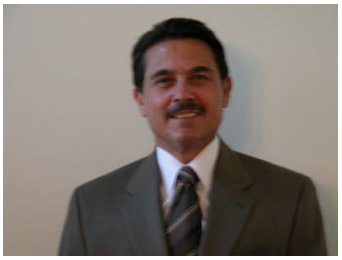
U.S. Geological Survey New York Water Science Center – http://ny.usgs.gov

Message from Rafael W. Rodriguez, Director, New York Water Science Center



The U.S. Geological Survey (USGS) has recently realigned the Bureau's regional management from a science discipline focus to a geographic area of responsibility focus. Under this structure, each Regional Executive will be responsible for leadership and management of a multidisciplinary portfolio within a geographic area, an effective way to promote integrated science and a more efficient use of management resources. The Northeast geographic area extends from Virginia to Maine and includes two biology, three geology and ten water science centers including the NY Water Science Center. As I discussed in our last newsletter the most recent USGS Science Strategy relies heavily on a multidisciplinary approach to address environmental issues. I believe this new management structure will offer a great opportunity to bring added scientific expertise to the science program of the New York Water Science Center.

As always, I am interested in hearing from you. Please feel free to contact me about these or any other issues or program opportunities you may wish to discuss. I can be reached at (518) 285-5659 or rrodrigu@usgs.gov.

Selected Projects – For information on all our active projects, visit our project summary web page. For more information on the specific project, please click on the project title.

Simulating saltwater intrusion beneath Manhasset Neck, Nassau County, New York, 1905-2005

The coastal-aquifer system of Manhasset Neck, Nassau County, N.Y., has been stressed by pumping, which has led to saltwater intrusion (including the need to abandon one public-supply well in 1944). Measurements of chloride concentrations and water levels in 2004 from the deep, confined aquifers indicate active saltwater intrusion in response to public-supply pumping.

In cooperation with the Town of North Hempstead, the New York State Department of Environmental Conservation and the Residents for a More Beautiful Port Washington, the USGS developed a computer model capable of simulating three-dimensional variable-density ground-water flow and solute transport in heterogeneous, anisotropic aquifers. This model uses the USGS finite-element, variable-density, solute-transport simulator SUTRA to simulate the extent of saltwater intrusion beneath Manhasset Neck. The model includes eight layers representing the hydrogeologic system beneath Manhasset Neck (fig. 1).

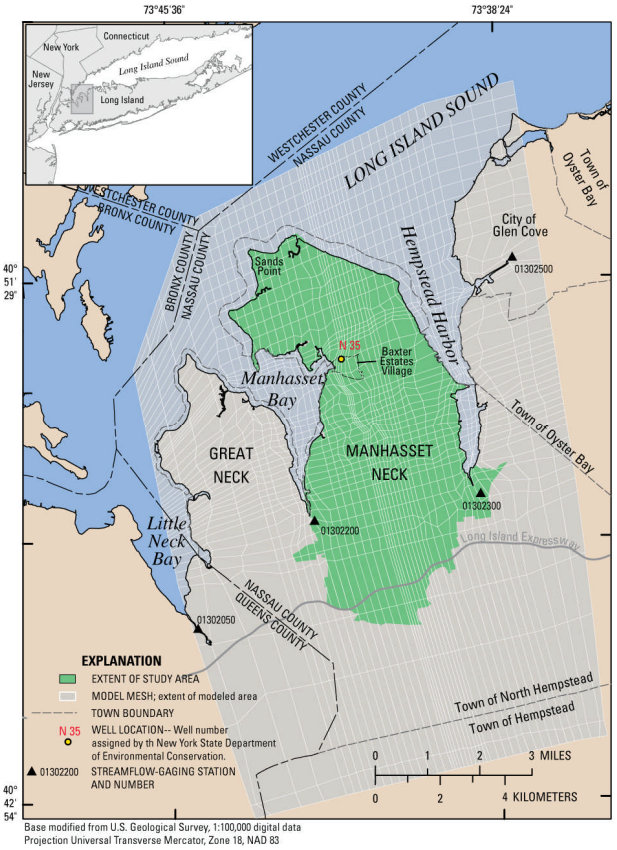


Figure 1. – Location of Manhasset Neck in Nassau County, Long Island NY showing the SUTRA model grid area.

