ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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

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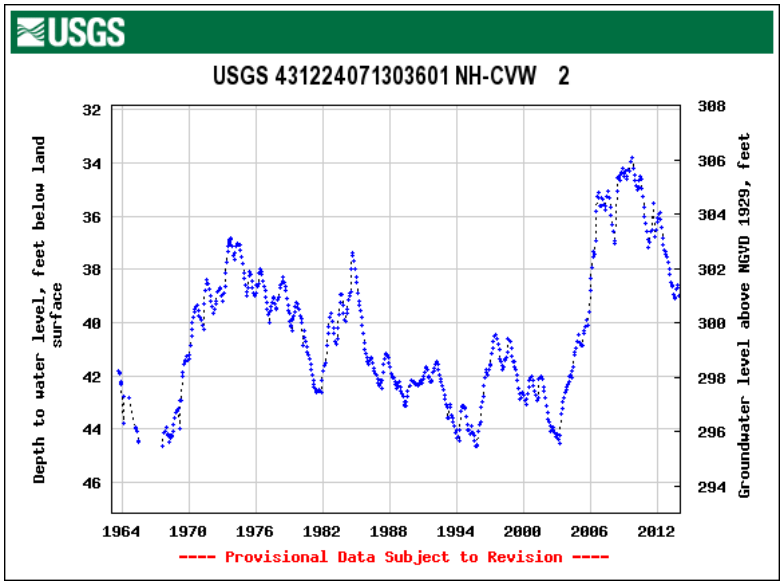
Groundwater Level Measurement Network:

A cooperative program to monitor the availability of groundwater resources

The 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.



A Story of 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 (Figure 1), 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 resources 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

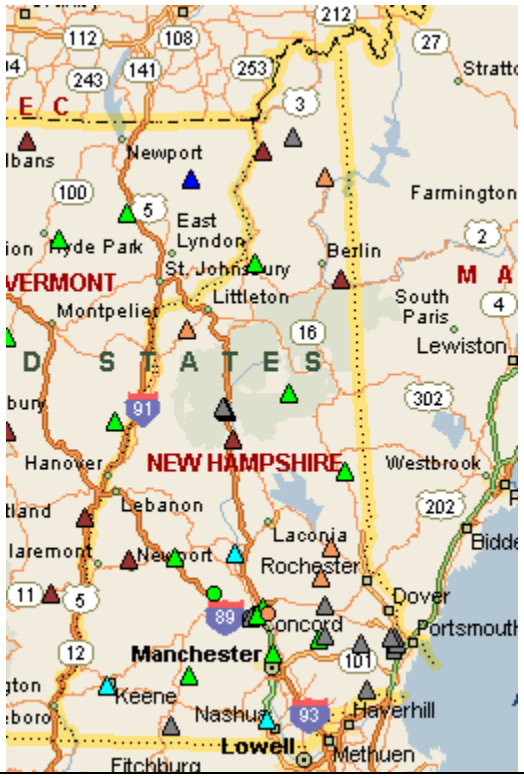
stratified drift deposits. With the addition of a twelfth well in 1966, the network attained a configuration which would remain unchanged for nearly three decades.

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, 9 new bedrock wells were added to the network, giving information on groundwater behavior in bedrock fractures. These wells expanded the network of 22 stratified drift wells and 1 dug well to its current configuration of 32 wells (see Figure 2). Water level measurements are collected each month by NHDES staff with the invaluable assistance of 6 volunteer "well readers",



http://groundwaterwatch.usgs.gov/NHV/StateMaps/NH.htm

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.

Current Status

NHDES provides volunteers with the necessary equipment and instruction to insure that recorded measurements are uniformly and accurately collected. The data are subsequently transferred to the USGS for analysis and publication in the monthly report "Water Resources Conditions in New Hampshire and Vermont". These data can be accessed directly at: http://nh.water.usgs.gov/WaterData/curr.htm

Data collection has been significantly enhanced in recent years by the installation of automatic water level recorders in 20 of the network wells. 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 physical water level measurement, these electronic readings are downloaded and stored for detailed analysis of how the water level in that aquifer responds to various meteorological events.

For more information about the program or information about becoming a volunteer reader, contact the Department of Environmental Services, New Hampshire Geological Survey at (603) 271-1976 or geology@des.nh.gov For information about obtaining publications, contact the United States Geological Survey - Publications Unit at (603) 226-7851 or see: http://vt.water.usgs.gov/Publications/index.htm