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DEPARTMENT OF
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Services

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Availability of Groundwater Resources in Southeastern New Hampshire

Project Update: Fall, 2004

This newsletter is the first of a new quarterly series intended to keep you informed of our progress. If you have any questions about the project, please contact:
Lindsay Anderson
New Hampshire Coastal Program
landerson@des.state.nh.us
603-559-0026

The proximity of the seacoast region in Southeastern New Hampshire to metropolitan Boston has led to a 36-percent population increase over the past 20 years. This population increase, and associated development, has been accompanied by an estimated 50-percent increase in the use of ground- and surface-water resources for drinking, industrial, and other purposes during the same period. Ensuring the sustainability of water resources into the future will require quantification of water storage and movement in surface- and groundwater systems and a thorough understanding of past, current, and future water demands. To gain a better understanding of these processes, the participants of the seacoast groundwater availability project are working on a 3-year multi-disciplinary project.

Federal and State participants of this project are the U.S. Geological Survey, New Hampshire Coastal Program, and the New Hampshire Department of Environmental Services, (which includes New Hampshire Geological Survey and New Hampshire Water Supply Engineering Bureau). In addition, seacoast communities have contributed substantial resources to the project. Finally, the Groundwater Project Advisory team, made up of water-resource consultants, water suppliers, and planners in southeastern New Hampshire, has contributed their time and knowledge to this undertaking.

New Hampshire Geological Survey

Groundwater Database

The New Hampshire Geological Survey (NHGS) has created a comprehensive database (GeoLogs) of subsurface hydrogeologic conditions. The database currently contains approximately 10,500 locations where exploratory soil borings and/or monitoring wells have been drilled. Parameters collected at the stations include local groundwater levels, soil type, and possibly bedrock types, aquifer properties, and geologic setting properties. Each station is geographically referenced to allow for inclusion in a Geographic Information System (GIS) for future analyses. The analyses will likely include estimation of regional groundwater recharge, identification of groundwater occurrence, and potentially aid in the construction of a regional water flow model.

NHGS has been using a desktop GIS method to locate water wells reported by drilling contractors as part of the state's water well inventory program. Nearly 2,400 wells have been located so far in the project area with this method. Although the hydrogeologic data still contained in the well reports is not as detailed as that being compiled in the GeoLogs database described above, it provides valuable insight into subsurface hydrogeologic conditions.

Surficial Geology Map

NHGS has been converting surficial geologic quadrangle maps of the seacoast area to a digital form in order to create a seamless data layer in GIS (map below). Maps for 12 full quadrangles and 2 partial quadrangles have been converted to date. The information in the data layer will provide insight into the distribution and thickness of surficial geologic materials, helping communities to better understand and protect their groundwater resources as they plan for future development. The data layer will be available for download from the GRANIT system at the University of New Hampshire within a few weeks at: *http://www.granit.sr.unh.edu.* An official announcement will be forthcoming.

Regional Recharge Map

NHGS has also begun researching techniques to estimate how much water recharges the aquifers in the entire seacoast area. These techniques will incorporate data from the

STATUS OF DIGITIZATION OF SURFICIAL GEOLOGIC MAPS

GeoLogs database, surficial maps and hydrometeorologic datasets. The final recharge analyses will be a resource for future planning and development in the Seacoast Region.

US Geological Survey

Groundwater Model

A groundwater flow model is being developed to quantify groundwater resources in the seacoast. The model covers a 120-mi^2 area east of Great Bay from Seabrook to Portsmouth, and incorporates data from NHGS data collection efforts, USGS hydrologic studies, and other investigations. The model will also use the results of the seacoast water-use analysis to estimate the impact of population growth on future water resources in the model area. For more information about the USGS groundwater flow model see: *http://nh.water.usgs.gov/CurrentProjects/seacoast/gw_model.htm*.

