U.S. GEOLOGICAL SURVEY

WATER-RESOURCES ACTIVITIES IN NEW YORK - 1985-86

Compiled by

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Open-File Report 86-146

Albany, New York

1986

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

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INTRODUCTION

The U.S. Geological Survey was established by an act of Congress on March 3, 1879, to provide a permanent Federal Agency to conduct the systematic and scientific "classification of the public lands, and examination of the geological structure, mineral resources, and products of national domain." An integral part of that original mission includes publishing and disseminating the earth-science information needed to understand, to plan the use of, and to manage the Nation's energy, land, mineral, and water resources.

U.S. Geological Survey Programs

Since 1879, the research and fact-finding role of the USGS has grown and been modified to meet the changing needs of the Nation it serves. As part of that evolution, the USGS has become the Federal Government's largest earth-science research agency, the Nation's largest civilian mapmaking agency, the primary source of data on the Nation's surface- and ground-water resources, and the employer of the largest number of professional earth scientists. Today's programs serve a diversity of needs and users. Programs include:

- Conducting detailed assessments of the energy and mineral potential of the Nation's land and offshore areas.
- Investigating and issuing warnings of earthquakes, volcanic eruptions, landslides, and other geologic and hydrologic hazards.
- Conducting research on the geologic structure of the Nation.
- Studying the geologic features, structure, processes, and history of the other planets of our solar system.
- Conducting topographic surveys of the Nation and preparing topographic and thematic maps and related cartographic products.
- Developing and producing digital cartographic data bases and products.
- Collecting data on a routine basis to determine the quantity, quality, and use of surface water and ground water.
- Conducting water-resource appraisals to describe the consequences of alternative plans for developing land and water resources.
- Conducting research in hydraulics and hydrology, and coordinating all Federal water-data acquisition.
- Using remotely sensed data to develop new cartographic, geologic, and hydrologic research techniques for natural resources planning and management.
- Providing earth-science information through an extensive publications program and a network of public access points.

Along with its continuing commitment to meet the growing and changing earth-science needs of the Nation, the USGS remains dedicated to its original mission to collect, analyze, interpret, publish, and disseminate information about the natural resources of the Nation--providing "Earth Science in the public Service."

Water Resources Division's Mission and Program

The mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the optimum use and management of the Nation's water resources for the overall benefit of the people of the United States.

This is accomplished, in large part, through cooperation with other Federal and non-Federal agencies by:

- Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

- Conducting analytical and interpretive water-resource appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface water and ground water.

- Conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques and to understand hydrologic systems sufficiently well to quantitatively predict their response to stress, either natural or manmade.

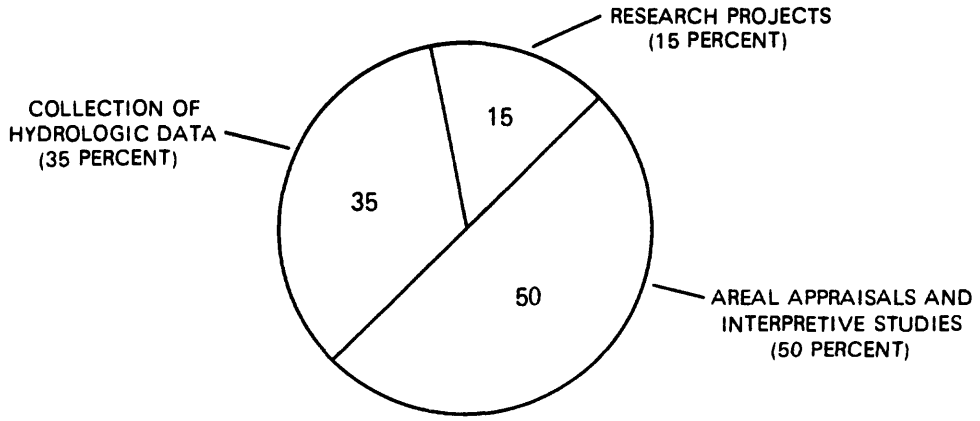
- Disseminating the water data and the results of these investigations and research through reports, maps, computerized information services, and other forms of public releases.

- Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground water.

- Providing scientific and technical assistance in hydrologic fields to other Federal, State and local agencies, to licensees of the Federal Power Commission, and to international agencies on behalf of the Department of State.

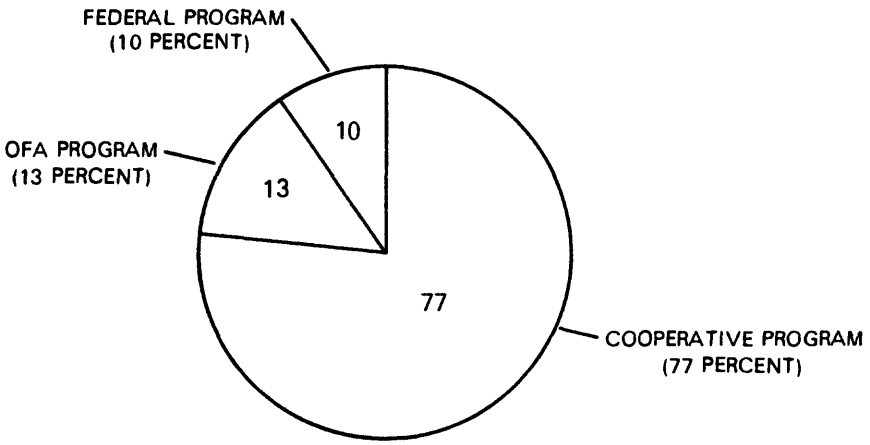
Types of Funding

The diagram below shows the percentage of the investigations for fiscal year 1985 in each of the broad categories of collection of hydrologic data, areal appraisals and interpretive studies, and research projects:



These investigations are directed toward obtaining the information needed by managers and planners for the solution or alleviation of water problems in New York.

The investigations are supported by funds provided by State and local units of government and federal funds from the U.S. Geological Survey and other federal agencies (OFA program). About 80 percent of the federal funds contributed by the U.S. Geological Survey are used to match, on a 50-50 basis, the funds contributed by the State and other local units of government. In fiscal year 1985, the financial support for these programs in New York was about $6.1 million, which was distributed as follows:



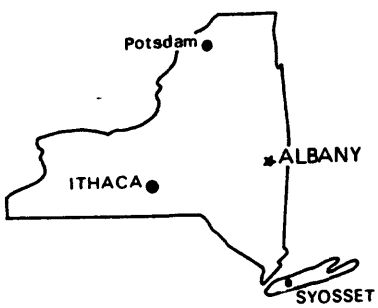
NEW YORK DISTRICT

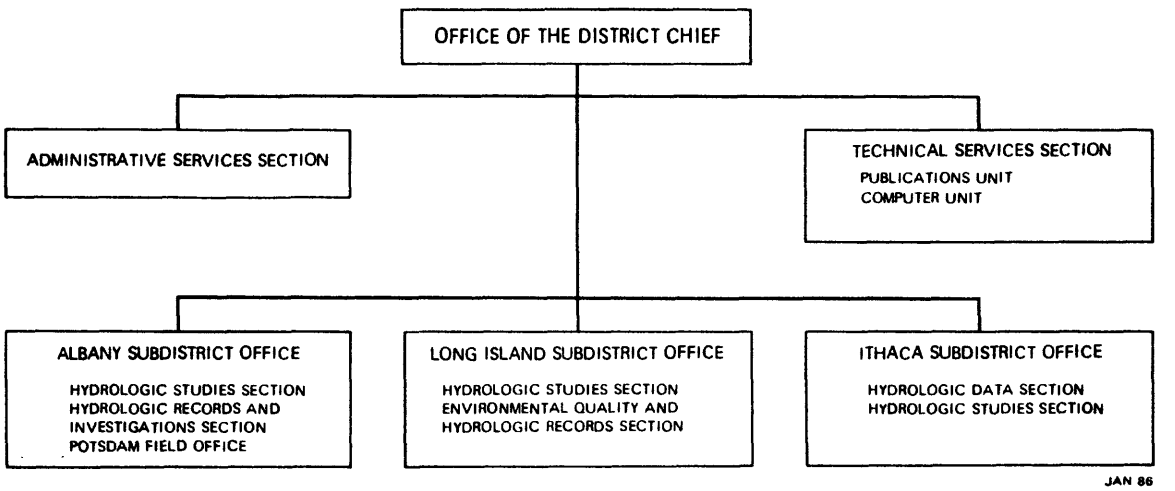
The following sections describe the water-resources investigations conducted by the U.S. Geological Survey in New York in 1985; many of these studies will continue into 1986 or longer.

The Geological Survey began its water-resources studies in New York State in 1895 with a stream-gaging program in the Catskill Mountain region and entered its first cooperative program, with the Office of the State Engineer, in 1900. The Survey has maintained a District office in Albany since 1910 to direct its water investigations within the State and has maintained a subdistrict office on Long Island since 1932 to study and monitor the groundwater situation in this area of increasing urbanization. The Survey also maintains subdistrict offices in Ithaca and Albany to collect and interpret data from western and eastern New York, respectively, and maintains a field station in Potsdam to collect records in the northernmost part of the State.

The staff of the New York District numbers about 100. The professional hydrologists represent a variety of scientific and technical backgrounds that include engineering, chemistry, geology, mathematics, physics, biology, and soil science. The hydrologists are assisted by experienced engineering and hydrologic technicians who provide support service in the collection and analysis of field data, and by specialists in computer, publication, and administrative services.

The office addresses and organization chart are given on page 5; the office locations are shown in the map below. A partial list of staff members is given on page 56.





NEW YORK DISTRICT OFFICE ADDRESSES

Inquiries regarding projects described in this section may be directed to the District Office or Subdistrict Office in which the work originated.

District Office	(518) 472-3107	U.S. Geological Survey Water Resources Division U.S. Post Office & Courthouse P.O. Box 1669 Albany, N.Y. 12201
Albany Subdistrict Office	(518) 472-3108	U.S. Post Office & Courthouse P.O. Box 1397 Albany, N.Y. 12201
Ithaca Subdistrict Office	(607) 272-8722	521 West Seneca Street Ithaca, N.Y. 14850
Long Island Subdistrict Office	(516) 938-8830	5 Aerial Way Syosset, N.Y. 11791
Potsdam Field Headquarters	(315) 265-4410	Route 2 Sandfordville, N.Y. 13676

Figure 1.--New York District organization chart with office addresses. *(List of staff members is on page 56.)*

PROJECTS IN 1985-86

Projects conducted by the New York District during 1985-86 are described on the following pages. They are grouped by office location and are given in numerical order by project number. (See list on p. iii-iv.)

ALBANY OFFICE

Surface-Water Stations
(NY 00-001)

Period of Project: Continuous since June 1898

Project Leader: Thomas J. Zembrzuski, Jr.

Field Location: Statewide

Principal Cooperating Agencies: New York State Department of Environmental Conservation; U.S. Army Corps of Engineers; City of New York, Department of Environmental Protection; Nassau County Department of Public Works; Suffolk County Department of Environmental Control; Suffolk County Water Authority; National Weather Service; New York Power Authority; Hudson River-Black River Regulating District; Westchester County Department of Public Works

Problem: Surface-water information is needed for surveillance, planning, design, hazard warning, structure operation, and water management for purposes such as water supply, hydroelectric power, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water-resources development. An appropriate data base is necessary to provide this information.

