

U.S. Geological Survey New York Water Science Center Strategic Science Plan, 2005-2010

This Strategic Science Plan (henceforth the Science Plan or Plan) identifies environmental and resource management problems, needs, and issues important to the State of New York and the Nation. The Science Plan will provide direction for the USGS New York Water Science Center (the Center or WSC) and also will help guide future training and hiring decisions. Collectively, the Center's Science Plan and workforce plan, and other USGS planning documents, outline steps needed to successfully accomplish USGS vision and mission goals for the next 5 years and beyond. Most work conducted by the New York Water Science Center is funded by other Federal, State, or local agencies through the [Cooperative Water Program](#).

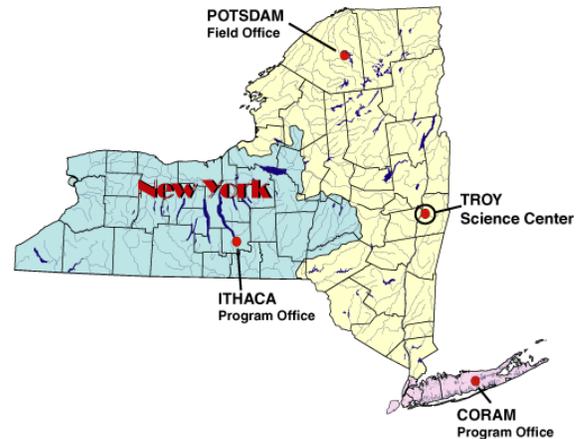


Figure 1.—USGS New York Water Science Center offices and areas of responsibility in New York State.

The Science Plan was prepared by the senior staff of the Center, and was founded on the mission of the USGS, the vision of the Center, and several guiding principles considered essential to the success of the USGS program. These principles are: (1) know the needs of cooperators and other customers, (2) promote a high level of science in the Center, (3) hire and maintain a highly qualified staff, and (4) communicate information that is timely, accessible, and easily understood. Input from 45 representatives of cooperating agencies factored heavily into the development of the Science Plan, as did input from the USGS staff of the Coram, Ithaca, and Troy offices (fig. 1). Input from cooperators was gathered by questionnaires and interviews between October 2004 and January 2005; staff input was gathered in brainstorming and discussion sessions during January 2005.

The Mission of the USGS is to serve the Nation by providing reliable scientific information to:

- describe and understand the Earth;
- minimize loss of life and property from natural disasters;
- manage water, biological, energy, and mineral resources; and
- enhance and protect our quality of life.

The Vision of the New York Water Science Center is to expand its role as a principal provider of hydrologic data and information essential to protecting and managing the State's water resources. The information the USGS provides is policy relevant but impartial. The data and information are important to a range of Federal, State, County, and local government policy makers, resource managers, scientists, and the public. The Center will maintain a leadership role in the scientific and water-resources community by:

- Providing high quality and timely reports, data, and information that are accessible (both easy to obtain and easy to understand) to cooperators and the public;
- Staying current on technological and scientific advances, and environmental and natural-resources issues;
- Being the first choice of cooperators, science educators, government officials, and the public for environmental science and water-resource information and data;
- Providing data and results that meet cooperator needs and exceed their expectations; and
- Providing a healthy, safe, and pleasant work environment for its employees, providing opportunities for professional development and career advancement.

Diversity of Geography, Development, and Programs

USGS water programs in New York State are diverse and reflect the diverse physical and cultural geography of the state. They also reflect the scientific, technical, and management needs of numerous local, county, state, and federal agencies, and the various levels of government at which water resources are managed and protected. Brief overviews of the physical geography, population, and development of New York, particularly as related to water resources, are presented below.

Physical Geography

New York is one of the larger eastern states and encompasses parts of several major physiographic regions, including the Central Lowland, St. Lawrence valley, Adirondack province, Appalachian Plateau province (which includes the Catskill Mountains), Valley and Ridge province, and Coastal Plain. The regions differ appreciably in topography, hydrology, and geology. Accordingly, land cover, land use, and population density vary markedly across the state. The coasts of both the Great Lakes and Atlantic Ocean are important resources to the state.

New York is primarily a headwater state. That is, most major rivers in New York originate in the state and flow to adjacent states, the Great Lakes, Canada, and the Atlantic Ocean. For example, the Genesee and Oswego Rivers flow north into Lake Ontario, the Susquehanna and Delaware Rivers flow south into Pennsylvania and New Jersey, and the Hudson River flows south to the Atlantic. Relatively little surface water flows into New York from adjacent states or Canada.