Streamflow Data Collection

The USGS will soon be completing more than a year of continuous streamflow data collection at 6 gaging stations in the groundwater flow model area. During periods of low rainfall most streamflow is composed of discharge from groundwater storage, known as base flow. These data can help determine the aquifer storage and are used in model calibration. The USGS is currently watching for a "low" rainfall period in which to measure additional streams and groundwater levels for a one-time regional measurement. At that time the USGS will be contacting local water suppliers and others who maintain water-level networks for assistance in measuring their networks during this sampling event.
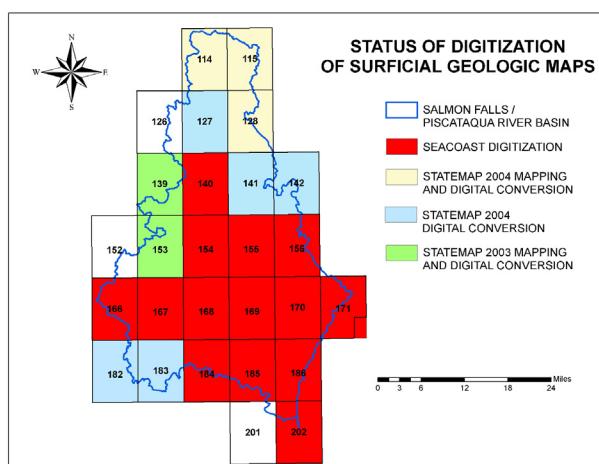
For the purpose of this project 4 new long-term streamflow gages have been installed and are online for data collection. These gages are located at: Winnicut River in Greenland, Isinglass River in Dover, North River in Lee, and Hampton Falls River in Seabrook.

In addition to the long-term streamflow gages, one year of data to be used in calibrating the pilot groundwater flow model has been collected from five short-term streamflow gages. Although these gaging stations are scheduled to be removed this fall, one community is funding continued monitoring of one gage. For more information about streamflow monitoring and how to support continued streamflow gaging, see: *http://nh.water.usgs.gov/CurrentProjects/seacoast/monitor.htm*.

Preliminary simulations using the groundwater flow model were presented by the USGS at the National Groundwater Association Fractured Rock conference recently in Portland, Maine. This presentation discussed the effects of regional geology and fracture zones on groundwater flow to wells.
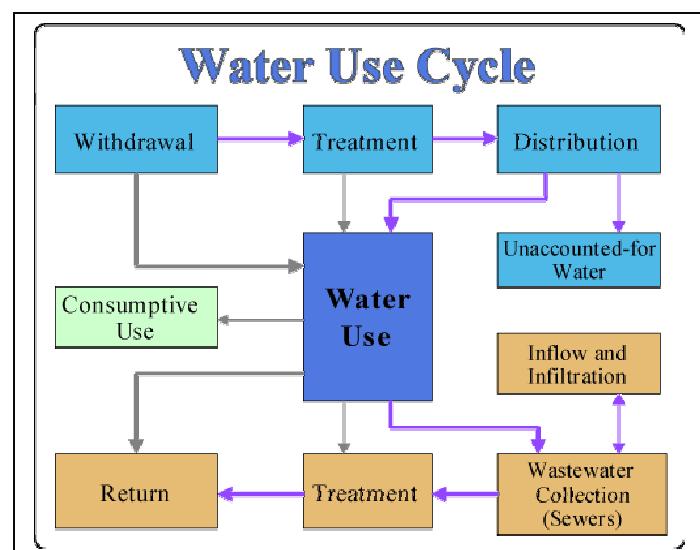
Water Use
In order to determine if homes with metered water use water differently than homes with well water, the USGS asked students and their families from 15 Seacoast Middle Schools in 27 seacoast towns to record home water-use data. Because the data collection was so successful, these data are still in the process of being analyzed. In addition to the primary purpose of determining water use in metered versus well homes, the data that the schools have collected are an integral part of the USGS' water-use model, and have allowed the USGS to capture attitudes about water-use

conservation, including seacoast citizens' awareness of water use. Please see the water-use middle school project Web site for more information at: *http://nh.water.usgs.gov/CurrentProjects/seacoast/ed_packet.htm.*

A water-use model of the metered homes in the town of Raymond has been completed and the USGS is in the process of calibrating the Raymond model with census data and home meter readings. An example of a town's water-use model will be available soon at: *http://nh.water.usgs.gov/CurrentProjects/seacoast.*

Finally, USGS is also working to update a water supply and sewer line flow chart for the entire watershed.