Objective: (1) To collect surface-water data for such purposes as (a) assessment of water resources, (b) operation of reservoirs or industries, (c) forecasting of stage or discharge, (d) pollution controls and disposal of wastes, (e) discharge data to accompany water-quality measurements, (f) compact and legal requirements, and (g) research or special-purpose studies. (2) To collect data to define the properties and trends of water in streams, lakes, and estuaries.

Approach: To use standard methods of data collection as described in the series, "Techniques of Water Resources Investigations of the United States Geological Survey" and to use partial-record gaging instead of complete-record gaging where it serves the required purpose.

Progress and Significant Results: Operation and maintenance of the surface-water network continued. In 1985 the network consisted of 182 continuous-record discharge stations and 19 continuous-record stage stations. By March 1986, 38 gaging stations has been equipped with GOES (Geostationary Orbiting Earth Satellite) DCP's (data-collection platforms.) Thus far, DCP's have been concentrated in the Susquehanna, Genesee, and Delaware River basins.

Plans for Next Year: A need for surface-water data for management of two separate activities is resulting in a growth of the gage network during late 1986 and 1987. The first is an improved flood-warning system for the Susquehanna River basin, which requires 12 new gaging stations in the basin, all equipped with DCP's; the second is associated with the Federal Energy Regulatory Commission to obtain data on streamflow at many older hydroelectric plants that are due for relicenscing.

Completed Reports:

U.S. Geological Survey, Water resources data - New York: U.S. Geological Survey Water-Data Report, v. 1, Eastern New York excluding Long Island; v. 2, Long Island; v. 3, Western New York. (Published annually.)

Ground-Water Stations (NY 00-002)

Period of Project: Continuous since July 1934

Project Leader: Roger M. Waller

Field Location: Statewide

Principal Cooperating Agencies: New York State Department of Environmental Conservation; Suffolk County Department of Environmental Control; Suffolk County Water Authority; Nassau County Department of Public Works

Problem: Long-term water-level records are needed to evaluate the effects of climatic variations on recharge to and discharge from aquifers and to provide a data base from which to measure the effects of development, assist in the prediction of future supplies, and provide data for water management.

Objectives: (1) To collect water-level data sufficient to provide a long-term data base so that the general response of the hydrologic system to climatic variations and induced stresses can be known and potential problems defined early enough to allow proper planning and management. (2) To provide a data base against which the short-term records acquired in areal studies can be analyzed. Such analyses provide for assessment of ground-water conditions and trends, enable prediction of future conditions, detect and define supply or contamination problems, and provide the general data base necessary for ground-water management.

Approach: To determine the most advantageous locations for long-term ground-water observations and to refine this network as records become available and as detailed areal studies more closely define the aquifers, their properties, and the stresses to which they are subjected.

Progress and Significant Results: Collection and compilation of water levels at over 1,000 Long Island and 46 upstate sites continued in a network of water-level stations to obtain basic hydrologic data needed by other interested agencies. These data have played a significant role in helping water managers on Long Island formulate long-term goals leading to conservation of the Long Island ground-water reservoir. The upstate data are used by State agencies to evaluate monthly trends in ground-water levels. These data are published annually.

Plans for Next Year: (1) To define areas where long-term records would be desirable and develop a priority list for establishing new stations should funds become available in the near future. (2) To continue operation of the basic network with revision as needed to supply future water data in the most useful form. (3) To continue to publish the data annually. (4) To continue to document water-level changes in major aquifers and evaluate water-level trends caused by increasing urbanization on Long Island.

Reports Completed Since 1980:

Donaldson, C. D., and Koszalka, E. J., 1983, Water table on Long Island, New York, March 1979. Potentiometric surface of the Magothy aquifer, Long Island, New York, in March 1979. Potentiometric surface of the Lloyd aquifer, Long Island, New York, in January 1979: U.S. Geological Survey Open-File Reports 82-163, 82-160, and 82-162, respectively; 2 sheets each.

Doriski, T. P., Potentiometric-surface altitudes of major aquifers on Long Island, New York, in 1983: U.S. Geological Survey Water-Resources Investigations, 8 sheets (in press).

Smolensky, D. A., 1984, Potentiometric surfaces on Long Island, New York--a bibliography of maps: U.S. Geological Survey Water-Resources Investigations Report 84-070, 31 p.

U.S. Geological Survey, Water resources data - New York: U.S. Geological Survey Water Data Report, v. 1, Eastern New York excluding Long Island, v. 2, Long Island, v. 3, Western New York. (Published annually.)

Water-Quality Stations
(NY 00-003)

Period of Project: Continuous since June 1906

Project Leader: Roger J. Archer

Field Location: Statewide

Principal Cooperating Agencies: New York State Department of Environmental Conservation; Suffolk County Department of Health Services; Suffolk County Water Authority; Nassau County Department of Public Works; City of New York, Department of Environment Protection

Problem: Water-resource planning and water-quality assessment require a statewide and nationwide level of information on the chemical and physical quality of surface water and ground water.

Objective: To create a statewide and nationwide bank of water-quality data for Federal, State, and local planning and to provide such data where they will support other projects within the New York district.

Approach: To maintain and operate a statewide network of water-quality stations, as part of a nationwide network, to provide data on concentrations, loads, and time trends of chemical constituents of surface water and ground water and to provide water-temperature data for management purposes.

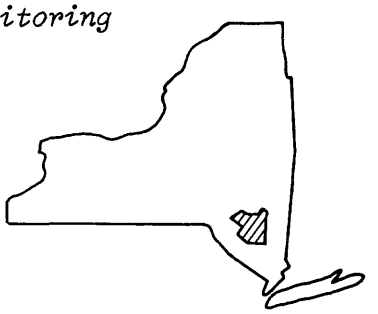
Progress and Significant Results: Samples were collected and analyzed by the U.S. Geological Survey at 15 National Stream Quality Accounting Network (NASQAN) stations, 1 Hydrologic Benchmark Network (HBN) station, 6 jointly funded surface-water stations, 2 precipitation-quality stations, and 32 wells. In addition, samples were collected at 11 surface-water stations and 8 wells and analyzed by a cooperator. Continuous recorders were operated at 13 stations to obtain water-temperature data. Specific conductance and water temperature were measured once daily at one station. Water-quality data for the 1984 water year were published in the annual data report.

Plans for Next Year: Collection of water-quality data will continue at about the same level as last year. Data from the 1985 water year will be published in the annual data report.

Reports Completed Since 1980:

U.S. Geological Survey, Water resources data - New York: U.S. Geological Survey Water Data Report, v. 1, Eastern New York excluding Long Island; v. 2, Long Island; v. 3, Western New York. (Published annually.)

National Trends Network (NTN) for Monitoring Atmospheric Deposition (NY 83-005)



Period of Project: Continuous since June 1983

Project Leader: Peter S. Murdoch

Field Location: Biscuit Brook, Ulster County

Problem: A nationwide long-term monitoring network needs to be developed and maintained to detect and measure atmospheric deposition.

Objective: To document weekly variations in atmospheric deposition and collect wet deposition for analysis for elements and compounds that contribute to the chemical composition of surface waters.

Approach: To (a) set up monitoring stations as part of the National Trends Network; (b) maintain stations, make onsite measurements, process samples, and submit them to a laboratory; (c) verify data retrievals, and (d) prepare report on results.

Progress and Significant Results: Two years of monitoring were completed. Five storms were sampled despite drought conditions. The relationship between stream chemistry and change in flow is dependent on the season; variability is greatest in the spring. Several streams in the southern Catskills have a low

buffering capacity that can be decreased to zero by spring runoff. Acidity in the streams studied appears to be inorganic.

Plans for Next Year: To continue monitoring and sequential sampling at Biscuit Brook until five more storms have been monitored, and to install a gage and automated sampler at Rondout Creek.

Flood-Insurance Studies for Federal Emergency Management Agency (NY 84-006)

Period of Project: July 1972 through September 1979; October 1983 through September 1986

Project Leader: David A. Stedfast

Field Location: Statewide

Cooperating Agencies: Federal Emergency Management Agency

Problem: The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 provide for the operation of a Flood Insurance Program. The Federal Emergency Management Agency (FEMA) needs flood studies in selected areas to determine the applicable flood-insurance premium rates.

Objective: To conduct the hydrologic and hydaulic studies of areas assigned by FEMA and to present the results in an appropriate format to the accuracy specified by FEMA.

Approach: (1) To conduct surveys by ground and (or) photogrammetric methods, (2) To develop flood-discharge-frequency relationships from local historic information, gaging-station records, and applicable reports. (3) To develop water-surface profiles through step-backwater models for inclusion in reports to be published by FEMA.

Progress and Significant Results: Studies were completed for the Towns of Cohecton, Delaware, Fremont, Highland, Tusten, Colchester, Woodbury, and Deer Park. Time and cost meetings were held for the Towns of Owasco and Walton.

New York Water-Use Data (NY 79-007)

Period of Project: Continuous since January 1979

Project Leader: Deborah S. Snavely

Field Location: Statewide

Cooperating Agencies: New York State Department of Environmental Conservation

Problem: The demand for water in New York State is unevenly distributed. Although records of available water supply have been collected for many years, little information is available on water use. Because increasing competition for local supplies could lead to shortages, it is necessary to know the present uses, how use may vary with demands, and how the availability and nature of the resources vary with demand.

Objectives: (1) To identify agencies and groups that collect water-use data on local, State, and Federal levels. (2) To evaluate the completeness of available data and identify terms that need to be derived or calculated. (3) To determine which categories of water-use data are not being collected and develop methods of collecting them. (4) To compile, computerize, and disseminate these data in formats suitable for analysis and planning. (5) To evaluate the effects of water use on the quantity and quality of the resource in selected areas.

Approach: Information from the files of local, State, and Federal agencies that collect water-use data will be evaluated for completeness and usefulness to the State Water-Use Data System (SWUDS) computer program. Each category (such as public water supply, industrial water use, commercial, etc.) will be analyzed for availability of data. Methods will be identified for collecting statewide data in each category. Some geographically smaller areas such as counties or river basins may be selected for special data collection and analysis. The information will be computerized and reports written.

Progress and Significant Results: Water-use data on public water suppliers and domestic use statewide were collected. Data in the categories of industrial, agricultural, irrigation, and electrical power generation are being collected and processed. The State Water-Use Data System computer program has been loaded onto the USGS computer in Albany, and is being used. The public-water supply data were analyzed and a report written. A summary report containing industrial-commercial and public-water supply usage figures for Nassau County was published.

Plans for Next Year: Water-use data from all categories of withdrawal will be collected and loaded into the SWUDS computer storage. Aggregations by county and hydrologic unit will be retrieved and compiled for publication.

Completed reports:

Snavely, D. S., and Williams, James, 1985, Estimated public-water supply and industrial-commercial ground-water withdrawals and return in Nassau County, Long Island, New York, 1973-79: U.S. Geological Survey Water Resources Investigations Report 84-4246, 16 p.

