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

Message from Ward Freeman, Acting Director, New York Water Science Center

Since the last Newsletter (April 2009), President Obama has nominated Dr. Marcia McNutt to become the next Director of the U.S. Geological Survey. Dr. McNutt is currently CEO of the Monterey Bay Aquarium and Research Institute and a professor of geophysics at Stanford University. It is expected that the Senate will confirm Dr. McNutt soon after they return from recess. Also, the Director of the USGS New York Water Science Center, Rafael Rodriguez has moved to a new position as the Senior Advisor for Strategic Workforce Initiatives for the USGS. In this new role he will work nationwide to improve recruitment of under-represented groups to enhance diversity in the USGS workforce. This of course leaves the Director position of the New York Water Science Center vacant. I am honored to have been asked to fill that role until the new Director is named, which we expect to happen in the very near future.

In the last newsletter we indicated that 10 high-priority streamflow gages were going to be discontinued due to funding shortfalls. I am pleased to report that we were successful in developing agreements with cooperators to fund most of these remaining high-priority streamflow gages, including all of those gages that are used by the National Weather Service for flood forecast and warning in New York. A list of those stations that are still unfunded is available on our web page (http://ny.usgs.gov).

Another program you may be interested in is the Great Lakes Restoration Initiative which, if funded, will provide fiscal 2010 support for State and Federal efforts to target the most significant problems in the Great Lakes region, including invasive aquatic species, non-point source pollution, and contaminated sediment. Visit the EPA web page (http://www.epa.gov/glnpo/glri/) and look at the "Agency Actions" document to learn more about what the USGS and other agencies have proposed.

I am interested in hearing from you. Perhaps I'll see you at our annual symposium, this year cosponsored by the Finger Lakes – Lake Ontario Watershed Protection Alliance (FL-LOWPA) and the Finger Lakes Institute.
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) 285-5658 or wfreeman@usgs.gov.

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

Water-Table and Potentiometric-Surface Altitudes in the Upper Glacial, Magothy, and Lloyd Aquifers beneath Long Island, New York, March-April 2006

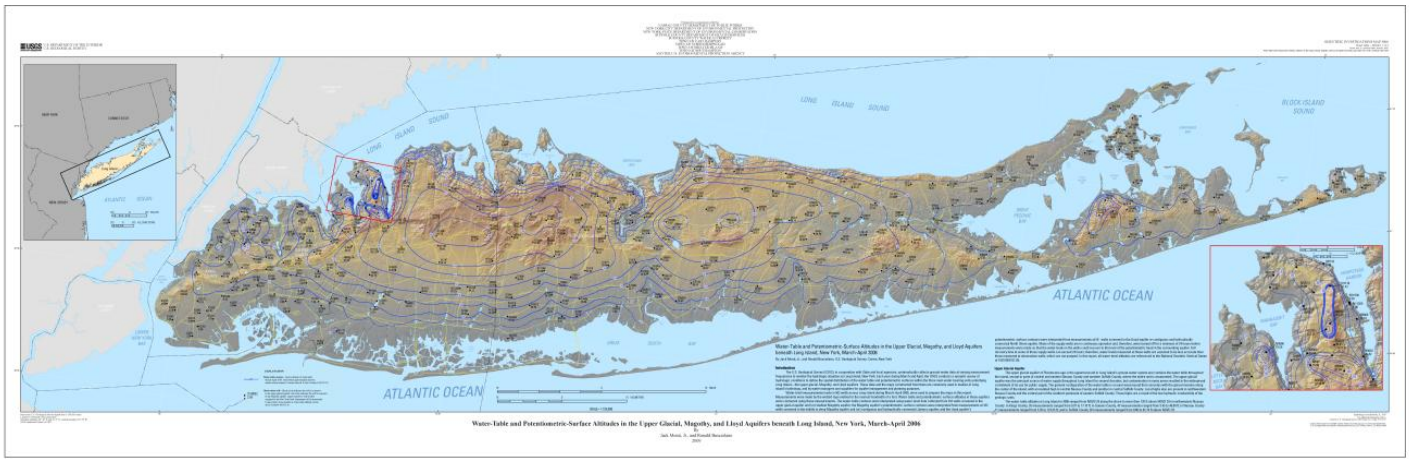

Figure 1. Map showing water-table altitude in March-April 2006 beneath Long Island, N.Y. (Sheet 1 from Monti and Busciolano, 2009).

