U.S. GEOLOGICAL SURVEY

Activities in New York

1979

Compiled by

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UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

For additional information, write
or telephone the appropriate office
listed on page 118.

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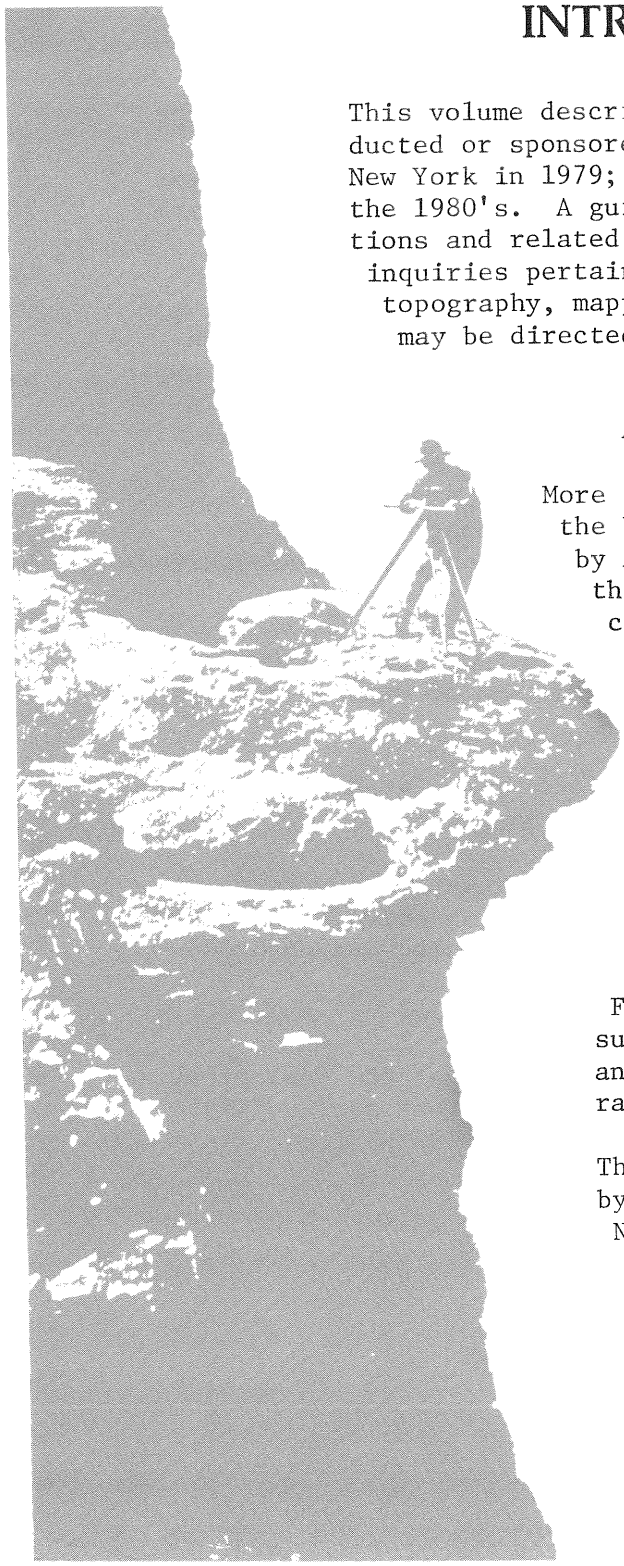


This volume describes the projects and programs conducted or sponsored by the U.S. Geological Survey in New York in 1979; many of these will continue into the 1980's. A guide to obtaining Geological publications and related information is given on page 119; inquiries pertaining to water resources, geology, topography, mapping, or the outer continental shelf may be directed to the addresses given on page 118.

History and Organization

More than a century ago, on March 3, 1879, the U.S. Geological Survey was created by Act of Congress, as a bureau within the Department of the Interior, to classify public lands as to their suitability for mining and irrigation and to evaluate the geologic structure and mineral resources of the Nation. Since then, the Survey's authority and responsibilities have expanded to include topographic mapping, geochemical and geophysical studies, stream gaging and water-supply assessments and, more recently, supervision of mineral exploration and development on Federal and Indian lands, engineering supervision of water-power projects, and administration of a minerals-exploration program.

The work of the Survey is carried out by four divisions--Water Resources, National Mapping, Geologic, and Conservation; coordination and assistance in the application of this information for certain specific uses is provided by the Land Information and Analysis Office. All of these organizational units are under the general auspices of the Director, who is in turn responsible to the Secretary of the Department of the Interior.

Programs in New York

The major programs conducted by the Geological Survey provide basic scientific information concerning water, land, and mineral resources. The Survey also supervises the exploration for mineral fuels on leased outer continental shelf lands. These programs are described briefly below:

Water resources investigations (page 3).--These encompass (a) statewide networks of measurement stations that provide continuous records of streamflow, ground-water levels, water quality, and sediment discharge, and (b) projects to study local or regional water problems as well as critical water problems of national scope or interest.

Geologic and mineral resource surveys and mapping (page 71).--These studies focus on geologic, mineral, and energy-resources investigations both on land and offshore.

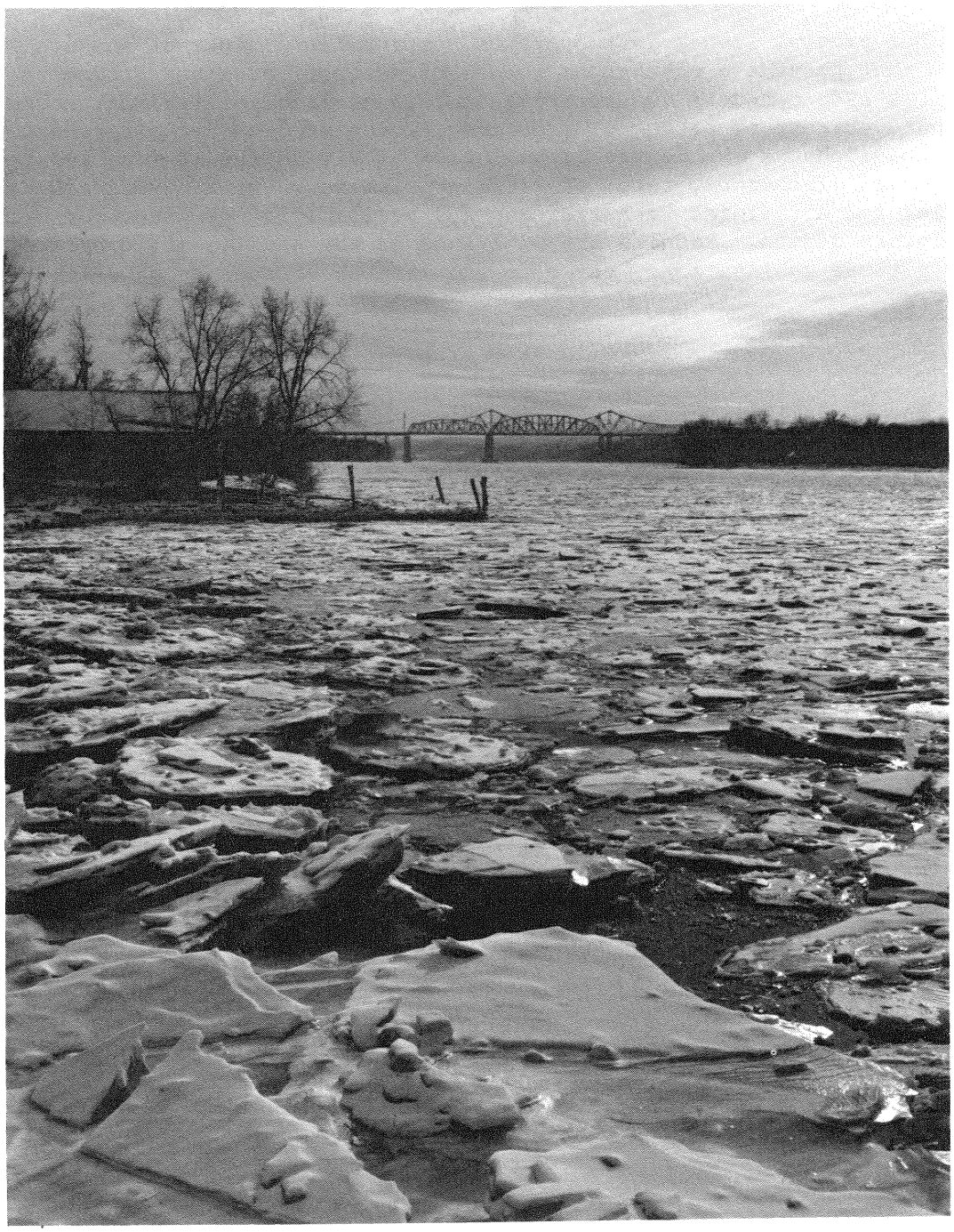
Conservation of lands and mineral resources (page 91).--These studies include the classification and evaluation of mineral resources on the outer continental shelf.

Topographic surveys and mapping (page 95).--These studies include quadrangle, small-scale, and special mapping.

Land information and analysis (page 111).--These studies focus on the interpretation and application of earth-science and related information to multidisciplinary land-resource and environmental-impact problems.

The sections that follow describe the work of the Geological Survey and summarize projects conducted in New York during 1979. Many of these projects will continue into the 1980's.

WATER RESOURCES INVESTIGATIONS



Hudson River at Castleton-on-Hudson, N.Y.

WATER RESOURCES INVESTIGATIONS

The Geological Survey's water-resources investigations program appraises the Nation's water resources and compiles data necessary to develop and manage these resources efficiently. The program is directed through 46 districts, each of which encompasses a State or group of States.

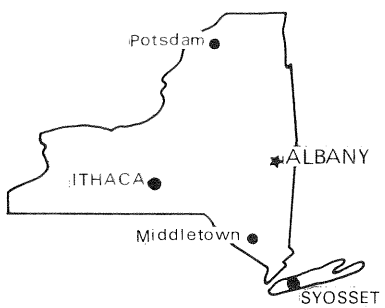
The program in New York operates a statewide network of measurement sites that provide a continuous record of surface-water and ground-water data; it also conducts interpretive studies of local or regional scope to evaluate current or potential problems. These studies are directed toward such questions as the degree of pollution likely to result from sewage or industrial discharges, rates of sedimentation in waterways, effects of heavy pumping and artificial recharge, and the availability of water for present and future demand. Results are published as the studies are completed. To obtain these publications, refer to the list of sources on page 119.

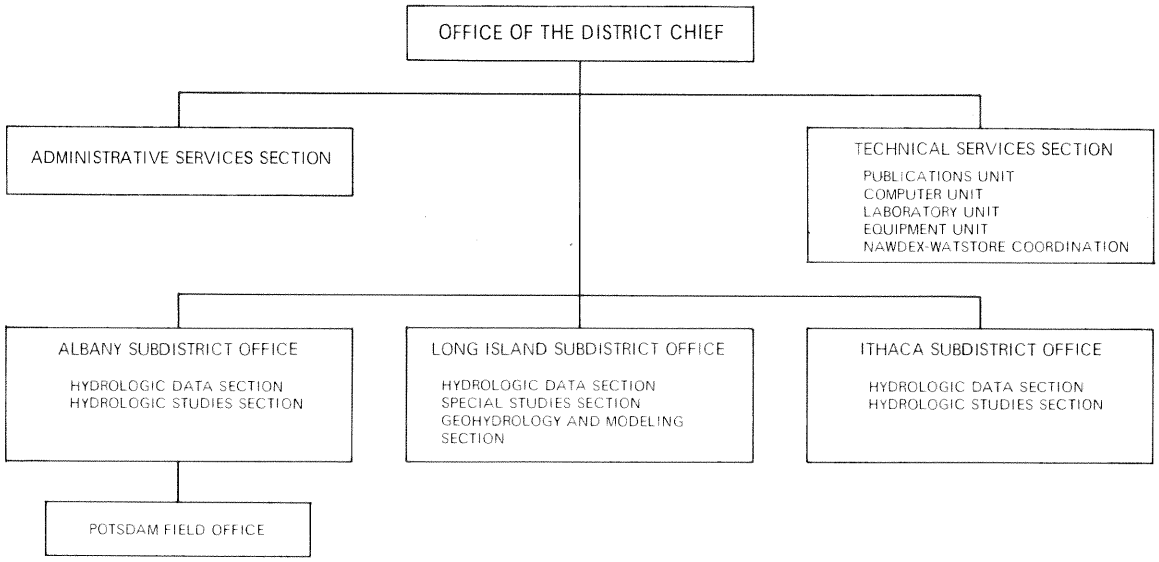
New York District

The Geological Survey began its first water-resources studies in New York 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. Since 1910, the Survey has maintained a District office in Albany to direct its water investigations within the State, and a Long Island subdistrict office since 1932 to study the ground-water situation in this area of rapidly increasing urbanization. Subdistrict offices are maintained in Ithaca and Albany to collect and interpret data from western and eastern New York, respectively. A field station is maintained in Potsdam. The District addresses and organization chart are given in figure 1; the office locations are shown in the map below.

Projects in 1979-80

Projects conducted by the New York District during 1979-80 are described on the following pages. For convenience, they are divided into two groups, statewide data-collection programs (p. 6-22) and regional and local studies. The regional and local studies are grouped as upstate projects (p. 23-46) and Long Island projects (p. 47-65).





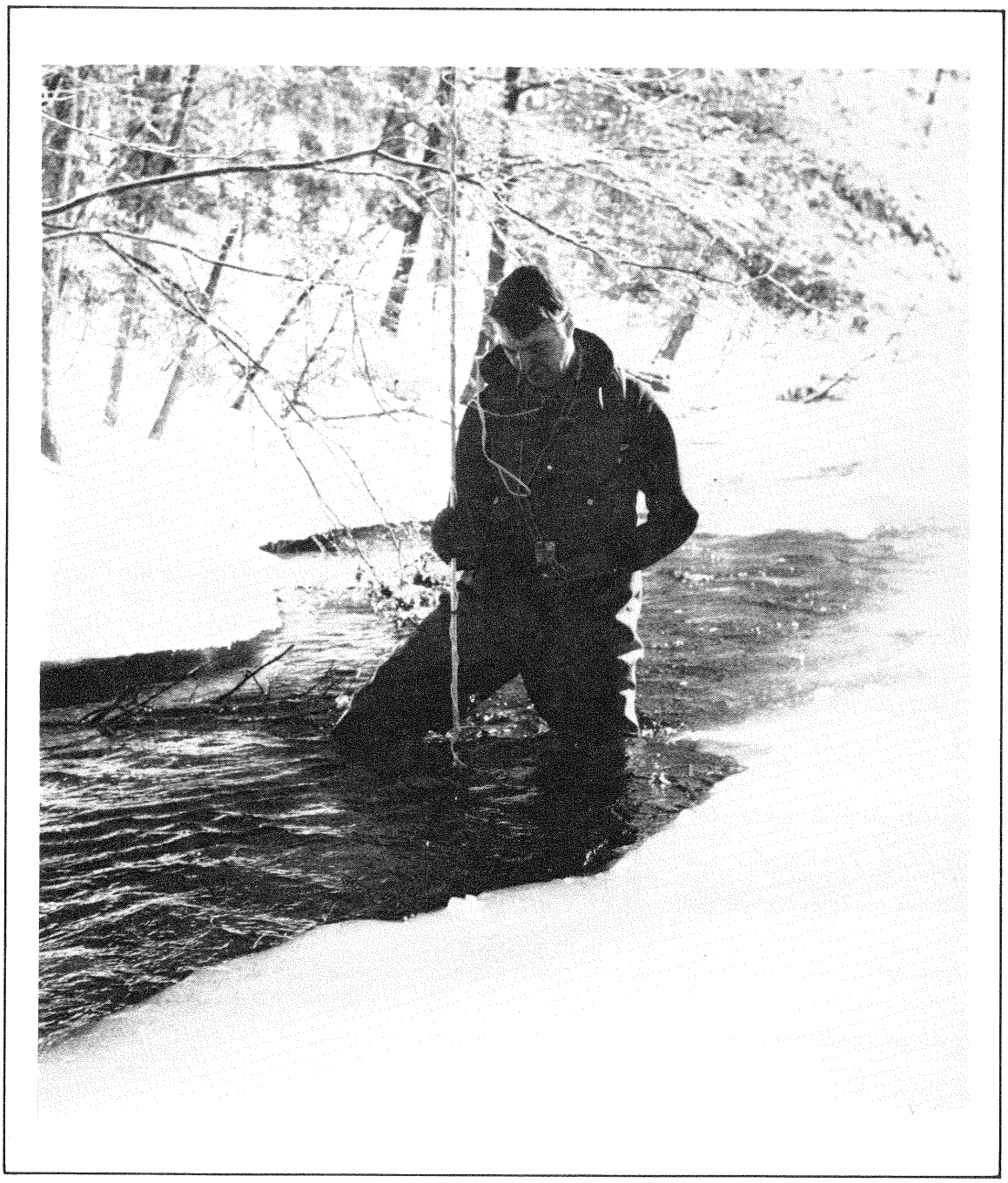
NEW YORK DISTRICT OFFICE ADDRESSES

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 Albany, N.Y. 12201
Albany Subdistrict Office	(518) 472-3107	U.S. Post Office & Courthouse P.O. Box 744 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 Sanfordville, N.Y. 13676

Figure 1.--New York District organization chart with office addresses.

STATEWIDE DATA-COLLECTION PROGRAMS



Positioning wading rod for streamflow measurement.

Surface-Water Stations
(NY 00-001)

Date Project Began: June 1898

Project Leader: Donald F. Farrell

Principal Cooperating Agencies: New York State Department of Environmental Conservation; U.S. Army Corps of Engineers; City of of New York, Department of Environmental Protection; Nassau County Department of Public Works; Suffolk County Department of Environmental Control; Suffolk County Water Authority

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

Objective: (1) To collect surface-water data sufficient to satisfy needs for current-purpose uses such 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 studies. (2) To collect data necessary for analytical studies to define for any location the statistical properties of, and trends in, the occurrence of water in streams, lakes, and estuaries for use in planning and design.

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: This project has started, maintained, operated, and periodically revised a network of streamflow stations to obtain basic hydrologic data needed for other U.S. Geological Survey studies and by other interested parties.

Plans for Next Year: To continue operation of the basic network with revision as needed to supply future water data in the most useful form.

Completed Reports:

U.S. Geological Survey, Surface-water supply of the United States: U.S. Geological Survey Water Supply Papers. (Published through 1970.)

_____, Water resources data for New York, part 1, Surface water records: U.S. Geological Survey open-file rept. (Released annually from 1961-1974).

_____, 1976, Water resources data for New York, water year 1975: U.S. Geological Survey Water-Data Rept. NY-75-1, 735 p.

_____, Water resources data for New York: U.S. Geological Survey Water-Data Report, v. 1, New York excluding Long Island; v. 2, Long Island. (Published annually since water year 1976).

Ground-Water Stations
(NY 00-002)

Date Project Began: July 1934

Project Leader: Donald F. Farrell

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 ground-water systems to provide a data base from which to (a) measure the effects of development, (b) assist in the prediction of future supplies, and (c) provide data for water management. Also included in this project are short-term studies of ground-water-pollution problems.

Objectives: (1) To collect water-level data sufficient to provide a minimum long-term data base so that the general response of the hydrologic system to climatic variations and induced stresses is known and so that potential problems can be 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. This analysis must provide an assessment of the ground-water resources, allow prediction of future conditions, detect and define pollution and supply problems, and provide the data base necessary for ground-water management.

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

Progress and Significant Results: This project has started, maintained, operated, and periodically revised a network of water-level stations to obtain basic hydrologic data needed for other U.S. Geological Survey studies and by other interested parties. These data have played a significant role in helping the water managers of Long Island to formulate long-term goals leading to the conservation of the Long Island ground-water reservoir. The data are published annually.

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

Completed Reports:

Kimmel, G. E., 1971a, The water-table on Long Island, New York in March 1970: U.S. Geological Survey open-file rept., 14 p.

_____, 1971b, Water-level surfaces in the aquifers of western Long Island, New York, in 1959 and 1970, in Geological Survey Research 1971: U.S. Geological Survey Professional Paper 750-B, p. B224-B228.

_____, 1972, The water table on Long Island, New York, in March 1970: Long Island Water Resources Bull. 2, 8 p.

_____, 1972, Nitrogen content of ground water in Kings County, Long Island, New York, in Geological Survey Research 1972: U.S. Geological Survey Professional Paper 800-D, p. D199-D203.

_____, 1973, Change in potentiometric head in the Lloyd aquifer, Long Island, New York: U.S. Geological Survey Journal of Research, v. 1, no. 3, p. 345-350.

Koszalka, E. J., 1975, The water table on Long Island, New York, in March 1974: Long Island Water Resources Bull. 5, 7 p., 3 pl.

Nakao, J. H., and Erlichman, F. R., 1978, The water table on Long Island, New York, in March 1975: U.S. Geological Survey Open-File Rept. 78-569, 10 p., 1 pl.

Prince, K. R., 1976, The potentiometric surface of the Magothy aquifer on Long Island, New York, in March 1975: U.S. Geological Survey Open-File Rept. 76-536, 12 p., 1 pl.

Rich, C. A., Prince, K. R., and Spinello, A. G., 1975, Potentiometric surface of the Lloyd aquifer on Long Island, New York, in January 1975: U.S. Geological Survey open-file rept., 12 p., 1 pl.

U.S. Geological Survey, Ground-water levels in the United States, Northeastern States: U.S. Geological Survey Water Supply Papers. (Published through 1974.)

_____, Water resources data for New York, part 2, Water quality records: U.S. Geological Survey open-file rept. (Released annually from 1961-1974.)

_____, 1976, Water resources data for New York, water year 1975: U.S. Geological Survey Water-Data Rept. NY-75-1, 735 p.

_____, Water resources data for New York: U.S. Geological Survey Water-Data Rept., v. 1, New York excluding Long Island; v. 2, Long Island. (Published annually since water year 1976.)

Water-Quality Stations
(NY 00-003)

Date Project Began: June 1906

Project Leader: Roger J. Archer

Principal Cooperating Agencies: U.S. Environmental Protection Agency; New York State Department of Environmental Conservation; Suffolk County Department of Environmental Control; Suffolk County Water Authority

Problem: Water-resource planning and water-quality assessment require a nationwide data base of standardized information. For proper planning and assessment of the water resource, the chemical and physical quality of the rivers, streams, and ground water must be defined and monitored.

Objective: To provide a national bank of water-quality data for broad Federal and State planning and action programs and to provide data for Federal management of interstate and international waters.

Approach: To operate a network of water-quality stations to provide data on chemical concentrations, loads, and trends as required by planning and management agencies.

Progress and Significant Results: Samples were collected monthly at 27 surface-water stations, water-temperature data were collected at 27 stations, and specific-conductance data were collected at 11 stations. Water-quality data for the 1978 water year were published in the annual data report.

Plans for Next Year: Collection of water-quality data will continue at approximately the same level as last year, and data for the 1979 water year will be published in the annual data report.

Completed Reports:

Turk, J. T., and Peters, N. E., 1977, Acid-rain weathering of metasedimentary rocks in Herkimer County, New York: U.S. Geological Survey Open-File Rept. 77-538, 10 p.

U.S. Geological Survey, Quality of surface waters of the United States: U.S. Geological Survey Water-Supply Papers. (Published annually through 1970.)

_____, Water resources data for New York, part 2, Water quality records: U.S. Geological Survey Open-File Rept. (Released annually from 1961-1974.)

_____, 1976, Water resources data for New York, water year 1975: U.S. Geological Survey Water-Data Rept. NY-75-1, 735 p.

_____, Water resources data for New York: U.S. Geological Survey Water-Data Rept., v. 1, New York excluding Long Island; v. 2, Long Island. (Published annually since water year 1976.)

Sediment Stations
(NY 00-004)

Date Project Began: October 1974

Project Leader: Donald F. Farrell

Cooperating Agencies: New York State Department of Environmental Conservation; U.S. Environmental Protection Agency.

Problem: Water-resource planning and water-quality assessment require a nationwide base of standardized information. Sediment concentrations and sediment discharges in rivers and streams must be defined and monitored.

Objective: (1) To provide a national bank of sediment data for use in broad Federal and State planning and programs and to provide data for Federal management of interstate and international waters. (2) To provide sediment data and interpretation for specific areas such as the Genesee River basin.

Approach: To establish and operate a network of sediment stations to provide data on areal and temporal averages and trends of sediment concentration, sediment discharge, and particle size of sediment being transported by rivers.

Progress and Significant Results: Operation of a series of stations for collection of suspended-sediment samples was continued. Two reports on the Genesee basin studies were completed.

Plans for Next Year: Data collection at Tioga River at Lindley, NASQAN, and bench-mark stations will be continued. Results will be published in the annual data report.

Completed Reports:

Mansue, L. J., Bauersfeld, W. H., and Soren, Julian, Hydrogeologic influences on sediment-transport patterns in the Genesee River basin, New York and Pennsylvania: U.S. Environmental Protection Agency (in press).

Mansue, L. J., and Young, R. A., Streamflow and sediment-transport in the Genesee River basin, New York and Pennsylvania: U.S. Environmental Protection Agency (in press).

Mansue, L. J., Young, R. A., and Miller, T. S., Geohydrology of the Canaseraga Valley basin, Dansville, New York: U.S. Environmental Protection Agency (in review).

U.S. Geological Survey, 1976, Water resources data for New York, water year 1975: U.S. Geological Survey Water-Data Rept. NY-75-1, 735 p.

_____, Water resources data for New York: U.S. Geological Survey Water-Data Rept., v. 1, New York excluding Long Island; v. 2, Long Island. (Published annually since water year 1976.)

Young, R. A., and Mansue, L. J., 1978, Holocene Climatic Variations and Sedimentation Rates in Western New York [abs.], in International Association for Great Lakes Research Symposium, proceedings: Rochester, N.Y., May 1978.

Flood-Insurance Studies for Federal Insurance Administration, Department of Housing and Urban Development (NY 00-006)

Date Project Began: July 1972

Date Project Ended: September 1979

Project Leader: Richard Lumia

Cooperating Agency: U.S. Department of Housing and Urban Development (HUD)

Problem: The National Flood Insurance Act of 1968 provides that HUD operate a flood-insurance program through the Federal Insurance Administration (FIA). HUD needs flood studies in selected areas to determine applicable flood-insurance premium rates.

Objective: (1) To conduct hydrologic and hydraulic studies of the areas assigned by FIA and to attain the accuracy specified by FIA within the prescribed time limit.

Approach: (1) To conduct the necessary surveys by ground and photogrammetric methods. (2) To (a) determine discharges and compute profiles of floods of specified frequencies, and (b) furnish results in reports prepared to FIA specifications.

Progress and Significant Results: Technical work and reports were completed for all remaining flood-insurance studies except the Towns of Chenango, Fenton, Greene, and Stephentown, and the Village of Greene, whose reports are in review stages. The study for the Town of Pittstown will not be done and has been returned to FIA.

Plans for Next Year: Resolve internal and Technical Evaluation Committee review comments and attend final meetings for the remaining five communities.

Reports Completed Since 1975:

U.S. Federal Insurance Administration, 1976, Flood insurance study, City of Oswego, Oswego County, New York: Washington, U.S. Department of Housing and Urban Development, 24 p.

_____, 1976, Flood Insurance study, Town of Colonie, Albany County, New York: Washington, U.S. Department of Housing and Urban Development, 40 p.

_____, 1976, Flood insurance study, Town of Collins, Erie County, New York: Washington, U.S. Department of Housing and Urban Development, 17 p.

_____, 1976, Flood insurance study, Village of Gowanda, Cattaraugus and Erie Counties, New York: Washington, U.S. Department of Housing and Urban Development, 20 p.

_____, 1977, Flood insurance study, City of Cohoes, Albany County, New York: Washington, U.S. Department of Housing and Urban Development, 28 p.

_____, 1977, Flood insurance study, Town of Evans, Erie County, New York: Washington, U.S. Department of Housing and Urban Development, 31 p.

_____, 1977, Flood insurance study, Town of Henrietta, Monroe County, New York: Washington, U.S. Department of Housing and Urban Development, 32 p.

_____, 1977, Flood insurance study, Town of Waterford, Saratoga County, New York: Washington, U.S. Department of Housing and Urban Development, 26 p.

_____, 1977, Flood insurance study, Village of Waterford, Saratoga County, New York: Washington, U.S. Department of Housing and Urban Development, 23 p.

_____, 1977, Flood insurance study, Village of Dryden, Tompkins County, New York: Washington, U.S. Department of Housing and Urban Development, 29 p.

_____, 1978, Flood insurance study, City of Oneonta, Otsego County, New York: Washington, U.S. Department of Housing and Urban Development, 20 p.

_____, 1978, Flood insurance study, Village of Fort Edward, Washington County, New York: Washington, U.S. Department of Housing and Urban Development, 16 p.

_____, 1979, Flood insurance study, Town of Brighton, Monroe County, New York: Washington, U.S. Department of Housing and Urban Development, 30 p.

_____, 1979, Flood insurance study, City of Albany, Albany County, New York: Washington, U.S. Department of Housing and Urban Development, 17 p.

_____, 1979, Flood insurance study, City of Rensselaer, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 17 p.

_____, 1979, Flood insurance study, City of Troy, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 22 p.

_____, 1979, Flood insurance study, City of Watervliet, Albany County, New York: Washington, U.S. Department of Housing and Urban Development, 11 p.

_____, 1979, Flood insurance study, Village of Menands, Albany County, New York: Washington, U.S. Department of Housing and Urban Development, 11 p.

_____, 1979, Flood insurance study, Town of East Greenbush, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 12 p.

_____, 1979, Flood insurance study, Town of North Greenbush, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 16 p.

_____, 1979, Flood insurance study, Town of Brunswick, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 16 p.

_____, 1979, Flood insurance study, Town of Poestenskill, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 17 p.

_____, 1979, Flood insurance study, Town of Sand Lake, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 18 p.

_____, 1979, Flood insurance study, Village of Green Island, Albany County, New York: Washington, U.S. Department of Housing and Urban Development, 20 p.

_____, 1979, Flood insurance study, Town of Stephentown, Rensselaer County, New York: Washington, U.S. Department of Housing and Urban Development, 30 p.

_____, 1979, Flood insurance study, Town of Chenango, Broome County, New York: Washington, U.S. Department of Housing and Urban Development, 30 p.

_____, 1979, Flood insurance study, Town of Fenton, Broome County, New York: Washington, U.S. Department of Housing and Urban Development, 30 p.

_____, 1979, Flood insurance study, Town of Greene, Chenango County, New York: Washington, U.S. Department of Housing and Urban Development, 30 p.

_____, 1979, Flood insurance study, Village of Greene, Chenango County, New York: Washington, U.S. Department of Housing and Urban Development, 25 p.

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

Date Project Began: January 1979

Date Project Ends: Continuous

Project Leader: Deborah S. Snavely

Cooperating Agency: 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 and how they may vary with demands.

Objective: (1) To inventory water use within New York and compile this information in a format suitable for analysis and future planning. (2) To determine what water-use data are being collected and by whom, and to evaluate the completeness of data within their category and whether they are useful to the National Water-Use Data System (NWUDS) of the Geological Survey. (3) To determine what additional data will have to be collected to complete NWUDS. (4) To design a system to summarize data collected by other agencies and put these data into the form compatible with NWUDS.

Approach: The several New York State agencies that collect and store water-use data will be evaluated for usefulness in NWUDS. A system to collect, store, and transmit data to NWUDS will be developed. USGS will be responsible for direction, management, and standards; New York State will be responsible for the collection and storage of data. Data-collection needs will be determined and a detailed work plan prepared. The system will then be refined and data collection begun.

Progress and Significant Results: Coordination with the New York State Departments of Environmental Conservation and Health was developed.