Flood Investigations
(NY 67-045)

Period of Project: Continuous since July 1966

Project Leader: Richard Lumia

Field Location: Statewide

Cooperating Agency: New York State Department of Transportation

Problem: Flooding is a serious problem in many parts of the State. Information on flood occurrences and analyses of flood data are needed for use in the design of bridges, highways, and buildings and in flood-plain zoning and flood-protection works.

Objective: To (a) provide information on magnitude and frequency of floods to agencies and individuals involved in flood-protection planning and design; (b) develop regional flood-frequency relationships for the entire State; and (c) make site studies.

Approach: To (a) collect flood data at crest-stage stations and publish annual peak discharges; (b) calculate discharges of floods, develop flood profiles, and collect information for flood-plain mapping; (c) prepare reports covering individual floods; and (d) make analyses to improve flood-frequency relationships for the State.

Progress and Significant Results: Significant flooding occurred December 29-30, 1984, throughout northern New York State. Several major basins experienced peak discharges with recurrence intervals greater than 100 years. Flood profiles were obtained for the Black and Salmon Rivers. The flooding will be documented in a report currently being prepared.

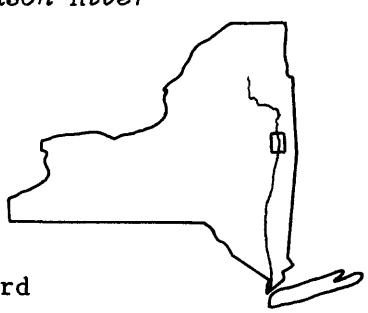
Plans for Next Year: (1) To publish a report documenting the December 1984 flooding throughout northern New York Sate. (2) To continue collection of flood data at crest-stage gages and publish annual peak flows.

Reports Completed Since 1980:

Lumia, Richard and Johnston, W. H., 1984, Floods of August 7-8, 1979, in Chautauqua County, New York, with hydraulic analysis of Canadaway Creek in the Village of Fredonia: U.S. Geological Survey Water-Resources Investigations Report 83-4211, 16 p.

Robideau, J. A., Burke, P. M. and Lumia, Richard, 1984, Maximum known stages and discharges of New York streams through September 1983: U.S. Geological Survey Open-File Report 83-927, 83 p.

Polychlorinated Biphenyl Transport in Upper Hudson River (NY 77-046)



Date Project Began: February 1977

Date Project Ends: September 1986

Project Leader: Charles R. Barnes

Field Location: Hudson River from Fort Edward to Waterford

Cooperating Agency: New York State Department of Environmental Conservation

Problem: The industrial discharge of PCBs into the upper Hudson River has degraded the water quality. Although PCB discharges ceased in 1977, contaminated riverbed sediments continue to release PCBs to the overlying waters.

Objectives: (1) To study the role of four reaches of the nonestuarine upper Hudson River in contributing PCBs to the estuary. (2) To establish a data base on the chemical quality of Hudson River water before dredging.

Approach: Loading of PCBs in the upper Hudson River is calculated from measurements of concentration and discharge, and results are compared for each year since 1977 to determine changes and to establish a data base on chemical quality of the river before dredging to remove contaminated sediments begins.

Progress and Significant Results: Hydrologic conditions of the river determine which of two mechanisms are responsible for the introduction of PCBs into the water column. At low flow, PCBs desorb and diffuse from the bottom sediments, while at high flow PCBs are associated with suspended sediments. Results from four sampling sites indicate an 80-percent reduction in PCB-transport rates during low flows since 1977. At high flows, a 50-percent reduction during the same period is indicated.

Plans for Next Year: Monitoring will continue in 1986 at about the same level as during 1977-85.

Completed Reports:

Schroeder, R. A. and Barnes, C. R., 1983, Polychlorinated biphenyl concentrations in Hudson River water and treated drinking water at Waterford, New York: U.S. Geological Survey Water-Resources Investigations Report 83-4188, 13 p.

_____ 1983, Trends in polychlorinated biphenyl concentrations in Hudson River water five years after elimination of point sources in 1976: U.S. Geological Survey Water-Resources Investigations Report 83-4206, 28 p.

Sloan, R. J., Simpson, K. W., Schroeder, R. A. and Barnes, C. R., 1983, Temporal trends toward stability of Hudson River PCB contamination: Bulletin Environmental Contamination and Toxicology, v. 31, p. 377-385.

Sloan, R. J., Brown, M. P., Brandt, R. J. and Barnes, C. R., 1984, Hudson River PCB relationship between resident fish, water, and sediments: Northeastern Environmental Science, v. 3, p. 138-152.

Turk, J. T., 1980, Applications of Hudson River basin PCB transport studies, in Baker, R. L., ed., Contaminants and sediments: Ann Arbor Science Publishers, v. 1, p. 171-183.

Turk, J. T. and Troutman, D. E., 1981, Relationship of water sources to water quality in the Hudson River, New York, during peak discharges to geologic characteristics of contributing subbasins: U.S. Geological Survey Water-Resources Investigations Report 80-108, 15 p.

_____ 1981, Polychlorinated biphenyl transport in the Hudson River, New York: U.S. Geological Survey Water-Resources Investigations Report 81-9, 11 p.

New York Cooperative Snow Survey--
Distribution of Snowcover
(NY 80-086)

Date Project Began: October 1981

Date Project Ended: September 1985

Project Leader: Ronald V. Allen

Field Location: Statewide excluding Long Island

Principal Contributing Agencies: New York State Departments of Environmental Conservation and Transportation; Hudson River-Black River Regulating District; City of New York, Department of Environmental Protection.

Problem: Snowcover information is important to management of hydroelectric operations, flood forecasting, and reservoir control. Monitoring the changeable snowpack is needed to calculate runoff extremes.

Objectives: The Geological Survey has found it necessary to discontinue management of the program but active participants agree that it should be continued. The Survey will arrange transfer of the program to another agency.

Approach: Data provided by cooperators will be compiled and a summary report mailed 3 weeks after each survey.

Progress and Significant Results: Summary reports of five snow surveys were issued in water year 1985.

Completed Reports:

Allen, R. V. and Barnes, C. R., 1985, Temporal and spatial snowcover distribution in New York State, in Eastern Snow Conference, 41st annual meeting, June 7, 1984, proceedings: Washington, D.C., v. 29, p. 199-203.

Baseline Water-Quality Assessment of
Selected Aquifers in New York
(NY 82-114)

Date Project Began: October 1981

Date Project Ends: Continuous

Project Leader: Richard J. Reynolds

Field Location: Glacial valleys within upstate New York

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Most principal aquifers in upstate New York are isolated unconfined glacial or alluvial deposits in valleys cut into crystalline or shale bedrock.

Development that has taken place on those aquifers has made them susceptible to contamination. Contamination, whether from agricultural, industrial, or nonpoint sources, jeopardizes the only economical source of water for individual homes, communities, and small industries in many places. Management decisions for solution or prevention of these problems would be facilitated by an appraisal of selected areas of known or potential problems.

Objectives: Phase I: To select aquifers that have known potential ground-water contamination (e.g., Utica-Rome, Olean, Salamanca) and compile geohydrologic maps of the aquifer system. Phase II: To select a ground-water-quality monitoring system for major water-supply users and sample and analyze for initial baseline quality.

Approach: Aquifer selection will be flexible, depending on needs of the cooperator. Aquifers will be mapped at 1:24,000 scale from published geologic and soils maps (or minor field mapping) and land-use maps. Aquifer geometry and characteristics will be interpreted and shown as maps depicting surficial geology, geologic sections, soil permeability, potentiometric surface, land use, and saturated thickness. Number and types of maps will vary, depending upon the amount and quality of hydrogeologic information available for each area.

Progress and Significant Results: Aquifer mapping in the vicinity of Olean, Salamanca, Clifton Park, Owego, Waverly, N.Y.-Sayre, Pa., and Croton-Ossining has been completed and reports written. Work on the Utica and Rome areas is underway.

Plans for Next Year: To complete aquifer mapping in the Utica-Rome area.

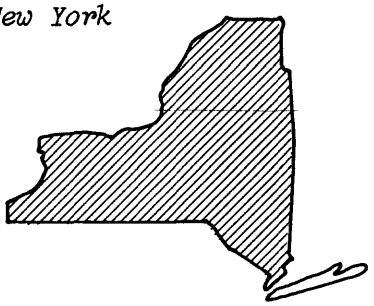
Completed Reports:

Reynolds, R. J., 1984, Hydrogeology of the Clifton Park area, Saratoga County, New York: U.S. Geological Survey Water-Resources Investigation Report 84-4031, 6 sheets, 1:24,000.

Zarriello, P. J., Hydrogeology of the Salamanca area, Cattaraugus County, New York: U.S. Geological Survey Water-Resources Investigation Report 85-4149, 5 sheets, 1:24,000 (in press).

Zarriello P. J. and Reynolds, R. J., Hydrogeology of the Olean area, Cattaraugus County, New York: U.S. Geological Survey Water-Resources Investigation Report 85-4157, 9 sheets, 1:24,000 (in press).

Glacial-Drift Aquifers in Upstate New York
NY 82-116



Date Project Began: March 1983

Date Project Ends: September 1986

Project Leader: Roger M. Waller

Field Location: New York State excluding Long Island

Funding: Federal Program

Problem: The Geological Survey's Regional Aquifer Systems Analysis (RASA) study of the Northeast glacial-drift aquifer system has identified several types of studies that are needed: (1) chemical processes in glacial-drift aquifers, (2) aquifer geometry at type sites, (3) geophysical techniques for determining composition of glacial-drift aquifers, and (4) rate of induced infiltration through streambeds of differing permeability.

Objectives: (1) To evaluate the chemical processes that affect quality of water in glacial-drift aquifers. (2) To describe the geology of type areas under differing glacial regimes. (3) To develop criteria for use of various geophysical methods under a variety of geohydrologic conditions. (4) To conduct streambed-permeability studies at a wellfield with an adjacent stream.

Approach: (1) To interpret aquifer-water chemical analyses through thermodynamic and statistical techniques. (2) To make a comprehensive study of the geology and hydrology at an area of glacial retreat from a headwater valley. (3) To conduct geophysical profiles in selected settings to compare results of the different methods. (4) To make synoptic measurements of ground-water levels, pumping rate, and stream discharge at a selected site.

Progress and Significant Results: (1) A report describing the chemical evolution of ground water in the Farmington area of Connecticut was completed. (2) Two more valley segments, one along the Susquehanna and Chenango Rivers between Johnson City and Binghamton, the other along the Mohawk River between Halfmoon and Rotterdam Junction, were investigated with marine seismic reflection. Poor penetration was observed in the Johnson City-Binghamton area where coarse gravel predominates, and in the Mohawk River; samples of bottom material were obtained along the Mohawk River to correlate depth of penetration with bottom material. (3) The reliability of aquifer properties estimated by a ground-water flow model was examined through three methods wherein (a) results of permeameter tests on riverbed cores were compared with the vertical hydraulic conductivity of the riverbed estimated by the model; (b) sensitivity analyses of horizontal and vertical hydraulic conductivity of the aquifer and vertical hydraulic conductivity of the riverbed were run; and (c) a joint confidence region in a subset of aquifer properties estimated by the model was calculated through regression analyses.

