the network attained a configuration that would remain unchanged for nearly three decades.

In February 1994, the responsibility for collecting monthly water level measurements was assumed by NHDES as a cooperative program with the USGS. Along with this new responsibility, NHDES had an opportunity to take advantage of a large population of approximately 475 new USGS observation wells, constructed as part of the cooperative stratified-drift aquifer mapping program (see NHDES Fact Sheet CO-GEO-5) to expand the program from the original 12-well network into a more comprehensive geographic network.

The New Expanded Water Level Network

In 2009, nine newly drilled bedrock wells were added to the network, giving information on groundwater behavior in bedrock fractures. In 2018, the USGS resumed responsibility of the Shelburne well (SJW-02), and the NHGS acquired an overburden well in Barrington, and a replacement for the overburden well at the Concord airport (CVW-2.1) These wells expanded the network to its current configuration of 31 wells (right). Water level measurements are collected each month by NHDES staff with the invaluable assistance of dedicated volunteer "well readers." The primary focus for the expanded network was to increase the geographic scope statewide because it was recognized that coverage by the original 12-well network was lacking in some areas.



The secondary focus was on sites that were good indicators of natural hydrologic conditions for their geographic region and had long-term reliability.

Preferences were given first to wells located on public lands that were considered relatively safe for long-term use. Land owners were interviewed in person by NHDES staff and permissions were granted before wells were selected for inclusion as part of the network.

Finally, wells were chosen that had potential to represent specific hydrologeologic settings within stratified-drift, including recharge vs. discharge areas, thin aquifers with a shallow water table vs. thick aquifers with a deep water table, and/or fine vs. coarse grained deposits. The bedrock wells were located in different bedrock types around the state.

Other factors that influenced well selection were proximity to public water supply wells or other large groundwater withdrawals, proximity to surface water bodies, and recognition of aquifers of local importance.

Data Collection

All wells in the network are measured by hand every month using electronic or steel tape. Of the 31 wells in the network, 20 have automated data loggers, which have significantly enhanced data collection in recent years. These data loggers are set to read the water levels once every hour on a continuous basis, providing a very detailed record of water level fluctuations in these wells. At the time of the monthly hand measurement, these electronic readings are downloaded, processed for quality control, stored in a local database, and finally accessed by web applications (below).

Data Access

Both hand-level and hourly logger data are accessible to the public through NHGS' new Hydro Server web applications. In addition, hourly logger data are transferred to USGS for public access in the National Ground-Water Monitoring Network online data portal. Both applications above offer graph plotting and data exporting capabilities. In addition to the groundwater data provided by NHGS, the USGS New England Water Science Center offers groundwater, surface water and water quality data from different monitoring stations across the state.

For more information about the program or information about becoming a volunteer reader, contact NHGS at (603) 271-1976 or geology@des.nh.gov. For information about obtaining publications, contact USGS - Publications Unit at (603) 226-7851 or visit their New England Water Science Center page.