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The U.S. Geological Survey (USGS), in cooperation with Federal, State and local agencies, systematically collects groundwater data at varying measurement frequencies to monitor the hydrologic situation on Long Island, New York. Each year during March and April, the USGS conducts a synoptic survey of hydrologic conditions to define the spatial distribution of the water table (fig. 1) and potentiometric surfaces within the three main water-bearing units underlying Long Island—the upper glacial, Magothy, and Lloyd aquifers. These data and the maps constructed from them are commonly used in studies of Long Island's hydrology, and by water managers and suppliers for aquifer management and planning purposes.

Water-level measurements made in 502 wells across Long Island during March-April 2006, were used to prepare water-table and potentiometric-surface maps available at http://pubs.usgs.gov/sim/3066/. The water-table contours were interpreted from water-level data collected from 341 wells screened in the upper glacial aquifer and (or) shallow Magothy aquifer; the Magothy aquifer's potentiometric-surface contours were interpreted from measurements at 102 wells screened in the middle to deep Magothy aquifer and (or) contiguous and hydraulically connected Jameco aquifer; and the Lloyd aquifer's potentiometric-surface contours were interpreted from measurements at 59 wells screened in the Lloyd aquifer and (or) contiguous and hydraulically connected North Shore aquifer. The report includes 4 large sheets which convey the hydrologic conditions of the aquifers beneath Long Island and the depth to the water table.

An interactive map interface is also available that allows a user to zoom in on specific areas of interest and overlay map features and potentiometric contours. The Arc Internet Map Server (ArcIMS) interactive map interface can be viewed at http://ny.ims.er.usgs.gov/LI_maps06/ (fig. 2). Contact: Jack Monti jmonti@usgs.gov.

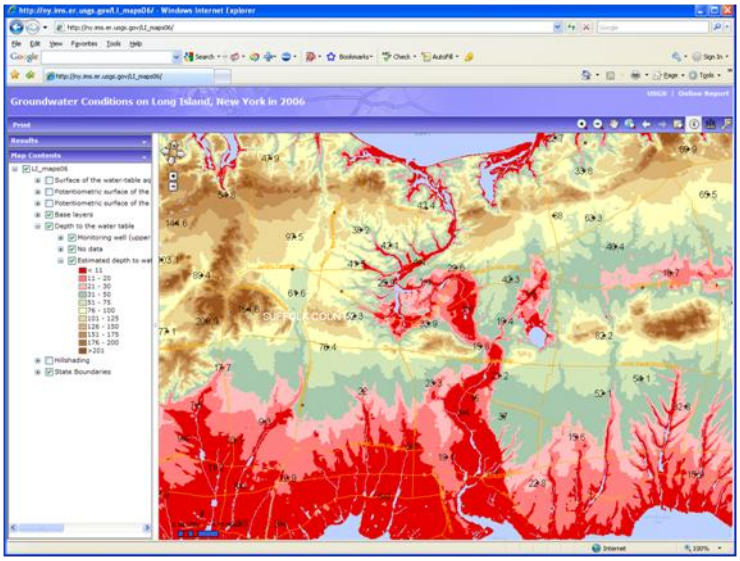
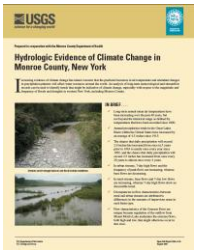


Figure 2. Example view of Arc Internet Map Server showing depth to the water table in March-April 2006 on Long Island, N.Y.