Plans for Next Year: (1) To continue a regional investigation of geochemical processes operating in glacial-drift aquifers to relate water chemistry to the underlying bedrock lithology. (2) To correlate marine seismic data with available borehole data to define seismic-stratigraphic units, and write report on use of the techniques and findings in New York. (3) To extend regression analysis to the other aquifer properties as necessary and complete the report.

Verification of Channel Roughness Characteristics ("n" Value)
(NY 84-140)

Date Project Began: October 1983

Date Project Ends: September 1989

Project Leader: Thomas J. Zembrzuski, Jr.

Field Location: Statewide

Cooperating Agency: New York State Department of Transportation

Problem: The indirect computation of flood discharges and flood profiles requires estimates of channel roughness coefficients ("n" values). The reliability of results of slope-area measurements and step-backwater analyses, in particular, is heavily dependent on the evaluation of channel roughness. Although several guides for estimating "n" values for natural channels are available, subjective judgment will probably always play a part in the final determination when all factors (streambed composition, bank and flood-plain vegetation, channel shape and curvature, depth of water, etc.) are considered.

Objectives: To (a) develop site-specific relationships between "n" values and such variables as flood depth and seasonal variation of vegetation cover, (b) assess the transferability of these relationships to other sites, (c) compile and maintain a file for each site that includes site maps, cross-sectional plots, site plans, photographs, and stereo slides that can be duplicated and used for office and field-training exercises.

Approach: (1) To select 25 to 30 well-rated gaging stations for site investigations. (2) After a flood, make a slope-area measurement to obtain initial "n" verification and cross-section location for subsequent installation of crest-stage gages. (3) Operate crest gages until enough record is collected to define the roughness characteristics of the reach and the relationship between roughness and variables such as depth and vegetation. (4) From the data of the 25 to 30 sites, evaluate the transferability of site-specific relationships.

Progress and Significant Results: Twenty-eight sites were selected and instrumented. Of these, 20 have been surveyed. Stage (profile) data have been collected on the nine sites that had been instrumented in the previous year. Most sites are vegetated to varying degrees. Thus, the project will attempt to quantify the effect of bank vegetation on the roughness coefficient. The total station instrumentation has been successfully used to collect survey data and transfer the survey notes to the office computer, and software has been developed to compute the field notes and plot site plans.

Plans for Next Year: Finish the remaining surveys and devise a method for quantifying bank vegetation. Collect data at crest-stage gages and visit sites during high flows to gather additional profile data and obtain further documentation (including photos) of flow conditions.

Relationship Between Wet and Dry Atmospheric Deposition and Air Quality
(NY 84-149)

Date Project Began: March 1984

Date Project Ended: September 1985

Project Leader: Charles R. Barnes

Field Location: Statewide

Cooperating Agency: New York State Department of Health

Problem: The effects of elevated acidity in atmospheric deposition are a growing concern. Currently both wetfall and dryfall components are being collected on a nationwide scale. Historical data are sparse, however, and air-quality data are available only from the early 1960's. If atmospheric deposition data can be related to air quality, past deposition rates can be estimated from historical air-quality data.

Objective: To relate chemical composition of atmospheric deposition as either wetfall, dryfall, or bulk precipitation to particulate and gaseous air-quality data.

Approach: (1) A precipitation-chemistry station was operated between June 15 and September 15, 1984, at a New York State Department of Health air-quality station. (2) Chemical data on atmospheric deposition were compared with air-quality data to determine (a) the correlation of sulfate and calcium in the various phases, and (b) the ratio of bulk deposition to the sum of the wet and dry fractions, and to obtain estimates of atmospheric-deposition velocities.

Progress and Significant Results: Wet, dry, and bulk atmospheric deposition, along with gaseous SO_2 and particulate sulfate samples, were collected for 2 months beginning June 1984. Preliminary results from the deposition data indicate (1) a mean weighted pH of 4.17 for wetfall, 4.28 for bulk, and 5.95 for the soluble dryfall fraction, (2) an inverse relationship between the rainfall amount and the concentration of most constituents, and (3) that approximately 85 percent of the total sulfate deposited was in the wet fraction, and only 15 percent was the result of dry deposition.

Ground-Water Resources of Upstate New York
NY 85-151

Date Project Began: January 1985

Date Project Ends: September 1988

Project Leader: Roger M. Waller

Field Location: Upstate New York excluding Long Island

Cooperating Agencies: New York State Department of Environmental Conservation; Westchester County Department of Health, Putnam County Planning Department; Orange County Planning Department; Oneida County Planning Department; Montgomery County Planning Department

Problem: Since the 1960's, no comprehensive effort has been maintained to (1) describe the ground-water resources in a form useful to specific management purposes, (2) provide an easily accessible data base, (3) complete an appraisal of ground-water resources in unstudied basins, (4) guide research devoted to understanding the response of the ground-water systems to development, waste disposal, agriculture, and other man-made stresses, or (5) provide easily useable tools such as maps and models through which multiple use of aquifers may be managed. As a result, implementation of the comprehensive ground-water management plan for upstate New York requires knowledge that is unavailable.

Objectives: (1) To focus and organize several unrelated studies to meet broader areal objectives. (2) To foster consolidation of special-interest activities into independent studies that meet areal objectives. (3) To guide efforts to obtain accurate description of ground-water resources and to understand how stresses affect the resource.

Approach: (1) To gather and organize data from a multitude of files into central computer storage files and collect new data to establish geologic and hydrologic data bases. (2) To prepare information in the form of maps and other descriptive-type formats. (3) To apply results of previous efforts to subsequent activities in areas where additional knowledge is required. (4) To coordinate the formation of independent, long-term studies.

Progress and Significant Results: Three river-basin aquifer maps were reconstructed and submitted for approval. Project-planning meetings were held with DEC, planning agencies, and each county, and project-coordination meetings were held with groups of counties involved in the same project. The scope of work was established, State funds have been released to the counties, and work began.

Plans for Next Year: To publish aquifer maps of the Allegheny, Black, and Genesee River basins; to complete aquifer maps of Mohawk River and mid- and lower Hudson River basins at 1:250,000 scale; prepare letters to each participating planning agency and county as to availability of data; and define scope of work for selected studies.

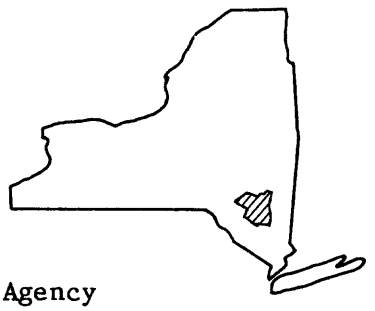
Completed Reports:

Frimpter, M. H., Surficial geology and ground-water availability in the Allegheny River basin and part of Lake Erie basin, New York: U.S. Geological Survey Water-Resources Investigations 86-4041, 2 sheets (in press).

Kammerer, J. C. and Hobba, W. A., Jr., Ground-water availability in the Genesee River basin, New York and Pennsylvania: U.S. Geological Survey Water-Resources Investigations 86-4048, 4 sheets (in press).

Waller, R. M., Ground-water availability in the Black River basin, New York: U.S. Geological Survey Water-Resources Investigations 86-4040, 3 sheets (in press).

Dynamics of Stream Chemistry and Discharge at Biscuit Brook and its Peripheral Streams, Catskill Mountains (NY 85-152)



Date Project Began: October 1984

Date Project Ends: September 1986

Project Leader: Peter S. Murdoch

Field Location: Ulster County

Cooperating Agency: U.S. Environmental Protection Agency

Problem: Reconnaissance data suggest that acid precipitation may affect stream chemistry in the Catskill Mountains. Assessment of the effect of acidic deposition requires data on both short- and long-term trends in stream chemistry. Long-term monitoring is essential to determine trends in atmospheric chemistry and to differentiate between natural and manmade changes.

Objectives: (1) To assess the relationship of stream chemistry to discharge at six streams peripheral to Biscuit Brook and during 10 storms at Biscuit Brook. (2) To calculate a mass balance for input and output of key constituents through the Biscuit Brook watershed. (3) To compare the effect of precipitation acidity in different storms on the geochemistry of Biscuit Brook.

Approach: To conduct (a) discharge-related sampling of stream and rainwater during 10 storms at Biscuit Brook and biweekly sampling during nonstorm periods; (b) weekly sampling of wetfall chemistry within the Biscuit Brook watershed as part of the National Trends Network program (see project NY 83-005, p. 10); and (c) monthly sampling at six streams peripheral to the Biscuit Brook watershed with simultaneous dischage measurements.

Progress and Significant Results: Two years of data have been collected. The rainfall acidity during that period was similar to that recorded in the Adirondack Mountain region. Data from a concurrent study of Catskill precipitation chemistry (project 005) indicate that precipitation volume and chemistry vary across the Catskill area. A special pilot study of metals deposition has been in operation this year at the National Trends Network station.

Plans for Next Year: To continue monitoring.

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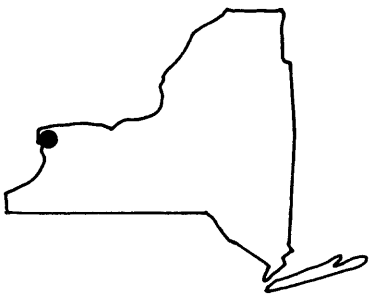
Influence of the Niagara Power Project on Ground Water in the Upper Part of the Lockport Dolomite, Niagara Falls Area, New York (NY 82-117)



Date Project Began: June 1984

Date Project Ends: September 1985

Project Leader: Todd S. Miller

Field Location: Niagara Falls and vicinity

Cooperating Agency: U.S. Environmental Protection Agency (Region II)

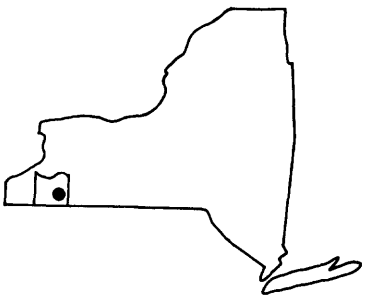
Problem: Ground-water flow and contaminant movement in the Niagara Falls area has been studied by the Geological Survey and several other agencies, but these studies have generally been site specific. To delineate regional ground-water flow in upper fractured zone of the Lockport Dolomite, seasonal water-level fluctuations and the influence of the Niagara River Power Project need to be studied.

Objectives: (1) To define the influence of daily water-level fluctuations in the powerplant forebay canal and pumped-storage reservoir on ground-water flow in the upper Lockport Dolomite surrounding the powerplant's buried conduits and the fill material above them. (2) To define ground-water flow in the upper fractured zone of the Lockport Dolomite in the central part of the City of Niagara Falls.

Approach: (1) To install seven test wells throughout the central part of the city to obtain local ground-water levels and range of fluctuation. (2) To install four test wells in the fill atop the buried conduits and record changes in water level in the backfill and adjacent bedrock system to assess the effect of water-level fluctuations in the forebay canal and pumped-storage reservoir on the regional flow system. (3) To conduct two series of water-level measurements (spring, fall) on at least 100 wells drilled in the upper Lockport Dolomite.

Progress and Significant Results: Analysis of well logs, other depth-to-bedrock information, and water-level data revealed that ground-water levels in the upper Lockport Dolomite closely follow the bedrock-surface topography. Water levels in the backfill above the buried conduits respond very slowly to changes in forebay-canal water levels, whereas the water levels in bedrock wells adjacent to the conduits respond immediately. Ground water that flows toward the buried conduits enters the draw system and discharges to the unlined Falls Street tunnel where the tunnel and conduits cross.