The principal aquifers in New York consist of: 1) discontinuous, unconsolidated glacial stratified-drift deposits composed of sand and gravel; 2) unconsolidated coastal-plain deposits on Long Island; and 3) sandstone and carbonate bedrock. Other types of bedrock and glacial till cover large areas of the state but are generally low yielding and typically only serve rural residents relying on private wells.

Annual precipitation amounts in New York differ spatially. The minimum is about 30 inches in the lowlands bordering Lake Ontario, and the

maximum is greater than 60 inches in areas of the Adirondack and Catskill Mountains. Eastward-moving frontal storms are most common from October through March. In April through September there are fewer frontal storms, but convective storms increase during this time. Precipitation is approximately evenly distributed throughout the year. Historically, the greatest flooding in the state has been caused by rain on a melting snow pack and by hurricanes.

Population, Development, and Water-Resources

Population and development vary greatly in New York State, from New York City, one of the country's largest metropolitan areas, to wilderness areas in the Adirondack Mountains (fig. 2).

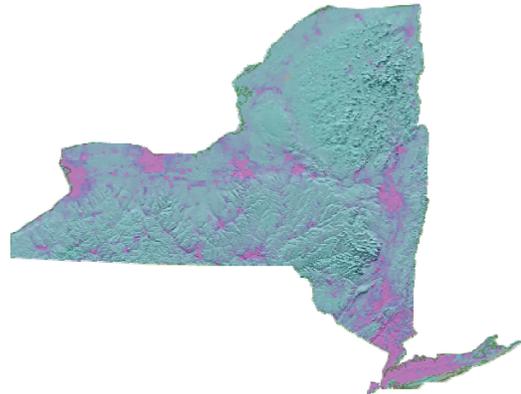


Figure 2.—Population density in New York State, based on 2000 census data.

The State is commonly considered by its residents to consist of two distinct areas--Downstate and Upstate. Downstate generally refers to New York City metropolitan area, including Long Island; Upstate refers to all areas of the state north of the New York City metropolitan area. Surface water is the primary source of drinking water supply in New York State and serves about two-thirds of the State's nearly 19 million residents. Ground water is the source of supply for the remaining third, about half of whom live on Long Island.

More than half of New York's residents live Downstate. Consequently, large portions of the state's political power and economic resources are concentrated in a small geographic area. New York City obtains its water supply from a large reservoir system, which is located Upstate in the Hudson and Delaware River basins (fig. 3). Ninety percent of

the water comes from the Delaware and Catskill systems west of the Hudson River; the balance comes from the Croton system east of the Hudson. The entire system supplies about 9 million people.

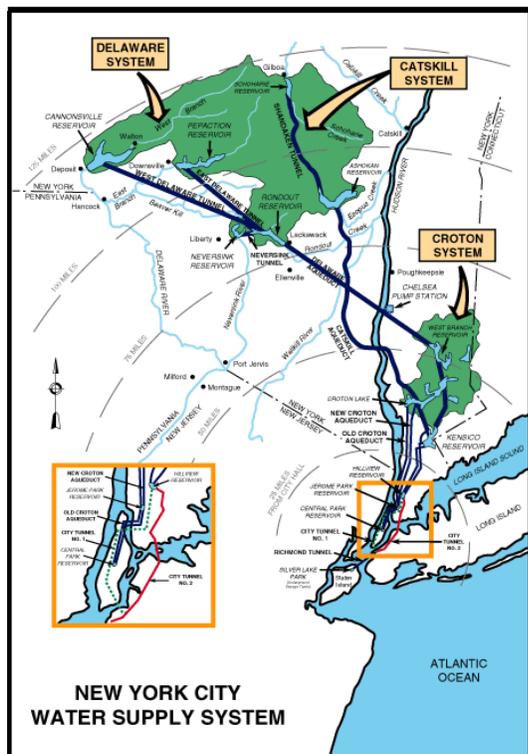


Figure 3.—New York City water-supply watersheds, showing both West of Hudson and East of Hudson

The US Environmental Protection Agency (EPA) in 1997 issued a filtration avoidance determination (FAD) for New York City’s water supply west of the Hudson River because of the high quality of the supply. In 2002 the FAD was extended until 2007. Nassau and Suffolk Counties on Long Island, with a combined population of over 2.8 million people, rely on the large underlying aquifer system as their sole source of water. Management and protection of the New York City watersheds, the Long Island aquifer system, and the surrounding marine waters encompass some of the largest water-resource issues confronting New York. Cooperating agencies in the Downstate area are politically active, technically capable, and generally have substantial fiscal resources.