Hydrologic Evidence of Climate Change in Monroe County, New York



A recent publication (Coon, 2008) describes the water-resource implications of climate change in Monroe County, N.Y.

Increasing evidence of climate change has raised concerns that the predicted increases in air temperature and attendant changes in precipitation patterns will affect water resources around the world. An analysis of long-term meteorological and streamflow records can be used to identify trends that might be indicative of climate change, especially with respect to the magnitude and frequency of floods and droughts. Such an analysis was conducted using meteorological data from the National Weather Service (NWS) station in Rochester, N.Y., and streamflow data from several U.S. Geological Survey flow-monitoring sites in Monroe County (Coon, 2008).

Based on these data, the following conclusions were made. The long-term annual mean air-temperature record from the NWS station indicates an apparent increase over the past 4 decades; however, this increase does not differ substantially from the historical range of temperatures during the last century. Annual precipitation totals are increasing (fig. 3), not only in Rochester, N.Y., but across the Great Lakes Basin within the United States, where an average increase in annual precipitation of 4.5 inches has been documented between 1915 and 2004. In addition, the chance that daily precipitation will exceed 2.0 inches has increased from once in 5 years prior to 1963 to nearly once every year since 1992, and the chance that daily precipitation will exceed 2.5 inches has increased from once every 20 years to almost once every 4 years.

This increase in precipitation is reflected in urbanized basins where the frequency of peak flows and the maximum 7-consecutive-day average flows (7-day high flows) are increasing. In rural streams, base flows and the minimum 7-consecutive-day average flows (7-day low flows) are increasing. The differences in flow

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characteristics between rural and urban streams are attributed to differences in the amounts of impervious areas in each basin type.

The hydrologic changes that have been identified from long-term meteorological and hydrologic data in response to changes in precipitation patterns and quantities can have far-reaching repercussions on water supplies, aquatic habitats, and biota diversity, as well as the design of culverts and bridges. Continued meteorological and streamflow monitoring is vital to the forecasting of future climatic conditions and their implications, and to the preparation of strategies to minimize the attendant risks to human life and damage to property and infrastructure.

For more information contact William Coon, wcoon@usgs.gov

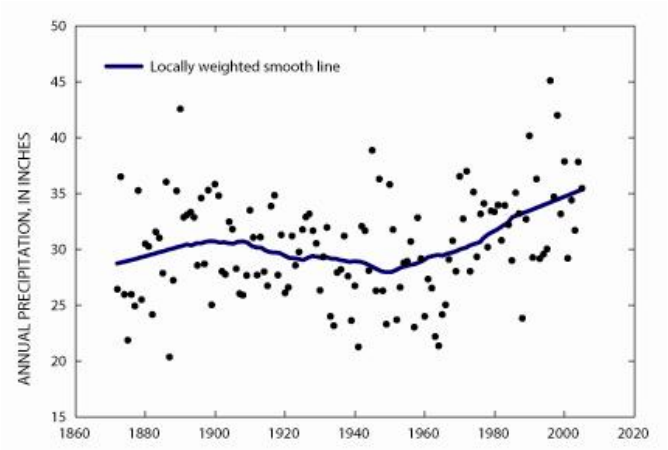

Figure 3. – Annual precipitation measured at the National Weather Service meteorological station, Rochester, N.Y., 1872–2005. (Based on data from Williams and others, 2007)

Streamflow data used to assess the impact of Hudson River PCB dredging

In February 2002, the Federal government (U.S. Environmental Protection Agency) ordered the General Electric Company (GE) to conduct targeted dredging of polychlorinated biphenyl (PCB) contaminated sediment in a 40-mile stretch of the Upper Hudson. Visit the EPA web site for the history and current information on the Superfund site and dredging operations: http://www.epa.gov/hudson/.
In a May, 2009, news release, the EPA stated "The long awaited and historic dredging of the Upper Hudson River to remove PCB-contaminated sediment has begun near Roger's Island in Fort Edward, NY. The first phase of the six-year dredging project is being conducted under an agreement with the General Electric Company."