Digital Model Analysis of Nitrogen Transport in an Outwash Aquifer Near Olean (NY 83-127)



Date Project Began: October 1982

Date Project Ended: September 1985

Project Leader: Marcel P. Bergeron

Field Location: Olean, Cattaraugus County

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Nitrogen compounds have contaminated a shallow aquifer in Olean. A ground-water model is being constructed to estimate changes in direction and rate of ground-water flow, ground-water levels, and streamflow that would result from well-field shutdown and other management practices. Although the model will provide estimates of rate and direction of contaminants by conductive transport, it does not predict changes in contaminant concentrations. A solute-transport model is needed to simulate dilution and hydrodynamic dispersion to assess the effects of remedial measures and of continued ground-water development on water levels.

Objectives: (1) To develop a solute-transport model that will simulate changes in chemical concentrations resulting from convective transport, hydrodynamic dispersion, and dilution. (2) To provide a method for evaluating water-quality responses in ground water to changes in management practice.

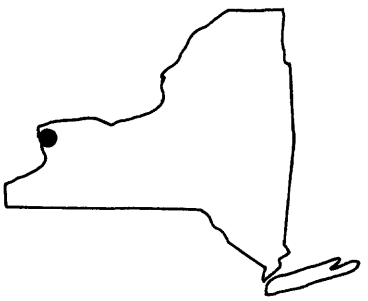
Approach: A quasi-three dimensional model will be used as the basis for a solute-transport model. An appropriate solute-transport model will be selected. The model could be calibrated from historical data on nitrogen concentrations during 1970-75 and verified through comparison with data on changes in nitrogen concentration since 1975.

Progress and Significant Results: The final solute-transport model of the study area was constructed and calibrated from a previous ground-water flow model of Olean and duplicates flow patterns reasonably well. The model was calibrated to historic trends of nitrogen concentrations in aquifer and adequately duplicates historic records. The model predicts that the movement of nitrogen from the area of contamination will result in nitrogen concentrations ranging from 2 to 5 milligrams per liter at a nearby municipal well field.

Completed Reports:

Bergeron, M. P. and Yager, R. M., Effect of reduction of industrial pumpage on the migration of dissolved nitrogen in an outwash aquifer in Olean, Cattaraugus County, New York: U.S. Geological Survey Water-Resources Investigations Report 85-4082 (in press).

Evaluation of Ground-Water Flow Patterns and the Movement of Toxic Waste in and Around the Hyde Park Landfill in Niagara County
(NY 83-128)



Date Project Began: April 1983

Date Project Ended: June 1985

Project Leader: Marcel P. Bergeron

Field Location: City of Niagara Falls

Cooperating Agency: U.S. Environmental Protection Agency

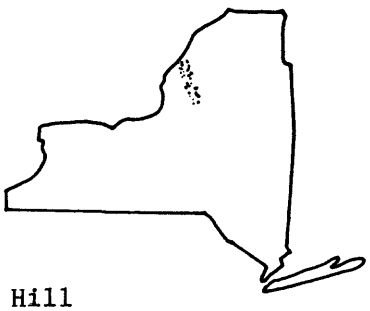
Problem: The Hyde Park Landfill is a 15-acre chemical-waste-disposal site just north of Niagara Falls. A chemical company disposed of about 80,000 tons of chemical waste in the landfill during 1953-75. In December 1979, the U.S. Environmental Protection Agency (EPA) and the State of New York filed suit, alleging substantial danger from chemical waste at the site. During negotiations between the various parties and subsequent court hearings to address the problem of chemical migration from the site, it became evident that an understanding of ground-water movement in the site vicinity was needed.

Objectives: (1) To define ground-water flow patterns in the glacial overburden and Lockport Dolomite in and around the landfill. (2) To delineate the extent of the contaminant plume and assess the direction and mechanism of plume migration. (3) To develop capabilities to predict the hydrologic effects of proposed remedial efforts and of external stresses such as increased pumpage or drought.

Approach: To (1) construct potentiometric and water-quality maps of the landfill area from available geologic, hydrologic, and chemical information. (2) To develop a three-dimensional ground-water flow model of the landfill area. (3) To use simulated ground-water patterns along with chemical data to assess future plume migration. (4) To simulate the effects of proposed remedial efforts and external stresses on ground-water levels and flow paths and evaluate the potential effects on contaminant migration.

Progress and Significant Results: A three-dimensional ground-water flow model was constructed, calibrated, and approved for release to EPA.

Hydrologic Appraisal of a Glacial-Drift Aquifer in the Tug Hill Region (NY 83-129)



Date Project Began: October 1984

Date Project Ends: September 1986

Project Leader: Todd S. Miller

Field Location: Jefferson, Oswego, Oneida Counties

Cooperating Agency: Temporary State Commission on Tug Hill

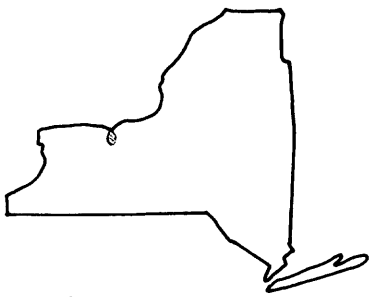
Problem: The Tug Hill aquifer, along the western margin of the Tug Hill Plateau, is a relatively little-used aquifer system. An assessment of the hydrogeology and water quality of this aquifer system is needed to properly manage and protect it.

Objectives: To (a) define the aquifer boundaries, thickness, and direction of ground-water movement, (b) describe water quality and land use, (c) identify areas susceptible to water-quality degradation, and (d) help the Tug Hill Commission and Cornell University to prepare educational material for citizens in the area.

Approach: (1) Collect and compile hydrologic and geologic data and, in areas where data are lacking, conduct a well inventory and test-drilling program. (2) Obtain water levels and select 30 to 40 wells for collection of water-quality samples. (3) Update the Land Use Natural Resources (LUNR) land-use maps of the study area and compile maps showing aquifer extent and thickness, water-table altitude, and well locations. (4) Conduct seepage runs in selected streams to define the interaction between streams and aquifer.

Progress and Significant Results: Twenty-six test holes and wells were installed, and 20 seismic surveys were conducted to determine depth to the bottom of the aquifer. A seepage survey was done that entailed measuring streamflow at 15 streams that flow across the aquifer. Water-quality samples were collected at 43 wells and analyzed.

Stormwater Quality and Retention in the Irondequoit Creek Basin, Monroe County (NY 84-138)



Date Project Began: October 1983

Date Project Ends: September 1986

Project Leader: William M. Kappel

Field Location: Irondequoit Creek basin

Cooperating Agency: Monroe County Department of Engineering

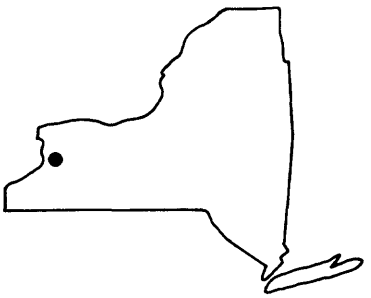
Problem: The U.S. Geological Survey's National Urban Runoff Program study in the Irondequoit Creek basin identified several "best management practice" strategies to improve the chemical quality of stormwater runoff. Results of this study and other local research have indicated that additional study is needed to (a) determine the feasibility of instream impoundments, (b) assess the effect of urbanization on the quantity and quality of ground water supplying a county fish hatchery, and (c) determine the surface-water/ground-water interaction in the lower Irondequoit valley.

Objectives: (1) To evaluate detention capability of instream impoundments and determine to what degree detention may decrease constituent loads and change surface-water and ground-water quality. (2) To describe the ground-water resources in the vicinity of the county fish hatchery and establish a data base from which changes due to planned urbanization can be monitored. (3) To identify ground-water-flow characteristics in the lower Irondequoit Creek valley and determine whether stormwater retention within the Irondequoit wetlands in the lower valley segment might affect ground-water quality.

Approach: For instream impoundments, site dimensions and water-quality data will be used in the Distributed Routing Rainfall Runoff Model (DR3M) detention-pond subroutine. Cornell University's computer graphics will be used to analyze results of an impoundment study and to report the effectiveness of the impoundment. The effects of urbanization upon the fish hatchery will be evaluated through analysis of quantity and quality of the surface and subsurface sources of water to the hatchery. The surface-water/ground-water study in the lower valley segment will include installation of a series of shallow wells across the valley floor and comparison of water-level and water-quality data from the wells and Irondequoit Creek.

Progress and Significant Results: Instream-impoundment analysis indicates that 50 to 70 percent of the sediment and associated nutrient load could be removed during most runoff events. During spring runoff and high-intensity rainstorms, these removal efficiencies are reduced considerably. Monitoring wells at the hatchery indicate that springflow at the hatchery is related to local ground-water levels and upgradient recharge. In the lower valley segment Irondequoit Creek controls ground-water levels within the floodplain, and the floodplain soils provide streambank storage during rising creek stages and streambank discharge during falling creek stages.

Hydrologic Investigation of the Onondaga Limestone Outcrop Area, Erie County (NY 84-139)



Date Project Began: December 1983

Date Project Ended: September 1985

Project Leader: Ward W. Staubitz

Field Location: North-central Erie County

Cooperating Agencies: Erie County, Towns of Clarence and Newstead

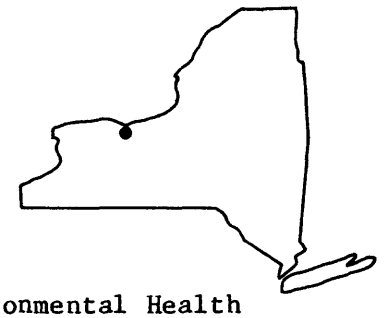
Problem: During the late summer and early fall of 1982, ground-water levels dropped as much as 30 feet in some wells that tap the Onondaga Limestone in Erie County. As a result, nearly 60 wells required deepening at substantial cost to the well owners. Although ground-water levels temporarily recovered during the following winter and spring, they dropped even farther in the summer of 1983 and required some well owners to once again deepen their wells. The development or enlargement of sinkholes in the area was also reported during the same period.

Objectives: (1) To obtain data on the geohydrology and water quality of the Onondaga Limestone and relate this to water-level declines and increased sinkhole development. (2) To determine whether continued and possibly more widespread water-level declines may result in complete loss of shallow, potable ground water.

Approach: (1) To compile available geologic, hydrologic, water-quality, water-level, pumpage, diversion, and other data, and define the extent of the problem area and identify specific locations of severe water-level decreases and increased sinkhole development. (2) To conduct an inventory of wells to determine potentiometric heads and the direction of ground-water flow and conduct seepage runs to delineate surface-water/ground-water interactions. (3) To collect water-quality samples, identify the water-bearing zones at various depths, calculate the degree of saturation with respect to calcite and gypsum, and compare the quality of water from the same water-bearing strata in areas of sinkhole development and unaffected areas.

Progress and Significant Results: Wells with rapidly falling water levels seem to be in areas adjacent to surface depressions (dissolution zones in the Onondaga Limestone) that appear to be linked in a continuous pattern and generally contain sinkholes. The initial water-level drop coincided with the diversion of water away from a series of sinkholes in 1981. New sinkhole development continues, and more wells have been deepened as water levels declined to record lows during the summer of 1985.