Plans for Next Year: (1) To coordinate water-use data system of New York State Departments of Environmental Conservation and Health with NWUDS and make the two systems compatible. (2) To begin expansion of data-collection network to include data items required by both systems.

Time-of-Travel Studies
(NY 67-013)

Date Project Began: July 1966

Date Project Ended: September 1979

Project Leader: David E. Troutman

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Streams of New York carry and dilute large quantities of municipal and industrial effluents. To determine the amount of pollutants that can safely be introduced into a stream, it is necessary to analyze the hydraulics and hydrology of flow systems. Time-of-travel studies are designed to provide this information.

Objective: To determine the time needed for water and its accompanying pollutants to move from point to point on many streams in the State.

Approach: As the need arises, teams measure traveltime of water in a particular river or stream. A fluorescent dye is injected into the river at an observed time, and the time of arrival of the peak dye concentration at downstream sampling points is determined with a fluorometer. Two-ounce samples are collected at sampling points at selected time intervals to trace the passage of the dye.

Progress and Significant Results: Study plans were altered to include the determination of stream-reaeration coefficients (project 79-058, p. 32).

Reports Completed Since 1975:

Hamecher, P. H., and Wagner, L. A., 1975, Dye-dispersion study on Lake Champlain near Crown Point, New York: U.S. Geological Survey Open-File Rept. 74-355, 16 p.

Dunn, Bernard, 1975, Time-of-travel study, Lake Erie-Niagara River basins: U.S. Geological Survey open-file rept., 41 p.

Wagner, L. A., and Hamecher, P. H., 1976, Time-of-travel and dye-dispersion in La Chute and Lake Champlain, Northeastern New York: U.S. Geological Survey Open-File Rept. 75-639, 8 p.

Shindel, H. L., and Wagner, L. A., 1977, Time-of-travel study, Black River from Lyons Falls to Dexter, New York: New York State Department of Environmental Conservation, Rept. of Investigations 16, 18 p.

Shindel, H. L., Wagner, L. A., and Hamecher, P. H., 1977, Time-of-travel studies of selected streams in the Oswego River basin, New York, 1967-75: New York State Department of Environmental Conservation, Rept. of Investigations 17, 153 p.

Low Flow-Frequency Study - New York (NY 77-044)

Date Project Began: October 1978

Date Project Ends: December 1979

Project Leader: Benjamin B. Eissler

Field Location: Statewide, excluding New York City and Long Island

Cooperating Agency: New York State Department of Environmental Conservation

Problem: The increasing demand for water for all purposes, including waste disposal, has created a need for low-flow data and statistical evaluations of these data.

Objectives: To (a) publish a summary of all available low-flow information (excluding New York City and Long Island); (b) design a network of low-flow partial-record stations; and (c) prepare a report that summarizes the data and regional low-flow characteristics in New York (excluding Long Island and New York City urban area).

Approach: (1) To (a) search literature and summarize previously published information; (b) determine 7-day 2-year, and 7-day 10-year low-flow values at all gaging stations, low-flow partial-record sites, and at any miscellaneous site with enough base-flow information. (2) To (a) plot this information on maps to determine where more information is needed; (b) monitor flow conditions to get needed measurements at proper duration levels; (c) compile low-flow characteristics and define areal relationships, and (d) prepare a report.

Progress and Significant Results: Low-flow report was completed and sent to publisher.

Plans for Next Year: To continue low-flow measurements at sites requested by cooperating agency.

Completed Reports:

Eissler, B. B., 1978, Selected low-flow characteristics of streams in the vicinity of Warwick, Orange County, New York: U.S. Geological Survey Open-File Rept. 78-811, 21 p.

_____, 1979, Low-flow frequency analysis of streams in New York: New York State Department of Environmental Conservation, Bull. 74, 184 p.

Flood Investigations - New York
(NY 67-045)

Date Project Began: July 1966

Project Leader: Bernard Dunn

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) determine discharges for flood events, define flood profiles, and collect information on flood-plain mapping; (c) prepare reports covering individual events; and (d) make analyses to improve flood-frequency relationships for the State.

Progress and Significant Results: Peak data were collected at partial-record sites on small streams, and the small-streams network was evaluated. The report, "Techniques for estimating magnitude and frequency of floods in New York" was completed. One bridge-site report was completed and one is in progress. Data on an area storm were collected.

Plans for Next Year: To (a) collect and publish flood-peak data at small-stream partial-record sites; (b) determine floodflow characteristics at proposed bridge sites; (c) collect data of flood events at miscellaneous sites.

Reports Completed Since 1975:

Dunn, Bernard, 1975, Floodflow characteristics at proposed bridge site on Cazenovia Creek in Town of West Seneca, Erie County, New York: U.S. Geological Survey open-file rept., 7 p.

_____, 1975, Floodflow characteristics at proposed bridge site on Fishkill Creek, Fishkill, New York: U.S. Geological Survey open-file rept., 8 p.

_____, 1975, Floodflow characteristics at proposed bridge site on Mohawk River, Whitesboro, New York: U.S. Geological Survey Open-File Rept. 75-442, 5 p.

Dunn, Bernard, 1975, Floodflow characteristics at proposed bridge site on West Branch Delaware River, Delhi, New York: U.S. Geological Survey Open-File Rept. 75-441, 9 p.

Dunn, Bernard, and Zembrzuski, T. J., Jr., 1976, Floodflow characteristics at proposed bridge site above Sherwood Road on West Branch Delaware River, Delhi, New York: U.S. Geological Survey Open-File Rept. 76-778, 10 p.

Leonard, I. R., and Dunn, Bernard, 1976, Maximum known stages and discharges of New York streams through 1973: New York State Department Environmental Conservation Bull. 72, 67 p.

Robison, F. L., 1976, Floods in New York, 1972, with special reference to Tropical Storm Agnes: U.S. Geological Survey Water-Resources Investigations 34-75, 91 p.

Robison, F. L., Embree, W. N., and Dunn, Bernard, 1976, Floods in New York, 1973 and 1974: New York State Department of Environmental Conservation Rept. of Investigations RI-15, 81 p.

Zembrzuski, T. J., Jr., and Dunn, Bernard, 1976, Floodflow characteristics at proposed bridge site on Fishkill Creek, Fishkill, New York: U.S. Geological Survey Open-File Rept. 76-595, 8 p.

_____, 1976, Floodflow characteristics at proposed bridge site on Mohawk River in Towns of Frankfort and Schuyler, Herkimer County, New York: U.S. Geological Survey Open-File Rept. 76-413, 8 p.

Dunn, Bernard, and Lumia, Richard, 1977, Supplementary hydraulic analysis of the Chenango River, Broome County, New York, in relation to planned highway construction: U.S. Geological Survey Open-File Rept. 77-484, 8 p.

Zembrzuski, T. J., Jr., and Dunn, Bernard, 1977, Floodflow characteristics at proposed channel relocation site on Mohawk River near Rome, New York: U.S. Geological Survey Open-File Rept. 77-328, 18 p.

Lumia, Richard, and Dunn, Bernard, 1978, Floodflow analysis of Ninemile Creek, Onondaga County, New York: U.S. Geological Survey Open-File Rept. 78-85, 10 p.

Lumia, Richard, 1978, Supplementary hydraulic analysis of proposed bridge site on Mohawk River, Whitesboro, New York: U.S. Geological Survey Open-File Rept. 78-348, 4 p.

Dunn, Bernard, 1979, Floodflow characteristics of Butternut Creek and Jamesville Reservoir, Jamesville, Onondaga Co., New York, U.S. Geological Survey Open-File Rept. 79-1292, 14 p.

Zembrzuski, T. J., Jr., and Dunn, Bernard, 1979, Techniques for estimating magnitude and frequency of floods on unregulated streams in New York, excluding Long Island: U.S. Geological Survey Water-Resources Investigations 79-83, 66 p.

Drainage-Area and Other Basin Characteristics
of New York Streams
(NY 78-057)

Date Project Began: October 1977

Date Project Ends: September 1983

Project Leader: Lloyd A. Wagner

Cooperating Agencies: New York State Department of Environmental Conservation; Town of Warwick; New York State Department of Transportation; U.S. Army, Corps of Engineers

Problem: Data on drainage-area size, as well as stream length and slope and the size of lakes and ponds within the drainage area, are needed for hydraulic and hydrologic studies of any given site. The drainage-area data are available for only a small percentage of sites within the State.

Objective: To promote uniformity and reduce discrepancy and contradiction among published values, and to make data on drainage areas and other basins characteristic of New York streams available to persons engaged in hydraulic and hydrologic studies.

Approach: Phase I of this study will be a compilation of all available drainage-area data. Phase II will be the measurement of drainage areas and other basin characteristics, such as river miles and slope, from the latest available USGS maps published. This work will be done in accordance with the recommendations of the Water Resources Council, Hydrology Committee, in Committee Bulletins 4 and 14. Drainage areas at the mouth of the following types of streams will be determined: (a) all streams having a drainage area greater than 10 mi^2, (b) all named streams with a drainage area exceeding 5 mi^2, and (c) streams having significant hydraulic structures such as dams and bridges.

Progress and Significant Results: Under phase I, compilation of all known stations was completed, and drainage-area information was compiled for the area within Hydrologic Units 02020007, 02020008, 04120101-04120104, 04130001-04130003 and 04140101, 04140201-04140203. Under phase II, a tabulation of drainage areas has been completed for the area within Hydrologic Units 02040101, 02040102, 02040104, 04150101 and 04150302-04150306.

Plans for Next Year: Under Phase I, to complete compilation of all known sites and drainage-area information for the rest of New York State. Under Phase II, to complete tabulation of drainage areas for the area within Hydrologic Units 04130002, 04130003, 04120101-04120104.

Precipitation-Monitoring Network for New York State (NY 79-071)

Date Project Began: October 1979

Date Project Ends: September 1981

Project Leader: Roy A. Schroeder

Cooperating Agency: N.Y. State Energy Research and Development Authority

Problem: Atmospheric fallout contributes significant quantities of both beneficial and harmful chemicals to surface waters. There is a need to quantify these inputs for determinations of chemical budgets in basins, weathering rates, and long-term changes in precipitation quality. Of particular importance are the oxides of sulfur and nitrogen, which contribute to "acid rain" in the Northeast.

Objective: To (a) measure quality and quantity of atmospheric precipitation at selected sites throughout New York State; (b) determine whether statistically significant changes have occurred in precipitation quality in the State; (c) compare data collected by the monthly composite wet-plus-dry fallout method previously used by the USGS in New York with data collected from wet fallout only, which is the method chosen by the National Atmospheric Deposition Program (NADP).

Approach: The previous network of 13 stations where wet-plus-dry precipitation was collected has been reactivated. Existing data as well as new data from these stations are being analyzed to search for trends in precipitation quality since 1965. Automatic-sensing wet/dry collectors will be installed at 5 of the above 13 sites to collect wet fallout on a weekly basis. The concentration of major cations, major anions, macronutrients, total acidity, hydrogen ion, and lead will be determined in all samples.

New York Cooperative Snow Survey
(NY 00-86)

Date Project Began: October 1979

Date Project Ends: September 1981

Project Leader: Ronald V. Allen

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

Problem: Data on runoff from spring snowmelt are important to management of hydroelectric operations, flood forecasting, and reservoir control. Snowcover information is needed for predicting the magnitude of spring runoff and for preparing for runoff extremes.

Objectives: To (a) collect, compile, and interpret snowcover information at approximately 500 snow courses throughout the State; (b) prepare timely summaries of synoptic measurements, and (c) publish statistical analysis of selected snow courses for 1961-80.

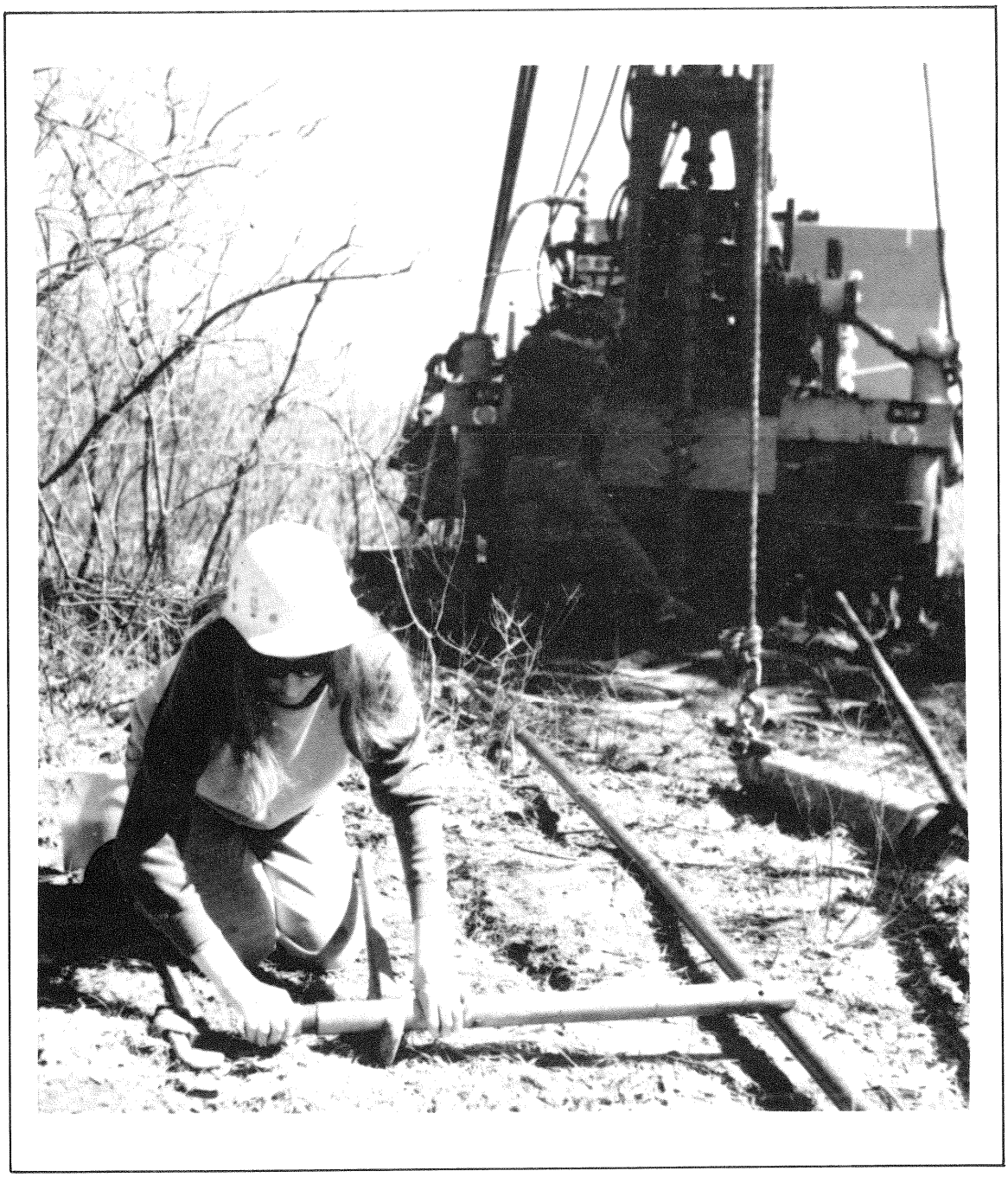
Approach: The USGS will use standard snow-tube equipment to measure 81 sites, Monday through Wednesday of each survey week. Data from an additional 400 sites, from 11 contributing agencies, will be compiled. A summary of current conditions is issued Friday of each survey week, six times each winter season. Index sites will be selected for 14 river basins. Data analysis will include Log Pearson Type III frequency distributions. A series of maps will be prepared showing maximum water equivalent of snowcover for 2-year, 10-year, and 50-year recurrence intervals for each snow survey period.

Plans for Next Year: To (a) collect, compile, and disseminate current data; (b) revise and update ADP data base; (c) run statistics program to generate site backfile listing, plus maximum, minimum, and mean snow depths and water equivalents; (d) select index sites; (e) use regression analysis to map areal distribution of maximum water equivalent of snowcover for 2-year, 10-year, and 50-year recurrence intervals.

Completed Reports:

U.S. Geological Survey and National Weather Service, Snow-Cover Surveys, by the Eastern Snow Conference: (A compilation of site data for New York and New England, released annually since 1941).

REGIONAL AND LOCAL STUDIES
— Upstate —



Drilling and coring to investigate ground-water potential.

Short-term Miscellaneous Studies
(NY 71-017)

Date Project Began: September 1971

Project Leader: Lawrence A. Martens

Field Location: Statewide

Cooperating Agencies: Bonneville Power Administration; New York State Department of Health; U.S Coast Guard; New York State Department of Environmental Conservation; Schenectady County Planning Department.

Problem: Every year several projects are undertaken that, because of low funding or short time span, do not warrant the establishment of individual accounts or a project description. Such projects might entail a literature search and report on methods, or preliminary planning of a resource assessment.

Objective: To assist government agencies in carrying out their responsibilities in relation to water-resources problems such as location of supply or management of resources.

Approach: To respond quickly and appropriately in accordance with the nature of the request. The response may vary from collection of data or sample analysis to administrative or letter reports.

Progress and Significant Results: Short-term studies and services were performed as requested.

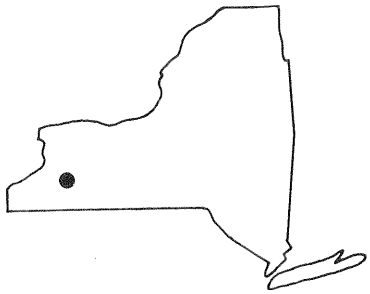
Plans for Next Year: Continuation of technical services as requested.

Reports Completed in 1979:

Waller, R. M., 1979, Ground-water appraisal for the community of Kiryas Joel, Orange County, New York: U.S. Geological Survey Open-file Rept. 79-401, 23 p.

Snavely, D. S., Ground-water appraisal for Town of Fishkill, Dutchess County, New York: U.S. Geological Survey Water-Resources Investigations (in review).

Radiohydrology of Waste-Burial Ground at Western New York Nuclear Service Center (NY 75-035)



Date Project Began: February 1975

Date Project Ends: September 1980

Project Leader: David E. Prudic

Field Location: Erie and Cattaraugus Counties

Funding: Federal program

Problem: Since the beginning of the nuclear era, low-level radioactive waste has been buried in shallow trenches. The West Valley burial ground has been used about 10 years. Although some monitoring has been done there, little has been published as to underground travel of radioisotopes. The USGS has been authorized to develop geohydrologic criteria for location of future burial grounds and, to aid in so doing, we propose to learn from what has happened at existing sites. No large-scale migration of radioisotopes has been detected off-site, but abnormal tritium levels have been reported in streams draining this site.

Objective: (1) To (a) determine distance and rate of radioisotope migration underground in this particular environment, which is an elevated plain of clay-rich glacial till locally capped by thin outwash gravel and severely dissected; (b) estimate the rate of off-site migration (if any), and (c) identify geohydrologic and geochemical factors controlling migration. (2) To determine whether a predictive digital waste-transport model can be constructed for a burial ground established in a glacial till terrane in an area of high precipitation.

Approach: (1) To define microhydrology and distribution of radioisotopes with techniques such as reviewing previous data and testing and sampling observation wells. (2) To install piezometers at various depths in till and in sand or sandy till logged nearby and to obtain undisturbed cores while drilling wells. (3) To obtain continuous cores below refuse trenches and to analyze cores for dissolved and adsorbed ions. (4) To install control wells in similar terrane nearby. (5) To measure and sample small streams and look for springs and storm runoff from site. (6) To reevaluate regional glacial geology to improve understanding of site.

Progress and Significant Results: Results of core samples from two test holes near trenches 2 and 3 did not confirm an earlier reported secondary tritium peak in test hole B. Presumably the secondary peak was caused by contamination of the samples during coring or handling. Radiochemical analyses of cores collected beneath the trenches were completed. Initial simulation of tritium migration beneath the trenches suggests that molecular diffusion may be the dominant transport mechanism.

Plans for Next Year: (1) To finish the ground-water flow model and solute-transport model. (2) To prepare and complete reports on ground-water flow at the burial site and to release data on geohydrologic properties to the open file. (3) To complete the final report.

Completed Reports:

Prudic, D. E., and Randall, A. D., Ground-water hydrology and subsurface migration of radioisotopes at a low-level solid radioactive-waste disposal site, West Valley, New York, in Carter, M. W., Kahn, B., and Moghissi, A. A. (eds.), Management of low-level radioactive waste: Pergamon press, v. 1, p. 853-882.

Prudic, D. E., 1978, Installation of water- and gas-sampling wells in low-level radioactive-waste burial trenches, West Valley, New York: U.S. Geological Survey Open-File Rept. 78-718, 70 p.

LaFleur, R. G., 1979, Glacial geology and stratigraphy of low-level radioactive waste-burial site, West Valley, New York: U.S. Geological Survey Open-File Rept. 79-989, 15 p., 8 pls.

Prudic, D. E., 1979, Recharge to low-level radioactive waste burial trenches 11 through 14, West Valley, New York: U.S. Geological Survey Open-File Rept. 79-990, 5 p.

Prudic, D. E., Core sampling beneath low-level radioactive-waste burial trenches, West Valley, Cattaraugus Co., New York: U.S. Geological Survey Open-File Rept. 79-1532, 55 p.

Prudic, D. E., Permeability of covers over low-level radioactive-waste burial trenches, West Valley, New York: U.S. Geological Survey Open-File Rept. (in review).

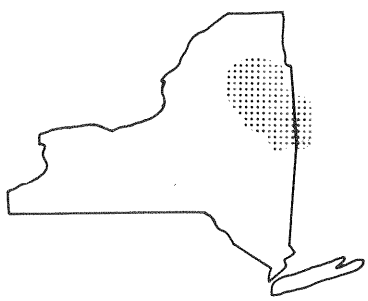
Occurrence and Transport of PCB Residues within the Upper Hudson Basin (NY 77-046)

Date Project Began: February 1977

Date Project Ends: September 1982

Project Leader: Roy A. Schroeder

Field Location: Hudson River basin, New York



Cooperating Agency: New York State Department of Environmental Conservation

Problem: The discharge of PCB's into the Hudson River by industry has degraded the quality of the river. Most of the economic and ecological impact is in the Hudson estuary below Troy. The importance of various reaches of the nonestuarine Hudson in contributing PCB's to the estuary is not known, nor are the effects of curtailing point-source discharge of PCB's or dredging the PCB-laden sediments from the nonestuarine Hudson.

Objective: (1) To (a) study the role of four reaches of the nonestuarine Hudson River in contributing PCB's to the estuary, and (b) evaluate the degree to which resuspension of PCB's controls the transport of PCB's into the estuary. (2) To establish a data base on the chemical quality of Hudson River water before dredging.

Approach: (1) To determine mass balances of sediment and PCB's within the four nonestuarine river reaches and to approximate the net increase in PCB loading from the individual stretches. (2) To document, through appropriately scheduled sample collection, the present concentration of PCB's, sediment, and selected heavy metals in Hudson River water.

Progress and Significant Results: Annual PCB loads in selected reaches of the upper Hudson and to the estuarine Hudson have been calculated from concentration/discharge relationships. At most flows, it appears that PCB concentration in the estuary is determined by dilution of contaminated riverine Hudson water by uncontaminated Mohawk River water. However, during spring snowmelt, it appears that the estuarine PCB concentration is much lower than predicted by this model (based on one observation only). Results on drinking water at the Waterford Municipal Plant indicate that PCB's are substantially removed by treatment processes in current use there.

Plans for Next Year: Annual loads will be determined as in previous years. Daily sediment stations will be continued at Stillwater and Waterford only. Measurements of PCB concentration will be made in the estuary during spring snowmelt to check the result obtained last spring.

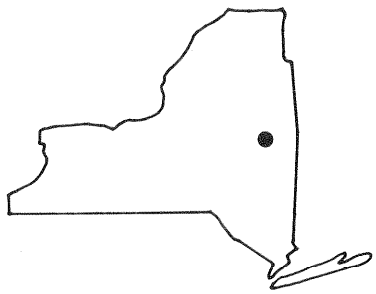
Completed Reports:

Turk, J. T., 1979, Applications of PCB transport studies in the Hudson River [Abs.], in American Chemical Society Symposium, proceedings (in press).

Turk, J. T., and Troutman, D. E., Polychlorinated biphenyl transport in the Hudson River (in review).

_____, Relationship of water sources to water quality in the Hudson River, New York, during periods of peak discharge (in review).

Transport of Heavy Metals and Organochlorine Compounds in the Hudson River at Waterford, New York (NY 79-046)



Date Project Began: September 1975

Date Project Ends: September 1979

Project Leader: Roger J. Archer

Field Location: Hudson River near Waterford

Cooperating Agency: Board of Water Commissioners of the Town of Waterford

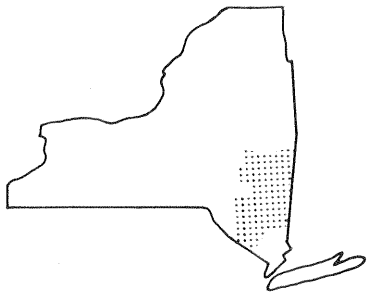
Problem: Previous basic-data programs have shown a variety of heavy metals in the Hudson River near Waterford in concentrations near or above limits set by New York State "Part 170, Standards for Drinking Water Sources." Survey analyses of bottom materials in the Hudson River near Waterford also reveal large concentrations of heavy metals and polychlorinated biphenyls. A sewage outfall handling industrial and residential wastes will begin operation a few miles upstream from the Waterford pumping-station intake.

Objective: To determine whether concentrations of heavy metals and organochlorine compounds can be related in a semipredictive manner to sediment concentration and discharge. The role of sediment movement as a transport mechanism for heavy metals and organochlorine compounds will be evaluated; mass-balance determinations will be used to determine the effectiveness of sediment flocculation in lowering concentrations of the metals and organochlorines studied.

Approach: Samples will be collected from the Route 4 bridge across the Hudson River at Waterford. Concentrations of total lead, copper, iron, manganese, and several organochlorines will be evaluated with the established discharge at Waterford to calculate loading rates over a variety of seasonal and flow conditions. Comparison of transport rates of dissolved species relative to those of total species will be used to evaluate the importance of sediment transport. Measurements of concentrations in processed water at the Waterford Water Works and in flocculated sediment will be used to evaluate the effectiveness of conventional water-treatment practices in removing heavy metals and organochlorines.

Progress and Significant Results: Project was completed. The concentration of PCB's, iron, and manganese in the Hudson River at Waterford can now be predicted from river discharge or the concentration of suspended sediment. The treatment provided by the discharging plant is effective in removing about 90 percent of PCB's and much of the heavy metals.

Determination of Flow in the Hudson River Estuary (NY 77-049)



Date Project Began: August 1977

Date Project Ends: September 1980

Project Leader: David A. Stedfast

Field Location: Hudson River basin

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

Problem: Streamflow data of the Hudson River estuary are available only from daily records from the gage at Green Island (not tide affected) or by calculation of the approximate monthly net freshwater inflow at Poughkeepsie and the Battery. With the continual water-resources development in the estuary, an urgent need for accurate total water-movement data at any point has developed. The collection and analysis of data, and development of a flow-simulation model as proposed in this project, will enable the Geological Survey to provide discharge data over a large part of the estuary.

Objective: To develop a one-dimensional flow model to determine quantity and direction of flow at any given time and at any given cross section of the estuary between Albany and Poughkeepsie.

Approach: (1) To (a) determine appropriate instrumentation and locations for recording gages; (b) maintain close coordination with the Geological Survey research team that is doing the Potomac estuary study; (c) establish three continuous gaging stations within the study reach; (d) determine channel geometry and volume of inflow throughout the estuary. (2) To use the above data in building a flow model to determine quantity and direction of flow during any given period at any site within the estuary. Results will be reviewed, and indicated adjustments will be made to the flow model.

Progress and Significant Results: Additional stage data were collected at the three continuous-gaging stations. Three simultaneous discharge measurements on the Hudson to be used for calibration of the computer model were determined. Initial setup of the computer model of estuary was completed.

Plans for Next Year: To collect additional stage data at the three continuous-gaging stations. Five discharge measurements and two stage-measurement runs will be made to help improve the calibration of the computer model. Calibration of model using 1979 and 1980 data will be continued.

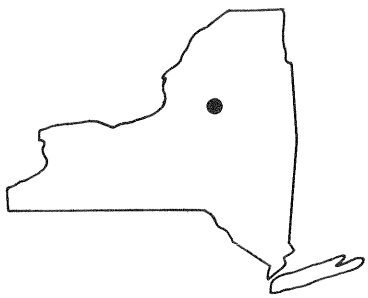
Completed Reports:

Embree, W. N., and Wiltshire, D. A., 1978, Estuarine research--An annotated bibliography of selected literature, with emphasis on the Hudson River: New York State Department of Environmental Conservation, Technical Paper 5, 58 p.

Completed Reports (Continued)

Stedfast, D. A., Cross sections of the Hudson River Estuary from Troy to New York City, New York: U.S. Geological Survey Water Resources Investigations (in review).

Integrated Lake/Watershed Acidification Study
(NY 79-050)



Date Project Began: September 1977

Date Project Ends: September 1982

Project Leader: Norman E. Peters

Field Location: Old Forge

Cooperating Agency: University of Virginia

Problem: Runoff from acid rainfall within the last 30 years is believed to have had increasingly detrimental effects on lakes and streams in the western region of the Adirondack Mountains, where the rocks are unreactive and fail to neutralize the acidity.

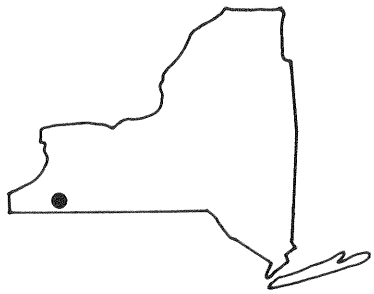
Objectives: (1) To (a) investigate quantity and quality of ground water flowing into the lakes, and (b) determine mineralogic changes associated with the weathering of rock and soil of the three basins. (2) To collect background data on the distribution of common pesticides and industrial organic substances in the lake sediments. (3) To evaluate, from the information gathered, the relationship between the pH and weathering rates in the three basins.

Approach: Three lake basins, one with pH less than 5, one with pH greater than 6, and one with pH of 5 to 6, were selected. Transport rates of heavy metals will be studied on the basis of quality and quantity of precipitation into the basin and the volume of lake outflow. Specific conductance, pH, and volume of lake outflow will be monitored continuously.

Progress and Significant Results: From the first phase of this project, significant differences in ground-water flux in each lake basin were determined from seepage-meter studies. These differences suggest that ground-water chemistry may significantly influence lake chemistry during nonstorm periods.

Plans for Next Year: Observation wells and soil-moisture-monitoring equipment will be installed. A snow-hydrology program will begin this winter, and seepage-meter work will continue next spring and summer.

Removal of Nitrogen Pollution from an Aquifer Near Olean (NY 78-056)



Date Project Began: October 1977

Date Project Ends: September 1980

Project Leader: Allan D. Randall

Field Location: Olean

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Nitrogen from fertilizer-plant operations is being removed from an aquifer by pumping. Although nitrogen concentrations are decreasing, they remain high. Cessation of pumping could allow the pollution to migrate to a municipal water-supply well field.

Objective: A new scavenger well within the polluted area is being pumped; evaluation of aquifer response to this stress will aid in interpreting the effectiveness of pumping in removing the pollutant. Monitoring of water levels and water quality will assist in interpretation of the chemical processes underway in the unsaturated soil and in the aquifer.

Approach: Streamflow measurements will determine possible aquifer recharge from nitrogen-polluted and unpolluted streams. The extent of a perched water table will be determined by several piezometers. Measurement of downward percolation through the contaminated soil zone will provide leaching rates. Measurement of the cone of influence of the new well will be evaluated. A digital model of the flow system is planned.