PCBs are considered a probable carcinogen and can accumulate in fish tissue and regulatory agencies have issued recreational and commercial fishing and fish consumption advisories. The New York State Department of Health recently issued new "2009-2010 Health Advisories for Chemicals in Sport Fish and Game" for the State.

The US Geological Survey (USGS), in cooperation with the New York State Department of Environmental Conservation, operates and maintains a continuous discharge stream-gaging station in Fort Edward, just upstream of Rogers Island (01327750, Hudson River at Fort Edward) (fig. 4). As a part of phase 1 dredging operations, the GE contractor has constructed a rock dyke

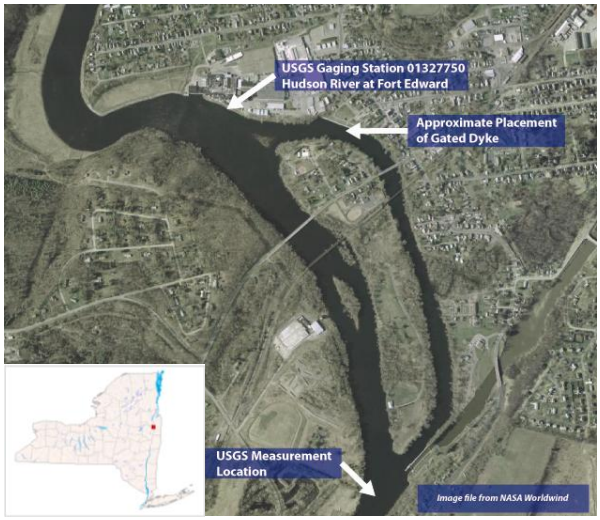

Figure 4. – Map showing Rogers Island in the Hudson River near Fort Edward, New York.

across the east channel of the river around Rogers Island (fig. 4). This dyke, equipped with gated culverts, was suspected of causing a variable backwater effect or change to the stage-discharge relationship for the USGS Fort Edward streamgaging station. There are many stakeholders that depend on the real-time streamflow data provided by the USGS gage, including hydropower generators, commercial navigators, and the EPA and GE contractors that are evaluating loads of PCBs and sediments being resuspended by the dredging operations. The USGS in cooperation with GE developed a plan to measure selected discharges with various culvert gate openings to define the shift to the base stage-discharge relationship for the gage while the dyke is in place.

Figure 5 – USGS staff making an ADCP boat measurement of streamflow downstream from Rogers Island and lock no. 7 to the Champlain Canal.

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The USGS, based on several streamflow measurements, is making adjustments to the stage-discharge relationship for this site to maintain reliable real-time discharge data during dredging operations. Because the Hudson River is highly regulated by many parties, coordinating steady flow conditions for an extended period of time was not feasible, the USGS needed to measure the total flow in the river quickly. The use of a boat mounted Acoustic Doppler Current Profiler (ADCP) allows quick and accurate measurements of discharge in the Hudson River during coordinated periods of relatively steady flow (fig. 5). The ADCP uses sound pulses, similar to radar or sonar, to measure water speed, direction and depth. This technology not only allows for accurate data collection in much less time than more traditional methods, but also provides maneuverability in a heavily navigated river channel.

For more information contact Tom Suro, tsuro@usgs.gov.