Physical and Chemical Quality of Ides Cove on Irondequoit Bay, Monroe County NY 85-144



Date Project Began: May 1985

Date Project Ends: June 1986

Project Leader: Ward W. Staubitz

Field Location: Irondequoit Bay

Cooperating Agency: Monroe County Department of Environmental Health

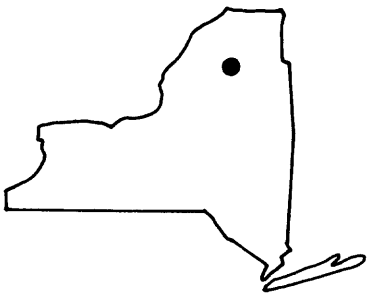
Problem: Ides Cove is a small embayment on the west shore of Irondequoit Bay. Its water quality and bottom-sediment characteristics are similar to those of the Bay. Because of this similarity, the bottom sediments were treated with alum in 1982 to test a proposed method for preventing nutrient flux from the sediments of the Bay to the overlying water. Since treatment, the water quality has changed. A description of the limnological characteristics of the cove before 1982 is needed for comparison to evaluate the effects of the treatment.

Objectives: To describe the physical and chemical character of Ides Cove during 1970-82, before treatment of the bottom sediments with alum. This entails documenting (a) thermal and chemical stratification; (b) distribution of dissolved oxygen, selected nutrients, and chloride; and (c) mixing characteristics of the water during this period.

Approach: To (a) construct detailed contour maps and chemical profiles to illustrate the general physical and chemical characteristics of the cove during 1970-82, and (b) describe the physical and chemical characteristics of the cove during this period by comparing the data to those published earlier.

Progress and Significant Results: All limnological data on Ides Cove have been collected from various researchers, and data sets from these sources have been tested for comparability; complete data sets for 1971, 1972, 1980, 1981, and 1982 have been compiled; chemical profiles for several physical and chemical characteristics have been constructed; and the final report is underway.

Lake-Acidification Mitigation Project in the Adirondack Region (NY 84-150)



Date Project Began: October 1983

Date Project Ends: December 1986

Project Leader: Ward W. Staubitz

Field Location: Herkimer and Franklin Counties

Cooperating Agency: Cornell University

Problem: The acidification of lakes in the northeastern United States is a well-known problem. A proposed management technique to mitigate the effects of lake acidification is neutralization by liming. At present, the U.S. Geological Survey and a consortium of universities in New York State are conducting a cooperative study to evaluate the long-term implications of liming acidic lakes. The U.S. Geological Survey is conducting the precipitation and hydrologic monitoring at three lakes.

Objectives: To provide daily values of hydrologic data such as precipitation, evaporation, lake storage, and streamflow, and determine the monthly hydrologic budget of Little Simon Pond, Cranberry Pond, and Woods Lake.

Approach: The lakes selected were studied for 1 year before liming and will be studied for 2 years after liming. Components of a hydrologic balance, including inflow from tributaries, precipitation, ground-water inflow and outflow, evaporation from the lake surface and transpiration along the lake shore, outflow from the lake, and changes in lake storage are being measured or estimated at each lake, and the hydrologic balance is being calculated on a monthly basis.

Progress and Significant Results: The hydrologic-data collection-network at each lake has been installed and monitored for 24 months. Aerial photographs of each lake basin have been taken, and the area of each lake, its drainage basin, and the wetland areas within the drainage basin have been delineated. Seismic surveys have been run, and the depth to bedrock in each basin has been determined. Monthly piezometric surveys of lake-bottom sediments at Woods Lake have been conducted, and ground-water inflow has been calculated. The monthly hydrologic balance of each lake for January 1984 through September 1985 has been calculated.

Plans for Next Year: To continue collecting hydrologic data at each lake and continue hydrologic-budget calculations.

Satellite Data-Collection Program
(GOES DCP Project)
(NY 86-151)

Date Project Began: October 1976

Date Project Ends: Continuing project

Project Leader: William H. Johnston

Field Location: Statewide

Cooperating Agencies: U.S. Army Corps of Engineers--Baltimore and Buffalo Districts; New York State Department of Environmental Conservation; Delaware River Master

Problem: Collection of surface-water and precipitation data on a reliable, near real-time basis has long been a problem for agencies responsible for regulating streams, forecasting floods, and issuing flood warnings. Hurricane Agnes in June 1972 emphasized the danger of relying on land line power and communications to obtain important data during this type of an emergency. Since 1976, the Geological Survey, with the cooperation of other agencies, has installed data collection platforms (DCP's) that transmit data to a Geostationary Orbital Environmental Satellite (GOES) on a preselected schedule.

Objectives: To provide hydrologic data on a real-time basis. Data include unit and daily values of stage, precipitation, and water temperature. Many other values could be added if desired.

Approach: Data-collection-platform sites are selected on the basis of Geological Survey and cooperator needs for reliable real-time data. Sites are typically stream-gaging sites or suitable precipitation-data sites. Data transmitted from DCP's are collected at a direct-readout ground station and may then be forwarded to district Prime computers through the U.S. Geological Survey's Distributed Information System.

Progress and Significant Results: Reliability, ease of operation, and usefulness of DCP's have improved in the past 10 years. Those using the equipment have become more familiar with the capabilities and with the problems that can be expected. Computer systems now make daily and unit values of both collected and computed terms available soon after they have been transmitted by the DCP. These data, along with other information such as battery voltage, can be monitored daily so that data loss may be minimized. The New York District currently operates 43 DCP's.

Plans for Next Year: (1) To install 23 additional DCP's; installation of 21 more DCP's is planned for 1987. (2) The Distributed Satellite Telemetry Data Handling System will be merged with automatic data records system for improved handling of all data. The new system is scheduled to be online by July 1, 1986.

Effects of an Instream Impoundment on Runoff and Water Quality in a Small Residential Headwater Basin, Monroe County (NY 86-161)

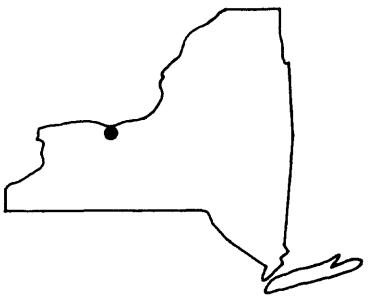
Date Project Began: January 1986

Date Project Ends: September 1989

Project Leader: Phillip J. Zarriello

Field Location: Monroe County

Cooperating Agency: Monroe County Health Department



Problem: The use of detention basins for improving the quality of storm water was recommended by the National Urban Runoff Program of EPA (1983). A detailed analysis of the effectiveness of detention basins in improving runoff quality is needed to assess the performance of detention basins and to help local water-quality managers determine the cost effectiveness of using such structures to improve the quality of downstream receiving waters.

Objectives: To (a) collect stormflow and water-quality information at the inlets and outlets of a selected detention basin, and (b) evaluate the physical and chemical process that occur in a detention basin to determine the effectiveness of using such structures to improve the quality of downstream receiving waters.

Approach: The inflows, outflow, and water quality of a detention basin will be monitored for 3 years. Precipitation data will be collected within the watershed to establish rainfall-runoff relationships, and basin characteristics will be compared. Data will be analyzed for accumulated loads, mass flux of the basin, and changes in concentration of selected water-quality constituents. Inflow and outflow will be compared in terms of water quality.

Progress and Significant Results: A detention basin has been selected, and work is underway to develop the specialized monitoring equipment needed in cooperation with the Geological Survey's Urban Hydrology office in Bay St. Louis, Mo. The Monroe County Health Department is prepared to begin collecting and analyzing water-quality data.

Plans for Next Year: To (a) continue collecting hydrologic and water-quality data at the inflow to and outflow from the detention basin, (b) make the first alteration to impede flow, and (c) examine the effects on water quality.

LONG ISLAND OFFICE

Ground Water in Kings and Queens Counties
(NY 79-076)

Date Project Began: August 1979

Date Project Ends: September 1986

Project Leader: Herbert T. Buxton

Field Location: Western Long Island

Cooperating Agencies: New York State Department of Environmental Conservation; New York City Department of Environmental Protection.

Problem: Urbanization and severe overpumping in western Long Island have caused the cessation of all pumping for public supply in Kings and western Queens Counties. At present, water supply in Kings and Queens Counties depends on nearly 700 Mgal/d from upstate New York surface-water sources, but this supply became unreliable during recent periods of severe drought. Expanded use of ground water may alleviate the problem, but data needed to design a suitable management plan are lacking.

Objectives: To determine whether the ground-water reservoir of western Long Island is still a usable source of water supply and, if so, to make pertinent scientific information available for the formulation of a management plan for its development. Two basic questions will be addressed--whether the ground-water quality is suitable for use as a supplement to the public water supply, and what quantity of water can be withdrawn and still retain acceptable quality.

Approach: (1) To (a) develop a network of wells to monitor ground-water levels and ground-water quality in the three major aquifers in western Long Island; (b) measure ground-water levels and quality to determine present hydrologic conditions and current trends, and (c) be prepared to monitor the response of the ground-water system to any implemented pumping scheme. (2) To map the geology of unconsolidated deposits to define geometry of ground-water system. (3) To investigate the effects of urbanization on the hydrologic system. (4) To construct, verify, and calibrate a digital model and evaluate ground-water management alternatives. (5) Prepare reports summarizing results of the study.

Progress and Significant Results: A ground-water-quality monitoring network has been expanded, and reconnaissance sampling and analysis completed. Maps defining the configuration of the major hydrogeologic units, the configuration and relationships between water table and potentiometric surfaces in the confined aquifer, and the extent of the saltwater/freshwater interface have been completed. These maps have been used to develop the framework and geometry of the Kings and Queens area of an islandwide ground-water model. Calibration of the model is completed. An urban water-budget analysis of conditions in western Long Island has been completed.

Plans for Next Year: Several management alternatives applicable to the western part of Long Island will be tested on the regional model. A lay-reader report summarizing the ground-water conditions of western Long Island and presenting the results of ground-water modeling will be prepared.

Completed Reports:

Buxton, H. T., Soren, Julian, Posner, Alex, and Shernoff, P. K., 1981, Reconnaissance of the water resources of western Long Island, New York: U.S. Geological Survey Open-File Report 81-1186, 59 p.

Ground-Water Resources of the Montauk Area (NY 81-102)

Date Project Began: October 1980

Date Project Ended: September 1985

Project Leader: Keith R. Prince

Field Location: South Fork of Suffolk County

Cooperating Agencies: Suffolk County Department of Health Services; Suffolk County Water Authority.

Problem: All freshwater in the Montauk area is derived from Pleistocene glacial deposits that are in direct contact with tidewater at the shores. The ground-water system contains several relatively thin lenses of fresh ground water that "float" on top of saline water. During periods of heavy pumping in the village of Montauk, operation of public-supply wells must be staggered to reduce upconing of saline water. It is feared that the local freshwater resources will not be adequate to meet future demands.

Objective: To define (a) the size and configuration of freshwater lenses in the vicinity of Montauk, (b) the response of these lenses to natural fluctuations in precipitation and to the seasonal pumping stress, and (c) the probable response of these lenses to proposed schemes for future development.