Simulated water levels and chloride concentrations for pumping periods indicated cones of depression and progressing saltwater intrusion in areas where large withdrawals were represented. A ground-water budget of simulated values that included increased pumping, corresponding decreased discharge to offshore areas, and a net increase of freshwater entering or leaving along the western, southern, and eastern edge of the model was developed. The simulated decrease in freshwater discharge to the offshore areas caused saltwater intrusion, as much as 1,700 ft, in several parts of the deep-aquifer system under Manhasset Neck. A report describing this study is in preparation. Contact Jack Monti (631)736-0783 ext.127 jmonti@usgs.gov

Tug Hill sole-source glacial aquifer hydrogeology to be addressed

The USGS along with the Tug Hill Commission and local governmental communities and Soil and Water Conservation Districts have developed a proposal to complete a comprehensive, 6-year study of the Tug Hill Aquifer. The aquifer is a 47-mile long, sand and gravel deposit that occupies 103 mi^2 along the western side of the Tug Hill Plateau in northern New York, extending from Adams Center in the north, to south of Camden and occupies portions of Jefferson, Oneida, and Oswego counties (fig. 2). The aquifer was designated as a Sole-Source Aquifer by the U.S. Environmental Protection Agency in 2006 and serves as the only water supply for the towns and villages in the area. For the purpose of this study the aquifer is divided into three segments to facilitate data management and to allow more efficient construction of ground-water-flow models for each segment.

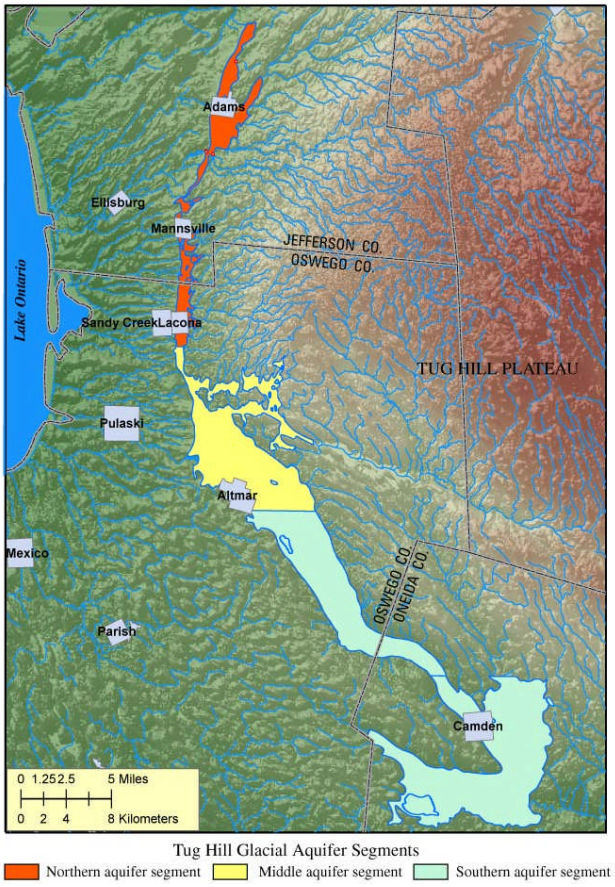


Figure 2. – Location of Tug Hill Glacier aquifer and three aquifer segments in Jefferson, Oswego, and Oneida Counties, N.Y.

The goals of the study are to collect and analyze the appropriate hydrologic data to determine (1) sources and amounts of recharge to the aquifer, (2) amounts of water exiting the aquifer through discharge areas, (3) long-term sustainability of ground-water withdrawals, (4) the extent of surface-water/ground-water interactions, (5) the amounts of streamflow and water-temperature fluctuations in major streams that flow over the aquifer, and (6) the potential affects of present and proposed development over the aquifer on quantity, quality and temperature with potential resulting influences on wetlands, fisheries, aquatic habitat, riparian habitat, esthetics, and recreation. The study will provide scientific information to local, county, and state agencies charged with protecting this critical resource.

Contact Ed Bugliosi (607) 266-0217 ext 3005 ebuglios@usgs.gov.

Measuring sediment concentrations with sound waves in the Hudson Estuary

Deposition of Hudson River sediment into New York Harbor interferes with navigation lanes and requires continuous dredging. Sediment dynamics at the Hudson estuary turbidity maximum (ETM) have received considerable study, but delivery of sediment to the ETM through the freshwater reach of the estuary has received relatively little attention and few direct measurements. In March of 2002, in cooperation with the New York State Department of Environmental Cooperation, an acoustic Doppler current profiler (ADCP) was positioned at the approximate limit of continuous freshwater (just south of Poughkeepsie, NY) to develop a time series of water velocity, discharge, suspended-sediment concentration and suspended-sediment discharge (fig. 3).

ADCPs are commonly used by USGS personnel for measurement of flow in streams and rivers. These instruments transmit sound into the water column and "listen" for the reflected echo off particles suspended in the water. Because these particles are moving, the echo is Doppler shifted – the ADCP translates this Doppler shift into the velocity of the particles (which are assumed to be moving at the same speed as the water). The ADCP in the Hudson is a bit unconventional as it not only measures water velocity, but uses information about the strength of the return echo as a surrogate for suspended-sediment concentration. From these measurements we are able to compute suspended-sediment discharge at the study site every 15 minutes (near-real time data for the project can be viewed here). A publication detailing the methodology of this approach was published last year and can be viewed online here: (SIR 2006-5055).