Hydrologic Conditions

Surface Water in New York, March to August 2009

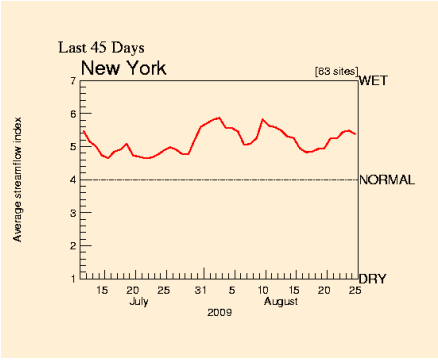
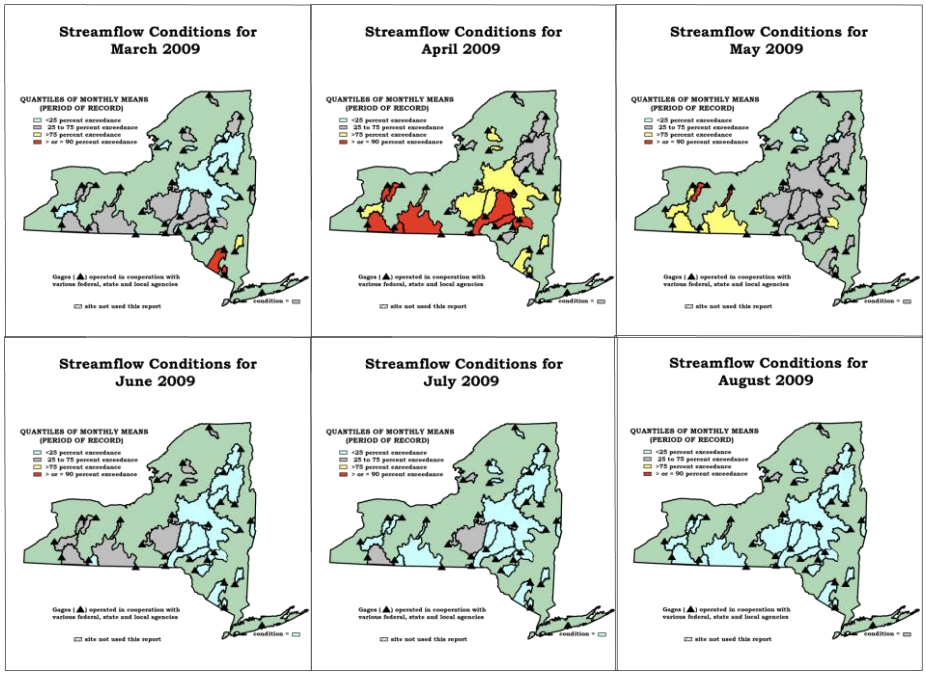


Figure 6. – Index streamflow for NY, July to August 2009, from 83 sites with more than 30 years of record.



Exceedance

0 to 25% 25 to 75% 75 to 90% > 90%

Figure 7 – Average monthly hydrologic conditions from March 2009 (upper left) to August 2009 (lower right) at selected surface-water sites in New York. These maps are available at: http://ny.water.usgs.gov/cgi-bin/eomreports.

Average streamflow conditions across New York State have been above normal over the last couple months as shown in the 45-day graph of index streamflow (fig. 6). Figures from the NOAA Regional Climate Center show that accumulated precipitation over the last 6 months in New York was above normal except for the St Lawrence basin which was normal or slightly below normal. For the 3-month period ending in August much of the state was above normal. In fact, the Albany area was the third wettest summer since record keeping began in 1826.

Streamflow conditions are now (August) well above normal (low exceedance or wet conditions = blue). Based on the average monthly streamflow conditions over the last 6 months, April (for much of the State) and May (in the southern tier) were below normal (high exceedance or dry conditions = yellow or red) but the remaining months were in the normal to wet range as shown in figure 7.

Groundwater in New York, March to August 2009

Similar to surface water, groundwater levels were in the dry to very dry range in April and May but have recovered to be in the normal to wet range from June onward (fig. 8). Most observation wells across the State are currently (August) in the wet range. The NY WSC web page displays real-time and historic groundwater 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 groundwater watch page.