Progress and Significant Results: Chemical analyses and related data from past years were reviewed. Cores were collected from auger holes on adjacent property not previously tested; these cores, and splits of selected cores from holes drilled for fertilizer company, were analyzed. Suggestions were made through the cooperator to improve mass-balance analysis by a consultant to the fertilizer company. Work was begun on the digital model.

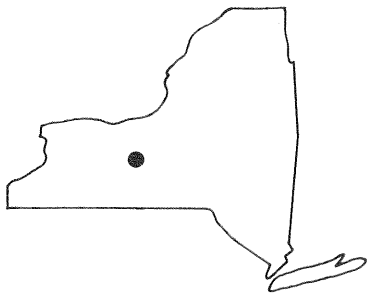
Plans for Next Year: To (a) complete model and report, and (b) continue monitoring on a reduced scale.

Completed Reports:

Randall, A. D., 1976, Ground-water flow and pollution at a wellfield near Olean, New York: U.S. Geological Survey Open-File Rept. 76-397, 21 p.

_____, 1978, Ground-water pollution by nitrogen compounds at Olean, New York--Progress report, June 1977: U.S. Geological Survey Open-File Rept. 78-304, 12 p.

Hydrocarbon Tracer Reaeration-Coefficient Studies (NY 78-058)



Date Project Began: April 1978

Date Project Ends: March 1981

Project Leader: Salvatore D. Schiavo

Field Location: Selected streams statewide

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Reaeration coefficients of streams receiving sewage are of major importance in determining water-treatment plant design and estimating the construction and operational costs. At present, these coefficients are determined by empirical methods that are expensive, time consuming, and yield only approximations of actual stream-reaeration coefficients. Indications are that hydrocarbon-tracer techniques give more accurate reaeration coefficients than currently used procedures and afford substantial savings in manpower.

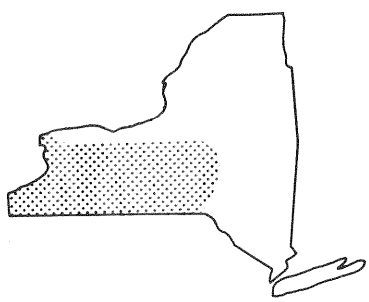
Objective: To determine reaeration coefficients of selected streams in New York State.

Approach: Hydrocarbon-tracer techniques of determining stream-reaeration coefficients to be used on selected reaches of the Hudson River and tributaries in the lower Hudson River Basin.

Progress and Significant Results: Compilation of data for Canandaigua Outlet was completed. Field studies were made on Hudson River at Fort Miller and Oswego River at Fulton.

Plans for Next Year: Studies are to be made on Hudson River at Fort Miller and one additional site on the Hudson River under low-flow conditions. Additional studies will be made on streams in Southeastern New York (lower Hudson River Basin). Compilation of data will be completed and a report prepared.

Hydrologic Environment of the Salina Group in Western New York (NY 77-059)



Date Project Began: October 1977

Date Project Ended: September 1979

Project Leader: William Buller

Field Location: Western New York

Cooperating Agency: U.S. Department of Energy

Problem: There is a need to investigate the hydrology of the Salina Group and the rock formations overlying and underlying it in two areas in western New York. Salt members within the Group are being considered for dry storage of wastes. Movement of ground water after construction and emplacement of solid wastes is of concern.

Objective: Two general areas in western New York may be evaluated by drilling two to six deep test holes. The hydrologic regime of the formations will be investigated as to the rate and movement of ground water.

Approach: The test holes were designed and drilled under contracts by other agencies, with USGS responsible for providing drilling specifications, assisting in site locations and supervision of drilling. Drilling provided detailed geologic, geophysical, and hydrologic data on the entire rock section. Rock cuttings, cores, geophysical logging, drill-stem tests, pumping tests, and analyses of water samples were appraised. Analyses includes Ca, Mg, Na, K, Cl, SO_4, HCO_3, Ba, Br, Sr, pH, temperature, total dissolved solids, and stable isotopes.

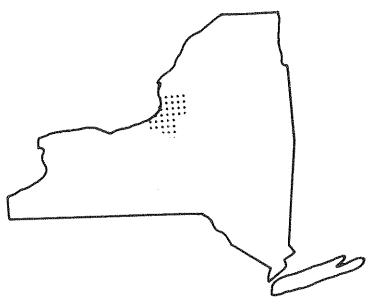
Progress and Significant Results: Project was terminated May 1979. Final report on knowledge determined to date was compiled.

Completed Reports:

Norris, S. E., 1978, Hydrologic environment of the Silurian salt deposits in parts of Michigan, Ohio, and New York: U.S. Geological Survey Open-File Rept. 78-6841, 31 p.

Buller, William, Chemical composition of brines in New York: U.S. Geological Survey, Water-Resources Investigations (in review).

Ground-Water Inventory of Oswego County, New York (NY 79-062)



Date Project Began: October 1978

Date Project Ends: September 1980

Project Leader: Todd S. Miller

Field Location: Oswego County

Cooperating Agency: Oswego County

Problem: Oswego County needs to have its ground-water resources defined in terms of aquifers, recharge areas, wetlands, and geologic conditions, in order to plan for residential, industrial, and commercial development.

Objective: To obtain data on ground water and geology in the unstudied half of the County and to make an appraisal of the geologic and hydrologic conditions.

Approach: To (a) compile well locations onto quadrangle maps from a well inventory and previous studies; (b) enter well data into computer storage for later retrievals; (c) map the surficial geology to determine aquifer extent, recharge areas, and potential for ground-water production; and (c) present the findings in a narrative and illustrative report. Areas of potential problems will be delineated as to need for development considerations or more detailed investigations.

Progress and Significant Results: Seventy percent of field mapping and 30 percent of office compilation were completed; first map was printed.

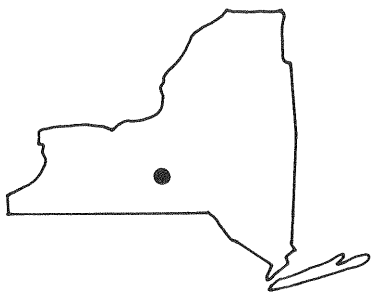
Plans for Next Year: Completion of field mapping and well inventory, office compilation, and the remaining 26 maps.

Completed Reports:

Miller, T. S., and Muller, E. H., 1979, Surficial geology of Pulaski Quadrangle, Oswego County, New York: U.S. Geological Survey Water Resources Investigations 79-1343, 1 sheet.

Miller, T. S., Surficial geology of Ellisburg quadrangle, Oswego County, New York: U.S. Geological Survey Water Resources Investigations 80-9, 1 sheet.

Nitrogen in Ground Water at New York State Agricultural Teaching and Research Farm at Harford (NY 79-064)



Date Project Began: October 1978

Date Project Ends: September 1980

Project Leader: Allan D. Randall

Field Location: Harford

Cooperating Agency: New York State College of Agriculture and Life Sciences at Cornell University.

Problem: Most of the land on the New York State College of Agricultural Teaching and Research Farm is used to grow feed for livestock and receives much of the livestock manure as fertilizer. The careful and comprehensive accounting of farm practices, the absence of other nitrogen sources, and the extensive shallow aquifer underlying the farm make this an ideal site for studying ground-water effects of nonpoint pollution from dairy farming.

Samples from wells and springs since 1974 suggest that nitrogen in ground water locally exceeds 10 mg/L NO_3-N, and that N_2O is being generated.

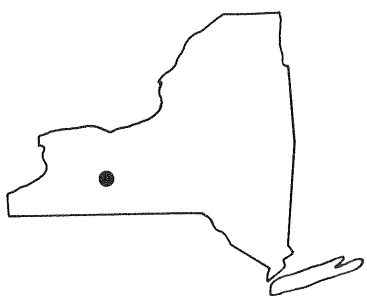
Objective: (a) To estimate annual ground-water recharge and delineate flow paths and downvalley flux; (b) define areal extent and influence of a till layer at shallow depth; and (c) determine present subsurface distribution of nitrogen species and correlate this with farm practices.

Approach: (1) To drill five observation wells 30-50 feet deep, dig several shallow wells with backhoe, and inventory nearby private wells. (2) To level to selected wells and measure water levels regularly. (3) To estimate annual volume of surface runoff from stage and occasional discharge measurements during the brief periods of surface flow. (4) To make seepage runs along the main stem at high and low base flow to estimate ground-water discharge, evaluate seepage losses from selected tributaries from 1974 and 1979 data, (5) to collect water samples from wells and streams for analysis of NO_3, N_2O, and other nitrogen species.

Progress and Significant Results: Observation wells were installed Oct. to Nov. 1978. Water levels were measured regularly and samples were collected for nitrogen analysis by Cornell. Streamflow measurements were taken by USGS during a brief period in April 1979, when streams crossed the study area; also, two sets of base-flow measurements were made in summer 1979, and a partial well inventory was completed.

Plans for Next Year: To continue some data collection, to begin analysis of data collected in 1974 and 1978-79, and to begin preparation of reports.

Assessment of Nonpoint Source Discharges from Switzer Creek Basin (NY 79-065)



Date Project Began: October 1978

Date Project Ends: September 1981

Project Leader: Donald A. Sherwood

Field Location: Upper Susquehanna River basin

Cooperating Agency: Susquehanna River Basin Commission

Problem: The Susquehanna River Basin Commission (SRBC) initiated a program for assessment of nonpoint source pollution in the basin to identify areas that warrant detailed studies. Because initial reports indicated that the available data were inadequate for detailed assessment of pollution from nonpoint sources, additional data collection was recommended to provide a detailed assessment of farming practices, soils, and topography of this section of the basin.

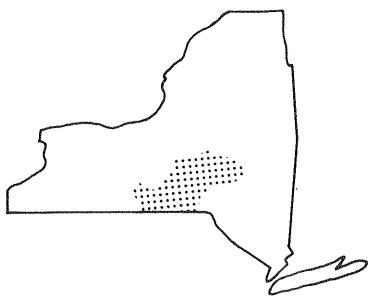
Objective: To provide a quantitative assessment of suspended sediment and nutrient (phosphorus, nitrogen) discharges from Switzer Creek. Because the sediment and nutrient transport may be affected by seasonal factors, an attempt will be made to establish seasonal trends. If the data are insufficient, only load data will be presented. Total nitrogen, phosphorus, and suspended-sediment discharges from the study basin will be estimated. Data will be collected over a 2-year period.

Approach: The Switzer Creek gaging station has been reactivated, and data are being collected. Observers and automatic sampling are being used to determine daily and storm discharges of nitrogen (TKN, NO(2)+ NO(3), and NH(3)-N), phosphorus and orthophosphate, dissolved and suspended organic carbon, and suspended sediment loads for the basin. Sediment is being collected on a daily basis; the other constituents on a twice-weekly and storm basis. Precipitation samples are being collected and analyzed by USGS to determine atmospheric input of nutrients. Storm as well as general discharge is being sampled to document the nutrient and sediment discharges from the basin.

Progress and Significant Results: Data collection was continued, analysis of data for inclusion in annual data report was completed, and preliminary working outline for report was developed.

Plans for Next Year: To continue collection and analysis of data for inclusion in annual data report; to complete preliminary outline for report.

Flow Routing in the Eastern Upper Susquehanna River Basin (NY 79-066)



Date Project Began: April 1979

Date Project Ended: September 1979

Project Leader: Thomas J. Zembrzuski

Field Location: Susquehanna River basin

Cooperating Agency: Susquehanna River Basin Commission

Problem: The Susquehanna River Basin Commission (SRBC) is responsible for managing all water resources within the Susquehanna River basin. One of the regulations requires that all consumed water must be made up by the user when streamflow declines to or below the 7-day, 10-year low flow. A major source of additional water is reservoir storage; however, a method is needed for evaluating the delivery of water from a reservoir to the point of usage downstream so that the SRBC can execute its responsibilities during low flows.

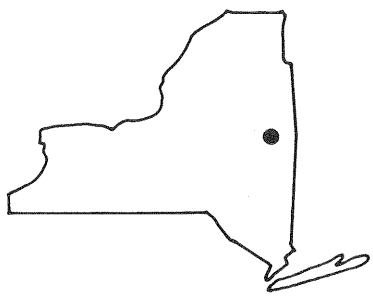
Objective: To calibrate a flow-routing model capable of predicting flow from East Sidney Lake down the Ouleout Creek and Susquehanna River, and from Whitney Point Lake down the Tioughnioga, Chenango, and Susquehanna Rivers to Waverly. From that point the flows can be traced to downstream points and the mouth of the Susquehanna River with previously developed flow-routing models. This model will be the fourth in a series of flow-routing models for the Susquehanna River basin. These models will play a role in future water-quality modeling in the basin.

Approach: Daily streamflow will be modeled from USGS computer program J351, "A Digital Model for Streamflow Routing by Convolution Techniques." The model is based on the unit-response method of flow routing and will use the diffusion analogy method with multiple linearization.

Progress and Significant Results: Five of the six models have been developed, and work is progressing on the last of the series. Of the completed models, four are completely adequate. The fifth, Chenango River from Sherburne to Greene, is borderline, but is still considered acceptable. The problem with this one is that there is a very large proportion of ungaged flow to account for.

Plans for Next Year: To finish the last model and complete the report.

Hydrology of the Pine Bush, Albany County, New York (NY 79-067)



Date Project Began: October 1978

Date Project Ends: September 1980

Project Leader: Deborah S. Snavely

Field Location: Albany County

Cooperating Agency: City of Albany

Problem: The quantity and quality of water in the Pine Bush aquifer need to be evaluated. If the aquifer is suitable for well development, the long-term effects of heavy pumping on storage, and the potential for stream depletion and inducement of water-quality changes, need to be considered.

Objective: To determine the feasibility of developing the Pine Bush aquifer. Specific objectives are to (a) drill observation and pumping wells to determine aquifer properties, (b) develop a ground-water simulation model of the aquifer system, (c) determine areal distribution of chloride and nitrate in the ground water, and (d) further delineate the buried preglacial river valleys in the area.

Approach: To (a) compile available geohydrologic data, (b) drill observation wells and test wells to determine aquifer properties and locate the most advantageous place for a production well, (c) measure low flow of streams and compute base flows, (d) determine chloride and nitrate concentration of surface water and ground water, (e) produce a digital ground-water simulation model, (f) do seismic work to determine aquifer thickness, and (g) estimate recharge from precipitation and evaporation data.

Progress and Significant Results: Sixteen observation wells and two test wells were drilled. A 24-hour pump test was run on each of the test wells, and the data were analyzed to determine aquifer properties. The water levels were measured weekly by tape and graphic recorders. Low-flow measurements were made monthly on several streams in the area to determine base flow. Forty-five ground-water and surface water samples were collected and analyzed for common chemicals, especially chloride, nitrogen, and phosphorus. One sample was analyzed for a suite of organic chemicals. Resistivity and seismic profiles were run to delineate confining layers and depth to bedrock.

Plans for Next Year: To (a) develop a ground-water simulation model of the aquifer system, (b) further delineate the buried preglacial river valleys, and (c) continue water-level monitoring of the Pine Bush wells.

Chemical Weathering Model Based on Basin Lithology, Precipitation Quantity, and Population Density (NY 79-068)

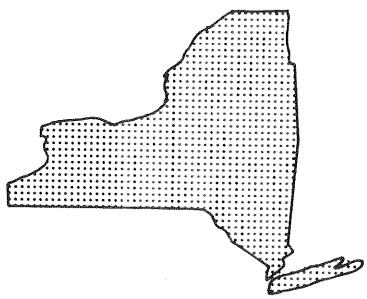
Date Project Began: January 1979

Date Project Ends: September 1979

Project Leader: Norman E. Peters

Field Location: Nationwide

Funding: Federal program



Problem: In many drainage basins, the yields of major dissolved cations and anions are principally the result of chemical weathering of rock and the deposition of dissolved substances in atmospheric precipitation. In highly urbanized basins, particularly those in which relatively unreactive rock types predominate, a significant percentage of the dissolved ion yield is a product of human activity such as road salting, sewage and industrial discharge, and use of agricultural fertilizers. It is hypothesized that the major factors controlling ion yields from drainage basins are precipitation quantity, population density, and drainage-basin lithology and that these relationships may be quantified.

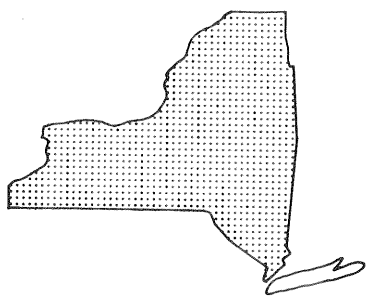
Objective: (1) To develop specific conductance/ion concentration relationships for the major dissolved ions: sodium, potassium, magnesium, calcium,

chloride, sulfate and bicarbonate at selected stream measuring sites. (2) To (a) predict and compare calculated yields of major dissolved ions and total dissolved solids from basins of predominantly crystalline, sandstone, and limestone in areas of varying population density, precipitation quantity, and mean stream temperature; (b) to assess the variability to determine what difference in loading rate is necessary to indicate the effects of these variables on basin weathering.

Approach: Basins across the U.S. will be selected from the NASQAN and benchmark networks to provide a representative range of rock types, precipitation quantity, population density, and stream temperature. Specific conductance (through major-ion regression analysis) and, in some cases, mean concentration, will be combined with the discharge and available conductance data from the Geological Survey computer files to calculate average annual yields for the years of record. These yields will be used with the appropriate values of the independent variables to develop relationships through multiple regression analysis for each type of basin lithology. In addition, the normalized annual discharge defined here as the effective precipitation will be substituted for precipitation quantity as an independent predictor for a comparative analysis of either usefulness.

Progress and Significant Results: The analysis has been completed for the 56 basins chosen and a draft of the significant results is in review. Regression analysis of specific conductance and major ion concentrations in each basin showed a higher percentage of statistically insignificant correlations for potassium in each rock type. Furthermore, sulfate and chloride had a high percentage of crystalline basins with poor correlations. The single most important variable used to predict the dissolved ion yields was the normalized discharge followed by population density in both sandstone and crystalline basins. Limestone basins showed a negative correlation with temperature for calcium, magnesium, and bicarbonate yields, reflecting the temperature effect on carbonate mineral solubility.

Hydrogeology of Upstate New York
(NY 79-072)



Date Project Began: October 1979

Date Project Ends: September 1981

Project Leader: Roger M. Waller

Field Location: Statewide excluding Long Island

Cooperating Agency: New York State Geological Survey

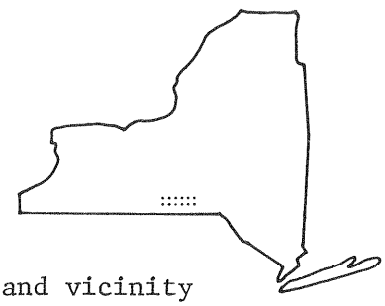
Problem: The New York State Geological Survey has a need to provide environmental data to the State. Ground-water availability, water-quality conditions, and waste-disposal well potential appraisals are specific data that they do not have the capability to provide.

Objective: To provide ground-water data and appraisals in a quadrangle format to complement the State Geological Survey's geologic data in areas of concern.

Approach: Quadrangles will be selected on a priority basis where urban or industrial development requires State evaluation as to adequacy and quality of water. File data and new data will be used to compile one or more maps of each quadrangle to complement the geologic maps generated by the State Survey. System 2000 and WATSTORE will be used where applicable.

Plans for Next Year: Monitoring of deep-well disposal sites, appraisals of any new disposal sites, selection and compilation of maps of urban areas showing geology and hydrology, and coding and entering of existing well data into System 2000.

Aquifer Model--Binghamton Area, Susquehanna River basin (NY 79-074)



Date Project Began: August 1979

Date Project Ends: September 1982

Project Leader: Allan D. Randall

Field Location: Binghamton, Johnson City, Endicott, and vicinity

Cooperating Agency: Susquehanna River Basin Commission

Problem: The Susquehanna River Basin Commission has responsibility for management of water resources in the basin, including approval of proposed ground-water withdrawals exceeding 0.1 Mgal/d. The Commission believes that aquifer models would help predict effects of new wells on existing wells and river flows. New withdrawals are most likely near urban areas, where there is already substantial groundwater use, and only in such areas can the hydrologic data required to calibrate models be obtained. The communities of Binghamton, Johnson City, and Endicott constitute the largest urban area in the Susquehanna basin in New York for which no model has yet been prepared.

Objective: To prepare and calibrate a digital model of the study area.

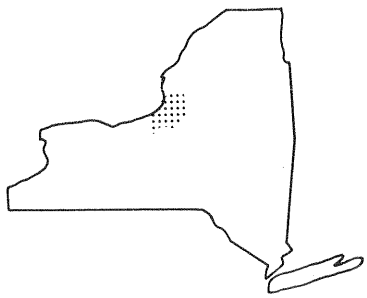
Approach: To (a) compile preliminary version of aquifer model to simulate shallow and deep gravels, locally separated by clay layers; (b) run sensitivity analyses; (c) compile a submodel for Clinton Street-Ballpark aquifer because of excellent data for calibration, (d) collect new data most needed to improve calibration, possibly including updated well inventory, pumpage

and water-level data, pumping tests, and head measurements beneath streams near production wells, (e) modify code as needed to fit local data and conditions; refine model.

Progress and Significant Results: Project proposal and description were completed.

Plans for Next Year: To compile and test preliminary version of model (winter 1979-80) and collect additional data as needed (summer 1980).

Migration of Chemical Wastes from Landfills in Oswego County (NY 79-075)



Date Project Began: August 1979

Date Project Ends: September 1981

Project Leader: Henry H. Anderson

Field Location: Oswego County

Cooperating Agency: Oswego County Planning Board

Problem: The county needs to know the environmental effects at sites where chemical wastes are processed, stored, or buried.

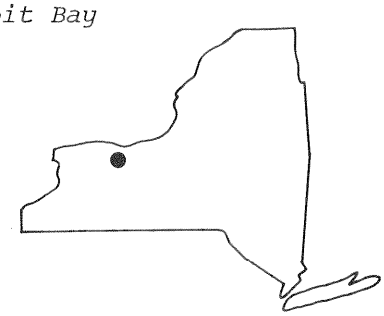
Objectives: To determine (a) the chemical quality of ground water beneath and downgradient of selected landfills; (b) the direction and rate of movement of contaminants; and (c) the source of industrial organics in Fulton municipal well water.

Approach: Field reconnaissance will include mapping, geophysical surveys, and measurement of conductance and pH. Test drilling will be done. Springs, seeps, stream reaches, and ground water will be analyzed for toxic organics and metals. Intensive drilling and testing for organics will be done in the Fulton well field.

Progress and Significant Results: Eight auger borings and three waste-disposal sites were completed. Monitoring wells were installed at six sites. Preliminary geologic mapping was made at two sites. An inventory of chemical wastes at one site was compiled.

Plans for Next Year: To complete test-well and monitoring-well installations. Water samples and core samples will be analyzed by the cooperator. Evaluation of extent of ground-water contamination at each site will be made.

Nonpoint Source Pollution of Irondequoit Bay
(NY 79-077)



Date Project Began: August 1979

Date Project Ends: September 1979

Project Leader: David E. Troutman

Field Location: Irondequoit Creek basin

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Nutrient loading of Irondequoit Bay, coupled with poor circulation (density stratification) and limited flushing by Lake Ontario, have resulted in severe eutrophication in the bay. Although no data exist, it is likely that urban activities in Rochester and agricultural activities in the Irondequoit Creek basin also contribute heavy metals, toxic organics, and pesticides to the bay, wetlands, and creek.

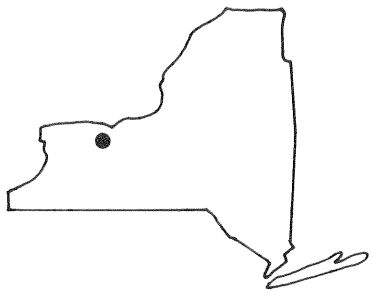
Objectives: (1) To determine heavy-metal, pesticide, and nutrient pollution of Irondequoit Creek. (2) To obtain sedimentation rates of Irondequoit Bay. (3) To determine the extent of heavy-metal, pesticide, toxic organic, and nutrient contamination of Irondequoit Bay, the wetlands, and near outfalls from combined sewer overflows emptying into tributaries.

Approach: (1) Concentrations of selected constituents will be determined in surficial bottom material from four successive sites from agricultural to urbanized reaches of Irondequoit Creek. (2) Pb^{210}, Cs^{137}, and varve chronologies will be determined on four to six box and gravity cores to be taken in the bay. (3) Concentrations of selected constituents will be measured in surficial bottom material from eight to ten sites in the bay, wetlands, and near two combined sewer outfalls.

Progress and Significant Results: A reconnaissance study of the Irondequoit Creek watershed was conducted to identify problem constituents and their probable sources. Additional data were obtained from an analysis of cores taken within Irondequoit Bay and will be used in preparing a proposal for a 3-year comprehensive nonpoint-source study of Irondequoit Bay.

Plans for Next Year: Data will be analyzed, summarized, and transferred to the cooperating agency.

Irondequoit Creek Urban Runoff Study
(NY 80-080)



Date Project Began: October 1979

Date Project Ends: October 1981

Project Leader: David E. Troutman

Field Location: Irondequoit Creek

Funding: Federal program

Problem: Eutrophication of Irondequoit Bay is believed to result partly from nonpoint-source nutrients derived from urban areas within the Irondequoit Creek basin. Neither the diversion of sewage from the bay nor a reduction in the combined storm-sewer overflows have significantly alleviated certain water-quality problems of the bay.

Objectives: (1) To evaluate the effects of runoff loads from catchment areas representing selected urban land uses on the quality and quantity of urban runoff. (2) To estimate the total annual loads of selected constituents transported to Irondequoit Bay. (3) To evaluate various proposed management practices for the Bay's wetland area in terms of their effectiveness in removing contaminants from stream water entering the bay.

Approach: Urban catchment areas representing selected land uses will be instrumented, and a mass balance will be calculated for periods of storm runoff. The storm-runoff data will be analyzed on an event basis for each catchment to determine rainfall-runoff relationships and to quantify constituent loads. A network of continuous-record streamflow gages and partial-record water-quality stations along Irondequoit Creek will be used to quantify the loads from the various land uses. A mass-balance approach will be used to evaluate the wetlands' ability to remove contaminants from the runoff.

Plans for Next Year: To (a) install sampling sites at four catchment areas and complete construction of two additional Irondequoit Creek gages; (b) sample runoff from at least 12 storm events during the year; and (c) begin evaluation of urban-runoff effects and the effects of wetlands on the management of storm-water runoff.

Detailed Ground-Water Studies in Selected Areas, Susquehanna River basin, New York (NY 80-081)

Date Project Began: October 1979

Date Project Ends: September 1982

Project Leader: Allan D. Randall

Field Location: Central New York

Cooperating Agency: Susquehanna River Basin Commission

Problem: Sand and gravel aquifers in valleys cut off from major streams form a significant source of water for municipal or industrial water supply and especially for low-flow augmentation because the aquifer is not hydraulically connected to the stream. One such aquifer at Cortland, previously studied, requires more detailed information over a larger area to aid water-management planning. Reconnaissance studies of separated aquifers at Kattellville and Smyrna are needed to assess water-yielding potential at those sites.

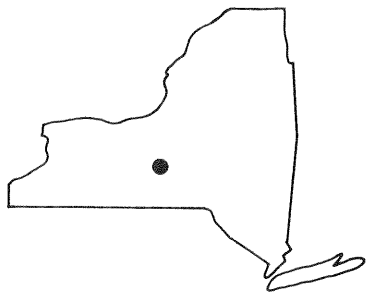
Objectives: To (1) update and expand a digital model of part of the Cortland, urban area, including the Otter Creek separated aquifer, and (2) investigage geohydrology of separated aquifers at Kattellville and Smyrna, N.Y.

Approach: (1) To revise the model of Cortland urban area to provide more realistic simulation of hydrologic boundaries and leakage from Otter Creek using newly developed modeling techniques. (2) To extend the area represented on the model to cover the Tioughnioga River area. (3) To determine aquifer diffusivity by installing river-bank wells and monitoring flood events. At Kattellville, well inventory will be updated and test wells drilled along the river bank to determine aquifer lithology and diffusivity. Long-term observation wells will be established and aquifer tests run. Similar data collection at Smyrna will be supplemented by geophysical studies. Reports will be written and published for each site.

Progress and Significant Results: Project proposal and description were completed, and personnel arrangements completed.

Plans for Next Year: (1) To conduct well inventory and test drilling at Cortland and Kattellville, and to conduct well inventory at Smyrna. (2) To extend and modify the Cortland model.

Digital-Model Simulation of Nitrogen Loading of the Otter Creek-Dry Creek Basin Glacial-Outwash Aquifer, Cortland County (NY 80-082)



Date Project Began: October 1979

Date Project Ends: September 1981

Project Leader: Richard P. Novitzki

Field Location: Cortland County

Cooperating Agency: Cortland County Departments of Health and Planning

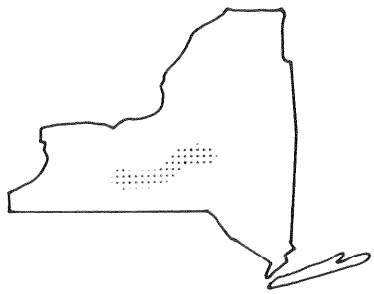
Problem: Approximately 85 percent of the population of Cortland County rely on the glacial-outwash aquifer, Otter Creek-Dry Creek basin, as a water supply. A ground-water hydrologic model covering the most vital 9.4-mi^2 area of the aquifer was constructed by Cosner and Harsh (1978). Simulations showed that given the general rainfall pattern of the area, there is probably adequate water quantity for future development. For the cooperator to plan future development, the quality aspects of different management and development schemes need to be considered.

Objectives: To provide a working water-quality (solute-transport and dispersion) model of the Otter Creek-Dry Creek basin aquifer. This model will incorporate information derived from the Cornell land-use model to assess the effects of present and future land development over the aquifer. It will provide the local planning board with an instrument for making decisions as to projected land-use patterns for the basin. This study will assess the effects of point and nonpoint chloride and nitrogen sources on the water quality of this aquifer.

Approach: The hydrologic model of Cosner and Harsh (1978), with minor modifications, is suitable as the hydrologic "base" needed for the solute-transport model. The solute transport model will probably use the method of characteristics (Konikow and Bredehoeft, 1978). A model by Cornell University will be used to add nitrogen to the top of the model saturated zone. If possible, this information will be used as the source term for nitrogen in the ground-water solute-transport model. Water-quality sampling will be carried out by Cortland County; supervision will be provided by the USGS.

Plans for Next Year: To (a) collect water-quality samples; (b) obtain calibration of water-budget nitroget-input model by Cornell University; (c) review and modify existing hydrologic model; (d) complete basic calibration of water-solute model.

Headwater Valley Aquifers for Streamflow Augmentation, Susquehanna River Basin, New York (NY 80-083)



Date Project Began: October 1979

Date Project Ends: September 1982

Project Leader: Allan D. Randall

Field Location: Central New York

Cooperating Agency: Susquehanna River Basin Commission

Problem: Late summer flows of streams in the Susquehanna River Basin commonly are inadequate for uses such as water supply or sewage dilution. Ground water has been proposed as an alternative to costly surface reservoirs for streamflow augmentation, but typical productive aquifers adjacent to large streams are normally in hydraulic connection with the streams, and induced infiltration from pumping the aquifer would largely nullify streamflow gains. At least 15 broad valleys along the northern divide of the Susquehanna River basin, remote from large streams, contain saturated sand and gravel. Hydrologic characteristics of these aquifers are not known well enough to evaluate their potential yield.

Objectives: To quantitatively describe a representative drift aquifer(s) in the basin divide area of the Susquehanna River basin and assess the potential effects of withdrawing water for streamflow augmentation to better understand the potential for such development in similar aquifers.