The first 4 years of the study indicate a mean annual suspended-sediment discharge of 737,000 metric tons. One of the more interesting conclusions of the study to date is that simple models of sediment transport currently in use for the freshwater reach of the estuary (i.e. a balance being attained between imports and exports in fairly short order) don't always apply during large tributary runoff events. Large tributary runoff events which occur late or outside the estuary "flushing season" (between October and April) can result in large amounts of sediment trapped in the estuary upstream of the study site.

Results from the first four years of the project are to be published in the journal *Estuaries and Coast*.

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Figure 3. – Redeployment of ADCP after routine maintenance.

Hydrologic Conditions

Surface Water in New York, August 2007 to February 2008

Streamflow conditions in northern and western NY were very dry from August through most of October 2007. The Hinckley Reservoir in Herkimer and Oneida Counties that serve as a water supply for over 130,000 people reached a historic low and was reported to be at only 17% of capacity in September. The reduced runoff from the upper Hudson and Mohawk Rivers resulted in the salt front (defined as 100 mg/L chloride) in the lower Hudson River Estuary to move upstream of the Poughkeepsie and Highland water supply intakes for several days. At the same time conditions in southeastern NY including New York City watersheds and Long Island were in the normal range. By the end of October precipitation and runoff increased and began to ease the dry conditions in much of the State. Conditions in November 2007 through January 2008 were in the normal to wet range at most hydrologic conditions network sites and in February all but one site was in the wet range. Figure 4 shows that over a 45 day period ending in February 2008, the index of streamflow was consistently above normal. For more information, our web page displays real time and historic data; visit the surface-water-watch page for hydrologic conditions across the country; and USGS NY's monthly summary of hydrologic conditions.

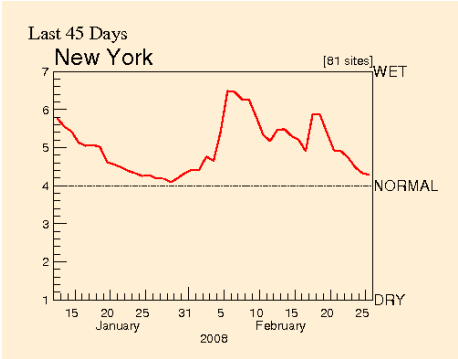

Figure 4. – Graph of index streamflow for NY, January to February 2008, from 81 sites with more than 30-years of record.

Ground Water in New York, August 2007 to February 2008

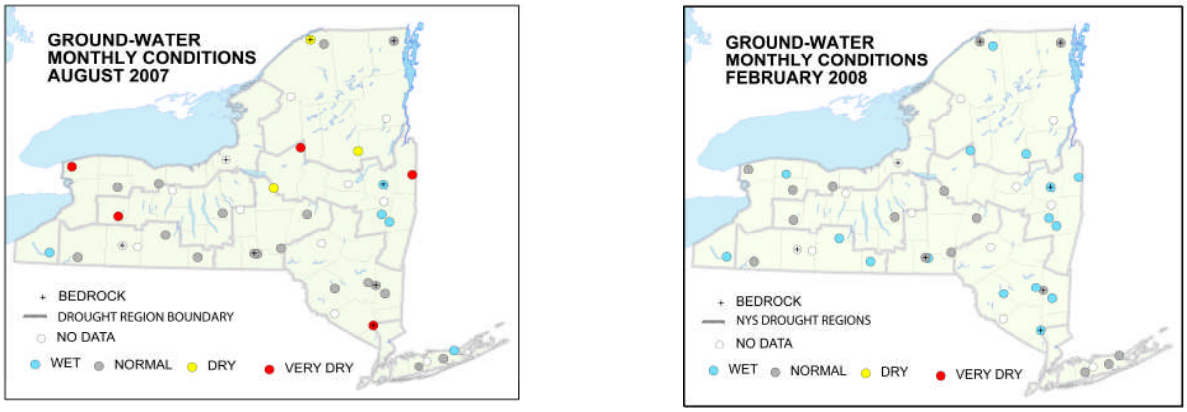

Figure 5. – Hydrologic conditions monitoring wells with greater than 4 years of record, showing the percent exceedance for August 2007 and February 2008. Note many additional network wells exist with less than 4 years of record. Only a small subset of the wells on Long Island is included because of long-term impacts from sewering and water supply pumping that obscures the natural climatic effects.

Ground-water levels from August through October 2007 continued to drop (dry conditions) in central and western New York but were in the normal to wet range for southeastern New York including Long Island. Starting in November and continuing through February water levels have risen through most of the State into the normal to wet range (figure 5). Our web page displays real time and historic ground-water data for these and other wells, in addition to a monthly summary of hydrologic conditions. Another useful resource for hydrologic conditions in New York is the USGS ground-water watch page.