Approach: All available hydrologic data will be used to develop a digital flow model of the area to provide an understanding of the hydrologic system. Field data will also be used to test a new freshwater/saline-water flow model designed to simulate two-dimensional flow of freshwater and saltwater in a single aquifer where the waters are separated by sharp interface. The ground-water flow model could be used to evaluate the safe yield of present and future public-supply wells and the effects of natural and other man-induced stresses on the local hydrologic system.

Progress and Significant Results: The areal flow model has been completed and calibrated for both steady-state and transient conditions. Predictive runs to assess the effects of increased pumpage on the ground-water system have been completed. Results indicate that the supply of freshwater is adequate to meet the needs of the population projected to the year 1995.

Completed reports:

Prince, K. R., 1986, Ground-water assessment of the Montauk area, Long Island, New York: U.S. Geological Survey Water-Resources Investigations 85-4013, 93 p.

Hydrologic Data Analyses and Computer Applications to Long Island Water Resources (NY 83-122)

Date Project Began: October 1982

Date Project Ended: September 1985

Project Leader: William J. Flipse, Jr.

Field Location: Islandwide

Cooperating Agencies: Suffolk County Water Authority; Suffolk County Department of Health Services, Nassau County Department of Public Works

Problem: The ground-water reservoir beneath Long Island is the sole source of freshwater for more than 3 million people. Declining water levels, saltwater encroachment into aquifers, and contamination from industrial and domestic wastes and agricultural practices pose a serious threat to this water supply. To monitor the quality and quantity of the water resources of Long Island, data are systematically collected at more than 500 observation wells, more than 70 surface-water sites, and more than 10 precipitation stations. A large percentage of data is generated by cooperating agencies, in particular, the Nassau County Department of Health, Suffolk County Department of Health Services, and Suffolk County Water Authority. Monitoring alone is insufficient; the data must be analyzed continually and interpreted to provide water-management agencies with a basis for decisionmaking.

Objectives: (1) To reduce the massive quantities of data to machine-readable form and to develop and support software for storing, retrieving, and manipulating the data for use by U.S. Geological Survey hydrologists and technical staff of cooperating agencies, (2) review current and historic data to determine trends that may require further study, (3) enter data from all projects into data bases, (4) develop user-oriented interactive statistical and application programs on a local multi-user minicomputer, and (5) develop programs and procedures for automated data editing and quality assurance.

Approach: To plan and conduct investigations of computer instrumentation and data-processing techniques that provide efficient, economical processing of hydrologic and water-quality data. Also, to analyze, design, and develop new automatic data-processing methods and systems to support and improve efficiency of scientific investigations, data collection and presentation, and report processing.

Progress and Significant Results: New computer programs were written and documented to provide additional user-friendly data management. Water-quality data bases and data bases to store, retrieve, and manipulate data on recharge-basin characteristics were added to the well-header file and the hydrogeology and water-level data bases. Previously developed programs were enhanced, including addition of online "help" facilities.

Hydrologic Models of the Ground-Water Flow System on Long Island (NY 83-125)

Date Project Began: October 1983

Date Project Ended: September 1986

Project Leader: Herbert T. Buxton

Field Location: Islandwide

Cooperating Agencies: Nassau County Department of Public Works; Suffolk County Department of Health Services; Suffolk County Water Authority; New York City Department of Environmental Protection

Problem: Declining ground-water levels, streamflow depletion, saltwater encroachment into aquifers, and pollution by industrial and domestic wastes poses a serious threat to the potable water supply of Long Island. Local governments are keenly aware of the importance of proper management of their ground-water resources. Integral to proper resource management planning is an adequate understanding of the hydrologic system and the testing of various alternatives through predictive hydrologic models.

Objective: To provide quantitative estimates of (1) the characteristics of the ground-water system under predevelopment conditions, (2) the changes in these characteristics that have been caused by man, and (3) the changes that would result from implementation of various water-resource-management schemes. Pertinent characteristics of the ground-water system include the patterns and rates of ground-water movement and the rates of ground-water discharge at boundaries (such as streams, shores, and subsea discharges).

Approach: A new three-dimensional finite difference ground-water flow model, which will represent all unconsolidated hydrogeologic units on Long Island, will enable regional hydrologic simulations. Data for model input include estimates of gaged- and ungaged-stream base flow, reinterpretation of hydrogeologic geometry, position of saltwater interfaces, and ground-water recharge under natural and urbanized conditions. Steady-state simulations of both predevelopmment and recent hydrologic conditions and a transient simulation of the 1960's drought will be made to increase our understanding of the characteristics of the ground-water system. Predictive runs will be made to assess managerial decisions regarding future development of the ground-water system.

Progress and Significant Results: Steady-state simulations of predevelopment and present conditions and transient-state simulations of the 1960's drought and the average annual cycle have been completed. Simulated results match observed data well. Local water managers are concerned about future development and protection of the resource. Four predictive runs that simulated ground-water conditions for the year 2020 were made. The effects of the various stress schemes proposed by water managers were significant. Additional schemes may be tested.

Interpretations of Hydrologic Data to Address Problems of Water Supply and Demand on Long Island (NY 83-132)

Date Project Began: April 1983

Date Project Ends: September 1987

Project Leader: Julian Soren

Field Location: Islandwide

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Past water-use trends on Long Island and projections of future increases in consumptive water use indicate the need for an effective management approach to the development of Long Island's freshwater resources. Until now, the "safe yield" concept has been the basis for water-resources management on Long Island. However, the complexity of the hydrologic system makes it impossible to determine allowable rates of withdrawal in any area without a development plan. An alternative management approach based on (1) defining pertinent aspects of present hydrologic conditions on a regional scale, and (2) identifying areas most susceptible to undesired hydrologic effects, is being developed.

Objectives: To (a) compile all hydrologic data pertinent to water-resources management in a useable format, (b) publish regional hydrologic interpretations of these data periodically, (c) reevaluate the regional monitoring networks and recommend augmentation as needed, and (d) demonstrate the feasibility, practicality, and advantage of technically based water-resource-management policy by making available and demonstrating the usefulness of the pertinent interpretive hydrologic data.

Approach: A series of maps will be developed that demonstrate a hydrologic interpretation of data collected in regional monitoring networks. The series includes (a) a standard base map and topographic base map at a scale of 1:125,000, (b) hydrogeologic maps showing structure contours and aquifer thickness; also cross sections through Long Island aquifers, (c) maps showing hydraulic potential, streamflow data, and water-transmitting properties, and (d) water-quality maps showing concentrations of chloride, nitrate, and selected organic compounds.

Progress and Significant Results: A standard base map, topographic base map, depth-to-water map, and saturated-thickness map have been prepared at a scale of 1:125,000. Structure-contour maps and isopach maps of all hydrogeologic units, also at a scale of 1:125,000, have been updated and completed. A report on the thickness of hydrogeologic units below the upper glacial aquifer on Long Island is in review.

Plans for Next Year: Plans include preparation of maps of the water-transmitting properties of significant hydrogeologic units, construction of streamflow maps, and preparation of a report on the depth-to-water and saturated thickness of upper glacial aquifer.

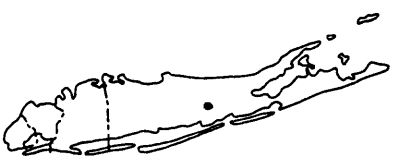
Effect of Waste Disposal on Ground Water in the Upper Glacial Aquifer of Long Island (NY 84-145)

Date Project Began: October 1983

Date Project Ends: September 1986

Project Leader: Michael Scorca

Field Location: Manorville



Cooperating Agency: Town of Brookhaven

Problem: The disposal of liquid scavenger waste (sludge and septage) through unlined aeration basins may have an adverse effect on drinking-water supplies. The effect of discharges from the Manorville Scavenger Waste Disposal Facility on the upper glacial aquifer, which is the primary source of water in this part of Suffolk County, has not been determined.

Objectives: To define the hydrogeology of the area near the Manorville disposal facility and map any areas of adversely affected ground water.

Approach: The hydrogeologic conditions and ground-water quality at the waste-disposal site are being assessed through installation of observation-well networks, collection of water-quality and geologic samples, compilation of geophysical logs, and preparation of maps showing directions of ground-water flow and chemical characteristics of ground water.

Progress and Significant Results: Three test holes were drilled at the Manorville site to determine geology. Thirty-one additional wells were drilled for water-quality monitoring. Sixty-three wells were sampled for inorganic constituents, and 20 wells along a flowline were sampled for volatile organic compounds.

Plans for Next Year: To (a) compile and analyze data, and (b) prepare manuscript and illustrations for the final report.

Saltwater Encroachment in Nassau County
(NY 84-147)

Date Project Began: April 1984

Date Project Ends: March 1987

Project Leader: Richard K. Krulikas

Field Location: Nassau County

Cooperating Agency: Nassau County Department of Public Works

Problem: All of the water supply for Nassau County is obtained from wells. Saltwater encroachment is one of the greatest threats to this water supply, especially under the barrier islands, where a confined aquifer is threatened by both downward movement of saltwater through the confining layer and landward movement of the saltwater front. Increased water-supply demands on the north shore of Nassau County could possibly result in overdraft. The potential for saltwater intrusion in that area has not been investigated. Integrated planning strategies are needed for all four aquifers in Nassau County. Saltwater intrusion needs to be studied on the north shore and reevaluated on the south shore to asses the effects of heavy pumping in recent decades.

Objectives: To (a) inspect and recondition outpost wells on the south shore, (b) delineate the present position of the saltwater interface in each aquifer, (c) investigate the phenomenon of saltwater movement, both vertically and horizontally, and (d) present the data in a form suitable for use by water-supply managers.

Approach: This project will require (a) evaluation of all available data on the saltwater interface in each of the four aquifers, (b) reconditioning and sampling of outpost wells, (c) evaluation of the offshore position of the interface in confined aquifers to help identify the controlling factors (offshore test drilling may be required), (d) construction of chloride maps and sections for each aquifer, (e) an update of the section of U.S. Geological Survey Professional Paper 700-D, pages 281-285, titled "Status of saltwater encroachment in 1969 in southern Nassau and southeastern Queens Counties, Long Island, New York," by Philip Cohen and G. E. Kimmel, and (f) sampling and analysis of water from selected wells with attention to sampling depth.

Progress and Significant Results: (1) Synoptic water-quality sampling of all outpost wells on the south shore of Nassau County was completed. (2) Data on pumpage in relation to chloride concentration in several south shore public-supply wells were collected. (3) Site selection for new wells is being considered.

Plans for Next Year: (1) A second synoptic water-quality sampling will be done. (2) Drilling will be done in the fall of 1985. (3) Evaluation of water-quality data and pumping versus chloride data will be continued.

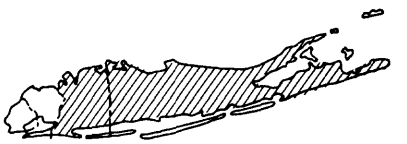
Ground-Water-Quality Appraisal of Long Island
(NY 84-148)

Date Project Began: April 1984

Date Project Ends: September 1987

Project Leader: David A. Eckhardt

Field Location: Nassau and Suffolk Counties



Problem: The hydrogeologic setting and land-use characteristics of Nassau and Suffolk Counties provide a unique situation for water-quality appraisal because 3 million people are served by water supply from ground water. The use of ground water has grown sharply in the past few years, but contamination has restricted its use in many areas. Successful management of the ground-water resources requires a through accounting of water quality in the upper glacial aquifer and the nature and extent of contamination.