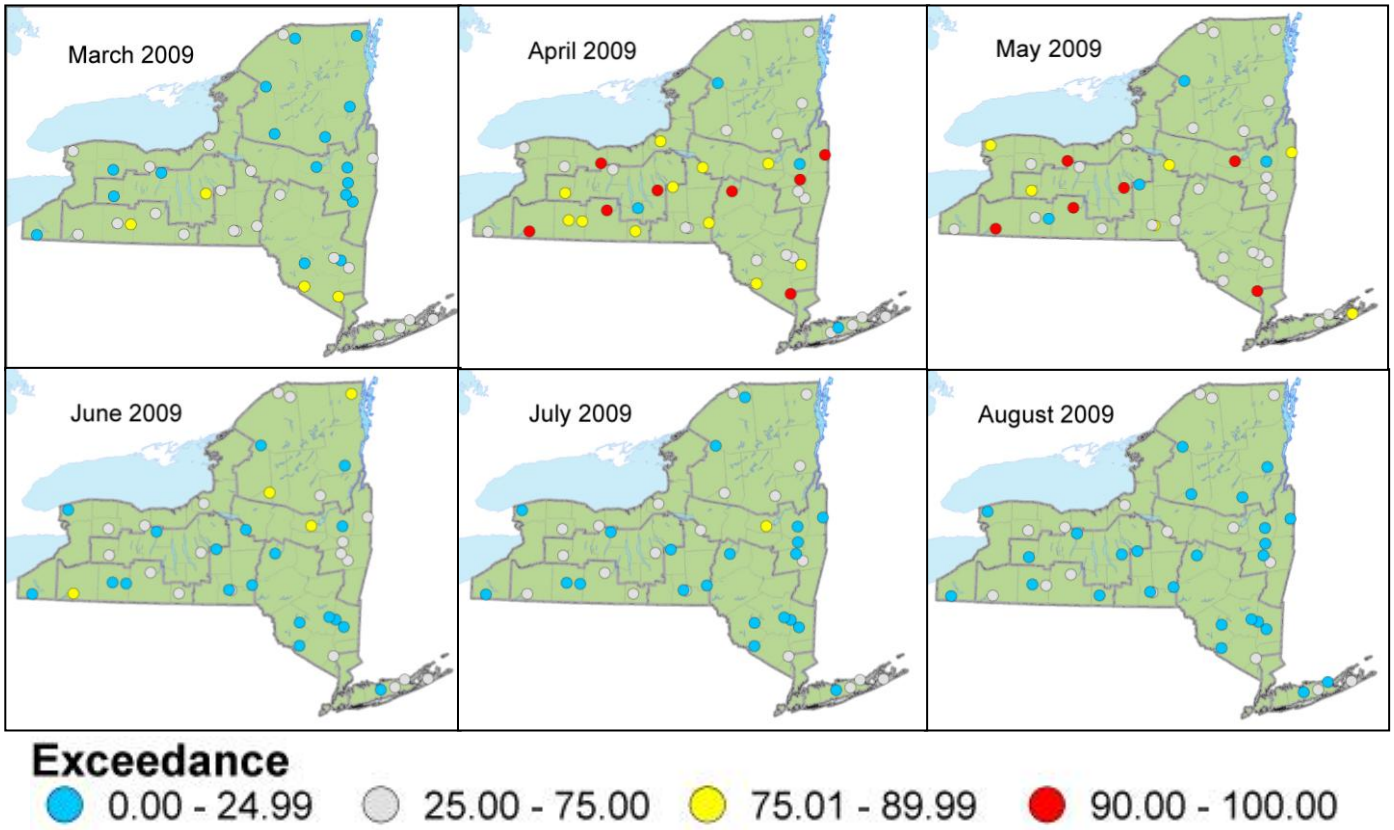


Figure 8. – Monthly hydrologic conditions in selected groundwater wells in New York from March 2009 (upper left) to August 2009 (lower right), showing percent exceedance based on the period of record for the well. Blue dots indicate wet conditions, gray dots indicate normal conditions, yellow dots indicate dry conditions, red dots indicate very dry conditions.

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.

Baldigo, B.P., Lawrence, G.B., Bode, R.W., Simonin, H.A., Roy, K.M., and Smith, A.J., 2009, Impacts of acidification on macroinvertebrate communities in streams of the western Adirondack Mountains, New York: Ecological Indicators, v. 9, p. 226-239.