Approach: (1) To conduct reconnaissance of headwater-valley aquifers with seismic exploration and well-data compilation and select a representative site for study after consultation with the Susquehanna River Basin Commission. (2) To install 2 or 3 screened test wells with appropriate observation wells to be monitored periodically and to conduct aquifer tests. (3) To measure base flow of minor stream(s) draining the aquifer to evaluate yield under present conditions. (4) To simulate the aquifer with a 2-dimensional digital model, calibrate with stream and observation-well data, and assess effects of aquifer pumping through model analyses. (5) To publish a report summarizing the geohydrology, the model analysis, and applicability of results to other headwater aquifers.

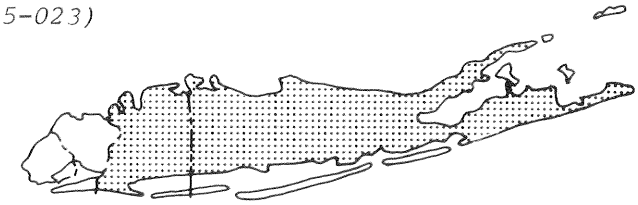
Progress and Significant Results: Project proposal and description were completed; staffing was determined.

Plans for Next Year: To (a) inventory wells in candidate valleys, consult with other agencies, and select study area(s); (b) drill preliminary test holes and undertake seismic exploration.

REGIONAL AND LOCAL STUDIES
— Long Island —

Determining elevation of sumps constructed to receive overflow from record-high water levels in Artist Lake, Suffolk County.

Storage and Retrieval of Hydrologic Data for Long Island
(NY 65-023)



Date Project Began: July 1964

Project Leader: George W. Hawkins

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: Since the USGS began collection of hydrologic data on Long Island in the 1930's, accumulation of data has grown to the point where annual manipulation becomes time consuming and inefficient.

Objective: (1) To store the massive quantities of data in a form that the digital computer can manipulate. (2) To assist other projects in data manipulation and output format.

Approach: To assemble data in computer-readable form as needed for projects. After the projects' needs are met, these data become part of a data bank. Historical data are coded and entered into the bank as time and manpower permit.

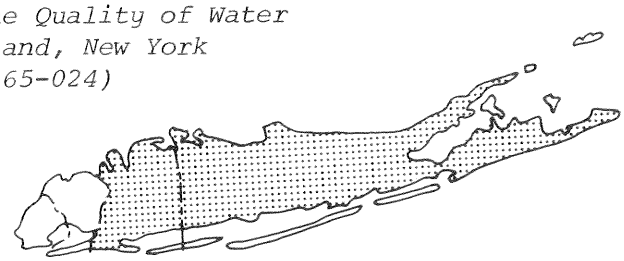
Progress and Significant Results: Project continued to support office data-processing needs. Work began on a hydrogeology file. The Digitizer and Tektronix 4051 were used to compute latitude and longitude, area, length, and discharge. The local well-data base was updated to contain header information on 4,916 wells and ground-water-level data on 1,818 wells. Base maps were produced at various scales for office projects. The minicomputer began to heavily support pre- and postprocessing of the digital-modeling programs at Brookhaven National Laboratory.

Plans for Next Year: Project will continue to support office data-processing needs. Plotting capability will be implemented on the Tektronix 4051.

Completed Reports:

Hawkins, G. W., Processing ground water level data by digital computer: Hydrological Sciences Bull., v. 24, no. 4, p. 529-538.

Evaluation of the Quality of Water on Long Island, New York (NY 65-024)



Date Project Began: July 1964

Project Leader: Brian G. Katz

Field Location: Nassau and Suffolk Counties

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

Problem: Ground water is the only source of supply for most of Long Island. Urbanization has radically altered its chemical quality, particularly in the western part of the two-county area. Systematized collection and interpretation of water-quality data are needed to assist in sound water-management decisions for Long Island.

Objective: To evaluate the natural physical and chemical character of water on Long Island and the effects of man's activities on water quality.

Approach: To review and interpret available water-quality data, and to collect additional data where needed for interpretation and for definition of trends in water-quality changes.

Progress and Significant Results: All existing nitrogen data (including nitrate, ammonium, and total nitrogen) in ground- and surface waters from southern Nassau County were described and interpreted in a report to be published in a scientific journal. A comparison of nitrate in shallow ground water beneath sewered and unsewered areas revealed that lawn fertilizers are contributing large amounts of nitrogen to the sewered areas, and domestic wastes are contributing to the unsewered areas. Organic-quality data (predominatly low-molecular-weight chlorinated hydrocarbons and pesticides) and chloride data are being entered into our computer for extensive interpretive work.

Plans for Next Year: Interpretation of additional water-quality data is planned to provide in-depth analyses of factors affecting chloride and organic-chemical concentrations in ground water from Nassau and Suffolk Counties. Additional water-quality analyses, including chlorinated hydrocarbons, pesticides, and metal extractions, are planned. Further work with nitrogen isotopes to define sources of nitrogen contamination is also planned.

Reports Completed Since 1975:

Braids, O. C., and Ragone, S. E., 1975, Nitrogen in Long Island ground water, in, Conference proceedings of nitrogen in Long Island water systems: American Chemical Society, Environmental Improvement Committee, Nassau-Suffolk Subsection, p. 64-88.

Ragone, S. E., Guerrera, A. A., and Flipse, W. J., Jr., 1976, Changes in methylene blue active substances and chloride levels in streams in Suffolk County, Long Island, New York, 1960-76: U.S. Geological Survey Open-File Rept. 76-600, 65 p.

Ragone, S. E., Lindner, J. B., Oaksford, E. T., 1976, Chemical constituents in water from streams in Nassau and Suffolk Counties, Long Island, New York, 1966 through 1975: U.S. Geological Survey Open-File Rept., 107 p.

Katz, Brian, Ragone, S. E., and Harr, C. A., 1977, Nitrogen in water in Nassau and Suffolk Counties, Long Island, New York: U.S. Geological Survey Open-File Rept. 77-433, 46 p.

Ragone, S. E., Katz, B. G., Lindner, J. B., and Flipse, W. J., 1977, Chemical quality of ground water in Nassau and Suffolk Counties, Long Island, New York--1952 through 1976: U.S. Geological Survey Open-File Rept. 76-845, 93 p.

Reynolds, Richard, and Ragone, S. E., 1977, Water-quality data for Nassau and Suffolk Counties, New York--July 1974 to September 1975: U.S. Geological Survey Open-File Rept. 77-154, 37 p.

Katz, B. G., Ragone, S. E., and Lindner, J. B., 1978, Monthly fluctuations in the quality of ground water near the water table in Nassau and Suffolk Counties, Long Island, New York: U.S. Geological Survey Water Resources Investigations 78-41, 38 p.

Kreitler, C. W., Ragone, S. E., and Katz, B. G., 1977, Nitrogen isotope ratios indicate sources of ground water nitrate, Long Island, New York: National Water Well Association, Proc., Boston, Mass.

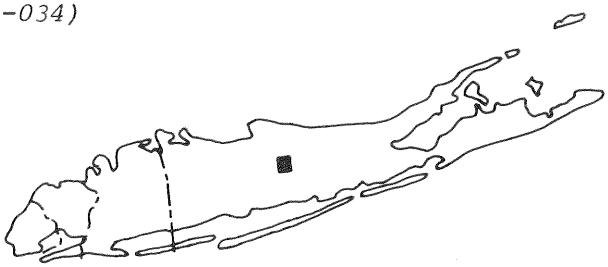
Kreitler, C. W., Ragone, S. E., and Katz, B. G., 1978, N^{15}/N^{14} ratios of ground-water nitrate, Long Island, New York: Ground Water, v. 16, no. 6, pp. 404-409.

Katz, B. G., and Krulikas, R. K., Analyses of ground water by different laboratories--a comparison of test results: U.S. Geological Survey Open-file Rept. 79-1063, 8 p.

Katz, B. G., Lindner, J. B., and Ragone, S. E., Comparison of nitrogen in shallow ground water from sewered and unsewered areas, Nassau County, New York, from 1952-76 (in press).

Ragone, S. E., Katz, B. G., Kimmel, G. E., and Lindner, J. B., Nitrogen in ground water and surface water in sewered and unsewered areas, Nassau County, New York: U.S. Geological Survey Water Resources Investigations (in review).

Role of the Unsaturated Zone in Basin Recharge With a Highly Treated, Denitrified Sewage Effluent (NY 75-034)



Date Project Began: July 1974

Date Project Ended: September 1979

Project Leader: Robert C. Prill

Field Location: Medford, Suffolk County

Funding: Federal program

Problem: Recharge of ground-water reservoirs with treated domestic and industrial sewage is receiving increasing attention on Long Island. Permeable glacial outwash deposits form much of the surficial materials, thereby making basin recharge practicable. Site selection and basin management depend on the role played by the unsaturated zone in controlling infiltration rates and modifying the quality of percolating water. The objective of this project is to elucidate the role of the unsaturated zone in high-rate recharge.

Objective: (1) To define the physical and chemical changes in the unsaturated zone that are associated with high-rate infiltration of a highly treated, denitrified domestic wastewater. (2) To develop a systematic approach for collection of soil and water samples and for monitoring factors needed to define those changes. (3) To assess the significance of those changes as they relate to maintenance of high recharge rates and the system's ability to improve water quality.

Approach: To (a) pump highly treated effluent from a sewage-treatment plant into basins excavated in outwash sand and gravels, (b) analyze soil and water samples and collect moisture and pressure-head data between the basin and the water table; (c) measure water characteristics such as dissolved oxygen, pH, chemical oxygen demand, sulfide, ammonia, bicarbonate, and nitrate.

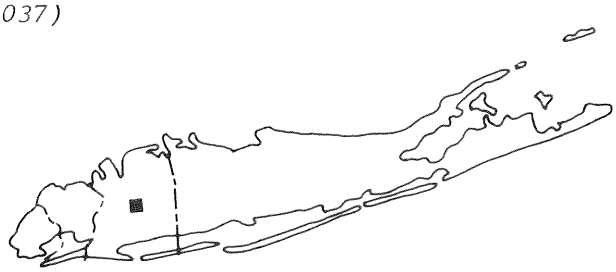
Progress and Significant Results: Final report was prepared.

Completed Reports:

Oaksford, E. T., 1979, Measurement of pressure head in the unsaturated zone with buried water tensiometers: American Society for Testing Materials, Geotechnical Testing Journal, v. 1, no. 4, p. 199-202.

Prill, R. C., Oaksford, E. T., Potorti, J. E., 1979, A facility designed to monitor the unsaturated zone during infiltration of tertiary-treated sewage: U.S. Geological Survey Water-Resources Investigations 79-48, 14 p.

Hydrologic and Water-Quality Effects of Artificial Recharge with Reclaimed Water on the Operation of Recharge Basins and Wells, Nassau County (NY 76-037)



Date Project Began: July 1975

Date Project Ends: September 1982

Project Leader: David A. Aronson

Field Location: Central Nassau County

Cooperating Agency: Nassau County Department of Public Works

Problem: A recent engineering feasibility study, done for Nassau County at the request and funding of U.S. Environmental Protection Agency, has recommended that advanced wastewater-treatment and groundwater-recharge facilities be constructed and operated in Nassau County to demonstrate the feasibility of reclaiming water and using it to recharge the aquifer through basins and shallow injection wells. Research on factors controlling the degree and causes of clogging of basins and wells, on factors causing improvement or degradation of water quality after recharge, and on the hydraulic response of the aquifer system, is required. From these findings, the optimum recharge procedures and costs would be evaluated.

Objective: To acquire and interpret information on (a) clogging factors affecting the operation of recharge basins and injection wells, and (b) the impact of large-scale recharge with reclaimed water on the Long Island ground-water system.

Approach: Hydrologic properties of the aquifer will be determined from laboratory analyses of core samples, geophysical logs, and well and aquifer tests. Baseline water-quality (chemical and microbiological) data will be determined from extensive field and laboratory analyses of soil samples and water samples. Hydraulic and water-quality models will be applied early in the study and used to predict response of the aquifer system. Performance of recharge basins and wells will be evaluated from head and flow-rate data. Study of clogging factors will be based on chemical, microbiological, and head data, and on particle analysis. Extensive water-quality analyses will be made both for public-health reasons and for studies of clogging factors and aquifer response.

Progress and Significant Results: Recharge facilities at the study site are close to completion. Water mains have been tested in preparation for transmittal of reclaimed water to the recharge site from the Cedar Creek tertiary-treatment plant. To date, instrumentation to monitor flow through the unsaturated zone in manholes in basins 2 and 3 has been selected and is on order. Preliminary results of chemical analyses of ground-water samples at 47 observation wells show that water in the upper glacial aquifer and in the upper part of the Magothy aquifer contain significant concen-

trations of low-molecular-weight chlorinated hydrocarbons, organochlorine insecticides, and polychlorinated biphenyls. Bacteria are present in ground water at site. Aerobic heterotrophs and nitrogen-transforming bacteria are generally present; however, fecal coliforms and fecal streptococci are typically absent, which indicates no significant fecal contamination of the ground water. Particle analyses of water from an experimental tertiary-treatment plant at Bay Park, show that cartridge filtration is effective in preventing clogging, but that large quantities of iron and alum flocs on the water cause rapid clogging of the filters. Preliminary three-dimensional digital-model analyses were made to predict the water-table rise in Nassau County and parts of neighboring counties caused by addition of up to 4 Mgal/d of reclaimed water to the ground-water reservoir. Results suggest that water-table mounds beneath recharge sites may locally exceed 20 feet. Streamflow at East Meadowbrook may increase by more than 30 percent as a result of the recharge.

Plans for Next Year: Manholes in basins 2 and 3 will be instrumented, and piezometer and neutron-access holes will be completed. Ponding tests will run in basins 2 and (or) 3 to test and verify instrumentation data-gathering capabilities. Water-quality sampling will continue at the 47 observation wells in the study area to gather background data prior to recharge and to monitor changes in water quality after recharge begins. Studies will begin at 8 basins and 5 injection wells at the Meadowbrook site. Water and soil samples will continue to be collected for microbiological studies. Areal differences in chemical composition and microbiota will be analyzed using the SYMAP program. Particle analyses and filtration studies of tertiary-treated water from the Medford sewage-treatment plant will be made in preparation for similar studies at the Meadowbrook site. Digital-model studies will continue. Observation-well recorders will be installed and operated. The ground-water flow system will be studied using a bromide tracer injected through a recharge well at the study site. Electrical-resistivity surveys will be made of the study area to determine the extent and thickness of stratigraphic sequences in areas for which geologic data are lacking. The surveys will also provide data on pre-recharge conditions for comparison with conditions during and after recharge.

Completed Reports:

Aronson, D. A., 1978, Artificial recharge on Long Island, New York: Long Island Water Resources Bull. 9, 25 p.

Aronson, D. A., Reilly, T. E., and Harbaugh, A. W., 1979, Use of storm-water basins in artificial recharge with reclaimed water, Nassau County, New York--a hydraulic feasibility study: Long Island Water Resources Bull. 11, 58 p.

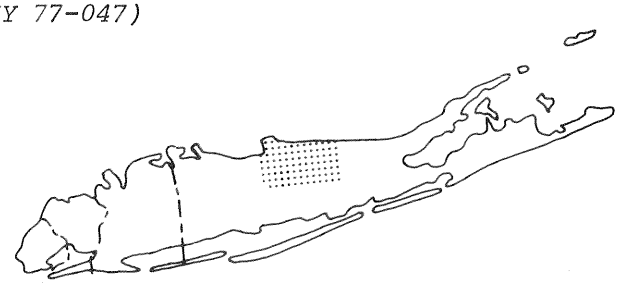
Ehrlich, G. G., Ku, H. F. H., Vecchioli, John, and Ehlke, T. A., Microbiological effects of recharging the Magothy aquifer at Bay Park, N.Y., with tertiary-treated sewage: U.S. Geological Survey Professional Paper 751-E (in press).

Ragone, S. E., 1977, Geochemical effects of recharging the Magothy aquifer, Bay Park, New York, with tertiary-treated sewage: U.S. Geological Survey Professional Paper 751-D, 22 p.

Vecchioli, John, Ku, H. F. H., and Sulam, D. J., Hydraulic effects of recharging the Magothy aquifer, Bay Park, New York, with tertiary-treated sewage: U.S. Geological Survey Professional Paper 751-F (in press).

Aronson, D. A., The Meadowbrook artificial-recharge project in Nassau County, Long Island, New York: Long Island Water Resources Bull. 14 (in press).

Geohydrology of North Brookhaven Town, Suffolk County (NY 77-047)



Date Project Began: October 1976

Date Project Ends: September 1980

Project Leader: Edward J. Koszalka

Field Location: North Brookhaven

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

Problem: Population growth in the northern part of Brookhaven Town has necessitated study of the interrelated problems of water supply, sewage disposal, and solid-waste disposal. The aquifers, which are the sole source of fresh water, need to be defined with respect to composition, areal extent, thickness, and hydrologic properties. Also needing definition are the potentiometric surfaces of the major aquifers, the amount of water leaving the ground-water body as streamflow, and both short- and long-term changes in water quality.

Objective: To describe the occurrence and movement of fresh water. The investigation will include: (a) preparation of water-table contour maps and potentiometric-surface maps of the deeper aquifers; (b) evaluation of natural and man-induced water-quality conditions in all aquifers; (c) description of surficial and subsurface geology with particular emphasis on factors affecting movement of ground water; (d) evaluation of surface-water bodies and their interrelationship with the ground-water reservoir; and (e) compilation of all data appropriate for future modeling studies.

Approach: (1) To collect and evaluate all available hydrologic and geologic information in order to select observation wells for periodic water-level measurements and water-quality sampling. (2) To design and

conduct a test-well program for delineating subsurface hydrogeologic conditions. (3) To assess hydrologic properties of aquifers through specific capacity tests on as many wells as practical.

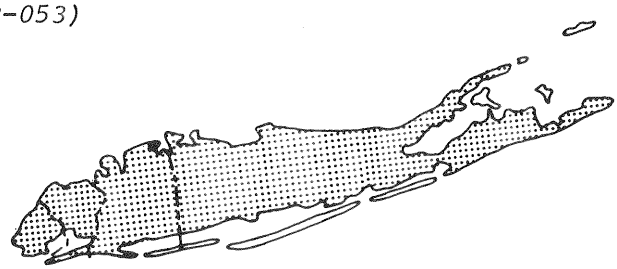
Progress and Significant Results: Additional observation wells for water-levels and water-quality samples have been installed. Test borings have been drilled to delineate subsurface geologic units. Mass measurements of water-level, streamflow and water quality samples were conducted in mid-October 1978 and April 1979. Water-level and water-quality data banks were updated. Geologic-mapping interpretations of subsurface geology were made, and a hydrologic data report was completed.

Plans for Next Year: To (a) conduct mass measurements of water-level, streamflow, and water-quality samples in October 1979 and April 1980; (b) complete geologic mapping and interpretations of subsurface geology; (c) select sites and drill additional wells for water-level and water-quality data and for deep geologic test borings; (d) conduct geophysical logging of existing wells; (e) complete final report.

Completed Reports:

Koszalka, E. J., Hydrogeologic data from investigation of water resources of the northern part of the Town of Brookhaven, Suffolk County, New York: Long Island Water Resources Bull. 15 (in review).

Impact of Future Sewering and the Effects of Proposed Mitigating Actions on the Fresh-Water Resources of Long Island (NY 78-053)



Date Project Began: January 1979

Date Project Ends: September 1980

Project Leader: Bronius Nemickas

Field Location: Nassau and Suffolk Counties

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

Problem: A lowering of the water table and a decrease in streamflow have been well documented in sewered areas of southwest Nassau County. Similar effects are expected in southeast Nassau and southwest Suffolk Counties, where large-scale sewer construction is underway. Because effluent will be discharged to the ocean, fresh-water discharge into Great South Bay will be decreased. As a condition of funding the sewer construction, EPA has requested the counties to determine the anticipated extent of the impact of sewers on the streams and the bay, and to address methods of mitigating these effects.

Objective: To determine: (a) the present volume of fresh-water discharge into Great South Bay from 36 tributary streams and from direct ground-water discharge; (b) the impact of sewering (with ocean outfall) on the total fresh-water discharge and on individual streams; and (c) the effectiveness of stream augmentation by shallow and (or) deep recharge wells.

Approach: Observation wells in the upper glacial (water-table) and Magothy (confined) aquifers will be installed. Stratigraphic test holes and seismic techniques will be used to define the extent and thickness of the Gardiners clay, the principal confining bed in the area. Contractual work will be administered by Nassau and Suffolk Counties with technical assistance from USGS. Aquifer tests will be conducted to determine the properties of the aquifers and the confining beds. Laboratory analyses of cores will also be used to determine the hydraulic properties of the Gardiners clay. Stream-flow will be determined at several sites along each stream. Ground-water/surface-water stage relations will be established for each site. A three-dimensional model of the aquifer-stream system will be used to determine fresh-water discharge. The model will be calibrated against steady-state (average) conditions, data from the 1960's drought, and data collected during a 1-year data-collection phase of this study. The model will be able to predict the decline in the water table, the reaches of streams that will be dewatered, and the spatial and temporal changes in fresh-water discharge. A subproject will evaluate the effectiveness of stream augmentation by means of a pilot study. This study will help define the mechanics of the ground-water/surface-water interface and determine the stream response to artificial discharges.

Progress and Significant Results: A large part of the data collection and compilation was completed. Delineation of ground-water contributing areas in southern Suffolk County was completed, and the report is in review. A report on the steady-state model for southwest Suffolk County is in progress.

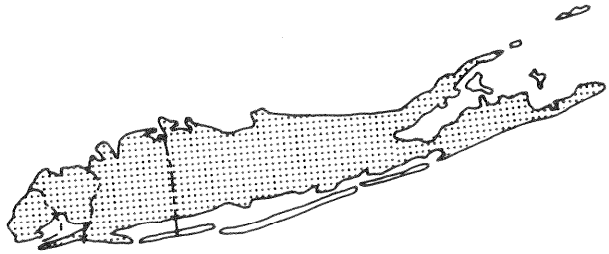
Plans for Next Year: Hydrologic models will be calibrated and verified. Aquifer tests in southern Nassau County will be conducted and analyzed. A 30-day stream augmentation test will be conducted, and a hydrologic-data report for south-central Long Island will be prepared.

Completed Reports:

Sulam, D. J., Delineation of ground-water contributing areas, Southern Suffolk County, New York: U.S. Geol. Survey (in review).

Reilly, T. E., Buxton, H. T, Franke, O. L., and Wait, R. L., Digital model study of the effects of sewering and extreme variations in natural recharge on ground-water levels and streams, Long Island, New York--Part 1--Model development for Suffolk County: U.S. Geological Survey (in review).

Hydrologic Models of the Ground-Water Flow System on Long Island, New York (NY 69-054)



Date Project Began: July 1968

Date Project Ends: December 1981

Project Leader: Thomas E. Reilly

Field Location: Long Island

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

Problem: Declining ground-water levels, streamflow depletion, saltwater encroachment into aquifers, and pollution with industrial and domestic wastes pose a serious threat to the potable water supply of Long Island, which is heavily dependent upon ground water as a source for domestic, public, and industrial water supplies. Local governments are keenly aware of the importance of ground water, and their water-management decisions require a knowledge of the hydrologic system. This knowledge can best be obtained through model studies.

Objective: (1) To provide decisionmakers with quantitative estimates of physical changes in the ground-water system that would result from stresses imposed through various management schemes. (2) To estimate the effects that stresses within the ground-water system would have on the quantity and quality of surface water. (3) To determine rates and directions of ground-water flow under natural and stressed conditions, and to use these velocity data to predict changes in water quality resulting from movement of pollutants and natural contaminants.

Approach: Several models will be prepared to study various aspects of the ground-water flow system. These models include areal multilayer digital and analog models, cross-sectional digital models, and radial-flow digital models. New techniques, including the coupling of flow and transport models, will be developed and tested. Existing models will be periodically refined with data collected specifically for model verification as well as data from current studies.

Progress and Significant Results: A steady-state subregional ground-water model is the process of calibration; it uses a developed regional model to predict boundary conditions. A subregional model for southern Nassau County is in the early stages. A radial flow model has been designed to aid in the analysis of pump tests.

Plans for Next Year: Continuing work on modeling water-management problems and on modeling subregions of Long Island is planned. The subregional models for Suffolk and Nassau Counties should be completed. Project personnel will also act as advisors to other projects requiring numerical simulation.

Completed Reports:

Kimmel, G. E., and Harbaugh, A. W., 1975, Analog model analysis of hydrologic effects of sewerage in southeast Nassau and southwest Suffolk Counties, Long Island, New York: U.S. Geological Survey Open-File Rept. 75-535, 22 p.

Franke, O. L., and Getzen, R. T., 1975, Evaluation of hydrologic properties of the Long Island ground-water reservoir using cross-sectional electric analog models: U.S. Geological Survey Open-File Rept. 75-679, 80 p.

Kimmel, G. E., and Harbaugh, A. W., 1976, Analog-model analysis of effects of waste-water management on the ground-water reservoir in Nassau and Suffolk Counties, New York, Report I--Proposed and current sewerage: U.S. Geological Survey Open-File Rept. 76-441, 34 p.

Harbaugh, A. W., and Reilly, T. E., 1976, Analog model analysis of effects of waste-water management on the ground-water reservoir in Nassau and Suffolk Counties, New York, Report II--Recharge with waste water: U.S. Geological Survey Open-File Rept. 76-847, 34 p.

_____, 1977, Analog-model analysis of effects of waste-water management on the ground-water reservoir in Nassau and Suffolk Counties, New York, Report III--Reduction and redistribution of ground-water pumpage: U.S. Geological Survey Open-File Rept. 77-148, 24 p.

Getzen, R. T., 1977, Analog-model analysis of regional three-dimensional flow in the ground-water reservoir of Long Island, New York: U.S. Geological Survey Professional Paper 982, 49 p.

Harbaugh, A. W., and Getzen, R. T., 1977, Stream simulation in an analog model of the ground-water system on Long Island, New York: U.S. Geological Survey Water Resources Investigations 77-58, 15 p.

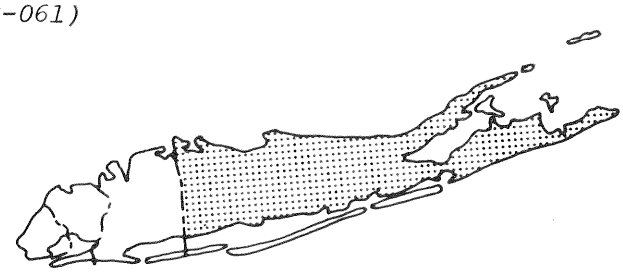
Kimmel, G. E., Ku, H. F. H., Harbaugh, A. W., Sulam, D. J., and Getzen, R. T., 1977, Analog model prediction of the hydrologic effects of sanitary sewerage in southeastern Nassau and southwestern Suffolk Counties, New York: Long Island Water Resources Bull. 6, 25 p.

Reilly, T. E., 1978, Convective contaminant transport to pumping well: American Society Civil Engineers, Journal Hydraulics Division, v. 104, no. HY12, p. 1565-1575.

Reilly, T. E., and Harbaugh, A. W., A comparison of analog and digital modeling techniques for simulating three-dimensional ground-water flow on Long Island, New York: U.S. Geological Survey Water Resources Investigations 80-14 (in press).

Aronson, D. A., Reilly, T. E., and Harbaugh, A. W., 1979, Use of storm-water basins for artificial recharge with reclaimed water, Nassau County, Long Island, New York--A hydraulic feasibility study: Long Island Water Resources Bull. 11, 57 p.

Appraisal of Hydrogeologic Conditions in Suffolk County, New York (NY 68-061)



Date Project Began: March 1968

Date Project Ends: December 1981

Project Leader: Richard K. Krulikas

Field Location: Suffolk County

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

Problem: Ground water is the sole source of public-supply water for over 1 million residents of Suffolk County, but development and exploitation of the ground-water reservoir concurrent with the large increase in population is causing deterioration of ground-water supplies. Hydrologic information is essential in formulating water-management decisions on the use, protection, and conservation of water resources.

Objective: To (a) determine altitudes of major hydrogeologic units penetrated by wells throughout the county; (b) construct contour maps and cross sections showing the extent and relationships of the major hydrogeologic units; (c) prepare summary maps of water levels, pumpage, and general chemical quality of ground water.

Approach: (1) To develop and interpret knowledge of the hydrogeologic framework of the ground-water reservoir system from well logs, electric logs, and formation cores. (2) To determine and interpret qualitative and quantitative relationships from measurement of water levels in wells, test drilling, and chemical analyses.

Progress and Significant Results: Newly acquired hydrogeologic data are being correlated with existing data and interpreted to evaluate local and areal hydrologic relationships. Also, the updating of computer files with newly acquired hydrologic data was continued.

Plans for Next Year: To continue collection, correlation, and interpretation of hydrogeologic data. A hydrogeologic data report will be prepared, and updating of subsurface maps will continue. Hydrogeologic relationships in the County will continue to be closely monitored.

Completed Reports:

Jensen, H. M., and Soren, Julian, 1971, Hydrogeologic data from selected wells and test holes in Suffolk County, Long Island, New York: Long Island Water Resources Bull. 3, 35 p., 1 pl.

Jensen, H. M., and Soren, Julian, 1974, Hydrogeology of Suffolk County, Long Island, New York: U.S. Geological Survey Hydrologic Investigations Atlas HA 501.

Erlichman, F. R., 1979, Distribution of ground-water withdrawals on Long Island, New York, by area, aquifer, and use in 1973: Long Island Water Resources Bull. 11, 16 p.

Appraisal of Hydrogeologic Conditions in Nassau County, New York (NY 71-070)

Date Project Began: July 1970

Date Project Ends: December 1981

Project Leader: Chabot Kilburn

Field Location: Nassau County

Cooperating Agency: Nassau County Department of Public Works

Problem: Intensive development of Nassau County ground-water resources requires updated and more detailed knowledge of the hydrogeologic framework. These data will be used in construction of models and in geochemical, waste-disposal, and other studies required for management and conservation of the county's ground water, its sole source of fresh water.

Objective: To (a) determine altitudes of major hydrogeologic units penetrated by wells throughout the county; (b) construct contour maps and cross sections showing the extent and relationships of the major hydrogeologic units; (c) prepare summary maps of water levels, pumpage, and general chemical quality of ground water.

Approach: To (a) review and integrate hydrogeologic data from previously published areal studies; (b) examine 4,000 well logs and review computerized data from selected old and new wells for use in basic-data printout, and (c) prepare structure-contour maps. Water samples from selected wells will be collected for chemical analysis. Well cuttings and cores will be collected from new wells for microscopic examination and chemical analysis.

Progress and Significant Results: Report on the hydrogeology of the Town of North Hempstead was delivered to the publisher. Compilation of ground-water pumpage for Nassau County (1920-76) was essentially completed, and for nonpublic supplies (1935-1977) is nearly completed. Delineation and coding of hydrogeologic data for each well for which pumpage is available is also essentially completed. Geologic data from most deep wells drilled in Nassau County during the past year have been collected, and the location, present status, and type of flow meters on nonpublic supply wells required to report pumpage data in the Towns of Hempstead and Oyster Bay were determined.

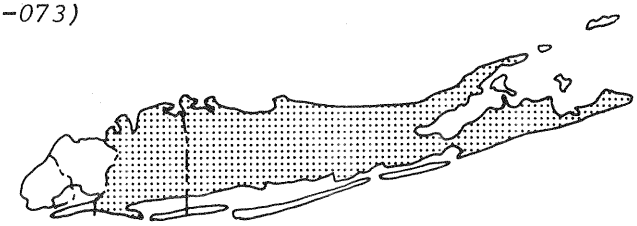
Plans for Next Year: Tabulation of ground-water-pumpage data will be completed. A review of available nonpublic-supply pumpage data indicated large deficiencies and ambiguities in about 30 percent of the data. This is to be resolved as far as possible. Available pumpage data will be published, and a summary of the data will be given in an additional report. Hydrogeologic data will be collected from new wells as they are drilled; also, updating and coding of hydrogeologic data on water-level observation wells and public-supply wells in Nassau County will continue, and the observation network in Nassau County will be reviewed. The long-term trends in water levels, pumpage, and water quality in the Town of North Hempstead will continue to be studied. Additional wells will be constructed to determine the extent of the occurrence of salty ground water in Great Neck and Manhasset Neck. Collection and compilation of data needed for hydrogeologic report on Oyster Bay Town will begin.