Upstate New York has several, widely-separated, population centers, which include Buffalo, Rochester, Syracuse, and Albany, but most of Upstate New York is dominated by agricultural lands and woodlands. Many of the larger communities rely on surface water supplies; many smaller communities use valley-fill aquifers as their

water supply. Agriculture is one of the largest industries in the Upstate area, particularly in central and western New York. The Adirondack and Catskill Mountains occupy much of the eastern Upstate area and are sparsely populated. Because the Catskill region is the principal source of New York City’s water supply, protection of watersheds in the area is a subject of utmost concern. The Hudson River Valley, particularly southern sections, is more densely populated and developed than other areas of eastern New York, and because it drains into the NYC metropolitan area and is tidal up to Troy, it has some unique water issues. Upstate communities and counties have fewer fiscal and political resources than the Downstate area.

Major Water-Resources Issues

The Science Plan categorizes New York State’s important water-resources issues and needs into several broad programmatic areas that reflect important societal needs. In many cases, the program areas are interrelated and overlap. More detail about each of these major programmatic areas are presented in separate program-specific plans, which document program opportunities, goals, and actions. A brief description of all projects currently being conducted by the Center can be found on the web at <http://ny.usgs.gov>

Water Availability and Sustainability

New York is a relatively water-rich state, and historically, its water-resources have been considered adequate to meet needs. Locally, however, increasing water use may be exceeding the sustainable yield of supplies. Drought can also lead to short-term water shortages both locally and statewide, as was last experienced in 2001 and 2002. New questions are being raised about competing water needs as population and development increases, contamination restricts the use of some water supplies, competing human and ecological needs are identified, and water needs for waste assimilation continue to increase. Reliable and accurate information are needed to properly manage and ensure a safe and sustainable water supply that meets all New York’s needs.

The New York WSC will provide the information needed to understand water use and availability, to identify areas at risk from contamination or over

use, and to assist managers in assessing opportunities or limitations to expansion.

Environmental Quality and Human Health

Environmental quality and human health are closely intertwined and are grouped for purposes of this plan. Some environmental causes of human disease are naturally occurring, such as radon and arsenic, but most environmental causes are linked to contamination. Water and air contamination are the most generally recognized adverse effects of man on the environment, and both can adversely affect human health.

The water-related issues falling under this broad category include such things as: 1) surface- and ground-water contamination associated with agriculture, urban development, wastewater disposal and other sources; 2) atmospheric deposition, including mercury contamination and acid rain; 3) contaminated sediments; and 4) aquatic habitat degradation. Contaminants include a large number of microorganisms and compounds, such as, nutrients, metals, pesticides, volatile organic compounds, and newly recognized “emerging” contaminants, which include pharmaceuticals, hormones, personal care and household products, and many other synthetic organic compounds.

The New York WSC will maintain a high level of expertise in water-quality sampling and data analysis and remain a primary source of information on the quality of the New York’s waters.

Hydrologic Systems, Surveillance, and Hazards

The U.S. Geological Survey has the principal responsibility within the Federal Government to provide the hydrologic information and understanding needed by others to achieve the best use and management of the Nation’s water resources. Part of this mission includes the responsibility of minimizing the loss of life and property from natural disasters such as floods and droughts.

The USGS has a nationwide network of ground-water and surface-water monitoring sites. In New York there are 374 surface-water sites and over 600 ground-water sites (in 2005). These provide the basis for the State’s flood warning system, drought monitoring system, and flood inundation mapping.

These networks are the foundation for water-resource management throughout the State and Nation.

The New York WSC will work to maintain its leadership in providing ground- and surface-water resource information for the State and Nation. The quality of the hydrologic information provided by the USGS will be the standard to which others are compared. The New York WSC will strive to be on the forefront of hydrologic research and related technical advances.



Figure 4.—Deployment of water velocity and sediment monitoring equipment on the bottom of the Hudson River.

Communication, Information Management, and Science Support

The USGS Mission is to “provide reliable scientific information.” Our ability to manage and communicate that information is critical to accomplishing our mission. The New York WSC must continually evaluate and improve how information is presented and conveyed. This evaluation requires asking our cooperators and stakeholders on a regular basis how we are doing and how we can do better.

For More Information

If you would like additional information or would like to provide suggestions for improvement of the New York WSC’s science program or operations, please contact:

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