Bohlke, J.K., Hatzinger, P.B., Sturchio, N.C., Gu, Baohua, Abbene, Irene, and Mroczkowski, S.I., 2009, Atacama perchlorate as an agricultural contaminant in groundwater: isotopic and chronologic evidence from Long Island, New York: Environmental Science and Technology, v 43, no. 15, p. 5619-5625.

Burns, D.A., Boyer, E.W., Elliot, E.M., and Kendall, Carol, 2009, Sources and transformations of nitrate from streams draining varying land uses – Evidence from dual isotope analysis: Journal of Environmental Quality, v. 38, p. 1149-1159.

Kappel, W.M., 2009, Remediation of mudboil discharges in the Tully Valley of central New York: U.S. Geological Survey Open-File Report 2009-1173, 8p.

McHale, M.R., 2008, Mercury in wet-only precipitation in the Catskill Mountains, New York: NYSERDA Data Report 6818, 12p.

Monti, Jack, Jr., Busciolano, R.J., and Terracciano, S.A., 2008, Monitoring groundwater levels, Long Island, NY [abs.]: in Sixth National Monitoring Conference – Monitoring, the key to understanding our waters, May 18-22, 2008, Atlantic City, NJ, p. 264.

Monti, Jack, Jr., Misut, P.E., and Busciolano, Ronald, 2009, Simulation of variable-density groundwater flow and saltwater intrusion beneath Manhasset Neck, Nassau County, New York, 1905-2005: U.S. Geological Survey Scientific Investigations Report 2008-5166, 69 p.

Monti, Jack, Jr., 2009, Water-table and potentiometric-surface altitudes in the Upper Glacial, Magothy, and Lloyd aquifers beneath Long Island, New York, March-April 2006: U.S. Geological Survey Scientific Investigations Map 3066, 4 sheets.

Mulvihill, C.I., Baldigo, B.P., and Ernst, A.G., 2009, Fish communities and habitat of geomorphically stable reference reaches in streams of the Catskill Mountain region, New York: U.S. Geological Survey Scienctific Investigations Report 2009-5047, 43 p., online only.

Siemion, Jason, Murdoch, P.S., and Ellsworth, Alan, 2008, Water quality monitoring in the Upper Delaware Scenic and recreational River [abs.]: in Sixth National Monitoring Conference – Monitoring, the key to understanding our waters, May 18-22, 2008, Atlantic City, NJ, p. 77.

Soeder, D.J. and Kappel, W.M., 2009, Water resources and natural gas production from the Marcellus Shale: U.S. Geological Survey Fact Sheet 2009-3032, 6 p.

Warren, D.R., Ernst, A.G., and Baldigo, B.P., 2009, Influence of spring floods on year-class strength of fall and spring spawning salmonids in Catskill Mountain streams: Transactions of the American Fisheries Society, v. 138, p. 200-210.

Williams, J.H. and Knutson, K.D., 2009, Integrated analysis of flow, temperature, and specific-conductance logs and depth-dependent water-quality samples in three deep wells in a fractured-sandstone aquifer, Ventura County, California: U.S. Geological Survey Open-File Report 2009-1023, 10 p., online only.

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 groundwater 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.

USGS New York Water Science Center, Senior Staff:

Vacant, Director, (518) 285-5658
Ward O. Freeman, Acting Director, (518) 285-5665
Edward Bugliosi, Ithaca Program Office Chief, (607) 266-0217 ext 3005
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Techniques for Evaluating Water Resources in the Finger Lakes

Tuesday, October 13, 2009

Hobart and William Smith Colleges
Geneva, New York

The United States Geological Survey, in partnership with the Finger Lakes – Lake Ontario Watershed Protection Alliance and the Finger Lakes Institute will be sponsoring a conference on October 13, 2009 in the Vandervort Room on the Hobart and William Smith Colleges campus in Geneva, New York. The conference will highlight techniques for evaluating water resources in the Finger Lakes and provide opportunities to share data and experiences with peers.

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