Completed Reports:

Kilburn, Chabot, Hydrogeology of the Town of North Hempstead, Nassau County, Long Island, N.Y.: Long Island Water Resources Bull. 12, 68 p.

Erlichman, F. R., 1979, Distribution of ground-water withdrawals on Long Island, New York, by area, aquifer, and use in 1973: Long Island Water-Resources Bull. 11, 16 p.

Urban Hydrology of Long Island (NY 79-073)



Date Project Began: October 1979

Date Project Ends: September 1982

Project Leader: Henry F. Ku

Field Location: Nassau and Suffolk Counties

Cooperating Agency: Nassau-Suffolk Regional Planning Board

Problem: Ground water is the sole source of fresh water for the more than 2.7 million people on Long Island. Currently, precipitation is being routed to the numerous recharge basins that are distributed broadly on Long Island. Approximately 60 Mgal/d of runoff reaches the ground-water reservoir through recharge basins. Although substantial filtering occurs through soils, large amounts of pollutants reach the ground-water system. Accordingly, it has been determined that storm-water basins contribute significant concentrations of pollutants to the ground water.

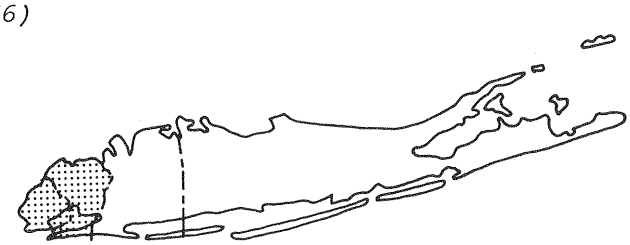
Objectives: To determine the type, quantity, and fate of pollutants in runoff to basins, to evaluate the changes in runoff that result from various management practices, and to determine changes in runoff quality as it infiltrates the floor of the basin.

Approach: Five recharge basins draining areas representing various land uses will be used as study sites. Highly sophistocated hydrologic instruments will be used to collect data on precipitation, runoff volume, runoff quality, and quality of water that infiltrates to the water table. Water samples will be collected both manually and automatically and analyzed for organic and inorganic indicators, bacteriological indicators, sediment concentration, viruses, and esthetic indicators.

Progress and Significant Results: A preliminary survey of potential basins was made, and some of the recording and sampling equipment was purchased.

Plans for Next Year: The recording and sampling instruments appropriate for each site will be chosen and installed. Data on storm discharge, water quality, and microbiology will be collected.

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



Date Project Began: August 1979

Date Project Ends: September 1982

Project Leader: Julian Soren

Field Location: Western Long Island

Cooperating Agency: New York State Department of Environmental Conservation

Problem: Local salt-water intrusion has forced the shutdown of many supply wells in Kings and western Queens Counties. The shift to surface-water supply from upstate reservoirs will overtax current reservoir and transmission-line capacity. Also, the shutdown of wells has caused ground-water flooding. The expanded use of ground water would alleviate both problems, but data needed to design a management plan are lacking.

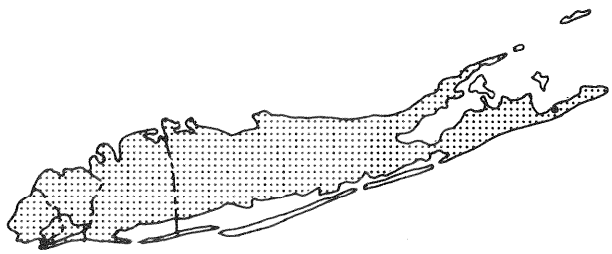
Objectives: A three-dimensional model of ground water in Kings and Queens Counties was calibrated, and a series of water-quality maps showing distribution of chloride, nitrogen species, and organic pollutants was completed. These will permit the design of pumping schemes to provide potable water and alleviate ground-water flooding.

Approach: (1) To establish a monitoring network of 100 wells, about half of which will be existing observation wells. (2) To take two suites of samples from each well (standard complete and about 20 common organics). (3) To the map geology in detail to permit construction of model on 1000-foot grid. (4) To complete construction, verification, and calibration of model.

Progress and Significant Results: The existing water-level and water-quality-monitoring network was evaluated, and sites for additional wells were chosen. Work on the installation of the wells began.

Plans for Next Year: The monitoring network will be sampled and water analyzed for organic and inorganic constituents. A series of water-level and hydrogeologic maps for the bi-county area will be prepared.

Long Island Regional Aquifer Study (NY 80-084)



Date Project Began: October 1979

Date Project Ends: September 1983

Project Leader: Murray S. Garber

Field Location: Islandwide

Funding: Federal program

Problem: To obtain the maximum effective use of the ground-water resource of Long Island, it will be necessary to undertake quantitative studies, particularly modeling of ground-water flow in three dimensions. The existing model must be expanded to encompass unmodeled areas and modified to conform with the constraints imposed by adjacent flow models.

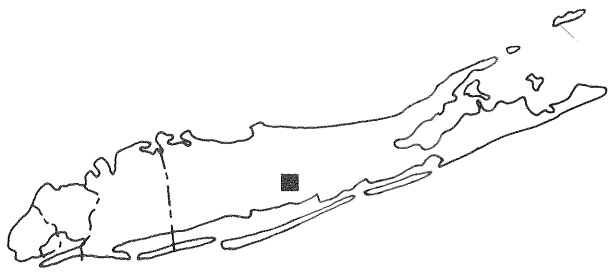
Objective: The five-layer Long Island model will be expanded to include the Lloyd aquifer as a sixth layer. A fine-grid six-layer model of western Long Island will be designed, calibrated, and interfaced with the Long Island model on the east and the adjacent model in New Jersey. The position and movement of the saltwater interface in the coastal aquifers will be evaluated.

Approach: The Lloyd aquifer will be modeled by finite-difference methods in two dimensions and will then be appended to the five-layer model.

A finer grid will be used to model the western part of the area. The model will be compatible with the Long Island model on the east and New Jersey coastal plain models to the west. The model will be formulated from a series of maps showing transmissivity, geologic structure, surface, and water chemistry. These maps will be compiled from maps, published and unpublished data, and data from some new observation wells planned for Kings and Queens Counties.

Plans for Next Year: Initial work will involve assembling and compiling data, collecting new data as needed, and constructing updated maps showing the features to be modeled followed by the initial model runs.

Role of the Unsaturated Zone in Basin Recharge with a Denitrified Sewage Effluent (NY 80-085)



Date Project Began: October 1, 1979

Date Project Ends: September 30, 1982

Project Leader: Edward T. Oaksford

Field Location: Medford, Suffolk County

Funding: Federal program

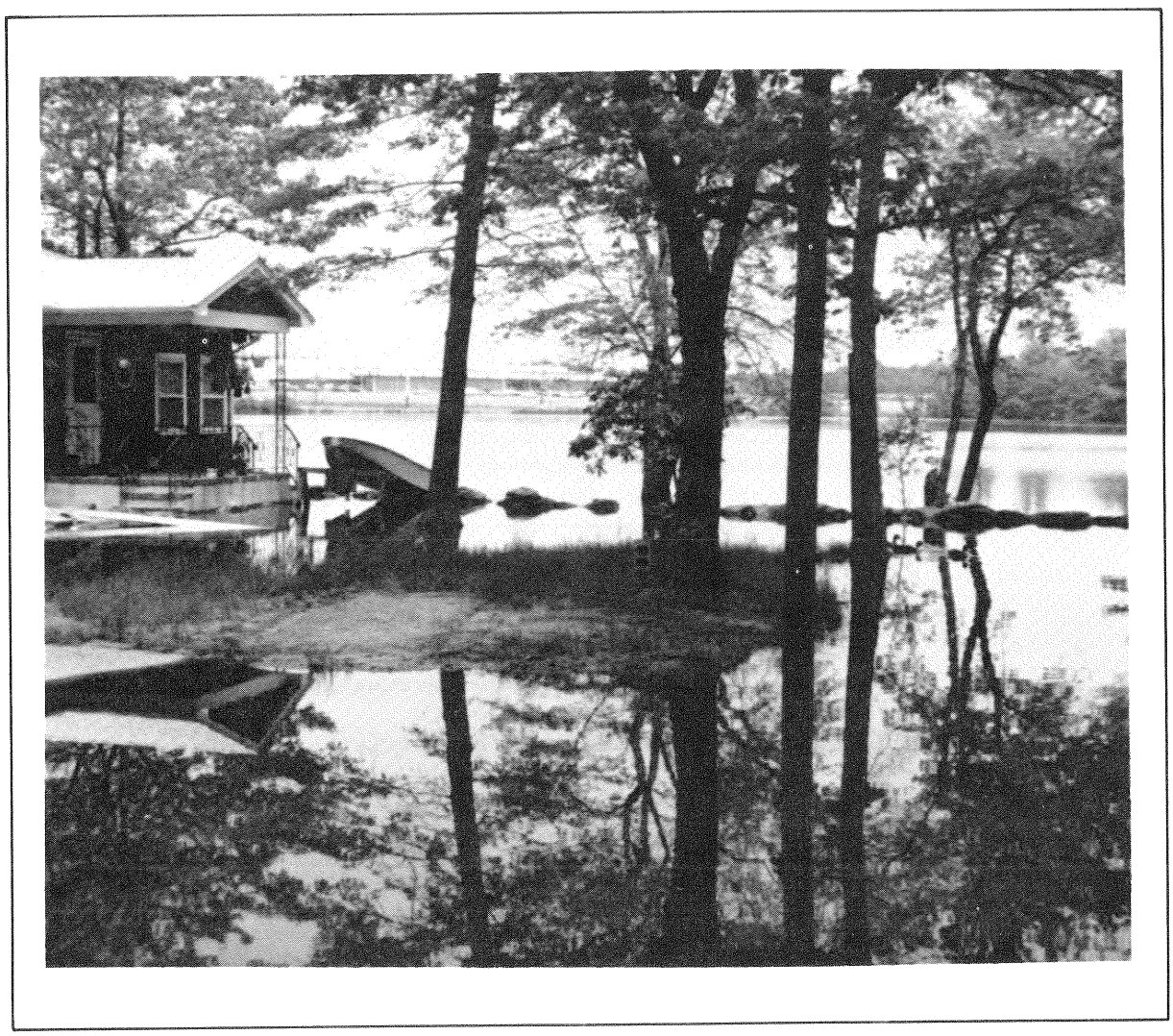
Problem: As a continuation of studies already conducted at this site (see project 034, p. 51), further attention will be given to the disposal of highly treated wastewaters recharging the ground-water reservoir through basins. Whereas initial studies dealt solely with physical, chemical, and microbiological processes during high-rate recharge, this study will closely examine the same processes under conditions of low hydraulic loading. Additional studies will be conducted to examine methods to control various types of clogging microbiologically, and to determine vertical flow-dispersion coefficients at various infiltration rates.

Objectives: To (a) evaluate the maximum treatment capability of the unsaturated zone under conditions of low-rate recharge, (b) control the clogging phenonemon microbiologically, and (c) determine vertical flow-dispersion coefficients.

Approach: To accomplish objectives (a) and (b), effluent from an advanced wastewater treatment plant will be pumped into a basin excavated in glacial outwash sand and gravel, and soil and water

samples will be taken from the unsaturated zone to evaluate the physical and chemical changes that take place. In certain instances, chemicals will be added to the effluent when necessary to verify and further clarify the removal or transformation potential for certain constituents (nitrogen or phosphorous) or to catalyze microbial activity to break up natural clogging. To accomplish objective (c), a conservative ion tracer will be introduced into the effluent and sampled throughout the unsaturated zone to evaluate dispersion characteristics at this site.

Plans for Next Year: To (a) replace old instrumentation in the basin and evaluate its durability; (b) characterize the flow regime in the unsaturated zone under low-flow conditions using the neutron moisture meter and soil tensiometers, and (c) take preliminary samples to evaluate additional treatment potential during low-rate recharge.



Flooding at Artist Lake, Suffolk County, June 1979.

COOPERATING AGENCIES IN 1979

The U.S. Geological Survey and organizations of the State of New York and other agencies have had joint funding agreements for the systematic collection and interpretation of water data since 1900. Organizations that entered into joint funding agreements with the New York District during 1979 are:

Central New York State Parks Commission
City of Albany, Department of Water and Water Supply
City of Auburn
City of New York, Department of Environmental Protection
City of Rochester, Water Bureau
County of Chautauqua, Planning Department
County of Cortland, Planning Department
County of Dutchess
County of Monroe, Water Authority
County of Nassau, Department of Public Works
County of Onondaga, Department of Public Works
County of Onondaga, Water Authority Commission
County of Oswego
County of Putnam
County of Rockland
County of Suffolk, Department of Environmental Control
County of Suffolk, Department of Health Services
County of Suffolk, Water Authority
County of Ulster, County Legislature
County of Westchester, Department of Public Works
Federal Power Commission
Hudson River-Black River Regulating District
New York State Department of Environmental Conservation
  Bureau of Monitoring and Surveillance
  Bureau of Standards and Compliance
  Office of Program Development, Planning, Research
New York State Department of Health
New York State Department of Transportation

COOPERATING AGENCIES IN 1979

New York State Education Department
  Geological Survey
New York State Energy Research and Development Authority
Oswegatchie River-Cranberry Reservoir Commission
Power Authority of the State of New York
St. Lawrence Seaway Development Corporation
Susquehanna River Basin Commission
Town of Clarkston
Town of Warwick
Town of Waterford, Board of Water Commissioners
University of the State of New York, Regents Research Fund, Inc.
University of Virginia
U.S. Army Corps of Engineers
  Buffalo, Baltimore, Philadelphia, Pittsburg,
  and New York Regions
U.S. Soil Conservation Service
U.S. Department of Energy
U.S. Environmental Protection Agency
Village of New Paltz
Village of Nyack, Board of Water Commissioners

The following organizations aided in collection of records:

Municipalities of Batavia, Canandaigua, Cortland, Harrison, Jamestown, Lancaster, Mamaroneck, Oneida, Plattsburgh, Rochester, Rome, Rye, Syracuse, Tarrytown, and Yonkers; Cornell University; Central Hudson Gas and Electric Corp.; Indian River Co.; New York State Electric and Gas Corp.; Niagara Mohawk Power Corp.; Rochester Gas and Electric Corp.; Orange and Rockland Utilities, Inc.

REPORTS PUBLISHED OR RELEASED IN 1979

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Aronson, D. A., Reilly, T. E., and Harbaugh, A. W., 1979, Artificial recharge with reclaimed water by storm-water basins in Nassau County, New York--A hydraulic feasibility study: Long Island Water Resources Bull. 11, 58 p.

Dunn, Bernard, 1979, Floodflow characteristics of Butternut Creek and Jamesville Reservoir, Jamesville, Onondaga County, New York: U.S. Geological Survey Open-File Rept. 79-1292, 14 p.

Ehlke, T. A., 1979, Effects of landfill leaching on water quality and biology of a nearby stream, South Cairo, Greene County, New York: U.S. Geological Survey Water-Resources Investigations 79-13, 18 p.

Ehrlich, G. G., Ku, H. F. H., Vecchioli, John, and Ehlke, T. A., 1979, Microbiological effects of recharging the Magothy aquifer, Bay Park, New York, with teritary-treated sewage: U.S. Geological Survey Professional Paper 751-E, 18 p.

Eissler, B. B., 1979, Headwater locations of U.S. streams tributary to St. Lawrence River basin between western Ohio and eastern New York, excluding Lake Champlain basin: U.S. Geological Survey Open-File Rept. 79-255, 740 p., 3 pl.

Eissler, B. B., 1979, Low-flow-frequency analysis of streams in New York: New York State Department of Environmental Conservation Bull. 74, 178 p.

Embree, W. N., and Wiltshire, D. A., 1979, Estuarine research--an annotated bibliography of selected literature, with emphasis on the Hudson River estuary, New York and New Jersey: New York State Department of Environmental Conservation, Technical Paper 5, 58 p.

Erlichman, F. R., 1979, Distribution of ground-water withdrawals on Long Island, New York, in 1973 by area, aquifer, and use: Long Island Water Resources Bull. 10, 16 p., 1 pl.

Finch, A. J. (ed.), 1979, Water resources investigations in New York-1978: Albany, N.Y., U.S. Geological Survey, 58 p.

Hawkins, G. W., 1979, Processing groundwater level data by digital computer: Hydrological Sciences Bull., v. 24, no. 4, p. 529-538.

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REPORTS PUBLISHED OR RELEASED IN 1979 (continued)

Katz, B. G., 1979, Background organic-chemical quality of a sole-source aquifer intended for artificial recharge on Long Island, N.Y. [Abs.]: EOS, v. 60, no. 46, H71.

Katz, B. G., and Krulikas, R. K., 1979, Analysis of ground water by different laboratories--a comparison of chloride and nitrate data, Nassau and Suffolk Counties, New York: U.S. Geological Survey Open-File Rept. 79-1063, 8 p.

Kilburn, Chabot, 1979, Hydrogeology of the town of North Hempstead, Nassau County, Long Island, New York: Long Island Water Resources Bull. 12, 90 p.

Koszalka, E. J., and Nemickas, Bronius, 1979, Ground-water resources of the South Fork, Suffolk County, New York, in Abstracts with Programs: Geological Society of America, Northeastern Section, 14th annual mtg., p. 20.

Ku, H. F. H., and Sulam, D. J., 1979, Hydrologic and water-quality appraisal of southeast Nassau County, Long Island, New York: Long Island Water Resources Bull. 13, 132 p.

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Miller, T. S., and Muller, E. H., Surficial Geology of Pulaski quadrangle, Oswego County, New York: U.S. Geological Survey Water Resources Investigations 79-1343, open-file rept., 1 sheet.

Oaksford, E. T., 1979, Water-manometer tensiometers installed and read from the land surface: American Society for testing and materials, Geotechnical Testing Journal, v. 1, no. 4, p. 199-202.

Prill, R. C., and Aronson, D. A., 1978, Ponding-test procedure for assessing the infiltration capacity of storm-water basins, Nassau County, New York: U.S. Geological Survey Water-Supply Paper 2049, 29 p.

Prill, R. C., Oaksford, E. T., and Potorti, J. E., 1979, A facility designed to monitor the unsaturated zone during infiltration of tertiary-treated sewage, Long Island, New York: U.S. Geological Survey, Water-Resources Investigations 79-48, 14 p.

Prudic, D. E., 1979, Recharge to low-level radioactive-waste burial trenches 11 through 14, West Valley, New York: U.S. Geological Survey Open-File Rept. 79-900, 5 p.

_____ 1979, Core sampling beneath low-level radioactive-waste burial trenches, West Valley, New York: U.S. Geological Survey Open-File Rept. 79-1532, 55 p.

REPORTS PUBLISHED OR RELEASED IN 1979 (continued)

Prudic, D. E., and Randall, A. D., 1979, Ground-water hydrology and subsurface migration of radioisotopes at a low-level solid radioactive waste disposal site, West Valley, New York, in Carter, M. W., and others (ed.), Management of low-level radioactive waste: New York, Pergamon Press, v. 1, p. 853-882.

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_____ 1979, Applications of Hudson River basin PCB transport studies [abs.]: American Chemical Society Conference, Honolulu, 2 p.

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_____ 1979, Water resources data for New York--water year 1978, v. 2, Long Island: U.S. Geological Survey Water-Data Rept., 264 p.

_____ 1979, Water resources investigations in New York, 1977 [folder, 5th ed.]: U.S. Geological Survey, 1 sheet.

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Zembrzuski, T. J., Jr., and Dunn, Bernard, 1979, Techniques for estimating magnitude and frequency of floods on rural unregulated streams in New York State excluding Long Island: U.S. Geological Survey Water-Resources Investigations 79-83, 66 p.

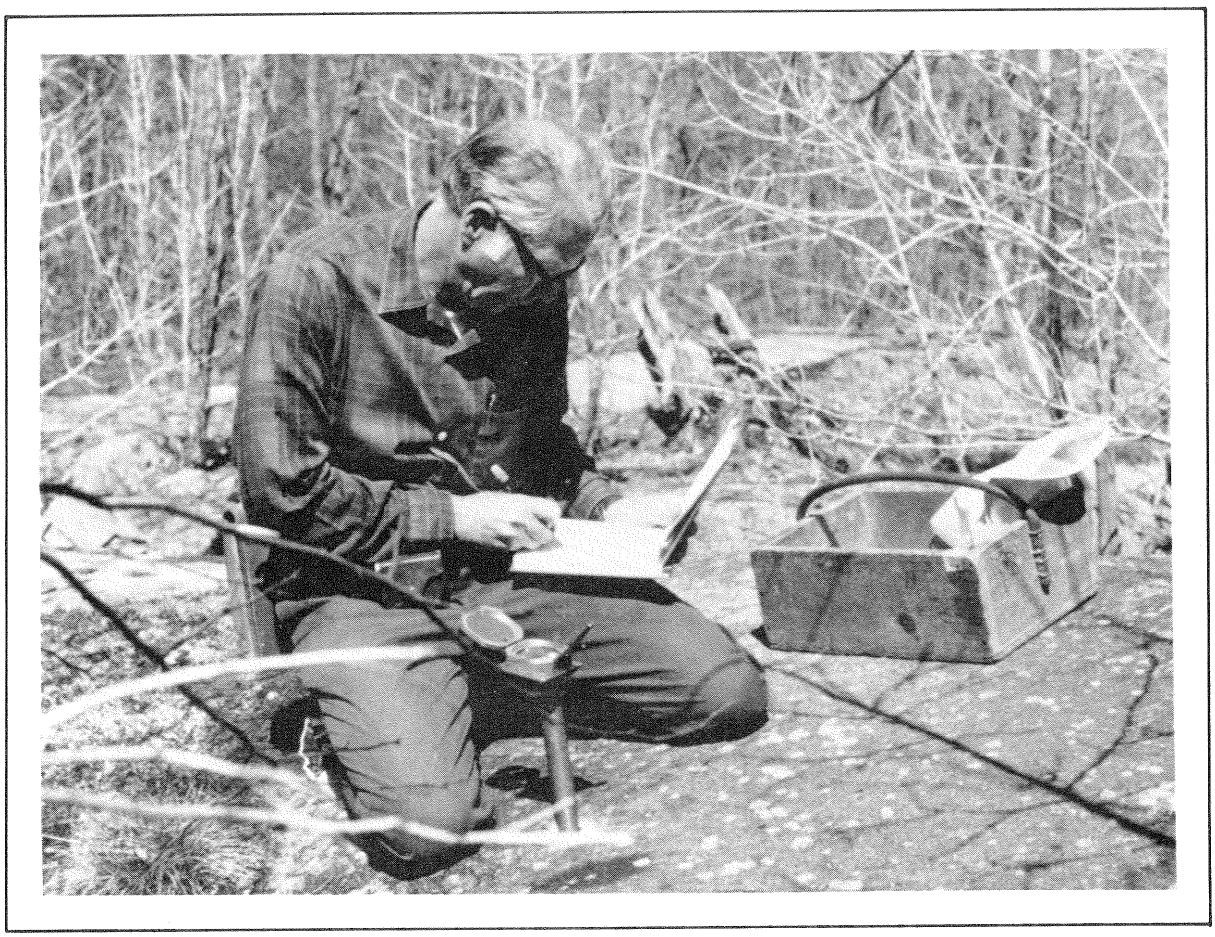
GEOLOGIC AND MINERAL RESOURCE SURVEYS AND MAPPING

Using portable drill for remanent magnetic-core study.

GEOLOGIC AND MINERAL RESOURCE SURVEYS AND MAPPING

The Geologic and Mineral Resource Surveys and Mapping program produces geologic, geophysical, and geochemical maps and analyses that show the distribution, age, composition, structure, and physical properties of the rocks and mineral deposits at and beneath the earth's surface. The program also does research to develop new methods, techniques, and instruments for mineral and energy exploration and assessment. The information collected by this program can be applied to resource development, land-use planning, geologic-hazard investigations, and the solution of construction problems.

The Geologic and Mineral Resource Surveys and Mapping program encompasses four subject areas--land-resources surveys, mineral-resource surveys, energy-resource surveys, and offshore geologic surveys--described in the following pages.



Orienting core for remanent magnetic-core study.

LAND RESOURCE SURVEYS

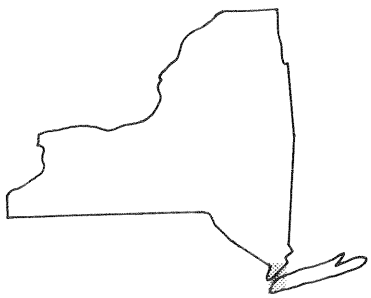
The Land Resources Surveys program:

- Increases knowledge of geologic framework of the Nation and of the geologic processes that have shaped it.

- Applies geologic knowledge and techniques to the mitigation of geologic hazards to assure optimum use of the Nation's land resources and to minimize adverse impacts of man's activities in the geologic environment.

The following projects in New York are included in the Land Resource Survey program.

Newark 2° Quadrangle
(9510-02284)



Period of Project: 1979-82

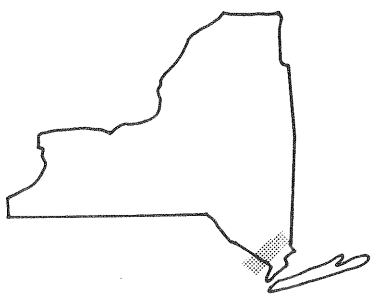
Project Leader: Peter T. Lyttle

Field Location: New Jersey, Pennsylvania, New York

Goals: To map and compile the geology of the Newark 2° quadrangle to provide a modern geologic data base to use in developing a conceptual model, compatible with current plate-tectonic theory, for the origin of the central Appalachians. In addition, the regional setting of some extremely important base-metal deposits, significant ferrous metal deposits, and scattered occurrences of radioactive material will be determined and related to the conceptual model of mountain-range origin. The structural geology of the Jurassic-Triassic Newark basin will be synthesized, interpreted, and applied to a model for Mesozoic continental breakup.

Progress and Significant Results: Initial mapping and data collection were begun.

Seismicity and Tectonics of the Ramapo Fault, Northeast U.S.
(9510-02388)



Period of Project: 1978-79

Project Leader: Nicholas M. Ratcliffe

Field Location: New York, New Jersey

Goals: (1) To evaluate the causes for current seismicity in the northeastern U.S. (2) To determine the attitude distribution and history of movement on faults of the Ramapo fault zone and determine those that are possibly related to the current seismicity. (3) To use selected drilling and trenching to determine if there is any evidence for offset of glacial and postglacial deposits in and near major faults of the Ramapo system.

Progress and Significant Results: Detailed mapping of bedrock in vicinity of Ramapo fault from Hudson River at Tompkins Cove south to Pompton Plains, N.J. was completed; diamond core drilling of the poorly exposed Ramapo fault was begun in New York, and reconnaissance studies of reported offset glacial striae in southeastern New York have been started.

Caledonide Orogen
(9510-02292)

Period of Projects: 1978-85

Project Leaders: Robert B. Neuman and Douglas W. Rankin

Field Locations: Eastern United States

Goals: To better understand the early Paleozoic geology of the American Appalachians through examination of the entire Caledonide Orogen through coordinated geologic analyses and syntheses in this and other countries of the North Atlantic region, as a part of the Caledonide Orogen Project of the International Geological Correlation Program (IGCP).

Progress and Significant Results: Guidelines for the compilation of plutonic, volcanic, metamorphic, lithostratigraphic, faunal and basement/basement-cover maps were agreed on; first draft of time of deformation map was completed.

Completed Reports:

Dallmeyer, D. R., Drake, A. A., Dunn, D. E., Hall, L. M., Tull, J. F., and Osberg, P. H., 1978, Time-of-deformation map of the Appalachian orogen [abs], in Geological Society of America, Abstracts with programs, v. 10, no. 2, p. 38, also v. 10, no. 4, p. 166.

Williams, Harold (compiler), 1978, Tectonic lithofacies map of the Appalachian orogen (1:1,000,000 scale): Memorial University of Newfoundland (St. John's), map no. 1. [In this map compilation, the contributions of the following Survey people are acknowledged: E. L. Boudette, W. M. Cady, A. A. Drake, G. H. Espenshade, D. S. Harwood, N. L. Hatch, Jr., M. W. Higgins, P. B. King, R. B. Neuman, P. H., Osberg, Louis Pavlides, D. W. Rankin, D. S. Stewart, E-An Zen, Isidore Zietz.]

Small-Boat Surveys
(9450-02421)

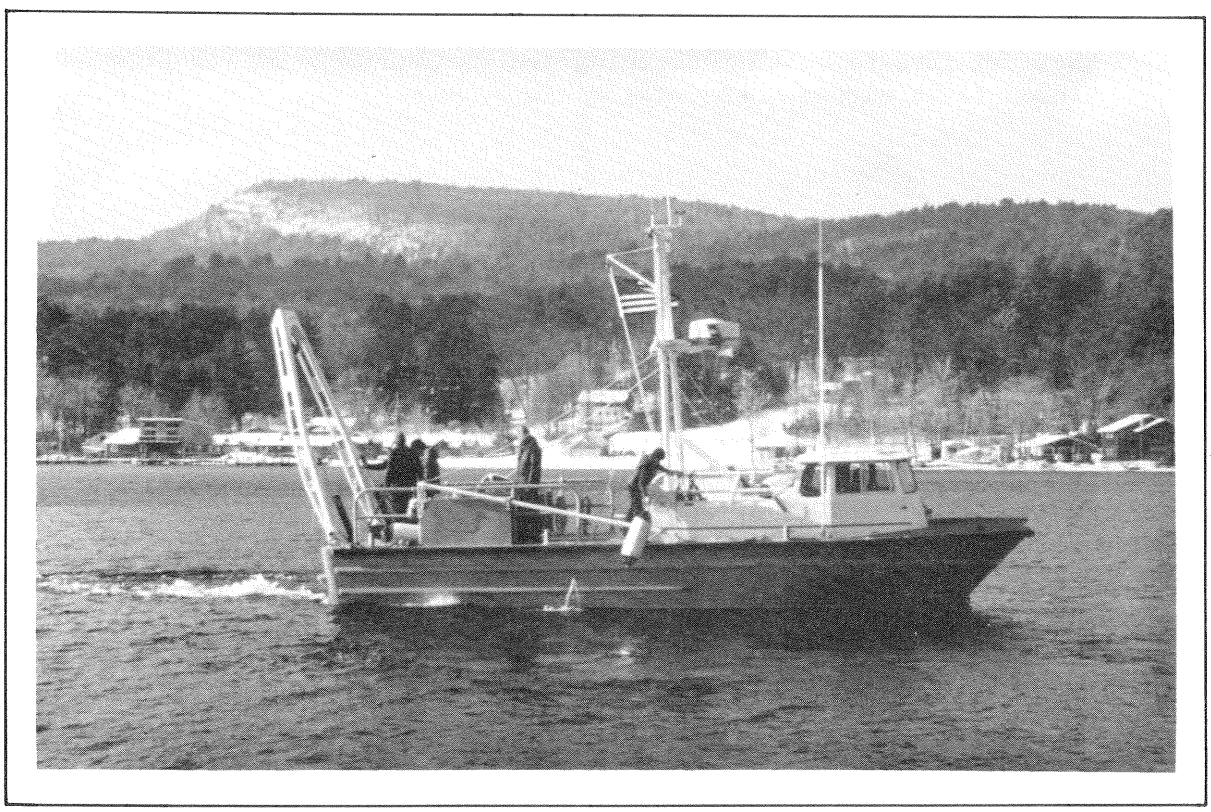
Period of Project: Continuous since 1979

Project Leader: Harley J. Knebel

Field Location: Maryland, Massachusetts, New York, Virginia

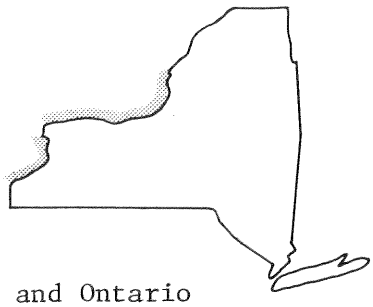
Goals: To discern and interpret the geologic and geophysical characteristics of the lands beneath nearshore and inland waters as they relate to geologic processes, facility siting, and resource potential.