Objectives: (1) To assess the present quality of the ground-water resources of Nassau and Suffolk Counties by investigating the nature and extent of ground-water contamination in the upper glacial aquifer in key land-use areas. (2) To present land-use, hydrologic, and water-quality data pertinent to the interpretation and management of Long Island's ground-water resources and its attendant contamination problems.

Approach: Phase I: (1) assemble current and historical water-quality data, (2) inventory and classify contaminants, (3) define areal distribution of identified contaminants in the upper glacial aquifer, (4) correlate land-use patterns and hydrogeologic characteristics with patterns of contamination, and (5) provide preliminary graphic semiquantitative representation of contaminant extent for identified classes of contaminants. Phase II: (1) develop well network and water-quality-sampling protocols to provide the data needed for addressing the objectives, (2) obtain water-quality samples and analytical results for wells in the network, (3) compile land-use, hydrogeologic, and water-quality data and conduct statistical analyses, and (4) prepare final report to describe the relationship between land use and water quality in the upper glacial aquifer of Nassau and Suffolk Counties and the representativeness of conditions in this region for other localities.

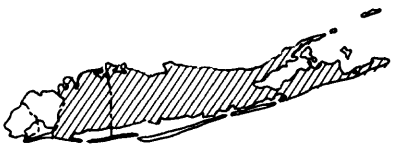
Progress and Significant Results: Phase I: A preliminary report (in review) describes the apparent relationship between land use and water quality in the upper glacial aquifer of Nassau and Suffolk Counties and provides the basis for refining data-collection protocols and conducting a statistical analysis for the final report under Phase II.

Plans for Next Year: Begin Phase II by delineating well network and obtain water-quality data needed to complete final report.

Selected Topics in Ground-Water Geochemistry
on Long Island
(NY 85-153)

Date Project Began: January 1985

Date Project Ends: April 1989



Project Leader: Kenneth A. Pearsall

Field Location: Nassau and Suffolk Counties

Cooperating Agencies: Nassau County Department of Public Works; Suffolk County Department of Health Services; Suffolk County Water Authority

Problem: Natural geochemical processes operating in Long Island's ground-water system have not been adequately studied and consequently are not well understood. A basic understanding of these processes, especially those operating in reducing environments, is essential to predicting the fate of contaminants that enter the ground-water system.

Objectives: To expand the current understanding of geochemical processes occurring in Long Island's aquifer system by: (1) developing a geochemical-reaction model of the evolution of the major-ion character of the water, (2) investigating in detail the geochemistry of reducing environments in the ground-water system, and (3) examining how and to what extent natural geochemical processes are affected by the introduction of contaminants and investigating how geochemical processes affect the attenuation of contaminants.

Approach: A multiphase study will examine the evolution of water quality in several different geochemical environments. The first phase will evaluate the evolution of native (natural) water quality in the oxidizing environments that predominate in Long Island's aquifer system; the second phase will examine native geochemistry in reducing environments; and the third phase will examine the geochemistry of reducing zones contaminated with manmade substances. The geochemical speciation models WATQEF, BALANCE, and PHREEQE will be principal tools used to evaluate the processes.

Progress and Significant Results: Background-water-quality wells have been selected for the flowline study along the Nassau-Suffolk border and for the islandwide aquifer-water-quality study. Well selection was based on existing water-quality data. A 1,200-ft Lloyd aquifer well was installed in Copiague for the flowline study. Core samples from the Lloyd borehole have been analyzed for mineral composition and ion-exchange capacity. Procedures have been selected and are being implemented for analyses of unstable samples for reduced ion and sulfide ion in the field or at the Syosset office laboratory.

Plans for Next Year: To sample approximately 250 wells, perform analyses for reduced ion and sulfide, and analyze the resulting water-quality data.

Hydrogeologic Factors that Influence Contributing Areas to Suffolk County Pumping Centers (NY 85-155)

Date Project Began: October 1984

Date Project Ends: September 1988

Project Leader: Peter K. Shernoff

Field Location: Suffolk County

Cooperating Agencies: Suffolk County Water Authority; Suffolk County Department of Health Services

Problem: Suffolk County relies completely on ground-water resources for its water supply. This supply is principally managed and distributed by the Suffolk County Water Authority from an extensive network of well fields or pumping centers. In recent years, contamination has resulted in closing of pumping wells in Queens and Nassau Counties. A more detailed knowledge of ground-water flow patterns and of the geologic conditions at the pumping centers will enable the designing of an efficient monitoring network for the Suffolk County Water Authority sites.

Objectives: (1) To determine changes in regional ground-water flow directions that result from withdrawals at selected pumping centers. (2) To describe the direction of ground-water flow to selected pumping centers with respect to the geologic framework. (3) To calculate, where possible, the rate of ground-water movement to selected pumping centers. (4) Recommend a monitoring network for selected pumping centers based on the first three objectives.

Approach: Upon agreement with the cooperators, several pumping centers will be selected on the basis of available geologic and hydrologic data and need. Surface geophysics, observation wells, and aquifer tests will be used to further evaluate selected sites. The resulting data will be used to construct flow nets and calculate ground-water flow rates to the pumping centers so that a monitoring network can be set up.

Progress and Significant Results: A few meetings and several contacts have been made with the cooperators to discuss project goals and the pumping centers selected. Data from a few selected pumping centers were used to construct maps and cross sections of the geologic and hydrologic settings. Observation wells were drilled at Long Springs Road and one at Dare Road for water levels, future quality sampling, and aquifer tests. Resistance, very low frequency, and electromagnetic surface geophysical methods were tested and used to identify changes in geology and in position of saltwater interface and contamination plumes.

Plans for Next Year: Aquifer tests will be carried out at the Long Springs Road pumping center. A third pumping center will be selected with approval of cooperators. Computer models will be constructed to test flow theories for Long Springs Road and Dare Road. Generalized flow nets will be constructed for selected pumping centers.

Analysis of Solute Transport in the Upper Glacial and Magothy Aquifers on Long Island (NY 85-156)

Date Project Began: October 1984

Date Project Ends: September 1988

Project Leader: Keith R. Prince

Field Location: East Meadow Recharge Site, Nassau County

Problem: Solute-transport modeling requires that (1) the velocity field be resolved sufficiently to define the path of an individual particle of water; (2) the concentration and rate of application of the contaminant be specified; (3) the characteristic dispersivity be estimated; and (4) chemical reactions be considered. These variables are not easily measured in the field and are difficult to define; thus, a unique solution cannot be guaranteed. Even though observed concentrations are matched through calibration, the correct representation of this multivariate system is not ensured, and errors in modeling may lead to serious errors in prediction.

Objectives: To (1) update the detailed hydrogeologic framework at the East Meadow recharge site; (2) compare the observed plume migration with predictions of plume movement by several analytical solutions; (3) construct a three-dimensional flow model of the recharge site to calculate ground-water velocities in detail; (4) construct a numerical transport model to evaluate the factors that affect the movement of solutes through the upper glacial and Magothy aquifers; (5) run detailed sensitivity analyses to reveal which aquifer properties control the movement of reclaimed water; and (6) assess the long-term hydrologic effects of artificial recharge.

Approach: Data from pumping tests will be analyzed to (1) describe the hydraulic characteristics of the site in detail; (2) develop a three-dimensional discretization scheme for the model; (3) select appropriate aquifer characteristics for further transport analysis. Analytical solutions for plume development will be compared with observed field data to assess factors that affect contaminant transport. A preliminary evaluation of three-dimensional ground-water flow at the site will be done by examining the results of an islandwide flow model. A site-specific three-dimensional flow model will be constructed to further refine the ground-water-flow values. A two-dimensional solute-transport model will be constructed to evaluate which factors affect the movement of solutes.

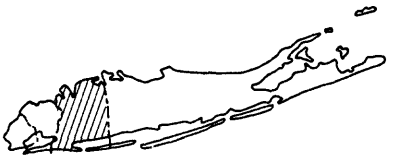
Progress and Significant Results: The hydrologic setting of the site has been refined. An aquifer-pumping test has been completed and analyzed to provide data for development of the solute-transport model. An observation-well network has been installed to monitor the movement of the plume of reclaimed water.

Plans for Next Year: The plume will be monitored through regular water sampling from observation wells. In preparation for the solute-transport modeling, work will begin on a detailed ground-water flow model of the site.

Effect of Stormwater Recharge Basins on the Quantity and Distribution of Recharge in Nassau County (NY 84-157)

Date Project Began: October 1984

Date Project Ends: September 1987



Project Leader: Henry F. H. Ku

Field Location: Nassau County

Cooperating Agency: Nassau County Department of Public Works

Problem: Stormwater basins transmit virtually all stormwater inflow to the ground-water reservoir. It has been postulated that recharge basins may increase recharge from precipitation to above the predevelopment level. Therefore, it is critical to understand the effect of recharge basin systems on the quantity and distribution of recharge to the Long Island ground-water system. The three-dimensional aspects of this recharge to the ground-water reservoir through recharge basins on an areal basis remain largely unquantified.

Objectives: (1) To update and revise the Nassau County part of a 1973 publication categorizing recharge-basin characteristics. (2) To characterize areal infiltration rates and examine the distribution of recharge basins and also the factors that influence recharge capability to establish the areal distribution of recharge.

Approach: To install a crest-stage gage at a basin and determine infiltration rate and vertical hydraulic conductivity. Use updated recharge distribution as input matrix for the Long Island regional model to examine the effect on regional ground-water flow and the resulting increased vertical flow in the aquifer system.

Progress and Significant Results: All Nassau County basin data have been entered into the computer. Aerial photos to cover Nassau County have been purchased; these were taken 5 days after a significant rainfall. Four infiltration rings were constructed, and a constant-level float system is under construction. Fourteen test holes were drilled and two cores obtained from clogged basins. Ten infiltration test were completed; also 58 crest-stage gages were installed. The preliminary computer plot of clogged basins indicates wide geographic distribution. The clogged basins occur not only in expected areas (near Seaford-Oyster Bay Expressway and morainal area) but also over a large part of the south-shore outwash plain. Results of test drilling show that only 2 of 14 clogged basins have clay units beneath the basin (within 40 ft), which suggests that basin clogging may be due to other factors. Most soil samples show nonhomogeneous sediments, but all have little or no clay fractions.

Plans for Next Year: To complete infiltration tests at 58 basins and continue to analyze aerial photos to determine the extent of infiltration rate.

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Anderson, H. R., Dineen, R. J., Stelz, W. G. and Belli, J. L., 1982, Geohydrology of the valley-fill aquifer to the South Fallsburgh-Woodbourne area, Sullivan County, New York: U.S. Geological Survey Open-File Report 82-112, 6 sheets.

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Nassau County Department of Public Works
New York City Department of Environmental Protection
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New York State Department of Environmental Conservation - Heritage Task Force
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New York State Power Authority
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☆ U.S. Government Printing Office: 1986—613-839