New Reports from the New York Water Science Center –Listed below are some of the reports and abstracts written by scientists in the USGS New York WSC that were released in recent months. A complete list of New York WSC publications can by found on our publication search page.

- Eckhardt, D.A., Reddy, J.E., and Tamulonis, K.L., 2007, Ground-water quality in the Genesee River basin, New York, 2005-2006: U.S. Geological Survey Open-File Report 2007-1093, 26 p.
- Gibs, J., Stackelberg, P.E., Furlong, E.T., Meyer, M., Zaugg, S.D., and Lippincott, R.L., 2007, Persistence of pharmaceuticals and other organic compounds in chlorinated drinking water as a function of time: Science of the Total Environment, v. 373, no. 1, pp 240-249.
- Kappel, W.M. and Teece, M.A., 2007, Paleoenvironmental assessment and deglacial chronology of the Onondaga Trough, Onondaga County, New York: U.S. Geological Survey Open-File Report 2007-1060, 12 p.
- McHale, M.R. and McChesney, D., 2007, Phosphorus concentrations in stream-water and reference samples – an assessment of laboratory comparability: U.S. Geological Survey Open-File Report 2007-1267, 25 p.
- Mulvihill, C.I., Filopowicz, A., Coelman, A., and Baldigo, B.P., 2007, Regionalized equations for bankfull discharge and channel characteristics of streams in New York State – hydrologic regions 1 and 2 in the Adirondack region of northern New York: U.S. Geological Survey Scientific Investigations Report 2007-5189, 18 p.
- Mulvihill, C.I. and Baldigo, B.P., 2007, Regionalized equations for bankfull discharge and channel characteristics of streams in New York State – hydrologic region 3 east of the Hudson River: U.S. Geological Survey Scientific Investigations Report 2007-5227, 15 p.
- Nystrom, E.A., 2007, Ground-water quality in the St. Lawrence River basin, New York, 2005-2006: U.S. Geological Survey Open-File Report 2007-1066, 33 p.

The USGS Water Resources Discipline (WRD) has the principal responsibility within the Federal Government to provide the hydrologic information and interpretation needed by others to achieve the best use and management of the Nation's water resources. WRD actively promotes the use of its information products by decision makers to:

- Minimize loss of life and property as a result of water-related natural hazards, such as floods, droughts, and land movement.
- Effectively manage ground-water and surface-water resources for domestic, agricultural, commercial, industrial, recreational, and ecological uses.
- Protect and enhance water resources for human health, aquatic health, and environmental quality.
- Contribute to wise physical and economic development of the Nation's resources for the benefit of present and future generations.

If you have an environmental or resource-management issue in which you would like to partner with the USGS to investigate, please contact any of our senior management staff (listed below). Projects are supported primarily through the Cooperative Water Program. This is a program through which any State, County, or local agency may work with the USGS to fund and conduct a monitoring or investigation project.

- Phillips, P.J., Smith, S.G., Steven, Z.D., Furlong, E.T., Kolpin, D.W., Esposito, A.K., Stinson, B., and Laurel, E., 2007, Pharmaceuticals and chloroxylenol in treated wastewater effluent samples from across the United States, 2003-2006: SETAC North America 28th Annual Meeting, Abstract Book, p. 114.
- Reynolds, R.J., 2007, Hydrogeologic appraisal of the valley-fill aquifer in the Port Jervis Trough, Sullivan and Ulster Counties, New York: U.S. Geological Survey Scientific Investigations Map, 2007-2960, 5 sheets.
- Schubert, C.E., 2007, Analysis of the shallow ground-water flow system at Fire Island National Seashore, Suffolk County, New York: Fire Island National Seashore Planning, Science, and Research Conference, Abstracts of Presentation, May 9-10, 2007, p.7.
- Stackelberg, P.E., Gibs, J., Furlong, E.T., Meyer, M.T., Zaugg, S.D., and Lippincott, R.L., 2007, Efficiency of conventional drinking-water-treatment processes in removal of pharmaceuticals and other organic compounds: Science of the Total Environment, v. 377, no. 2-3, pp. 255-272.
- Yager, R.M., Kappel, W.M., and Plummer, L.N., 2007, Halite brine in the Onondaga Trough near Syracuse, New York – characterization and simulation of variable density flow: U.S. Geological Survey Scientific Investigations Report 2007-5058, 40 p.
- Zajd, H.J., Jr., 2007, Evaluation of acoustic Doppler current profiler to measure discharge at New York Power Authority's Niagara Power Project, Niagara Falls, New York: U.S. Geological Survey Open-File Report 2007-1187, 22 p.

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