Progress and Significant Results: Assessments of the bottom and subbottom were made by seismic-reflection profiles and sediment sampling in the following areas and for the following reasons: (1) Lake George, New York--to determine the processes and rates of sedimentation; (2) Monomoy Island, Massachusetts--to determine the factors influencing barrier island development; (3) Potomac River--to determine the fate of bottom sediments in an estuary; (4) Lakes Erie and Ontario--to determine faulting and earthquake hazards; and (5) Massachusetts Coastal--to determine nearshore geologic hazards and resource potential.



Lake-research vessel "Neecho" used in seismic-reflection profiling of glacial sediments in Lake George, N.Y.

Great Lakes Research
(9450-01836)



Date Project Began: Continuous since 1977

Project Leader: Richard J. Wold

Field Location: Lakes Superior, Michigan, Huron, Erie, and Ontario

Goals: To better define the underlying structures of western Lake Ontario, eastern Lake Erie, Lake Michigan, and Lake Superior through the use of high-resolution seismics, airgun systems, seismic refraction, and magnetic studies in conjunction with a systematic coring and bottom-sampling program.

Progress and Significant Results: A series of charts for each of the five Great Lakes shows all known publicly available geological and geophysical data sources. Several studies of Lakes Michigan and Superior were begun, and several reports were completed.

Completed Reports (only those pertaining to New York are listed):

Wold, R. J., Hutchinson, D. R., and Moynihan, A. P., 1978, Great Lakes geological and geophysical data sources (abs.), in American Geophysical Union, Program, 1978 Annual Midwest Meeting: St. Louis, Mo, p. 9-10.

Hutchinson, D. R., Pomeroy, P. W., Wold, R. J., and Hall, H. C., A geophysical investigation concerning the continuation of the Clarendon-Linden fault across Lake Ontario (in press).

Other Projects

Several National and regional land-resources survey projects cover all or part of New York. These are listed below.

Number	Title	Leader
9530-02218	Computerized Map Data File	Kathy C. DeWitt
9550-02402	Information Exchange for Dams and Other Critical Installations	Fred N. Houser
9950-01207	Regional and National Seismic Hazard and Risk Analysis	Sylvester T. Algermissen
9920-01222	U.S. Earthquakes	Carl W. Stover

Number	Title	Leader
9920-01194	National Earthquakes Information Service	Edouard P. Arnold
9550-01787	Engineering Geologic Map of Conterminous U.S.	Dorothy H. Radbruch-Hall
9950-01917	Outer Continental Shelf (OCS) Seismic Risk	David M. Perkins
9510-01593	National Environmental Overview Program	Jack B. Epstein
9730-00364	Northeast Regional Tectonics	Robert W. Simpson, Jr.

MINERAL RESOURCE SURVEYS

The Mineral Resource Surveys Program:

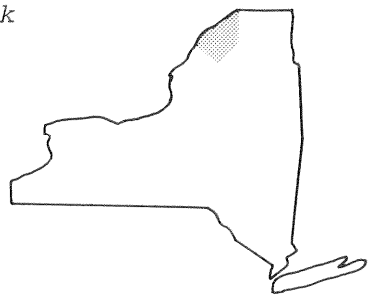
- Gathers, interprets, and disseminates information on mineral resources (a) on an areal basis for land-use planning and resource development and management, and (b) on a commodity basis to ensure adequate future supplies of mineral raw materials for the United States.

- Develops and implements computerized techniques for storing and retrieving this information in a readily accessible form and for rapidly and effectively analyzing it.

- Develops new scientific concepts and techniques for improved and more efficient assessment of mineral resources and for locating and evaluating new sources of mineral raw materials.

The following projects in New York are included in the Mineral Resource Survey Program.

Geologic Correlations and Mineral Resources in Precambrian Rock of St. Lawrence Lowlands, New York (9360-02019)



Period of Project: 1977-80

Project Leader: C. Ervin Brown

Field Location: St. Lawrence County

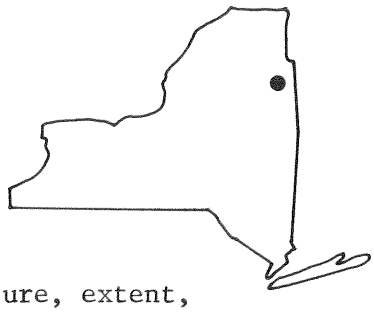
Goals: To (a) identify mineral resources in Precambrian rock of St. Lawrence lowlands; (b) complete detailed mapping and publication of map of Beaver Creek structure (parts of Richville, Pope Mills, and Heuvelton 1:24,000 quads.); (c) prepare geologic interpretation of aeromagnetic survey of the northwest Adirondack area; (d) prepare regional correlation of structure and stratigraphy in Gouverneur and part of Hammond 15-min. quads from existing geologic mapping, supplemented by new mapping of previously unmapped areas.

Progress and Significant Results: (1) Deciphered geologic structure of the Hyde School Alaskite body. This and similar bodies in the area have long been a source of geologic controversy; this structural analysis eliminates some of the controversy. (2) Began interpretation of aeromagnetic compilation map with New York State Geological Survey. (3) Completed paleomagnetic study of the diabase dikes in St. Lawrence County. Data are to be combined with a paper about these dikes.

Completed Reports:

Brown, C. E., 1978, Reconnaissance investigation of high-calcium marble in the Grenville Series in St. Lawrence County, New York: U.S. Geological Survey Circular 774, 10 p.

Iron, Vanadium, Zirconium, and Hafnium Commodity Studies (9360-00249)



Period of Project: Continuous since 1966

Project Leader: Harry Klemic

Field Location: Mineville, Essex County

Goals: (1) To obtain a better understanding of the nature, extent, location and geologic setting, and the economic significance of domestic and foreign iron-ore, vanadium, zirconium, and hafnium resources. (2) To investigate the minor elements and minerals in iron ores that have significant effects on their use or that may be coproducts or byproducts of iron ores. (3) To investigate geologic processes that result in the formation of these types of ore deposits. (4) To prepare reports on iron, vanadium, zirconium, and hafnium resources and to serve on interagency material-commodity committees.

Progress and Significant Results: Investigation of potential byproduct or coproduct minerals in magnetite ore of the Old Bed orebody of Mineville, Essex County, resulted in the identification of stillwellite, a rare earth borosilicate in association with rare-earth-bearing apatite. This is the first known reported occurrence of stillwellite in the U.S. The presence of stillwellite in faulted and sheared magnetite ore indicates that boron- and silica-bearing solutions permeated the fault zones and reacted with rare-earth-bearing apatite that is prevalent in the Old Bed ore.

A report on vandium reserves and resources was prepared for the National Materials Advisory Board of the National Academy of Science. Currently identified domestic uranium reserves of vanadium would be depleted by the year 2000 if average production rates increase by 3 percent annually from the 1975 rate. The overall domestic resource base is however, adequate for substantial expansion of the vanadium industry.

Completed Reports:

National Materials Advisory Board, Panel on trends in use of vanadium, 1978, Vanadium supply and demand outlook: National Academy of Science, National Research Council, p. 11-22.

Other Projects

Several national or regional mineral-resources survey projects cover all or part of New York. These are listed below.

Title	Project Number	Project Leader
Geophysical Studies Relating to Uranium Deposits in Crystalline Terranes	9790-01712	David L. Campbell
Mineral Resources in Conterminous U.S.	9320-01852	Edwin W. Tooker
Dynamic Modeling of Mineral Resources	9340-01938	Margaret E. Slade
Aluminum Resources of the U.S. and World	9360-00826	Sam H. Patterson
Fluorspar Resources of the U.S. and World	9360-01817	Ralph E. Van Alstine
Exploration for and Evaluation of Lithium Resources	9430-01093	James D. Vine

ENERGY RESOURCE SURVEYS

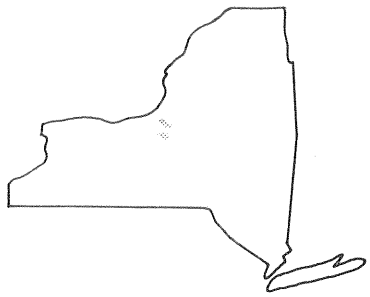
The Energy Resources Survey program:

- Locates the Nation's energy resources, including coal, oil and gas, oil shale, uranium and thorium, and geothermal energy and assesses their quality and quantity.

- Addresses questions related to National energy planning and resource assessment and development information used in environmental impact statements, wilderness areas studies, Bureau of Indian Affairs land evaluations, Forest Service and Fish and Wildlife Service land-use decisions, and Department of State international boundary determinations.

The following projects in New York are included in the Energy Resource Survey program.

Geochemical Survey of Oil Shale Regions
(9760-01767)



Period of Project: Continuous since 1976

Project Leader: Walter E. Dean, Jr.

Field Location: Central New York

Goals: To establish regional geochemical baselines for rocks, soils, sediments, and plants in the oil-shale areas of the west. Modern lakes in New York are being studied to better understand the ancient processes that formed the Green River Formation.

Progress and Significant Results (New York only): Investigations on the origin, geochemistry, and accretion rates of freshwater ferromanganese deposits in Oneida and Onondaga Lakes were continued by the Geological Survey in cooperation with researchers in Pahlavi University, Iran, the University of South Carolina, and Scripps Institution of Oceanography. Several reports were prepared regarding these studies.

Completed Reports:

Dean, W. E., and Eggleston, J. R., 1978, Freshwater oncolites, Onondaga Lake, New York; American Association of Petroleum Geologists Bull., v. 62, no. 3, p. 509.

Dean, W. E., and Greeson, P. E., 1979, Influences of algae on the formation of freshwater ferromanganese nodules, Oneida Lake, New York: Archiv für Hydrobiologie, v. 86, p. 181-192.

Dean, W. E., and Ghosh, S. K., 1978, Factors contributing to the formation of ferromanganese nodules in Oneida Lake, New York: U.S. Geological Survey Journal of Research, v. 6, no. 2, p. 231-240.

Moore, W. S., Dean, W. E., Krishnaswami, S., Borole, D. V., Growth rate of manganese nodules in Oneida Lake, New York: Earth and Planetary Science Letters (in press).

[A report on freshwater oncolites in Onondaga Lake, New York, has been prepared as part of a symposium on freshwater stromatolites and was presented at the annual AAPG-SEPM meeting in Oklahoma City. It is to be published as a special publication of the International Association of Sedimentologists.]

OFFSHORE GEOLOGICAL SURVEYS

The Offshore Geological Surveys program:

- Determines areas that have significant petroleum potential for future Outer Continental Shelf lease sales.

- Provides resource data and analysis to the Federal Government, coastal States, and the concerned public for use in (1) long-term planning with regard to the development of the resources; (2) international boundary determinations; and (3) Law of the Sea negotiations.

- Conducts geologic environmental research and characterizes regionally the nature of offshore geohazards to aid in the safe exploration and development of oil and gas resources in the Nation's Outer Continental Shelf.

- Locates and studies the nature of deposits of sand, gravel, phosphorite, and other mineral commodities on the continental shelves and in the deep ocean basins.

- Conducts geologic research on coastal, estuarine, and lacustrine processes in support of all USGS stratigraphic investigations and State coastal-zone activities.

The following projects in New York are included in the Offshore Geological Survey program.

Atlantic Continental Margin Magnetic Studies (9450-01909)

Period of Project: 1977-80

Project Leader: Kim D. Klitgord

Field Location: U.S. Atlantic continental margin from Florida to Maine including coastal-plains region of the Atlantic coastal states

Goals: (1) To investigate the deep structure and evolution of the continental shelf and the slope and rise of the western North Atlantic, integrating magnetic data with seismic reflection, refraction, gravity,

and drill-hole data. (2) To map the basement structures relevant to hydrocarbon exploration and tie in these structures along the margin with the offshore fracture zone pattern in oceanic crust. (3) To investigate, using magnetic and seismic reflection data, the relationship between the basement structure beneath the Continental Shelf and older features under the coastal plain region with regard to seismic activity along the U.S. Atlantic seaboard.

Progress and Significant Results: A paper titled "Basin Structure of the U.S. Atlantic Continental Margin," by Klitgord and Behrendt, was completed. This paper emphasizes the correlation between magnetic and seismic depth-to-basement estimates and uses the magnetic information to interpolate between multichannel seismic reflection profiles, producing a map of depth to basement along the entire U.S. Atlantic margin. The basin and platform structures are clearly delineated along with major intrusive bodies within the basins. The seaward edge of these basins (Georges Bank basin, Baltimore Canyon trough, and Carolina trough) is marked by a basement high beneath the east coast magnetic anomaly, and the diapirs along the margin appear to be concentrated around the high. The present drilling by Texaco, Exxon, and Gulf near diapirs along the shelf edge of the Baltimore Canyon trough region have indicated the possibility that significant gas is associated with them. The location of the above-mentioned basement ridge suggest many places to the north and south of the present drilling that are likely locations of diapirs and perhaps gas.

Maps of the seismic basement and magnetic basement for the continental slope and rise north of Cape Hatteras are nearly completed. Fracture zones can be traced from the offshore sea-floor spreading lineations onto the margin using the magnetic and seismic data. There is a direct correlation between the locations of these fracture zones and the basin structures along the margin. These fracture zones extend seaward from the ends of the major basins (such as The Baltimore Canyon trough) and also from the ends of the smaller basins into which the major basins are broken. For example, the Baltimore Canyon trough consists of four smaller basins with the shallowest and narrowest at the south; the next two are progressively wider and deeper (and have a thicker sequence of sediments), and, finally, the most northerly basin, which is truncated to the northeast by the Long Island Platform.

The comparison of magnetic data with drill-hole information and outcropping geology has just begun in the region of the Long Island Platform/New England, the Salisbury Embayment, and the Florida Platform. Preliminary results suggest that a better delineation of the Triassic and older sedimentary basins is possible, which would help to define the pre-Jurassic structures that influenced the Jurassic rifting locations and resulting pattern of basins and platforms.

Completed Reports:

Klitgord, K. D. and Behrendt, J. C. Basin structure of the U.S. Atlantic continental margin, in Watkins, J. S. and others, eds., Geophysical Investigation of Continental Slopes and Rises: American Association of Petroleum Geologists, Studies in Geology, Memoir 29 (in press).

Klitgord, K. D., 1978, Basement structures of Georges Bank, in Abstracts with programs: Geological Society of America, Northeastern Section, v. 10, p. 71.

Dillon, W. P., and Klitgord, K. D., 1978, Development of the United States continental Margin from Cape Fear to Cape Canaveral, in Abstracts with programs: Geological Society of America, Southeastern section, v. 10, p. 167.

Rankin, D. W., Popenoe, P. and Klitgord, K. D., 1978, The Tectonic Setting of Charleston, South Carolina, in Abstracts with programs: Geological Society of America, Southeastern section, v. 10, p. 195.

Behrendt, J. G., and Klitgord, K. D., 1978, Origin of the East Coast magnetic anomaly, in Transactions of American Geophysics Union: v. 59, p. 390-391.

Folger, D. W., Dillon, W. P., Grow, J. A., Klitgord, K. D., and Schlee, J. S., 1978, Evolution of the Atlantic continental margin of the United States: American Geophysical Union, 2nd Ewing Symposium, v. 3.

Resource Assessments of the Mid-Atlantic Continental Margin (9450-01830)

Period of Project: Continuous since 1976

Project Leader: John A. Grow

Field Location: Middle Atlantic

Goals: To document the structure and evolution of the Atlantic continental margin in the Mesozoic and Tertiary periods.

Progress and Significant Results: (1) Completed acquisition of 21 multichannel seismic reflection profiles under control contract with Geophysical Services Inc.; (2) published six multichannel depth sections between Cape Hatteras and Cape Cod; (3) prepared report for Lease Sale no. 49; (4) published report on petroleum geology of outer Continental Shelf and Upper Continental Slope off New Jersey; (5) published composite geophysical profile for sediment and crustal sections between Cape Hatteras and Cape Cod; (6) compared seismic data with the Cost B-2 Well.

Completed Reports:

Folger, D. W., Dillon, W. P., Grow, J. A., Klitgord, K. D., and Schlee, J. S., Evolution of the U.S. Atlantic continental margin of the United States: American Geophysical Union, 2nd Ewing Symposium Volume (in press).

Grow, J. A., Bowin, C. O., and Hutchinson, D. R., 1978, The gravity field of the U.S. continental margin: Tectonophysics (in press).

Grow, J. A., Mattick, R. E., and Schlee, J. S., Multichannel seismic depth sections and interval velocities over Outer Continental Shelf and Upper Continental Slope between Cape Hatteras and Cape Cod, in Watkins, J. S., Montadert, L., Dickerson, P. W. (eds), Geological Investigations of Continental Margins: American Association of Petroleum Geologists, Memoir 29 (in press).

Klitgord, K. D. and Behrendt, J. C., Basin structure of the U.S. Atlantic continental margin, in Watkins, J. S., Montadert, L. Dickerson, P. W. (eds.), Geological Investigations of Continental Margins: American Association of Petroleum Geologists, Memoir 29 (in press).

Mattick, R. E., Girard, O. W., Jr., Schoelle, P. A., and Grow, J. A., 1978, Petroleum potential of the U.S. Atlantic Slope, Rise, and abyssal plain: American Association of Petroleum Geologists Bulletin, v. 62, no. 4, p. 592-608.

Grow, J. A. and Klitgord, K. D., Structural framework, in Mattick, R. E. and Hennessy, R. E. (eds.), Structural framework, stratigraphy, and petroleum geology of the area proposed for oil and gas lease sale no. 49 of the Unites States Atlantic Continental Shelf Slope: U.S. Geological Survey Circular 812 (in press).

Schlee, J. S., Dillon, W. P., and Grow, J. A., 1978, Structure of the Atlantic Slope of eastern North American: American Association of Petroleum Geologists Bulletin, v. 62, no. 3, p. 560-561.

Stratigraphy of Atlantic Outer Continental Shelf (9450-00932)

Period of Project: Continuous since 1973

Project Leader: John C. Hathaway

Field Location: Atlantic Coast

Goals: To obtain reliable data for appraisals of environmental conditions and offshore resources. Objectives include measuring geotechnical and engineering properties of the shelf sediments, defining freshwater aquifers offshore, collecting information on possible resources such as phosphates, sand and gravel deposits, and calibrating existing geophysical data. Additional information is sought on the regional extent of a geologic unit, stratigraphic column, characteristics and ages of the sediments, variance of the geochemical baseline, and zones of slope stability or potential instability.

Progress and Significant Results: The AMCOR project, the first program of scientific shallow-drilling to cover the broad range of the Atlantic Continental Shelf, has delineated rocks from Pleistocene to Late Cretaceous in age, encompassing phosphoritic Miocene strata, widespread Eocene carbonates that serve as reflection seismic markers, and several regional unconformities. Two sites, off Maryland and New Jersey, showed light-hydrocarbon gases having affinity to mature petroleum. Pore fluid studies showed that relatively fresh to brackish water occurs beneath much of the Atlantic Continental Shelf, whereas increases in salinity off Georgia and beneath the Florida-Hatteras slope suggest buried evaporitic strata. The sediment cores demostrated engineering properties that range from good foundation strength to potential for severe loss of strength through interaction between sediments and manmade structures.

Completed Reports:

Dillon, W. P., Paull, C. K., Klitgord, K. D., Poag, C. W., and Valentine, P. C., 1978, Correlation of acoustic and biostratigraphic units off the southeastern United States (Abs.), in Geological Society of America, Abstracts with Programs: v. 10, no. 7, p. 389.

Folger, D. W., Hathaway, J. C., Christopher, R. A., Valentine, P. C., and Poag, C. W., 1978, Stratigraphic Test Well, Nantucket Island, Massachusetts: U.S. Geological Survey Circular 773, 28 p.

Manheim, F. T., and Commeau, J. A., 1978, Chemical composition of rocks from the AMCOR drill holes on the United States Continental Shelf: Geological Society of America, Abstracts with Programs, v. 10, no. 7, p. 450.

Poag, C. W., 1978, Stratigraphy of the Atlantic Continental Shelf and Slope of the United States: Annual Review of Earth Planetary Science, v. 6, p. 251-280.

Poag, C. W., and Valentine, P. C., 1978, Review of "Stratigraphic micropaleontology of Atlantic basin and borderlands," by F. M. Swain (ed.), 1977: Journal of Paleontology.

Richards, A. F., 1978, Atlantic Margin Coring Project 1976, Preliminary report on shipboard and some laboratory geotechnical data: U.S. Geological Survey Open-File Rept. 78-123, 158 p.

Swanson, P. G., and Brown, R. E., 1978, Triaxial and consolidation testing of cores from the 1976 Atlantic Margin Coring Project of the United States Geological Survey: U.S. Geological Survey Open-File Rept. 78-123, 144 p.

Valentine, P. C., 1978, Shallow-subsurface stratigraphy of the continental margin off southeastern Massachusetts (abs.): Geological Society of America, Abstracts with Programs: v. 10, no. 2, p. 90.

Other Projects

Several National or regional offshore geological-survey projects cover part of New York. These are listed below.

Project Number	Title	Project Leader
9450-01826	Marine Gravity Measurement U.S. Atlantic Continental Margin	John A. Grow
9450-00931	Atlantic Margin Geophysics	John C. Behrendt, John A. Grow

REPORTS PUBLISHED OR RELEASED IN 1979

Bothner, W. A., and Simpson, R. W., 1979, Bouguer gravity map of the Hartford 1-degree x 2-degree quadrangle, Connecticut, New York, New Jersey, and Massachusetts: U.S. Geological Survey Open-File Rept. 79-1083.

Bothner, W. A., Simpson, R. W., and Kucks, R. P., 1979, Bouguer gravity map of the Providence 1-degree x 2-degree quadrangle, Rhode Island, Massachusetts, Connecticut, and New York: U.S. Geological Survey Open-File Rept. 79-1084.

Campbell, D. L., Grauch, R. I., and Nutt, C. J., 1979, New geologic, ground magnetic, E-mode VLF, and radiometric surveys at Phillips Mine-Camp Smith uranium prospect, Westchester and Putnam Counties, New York: U.S. Geological Survey Open-File Rept. 79-1078.

D'Agostino, J. P., 1978, Simplified bedrock geologic map of the Hartford, New York-Connecticut 2-degree quadrangle: U.S. Geological Survey Open-File Rept. 78-896.

de Witt, Wallace, Jr., and Colton, G. W., 1979, Physical stratigraphy of the Genesee Formation in western and central New York: U.S. Geological Survey Professional Paper 1032-A.

Force, E. R., and Stone, B. D., 1978, The Port Leyden, New York, heavy mineral deposit revisited (abs.), in Forum on the geology of industrial minerals, May 1978: Albany, N.Y., p. 3.

Grauch, R. I., 1978, Geology of the uranium prospect at Camp Smith, New York, with a new model for the formation of uranium deposits in metamorphosed submarine volcanogenic rocks: U.S. Geological Survey Open-File Rept. 78-949.

Harris, A. G., Harris, L. D., and Epstein, J. B., 1978, Oil and gas data from Paleozic rocks of the Appalachian basin: maps for assessing hydrocarbon potential and thermal maturity (conodont color alteration isograds and overburden isopachs): U.S. Geological Survey Map I-917-E, scale 1:2,500,000.

Harwood, D. S., 1979, Geologic map of northeastern United States and adjacent Canada: U.S. Geological Survey Open-File Rept. 79-374.

Hutchinson, D. R., and Wold, R. J., 1979, Lake Erie geological and geophysical data sources: U.S. Geological Survey Map MF-1102.

_____, 1979, Lake Ontario geological and geophysical data sources: U.S. Geological Survey Map MF-1103.

REPORTS PUBLISHED OR RELEASED IN 1979 (continued)

Isachsen, Y. W., Brown, C. E., and Zietz, Isidore, 1979, Preliminary interpretation of an aeromagnetic map of most of the Adirondack Mountains and upper St. Lawrence Valley, New York (abs.), in Geological Society of America, Abstracts with Programs: v. 11, no. 1, p. 17.

Krohn, M. D., 1979, Enhancement of Landsat images for lineament analysis in the area of the Salina Basin, New York and Pennsylvania: U.S. Geological Survey Open-File Rept. 79-533.

LaGatta, D. P., Dalenberg, Karl, Knebel, H. J., and Sangrey, D. A., 1978, Report on laboratory testing of shallow sediments, Middle Atlantic Outer Continental Shelf: U.S. Geological Survey Open-File Rept. 78-578.

Leventhal, J. S., 1978, Trace elements, carbon and sulfur in Devonian black shale cores from Perry County, Kentucky; Jackson and Lincoln Counties, West Virginia; and Cattaraugus County, New York: U.S. Geological Survey Open-File Rept. 78-504.

Mei, Leung, Larson, R. R., Loferski, P. J., and Klemic, Harry, 1979, Analyses and description of a concentrate of stillwellite from Mineville, Essex County, New York: U.S. Geological Survey Open-File Rept. 79-847.

Miller, R. E., Schultz, D. M., Lerch, H., Ligon, D., Owings, D., and Gary, C., 1979, Hydrocarbon geochemical analyses of mid-Atlantic Outer Continental Shelf sediments--an environmental assessment: U.S. Geological Survey Open-File Rept. 79-363.

Pohn, H. A., Podwysocki, M. H., and Merin, I. S., 1979, The relationship between lineaments, stream valleys, glaciation, and joints in south-central New York (abs.), in Geological Society of America, Abstracts with Programs: v. 11, no. 1, p. 49.

Ratcliffe, N. M., 1978, Reconnaissance bedrock geologic map of the Pittsfield West quadrangle and part of the Canaan quadrangle, Berkshire County, Massachusetts, and Columbia County, New York: U.S. Geological Survey Map MF-980, scale 1:24,000.

Roen, J. B., Wallace, L. G., and de Witt, Wallace, Jr., 1979, Preliminary stratigraphic cross section showing radioactive zones in the Devonian black shales in the central part of the Appalachian basin: U.S. Geological Survey Map OC-87.

Schlee, J. S., Aaron, J. M., Ball, N. M., Klitgord, K. D., Grow, J. A., Butman, Bradford, and Bothner, M. H., 1979, Summary report of the sediments, structural framework, petroleum potential, and environmental conditions of the United States northeastern Atlantic continental margin: U.S. Geological Survey Open-File Rept. 79-674.

REPORTS PUBLISHED OR RELEASED IN 1979 (continued)

Simpson, R. W., Bothner, W. A., Diment, W. H., and Urban, T. C., 1979, Bouguer gravity map of the New York 1-degree x 2-degree quadrangle, New York, New Jersey, and Connecticut: U.S. Geological Survey Open-File Rept. 79-1082.

Simpson, R. W., Bothner, W. A., and Kucks, R. P., 1979, Bouguer gravity map of the Albany 1-degree x 2-degree quadrangle, parts of New York, Connecticut, Massachusetts, New Hampshire, and Vermont: U.S. Geological Survey Open-File Rept. 79-970.

_____, 1979, Bouguer gravity map of the Glenn Falls 1-degree x 2-degree quadrangle, New York, Vermont, and New Hampshire: U.S. Geological Survey Open-File Rept. 79-957.

Simpson, R. W., Bothner, W. A., and Kucks, R. P., 1979, Bouger gravity map of the Lake Champlain 1-degree x 2-degree quadrangle, New York, Vermont, and New Hampshire: U.S. Geological Survey Open-File Rept. 79-958.

U.S. Geological Survey, 1979, Aeromagnetic map of central New York: U.S. Geological Survey Open-File Rept. 79-653.

_____, 1979, Aeromagnetic map of northern New York: U.S. Geological Survey Open-File Rept. 79-655.

_____, 1979, Aeromagnetic map of southeastern New York: U.S. Geological Survey Open-File Rept. 79-654.

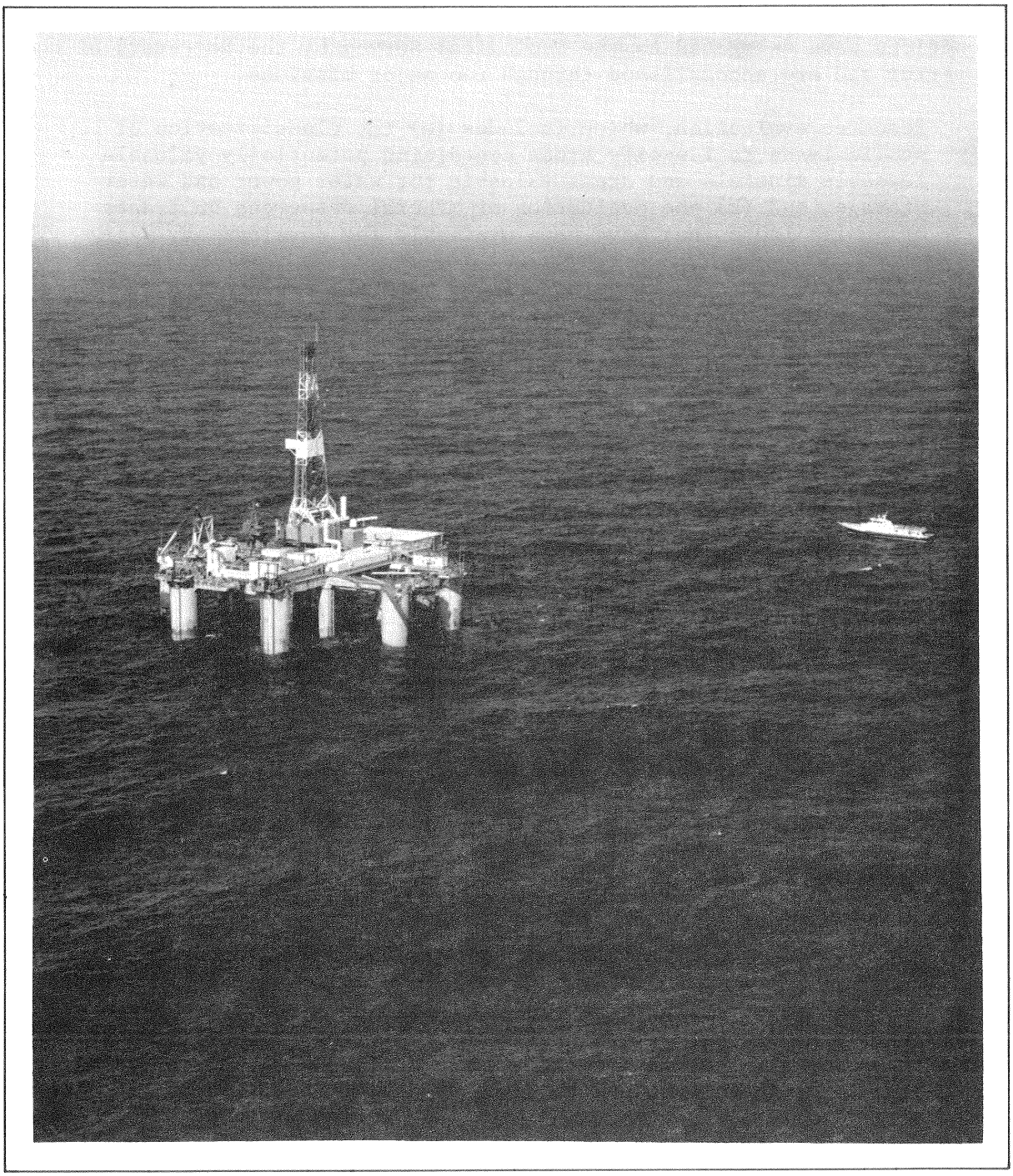
_____, 1979, The Mississippian and Pennsylvania (Carboniferous) Systems in the United States: U.S. Geological Survey Professional Paper 1110-A-L.

West, Mareta, 1979, Preliminary stratigraphic cross section showing radioactive zone in the Devonian blacks shales in the eastern part of the Appalachian Basin: U.S. Geological Survey Map OC-86.

Whelan, J. F., and Rye, R. O., 1978, Stable-isotope studies of the Balmat-Edwards Zn-Pb district, New York (abs.), in Geological Society of America, Abstracts with Programs: v. 10, no. 7, p. 515.

In addition to these reports, summaries of significant results of most current projects are contained in U.S. Geological Survey Professional Paper 1100.

CONSERVATION OF LANDS AND MINERAL RESOURCES



Offshore drilling platform "Ocean Victory."

CONSERVATION OF LANDS AND MINERAL RESOURCES

The Conservation Division, directed from Reston, Virginia, performs several evaluation and regulatory funtions concerning the leasing, mining, and use of mineral and water resources on Federal and Indian lands. These functions were delegated to the Geological Survey by the Secretary of the Interior and are accomplished through two major missions:

- Resource evaluation, which includes (a) the classification of public lands to identify areas containing potentially valuable leasable minerals and areas valuable for water power and water storage, and (b) the evaluation of mineral resources on tracts of public lands that have been available for development.

- Supervision of operations associated with the exploration, development, and production of minerals from leased Federal, Indian, and outer continental shelf lands. This work includes the collection of royalties for minerals produced and certain rentals.

The Conservation Division's major program in New York entails supervision of operations associated with oil and gas exploration and the leasing of lands, primarily on the outer continental shelf. Recent activities are concerned with the Baltimore Canyon trough, an offshore feature that extends from Maryland to Long Island, and the Georges Bank basin, a structural depression beneath the continental shelf of southeast New England. Both areas may yield moderate amounts of oil and gas.

ONSHORE ACTIVITIES

In New York, the Conservation Division oversees 16 oil and gas leases totaling 35,345 acres.

OFFSHORE ACTIVITIES

Baltimore Canyon Trough

Resources evaluation for the Mid-Atlantic area is undertaken by the Conservation Division regional office in Washington, D.C. A selection of tracts is made after a "Call for Nominations," in which interested parties are asked to nominate tracts within the area that they wish to have offered for sale. From these nominations, the Conservation Division makes recommendations on the basis of resource potential in conjunction with the Bureau of Land Management, which makes recommendations on the basis of

nomination patterns and past history. After the Department of the Interior announces the tentative tract list, Conservation Division geologists, geophysicists, and engineers prepare detailed evaluations of oil and gas potential for each tract and arrive at a resource economic value that is used as a basis for acceptance or rejection of bids submitted on tracts at the lease sale. Division professionals also generate resource estimates for environmental impact statements and other milestones in the lease-sale process. Before a sale takes place, Conservation Division professionals use detailed high-resolution geophysical data to identify and evaluate any shallow geologic features that constitute a potential hazard to oil and gas exploration and development operations on the outer continental shelf.

Once the leases have been issued and companies are ready to begin drilling their respective acreage, supervision of operations on the Mid-Atlantic becomes a function of the Conservation Division District office in Atlantic City, N.J. Here drilling engineers, geologists, geophysicists, and petroleum engineering technicians receive, review, and approve, when applicable, lessee plans and permits for conducting exploratory, development, and production operations. Also, onsite inspections of lease operations are made. Issuance of OCS Orders and Notices provide direction and limitation to operators.

Commercial drilling for oil and gas in the Mid-Atlantic began on March 29, 1978, when Exxon spudded the first well in Hudson Canyon (NJ 18-3) Block 684. The drillship *Glomar Pacific* was used. As of January 8, 1980, 20 wells were completed and 2 are currently testing. Of the 20 wells completed, 4 were drilled by Exxon, 3 by Shell, 2 by Gulf, 3 by Mobil, 3 by Texaco, 2 by Houston Oil and Minerals, 2 by Tenneco, and 1 by Conoco. Nine of these wells were spudded in fiscal year 1979. Of the 22 wells drilled or in process of drilling, 21 were drilled on tracts leased in Outer Continental Shelf sale no. 40 in August 1976. The Government accepted bonuses totalling $1,127,936,425. In June, Tenneco became the first company to begin drilling on an Outer Continental Shelf sale no. 49 tract. This sale was held in February 1979 and brought in $40,001,631.

In addition to commercial drilling, two deep stratigraphic test wells were drilled to evaluate the regional stratigraphy, reservoir beds, and petroleum potential of tracts to be offered in sales no. 40 and 49, respectively. The Continental Offshore Stratigraphic Test (COST) B-2 well was completed on March 18, 1976, on Hudson canyon (NJ 18-3) Block 594. (See Smith and others, 1976). The COST B-3 well was completed on January 25, 1979, on Wilmington canyon (NJ 18-6) Block 66. The B-3 well encountered a "show" of gas with possibility of condensate or oil being present. (See Amato and Simonis, 1979).

In addition to the two lease sales previously mentioned, the "Call for Nominations" for a third Mid-Atlantic lease sale (OCS sale no. 59) was published in the *Federal Register* on July 12, 1979. Nominations and comments were due on September 28, 1979. Tentative Tract Selection was announced in December 1979. The sale is tentatively scheduled for December 1981.

Georges Bank Basin

Resource evaluation for the North Atlantic area is undertaken by the Conservation Division Regional Office in Washington, D.C. The same procedures, milestones, and evaluation processes used for the Mid-Atlantic are undertaken for the North Atlantic.

Sale no. 42 for the Georges Bank basin was originally scheduled for January 1978; however, it was delayed as a result of various court actions. A notice of sale went out for publication in the *Federal Register* on November 16 announcing that 116 tracts totalling 660,409 acres would be offered for sale on December 18, 1979. The sale was held and, the Government accepted $816,516,546 in bonuses for leases on 63 tracts.

When Sale no. 42 leases in the Georges Bank area are drilled, supervision of drilling operations will become the function of a Conservation Division District Office in Hyannis, Mass. The functions of this office will be the same as those of the District Office in Atlantic City, N.J., which handles Mid-Atlantic activities. It is not expected that drilling would begin in the North Atlantic before summer 1980.

Two deep stratigraphic test wells, COST G-1 and COST G-2, have been drilled in Blocks 79 and 972, respectively. Data from these wells will be made publically available through two USGS open-file reports. Present regulations dictate that the data be made available within 60 days after the issuance of a lease within 50 miles of the well, or 5 years, whichever is sooner.

REPORTS PUBLISHED OR RELEASED IN 1979

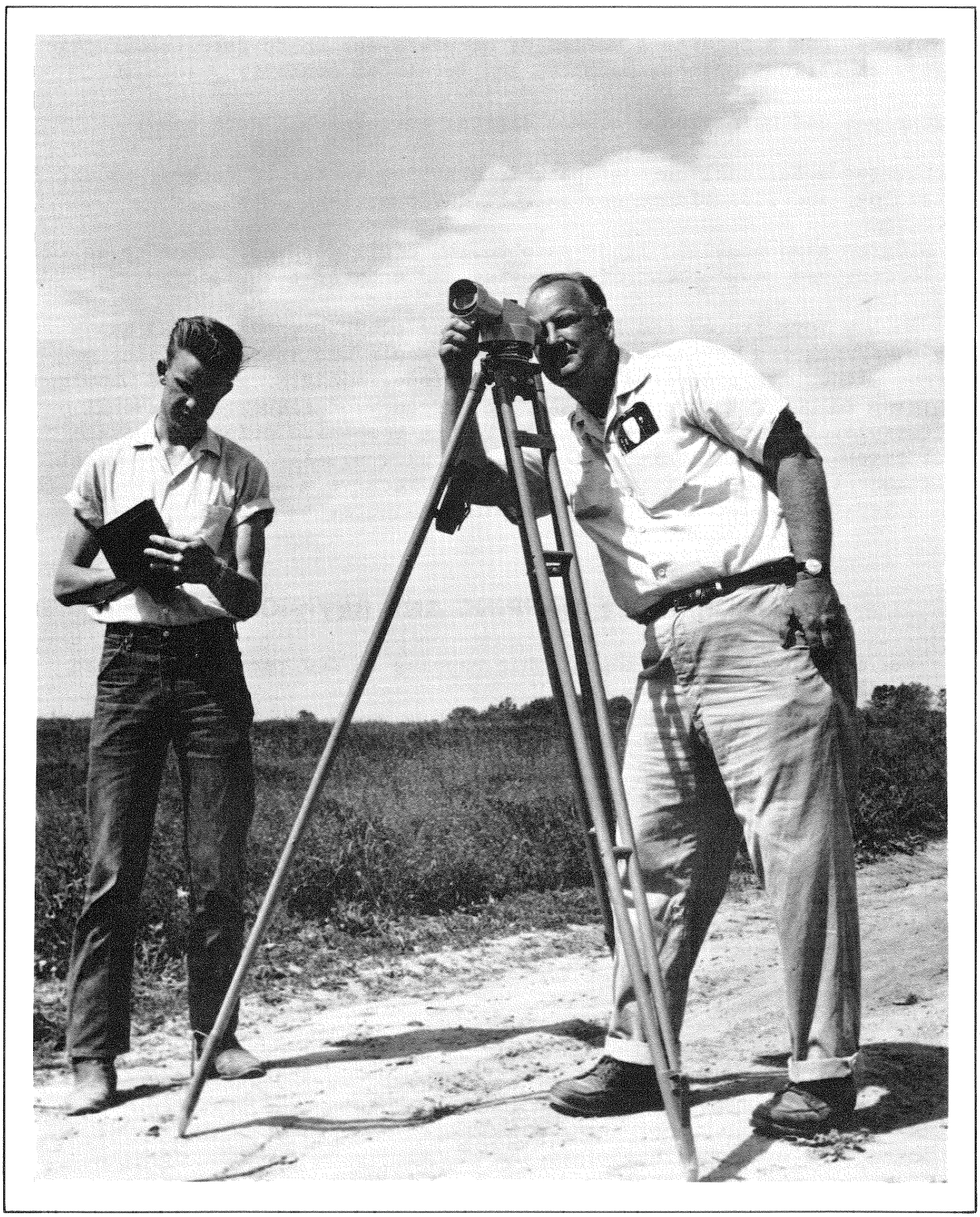
Adams, M. V., John, C. B., Kelly, R. F., LaPointe, A. E., and Meurer, S. R.; 1974, Mineral Resource Management of Outer Continental Shelf, U.S. Geological Survey Circular 720, 32 p.

Amato, R. V., and Simonis, E. K., 1979, Geological and operational summary COST No. B-3 well, Baltimore Canyon Trough area, Mid-Atlantic OCS: U.S. Geological Survey Open-File Report 79-1159, 118 p.

Smith, M. A., and others, 1976, Geological and operational summary, COST No. B-2 well, Baltimore Canyon Trough area, Mid-Atlantic OCS: U.S. Geological Survey Open-File Report 76-774, 79 p., 1 pl., 14 figs.

U.S. Geological Survey, 1976, Leasing and Management of Energy Resources on the Outer Continental Shelf, U.S. Geological Survey INF-74-33, 40 p.

TOPOGRAPHIC SURVEYS AND MAPPING



Field engineer extends a level line to establish elevations for a topographic 7½-minute quadrangle.

NATIONAL MAPPING PROGRAM

The National Mapping program's main objective is to provide multipurpose maps and cartographic data to meet expanding National needs. The program

- produces and maintains a series of accurate and up-to-date topographic maps at various scales, formats, and levels of content;

- develops and maintains a common digital cartographic data base;

- operates a National cartographic-information system to gather, index, catalog, and disseminate cartographic information.

The program also provides leadership to the civil mapping community in the development and advancement of surveying and mapping technology.

In New York State, the National Mapping program provides (a) quadrangle mapping and revision, and (b) small-scale and special mapping as needed. Funds are allocated annually for topographic surveys and mapping according to the relative importance and urgency of requests. Federal needs are correlated with State requests to form a composite priority. State and local governments who share the cost of mapping equally with the Federal Government (through joint funding projects) receive a separate priority and thus expedite completion of their mapping projects.

QUADRANGLE MAPPING AND REVISION

The current status of topographic mapping in New York is presented in table 1.

7.5-Minute and 15-Minute Topographic Mapping

For many years, the 7.5-minute quadrangle at 1:24,000 (1 inch = 2,000 feet) and the 15-minute quadrangle at 1:62,500 (1 inch = about 1 mi), have been the two principal scales used in mapping New York State and the U.S. During the last decade, the need for detailed maps has placed increasing emphasis on the 7.5-minute quadrangle. The status of these projects is given in table 2 and figure 2. More recently, the conversion to metric mapping has instituted a change from 1:24,000 to 1:25,000 scale with metric contour intervals. The status of metric mapping in New York is depicted in figure 3.

Photorevision

Maps are compared to recent aerial photographs and other source data to identify changes that have occurred since the map was produced. Depending on the type and quantity of changes that occurred, and the quality of the map base, maps may be entered into the photorevision program. Current photorevision projects are listed in table 2 and shown in figure 2.

Table 1.--Map Coverage for New York State as of July 1979

Scale		Square miles	Percent coverage
1:24.000 (7½-minute series)		43,704	89
1:62,500 (15-minute series)		5,404	11
	Total	49,108	100
1:25,000 (7½ by 15-minute format) in progress. Metric mapping to replace 15-minute series		2,089	4.3
1:100,000 Intermediate-scale series, in progress. Advance prints available.			
County planimetric base maps are available for:			
Allegany County		1,049	
Genessee County		501	
Monroe County		679	
Niagara County		539	
Ontario County		666	
Orleans County		396	
Seneca County		414	
Suffolk County		1,177	
Tompkins County		497	
Yates County		356	
		6,274	12.8
30- x 60-minute quadrangles, in progress			
Name:	Quarter of 1:250,000		
Block Island	Providence SW/4	20	
Canandigua	Elmira NE/4	1,760	
Lockport	Toronto SE/4	1,228	
Long Island East	New York NE/4	530	
Long Island West	New York NW/4	1,242	
New Haven	Hartford SE/4	172	
Niagara Falls	Toronto SW/4	42	
Rochester	Rochester SW/4	1,029	
	Total	6,023	12.2
1:250,000 series (see fig. 8).		49,108	100.0

Table 2.--7 1/2-minute topographic mapping in progress

(Numbers at left refer to circled numbers in fig. 2.)

No.	Project	Part in	Quads	Type*	Area Mi^2	Area Km^2	Scale
1	Buffalo (7 1/2' x 15' quad with metric contours)	--	13	X2	603	1562	1:25,000
2	Clarence (7 1/2' x 15' quad with metric contours)	--	3	X2	165	427	1:25,000
3	Lockport (metric scale with foot contours)	--	16	X2	674	1746	1:25,000
4	Long Lake (7 1/2' x 15' quad with metric contours)	--	4	B1	430	1114	1:25,000
5	Medina (metric scale with foot contours)	--	2	X2	109	282	1:25,000
6	Port Henry (7 1/2' x 15' quad with metric contours)	Vermont	2	B1	189	489	1:25,000
7	Rome (with metric contours)	--	7	X2	383	992	1:24,000
8	Saranac Lake (7 1/2' x 15' quad with metric contours)	--	12	B1	1290	3341	1:25,000
9	Sylvan Beach (with metric contours)	--	3	X2	162	419	1:24,000
10	Utica East (with metric contours)	--	4	X2	218	565	1:24,000
11	Willsboro (7 1/2' x 15' quad with metric contours)	Vermont	2	B1	189	489	1:25,000
12	Albany	--	53	A2	2919	7562	1:24,000
13	Jamestown	--	26	A2	1342	3477	1:24,000
14	New York	--	23	A2	1229	3184	1:24,000

*Type: A2, Interim Revision. Standard 7 1/2-minute quads will be updated with current imagery without a field check. The revised information will be shown in purple on the published map.
B1, Replacement Mapping. Quads in new 7 1/2 x 15-minute format to replace maps published in 15-minute series at 1:62,500 scale.
X2, Complete Revision. New standard quadrangles to replace maps published in the same series.

Note: Fishers Island, at the eastern end of the Long Island area, is included in the New London and Mystic quadrangles now being revised and part of the Norwich, Conn., project.

EXPLANATION

(1) Circled numbers refer to projects listed in table 2.

[2] Aerial photography completed. Information is available from National Cartographic Information Center, U.S. Geological Survey, 536 National Center, Reston, Va. 22092

[3] Basic horizontal and vertical control surveys completed. Descriptions and unadjusted coordinates and(or) elevations are available from the above address. Price 50¢ for each 15-minute quadrangle horizontal or vertical control list.

[4] Prints of manuscripts compiled from aerial photographs are available at $1.25 each. Contours are shown in areas suitable for stereoplotting.

[6] Final drafting completed. Partially edited one-color advance prints (with names) are available for $1.25 each.

Photorevisions in progress

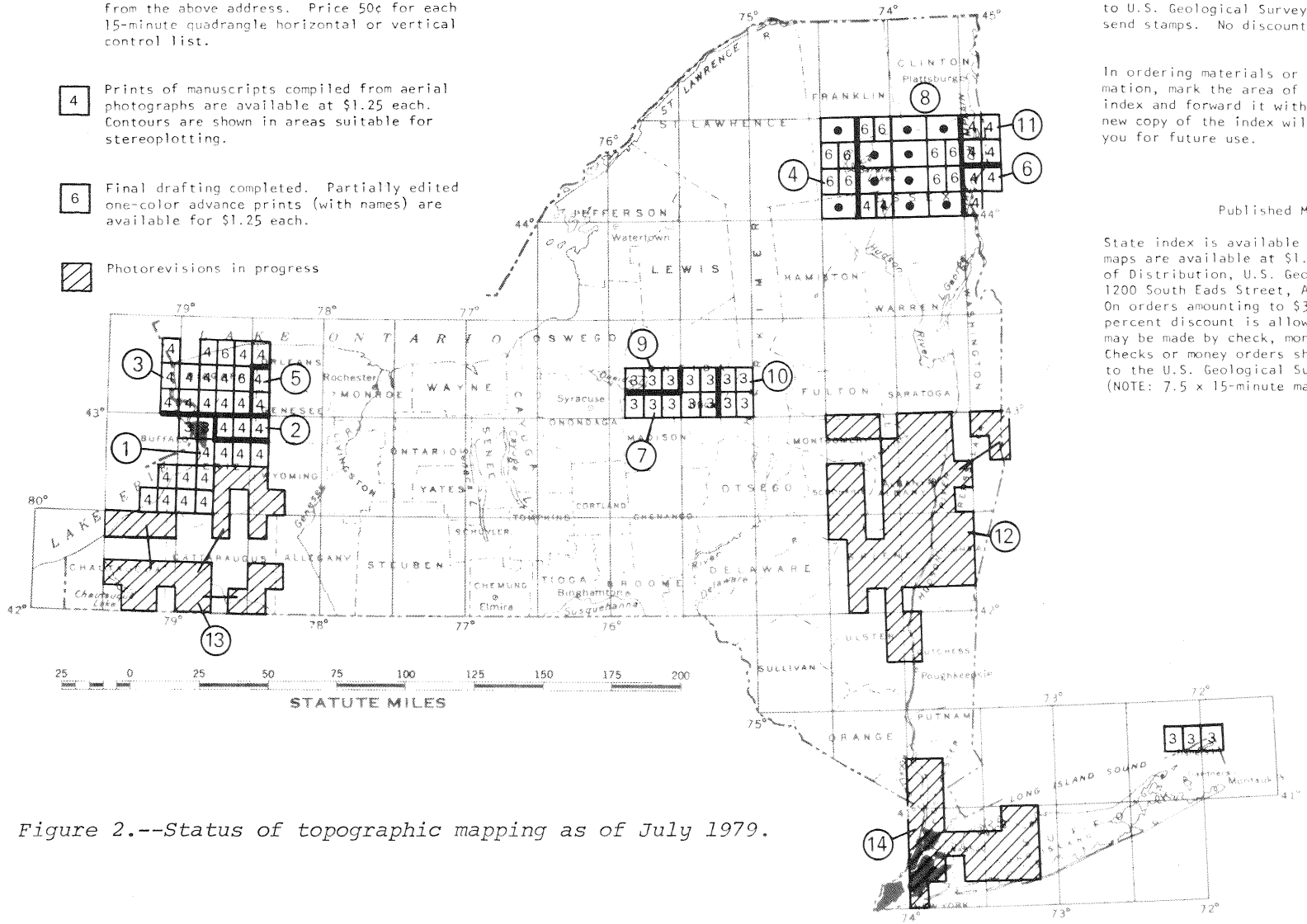


Figure 2.--Status of topographic mapping as of July 1979.

EXPLANATION

[•] Maps published since latest edition of index to published maps (April 1978).

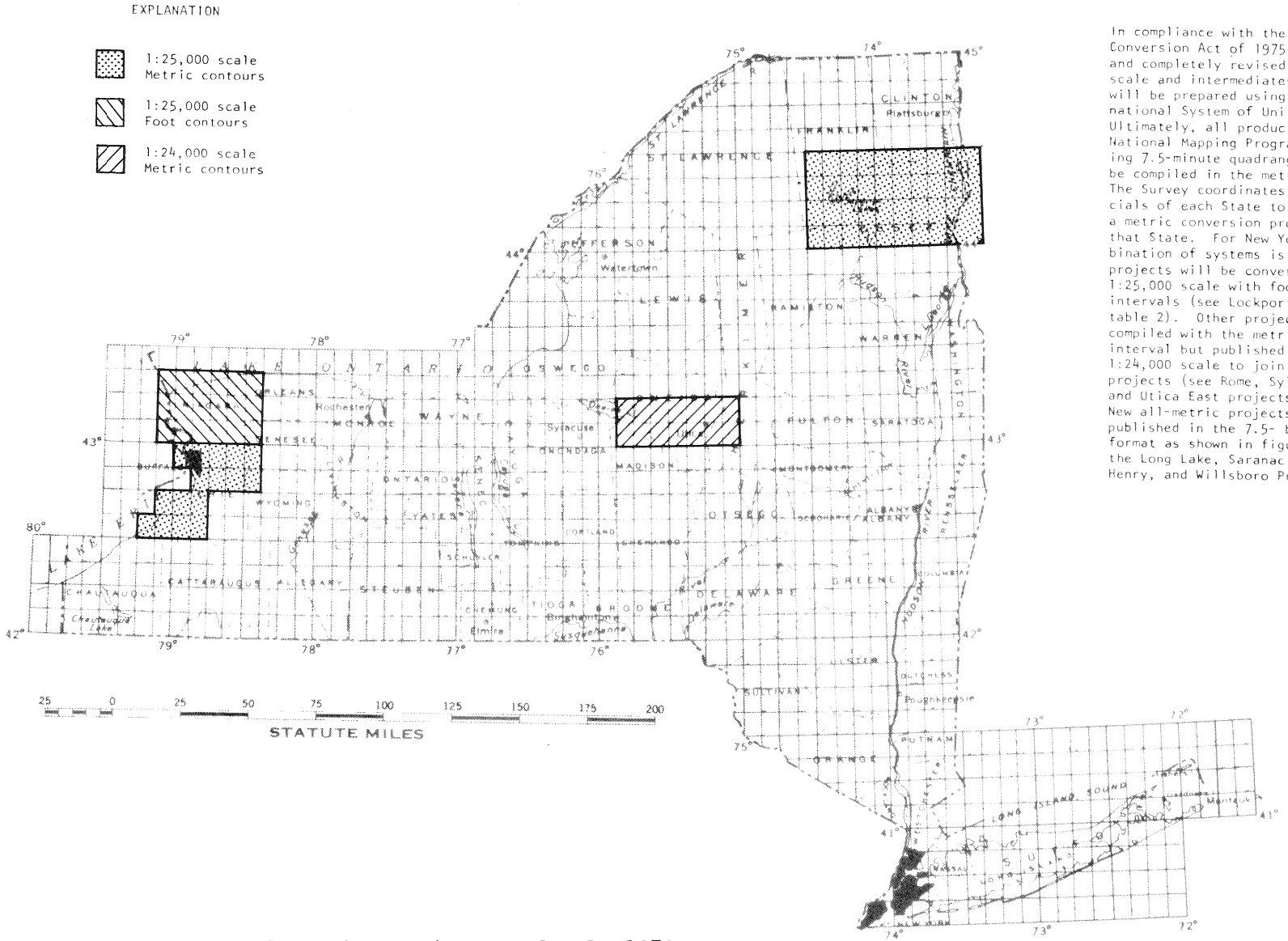
NOTES:

Requests for advance prints should be sent to U.S. Geological Survey, 536 National Center, Reston, Va. 22092. Payment in exact amount should accompany order and may be made by check or money order, payable to U.S. Geological Survey. Please do not send stamps. No discount allowed.

In ordering materials or requesting information, mark the area of interest on this index and forward it with your order. A new copy of the index will be returned to you for future use.

Published Maps

State index is available free. Published maps are available at $1.25 each from Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Va. 22202. On orders amounting to $300 or more, a 30-percent discount is allowed. Remittance may be made by check, money order, or cash. Checks or money orders should be made payable to the U.S. Geological Survey. (NOTE: 7.5 x 15-minute maps are $2 each.)



In compliance with the Metric Conversion Act of 1975, all new and completely revised small-scale and intermediate-scale maps will be prepared using the International System of Units (SI). Ultimately, all products of the National Mapping Program, including 7.5-minute quadrangles, will be compiled in the metric system. The Survey coordinates with officials of each State to determine a metric conversion program for that State. For New York, a combination of systems is used. Some projects will be converted to the 1:25,000 scale with foot contour intervals (see Lockport Project, table 2). Other projects will be compiled with the metric contour interval but published at the 1:24,000 scale to join adjacent projects (see Rome, Sylvan Beach, and Utica East projects, table 2). New all-metric projects will be published in the 7.5- by 15-minute format as shown in figure 2 for the Long Lake, Saranac Lake, Port Henry, and Willsboro Projects.

Figure 3.--Status of Metric mapping as of July 1979.

Orthophotoquads

All 15-minute quadrangle maps in New York State are to be replaced in the future with new metric 1:25,000-scale maps. As an interim measure, orthophotoquads are available or in progress over all areas where 7.5-minute maps are not published, as shown in figure 4. Additional orthophotoquads are being prepared over some areas where published 7.5-minute maps are available (fig. 4.)

Experimental editions of color-simulated orthophotoquads along the U.S.-Canadian border, from St. Regis, N.Y. to the Maine-New Hampshire State line, were produced using dual-camera photography. One camera recorded the visible spectrum, the other only the infrared. By combining the panchromatic and infrared rectified photographs with assigned colors during the printing, color imagery was produced. These orthophotoquads are also being prepared on an experimental basis over various types of terrain in other parts of the U.S. (See U.S. Geological Survey, "Index to Topographic Maps of New York, April 1978" for names of color orthophotoquads.) Figure 5 shows areas that have, or will have when completed, high-altitude photography coverage (about 1:80,000 scale). These photos are used for preparing orthophotoquads and to inspect 7.5-minute quadrangles to determine their need for revision.

SMALL-SCALE AND SPECIAL MAPPING

Intermediate-Scale Maps

Multipurpose intermediate-scale mapping is underway at both 1:50,000 (1 inch = .78 mi) and 1:100,000 (1 inch = 1.58 mi) scales in county format (fig. 6) and quadrangle format (fig. 7) with planimetric and topographic editions.

1:250,000-Scale Maps

The 1:250,000-scale topographic maps now being revised include Elmira, New York, Rochester, and Toronto. The Scranton quadrangle is a recently published revision. Maps available in this series are indicated in figure 8.

Topographic/Bathymetric Maps

Topographic/bathymetric maps show both land and underwater contours for coastal areas and are being prepared under a joint agreement by the National Ocean Survey (NOAA) and the Geological Survey. The U.S. program includes maps of 1:24,000, 1:25,000, 1:100,000 and 1:250,000 scale. The 1:250,000-scale New York quadrangle is now in preparation. These maps are useful for coastal-zone management and offshore natural-resource development.

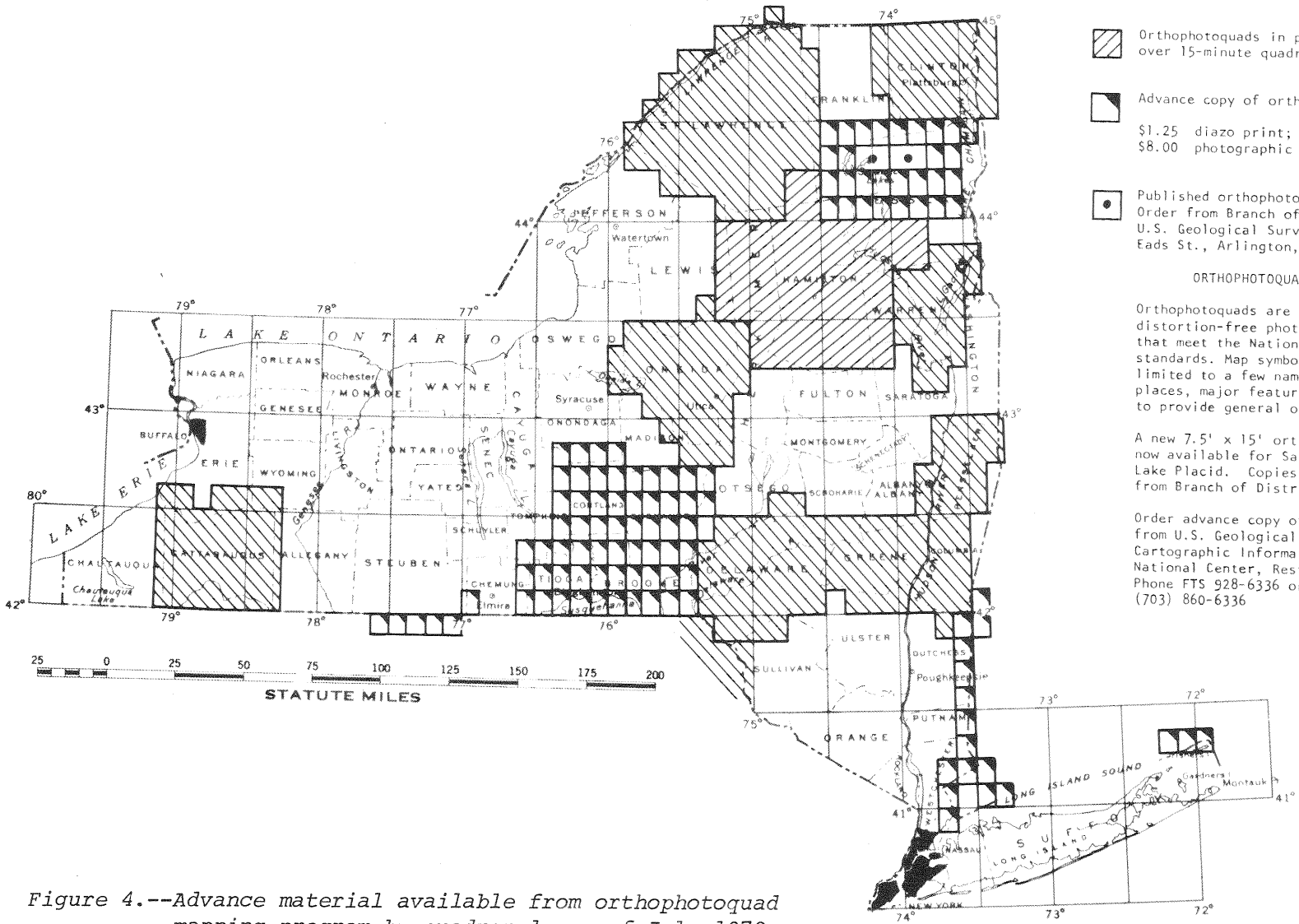


Figure 4.--Advance material available from orthophotoquad mapping program by quadrangle as of July 1979.

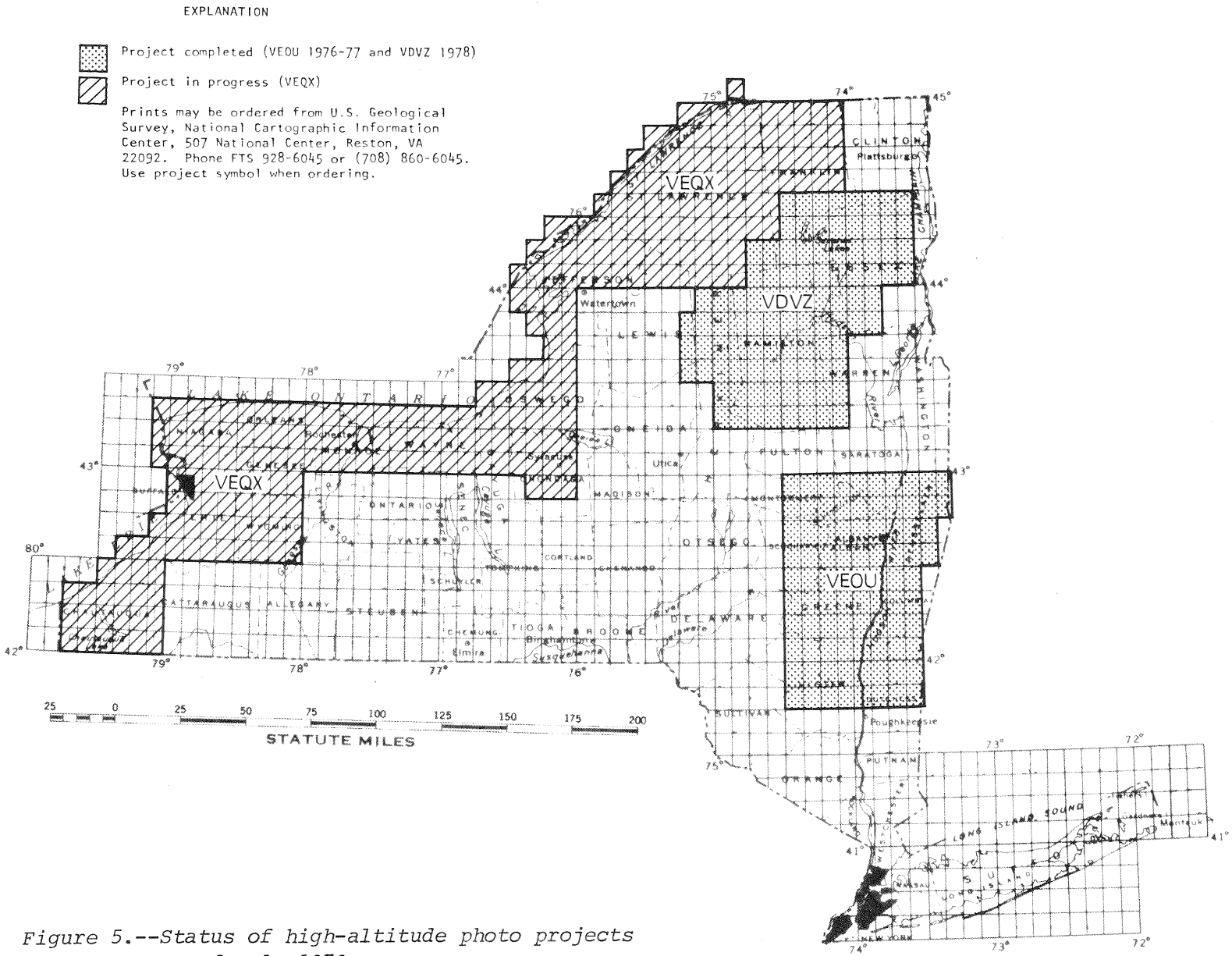


Figure 5.--Status of high-altitude photo projects as of July 1979.

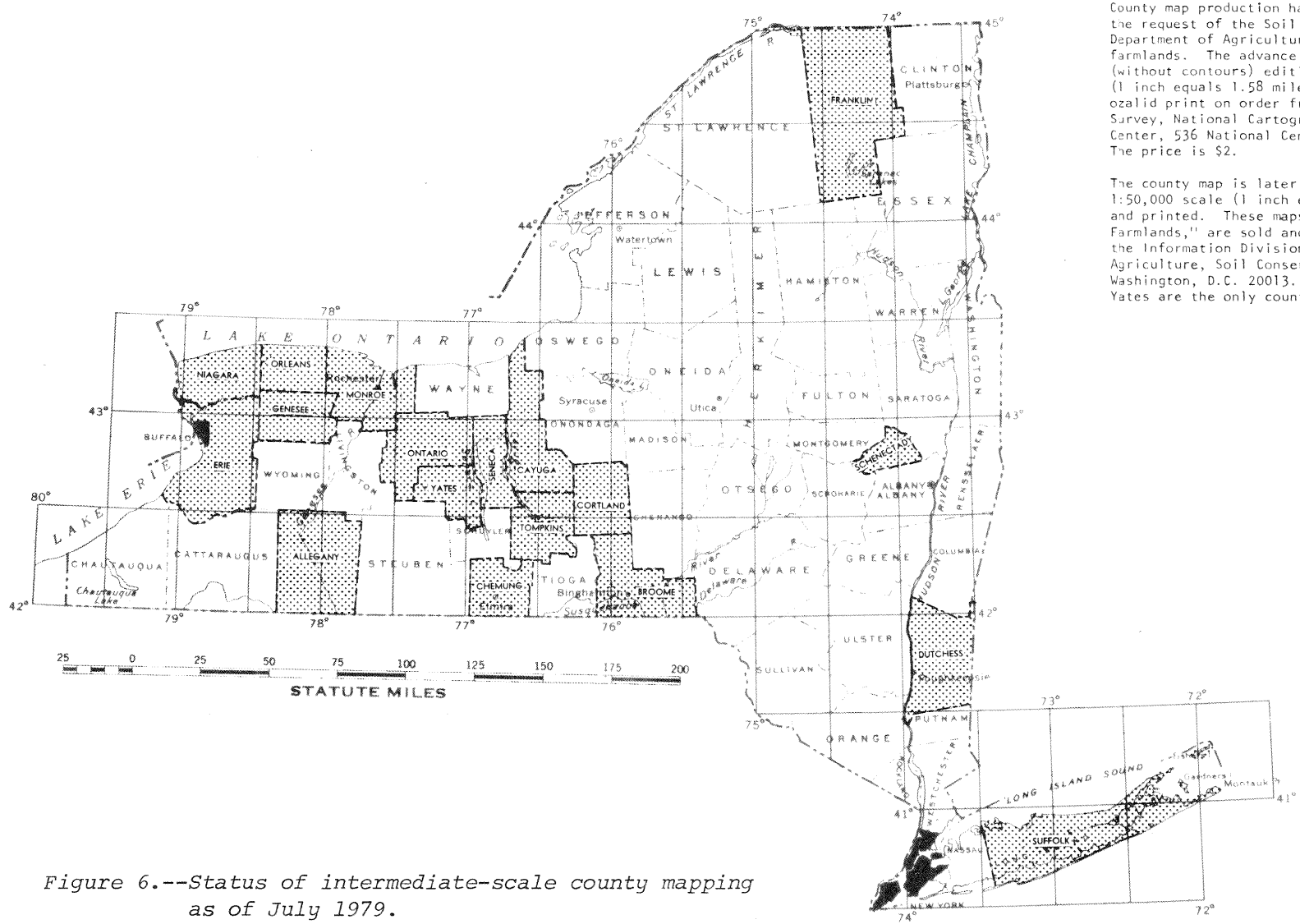


Figure 6.--Status of intermediate-scale county mapping as of July 1979.

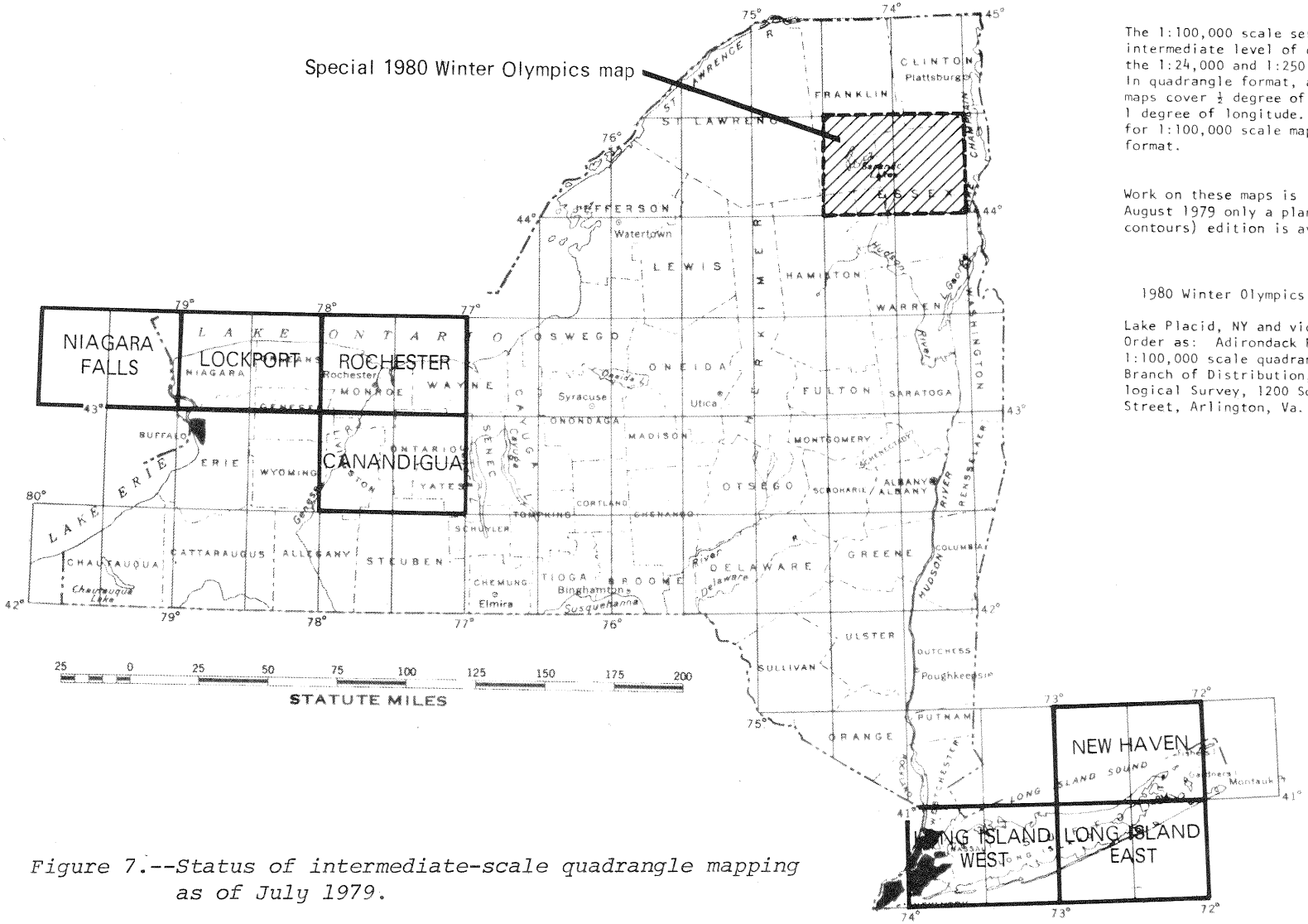


Figure 7.--Status of intermediate-scale quadrangle mapping as of July 1979.

EXPLANATION

ROCHESTER — 1:100,000 scale quadrangle.

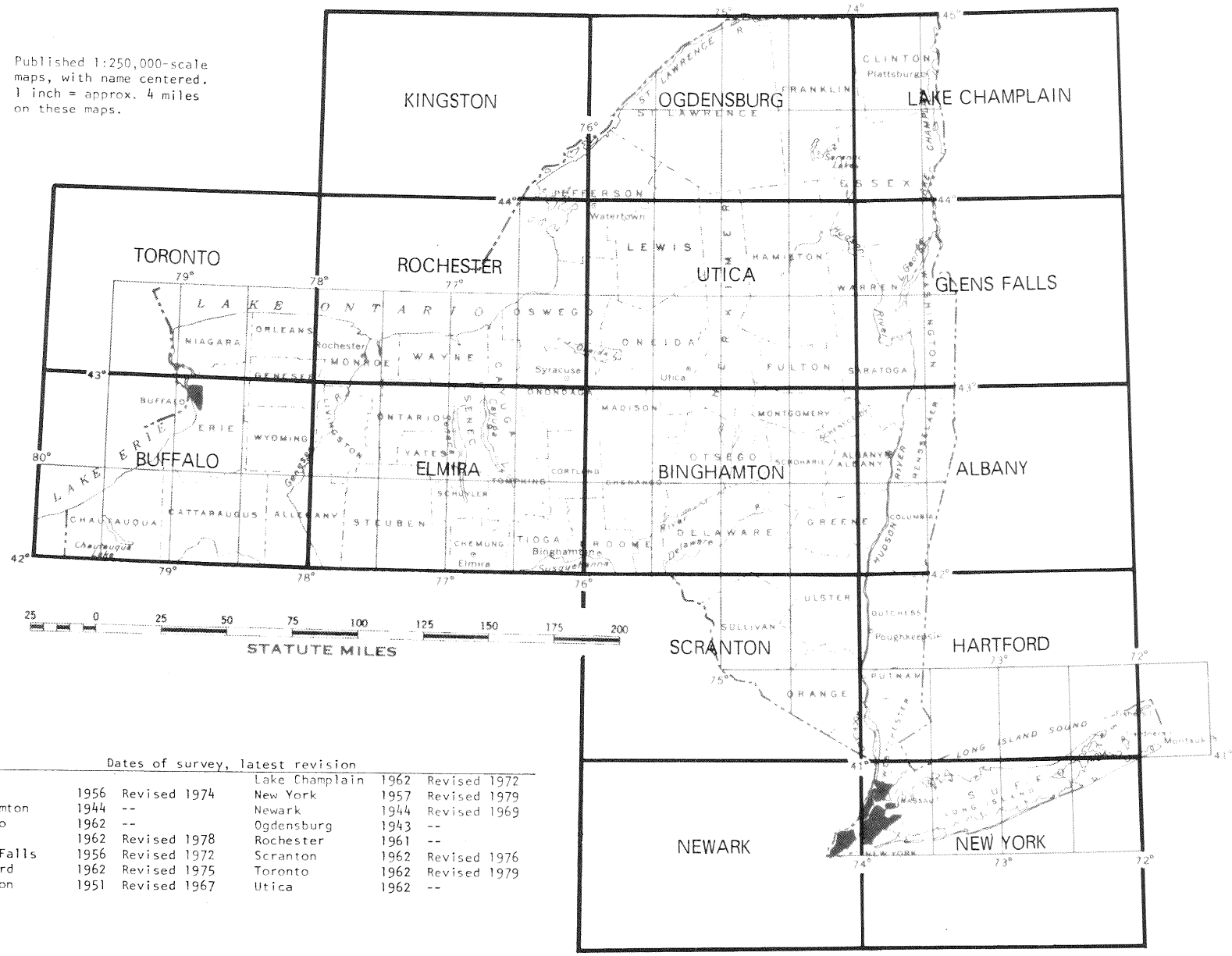
Advance copy available.

The 1:100,000 scale series provides an intermediate level of detail between the 1:24,000 and 1:250,000 map series. In quadrangle format, as above, the maps cover ½ degree of latitude by 1 degree of longitude. See figure 6 for 1:100,000 scale maps in county format.

Work on these maps is in progress. As of August 1979 only a planimetric (without contours) edition is available.

1980 Winter Olympics map

Lake Placid, NY and vicinity. Order as: Adirondack Region, NY 1:100,000 scale quadrangle, from Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Va. 22202



Dates of survey, latest revision

Albany	1956	Revised 1974	Lake Champlain	1962	Revised 1972
Binghamton	1944	--	New York	1957	Revised 1979
Buffalo	1962	--	Newark	1944	Revised 1969
Elmira	1962	Revised 1978	Ogdensburg	1943	--
Glens Falls	1956	Revised 1972	Rochester	1961	--
Hartford	1962	Revised 1975	Scranton	1962	Revised 1976
Kingston	1951	Revised 1967	Toronto	1962	Revised 1979
			Utica	1962	--

Figure 8.--Status 1:250,000-scale mapping as of July 1979.

New York State

This map shows (a) names and locations of all counties, cities and towns, and most of the smaller settlements as well as railroads (all in black); and (b) rivers, many of the smaller streams, and other water features (in blue). It does not show contours. Scale of this 44 x 58-inch map, published in 1953, is 1:500,000, or about 8 miles to 1 inch. A comparable map is published in black and white at 1:1,000,000 scale, or about 16 miles to 1 inch; size is 23 by 29 inches.

New York (Topographic)

This map is an overprint of the 1:500,000-scale base map described above and includes highways in purple and contours in brown. Contour interval is 200 feet.

New York (Relief)

This map is overprinted on a modified base map that shows the State and county boundaries, the State capital, and the county seats (in black), and the water features (in blue). Physical features on the map are brought out by shaded relief in color. It does not show contours. Scale is 1:500,000, or about 8 miles to 1 inch; size is 44 by 58 inches.

The above maps may be ordered from the Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Virginia 22202.

NEW YORK STATE TOPOGRAPHIC MAPS ON MICROFILM

A set of topographic maps published by the Geological Survey from 1884-1977 is now available on a series of 35 mm black-and-white microfilm rolls. The reduction image ratio is 20 times, making it compatible with 35 mm roll-film readers found in most libraries. The file is alphabetical by State and by quadrangle name within States. The New York State set of maps is on 10 rolls (about 5,200 maps). The set does not include maps that are centered in the surrounding States but overlap New York. The diagram on the next page shows the number of rolls available for New York and adjacent States. Two types of microfilm may be ordered--a silver emulsion, preferred by most librarians for archival quality ($20 per roll), or diazo, which is recommended for its ease of use and durability ($10 per roll). Partial rolls are the same price as full rolls.

Number of microfilm rolls in map set for New York and adjacent States.

OTHER PRODUCTS AVAILABLE FROM TOPOGRAPHIC MAPPING

- Aerial photography--normally ranges from 1:80,000 to 1:20,000 scale
- Horizontal and vertical control, second and third order
- Blueline prints of compilation copy prior to publication
- Stable-base color-separation drawings or combinations of drawings of the published map
- Stable-base feature separate drawings of map detail such as hydrology, terrain, and transportation routes for base and special maps
- Land-use maps
- Special maps prepared from published maps to show thematic information, energy sources, regional planning areas, etc.

To order microfilm or obtain additional information about the above products, write or call the:

National Cartographic Information Center
U.S. Geological Survey
507 National Center
Reston, Va. 22092
(703) 860-6045 or FTS 928-6045

NATIONAL DIGITAL CARTOGRAPHIC DATA BASE

One of the primary missions of the National Mapping program of the Geological Survey is the development of a cartographic data bank that will contain 11 types of base-map data:

- Reference systems--geographic and other coordinate systems except the public-land survey network.
- Hypsography--contours, elevations, and slopes.
- Hydrography--streams and rivers, lakes and ponds, wetlands, reservoirs, and shorelines.
- Surface cover--woodland, orchards, vineyards.
- Nonvegetative features--lava rock, playas, dunes, slide rock, barren waste areas.
- Boundaries--portrayal of political jurisdictions, national parks and forests, military reservations. This category does not fully set forth land ownership or use.
- Transportation systems--roads, railroads, trails, canals, pipelines, transmission lines, bridges, tunnels.
- Other significant manmade structures such as buildings, airports, and dams.
- Identification of portrayal of geodetic control, survey markers, and landmark structures and objects.
- Geographic names.
- Orthophotographic imagery.

Although the data base is in the development phase, a number of $7\frac{1}{2}$-minute quadrangles (fig. 9) now have Digital Elevation Models (DEMs). These models consist of a network of terrain elevations of points taken at regular space intervals. Planimetric data such as boundaries, roads, canals, pipelines, etc., when digitized, are designated as Digital Line Graphics (DLGs). Both DEMs and DLGs require computer-assisted graphic line-plotting equipment to read the magnetic tapes.

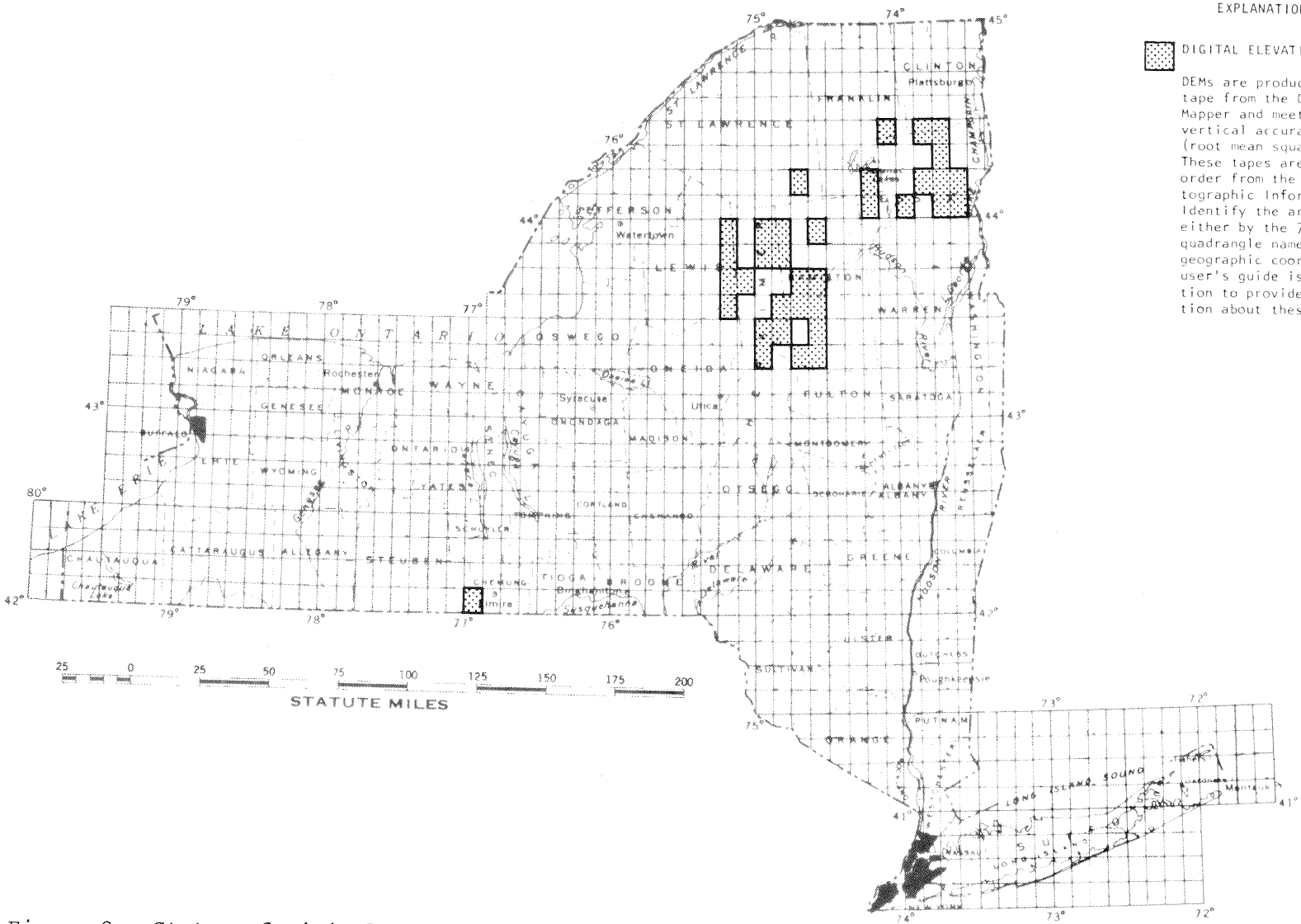
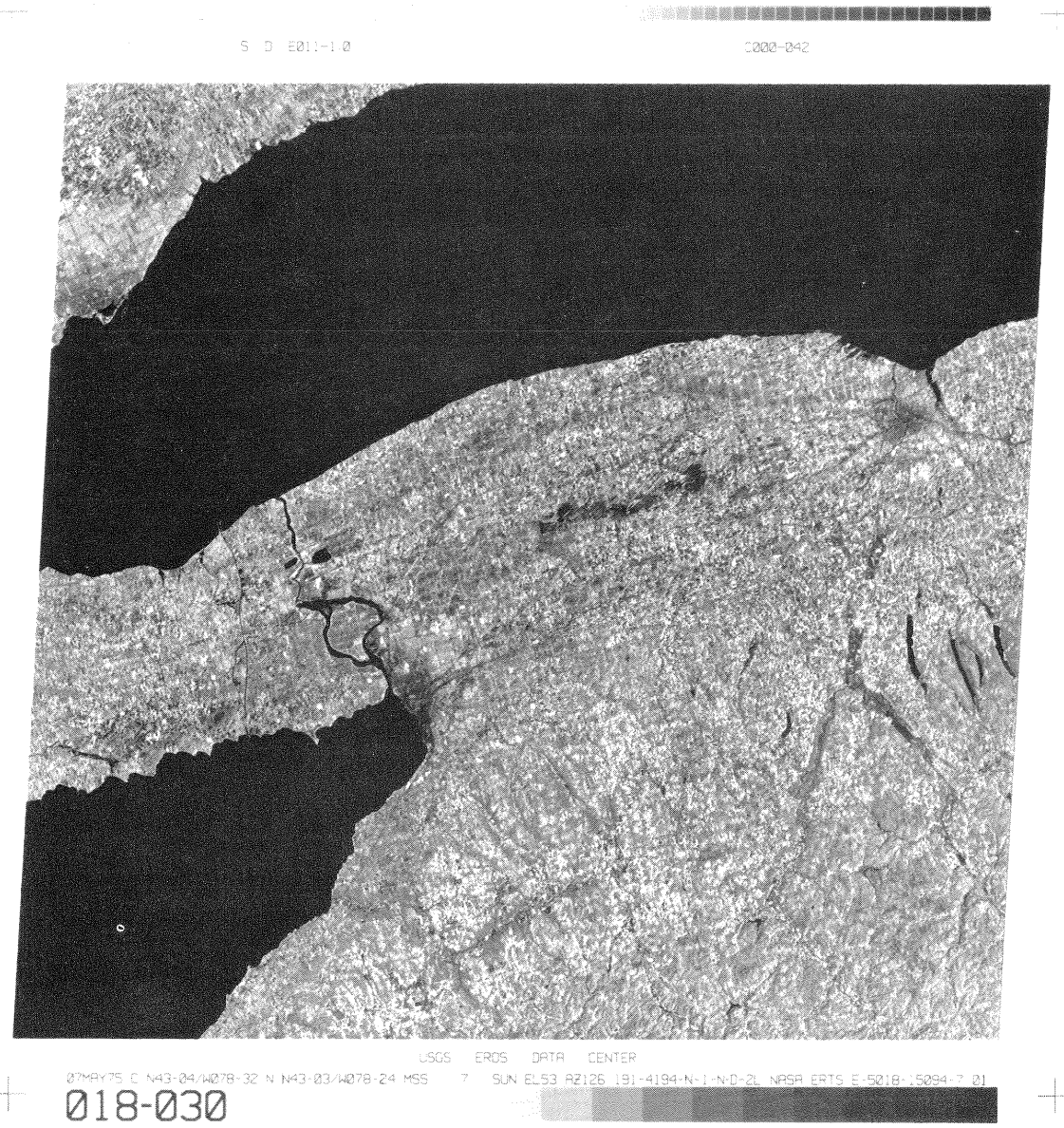


Figure 9.--Status of Digital Elevation Models as of July 1979.

LAND INFORMATION & ANALYSIS



Landsat image of Lake Erie-Lake Ontario region, New York.

LAND INFORMATION AND ANALYSIS

The Land Information and Analysis Office, in Reston, Virginia, conducts earth-science, earth-resources, and environmental studies to meet the Nation's increasing need for information used in land-use planning and decisionmaking. This information is being derived from combinations of the Geological Survey's core disciplines--geology, hydrology, cartography, and geography.

During recent years, it has become clear that land-resource and environmental studies require the analysis and interpretation of information from several disciplines; it is also evident that closer interaction between the data compilers and the data users (including land-resource planners and decisionmakers) is necessary to provide the data in an understandable and usable form. Part of the Land Information and Analysis Office's mission is to present scientific and engineering information about land and other resources in language and format that will be readily understandable by elected officials, planners, public-interest groups, the legal profession, social scientists, and the general public. The Office conducts its work through five programs--Earth Sciences Applications, Geography, Resource and Land Investigations, Earth Resources Observation Systems, and Environmental Impact Analysis--described below.

EARTH SCIENCES APPLICATIONS

The Earth Sciences Applications Program directs and coordinates multidisciplinary Geological Survey activities designed to interpret, demonstrate, and encourage the use of earth-science information in land-resource planning and decisionmaking. The program's principal means of achieving these goals are through specially designed projects and reports, and through technical assistance to users. The following projects in New York are included in this program:

Geological Hazard Notification

The Earth Sciences Application Program coordinates the Geological Survey's role in warning and preparedness for geologic-related hazards. Beginning with the documentation of potential hazards identified through the work of field scientists, this program coordinates the procedures required to (a) evaluate the potential severity of the hazard; (b) inform the appropriate State and local government officials; and (c) issue appropriate public notifications or other information releases concerning the hazards. Representatives of this office met with New York State officials during 1979 to discuss the role and procedures of the Geological Survey in communicating possible geological-hazard notifications.

State Directories

The Earth Sciences Applications Program initiated and participated in the preparation of this prototype directory of "U.S. Geological Survey Activities in New York, 1979," which is one of two prototypes designed to inform present and potential users of earth-science information of Geological Survey activities and products of potential interest in their states.

RESOURCE AND LAND INVESTIGATIONS

The Resource and Land Investigations (RALI) Program was established in 1972 to improve technical communications between the collectors and analysts of resource and land information and the planners, managers, and decisionmakers in government, industry, and the public sector.

The Program undertakes projects that address multidisciplinary natural-resources management problems that affect the missions of the Geological Survey. The program's clientele are primarily Federal, State, and local land-use planners, but it also includes others that require a suite of earth-science, biological, and socioeconomic data or methods and technologies that are not available from any single Bureau. Program activities include product evaluation, methods development, technology transfer, and information dissemination, resulting in numerous reports, inventories, and directories. The Program has sponsored or cosponsored a National symposium and regional and National workshops designed to transfer technical knowledge to State and local resource planners and managers. Additional workshops are scheduled on topics such as natural-resource information systems, use of mediation in environmental conflict resolution, and planning for mineral development.

An activity that directly benefits the State of New York is carried out under the Outer Continental Shelf (OCS) Oil and Gas Information Program. An "Atlantic Index" has been prepared that gives planners and managers information on the reports and documents used by the Federal Government in the decisionmaking process for offshore mineral exploration and development activities. An additional product, the summary report, will be released in 1980 and will provide information on the prospects for OCS oil and gas development and associated onshore impacts. Both documents will be updated periodically.

In addition, under the auspices of RALI and the U.S. Environmental Protection Agency, two workshops were held in the Mid-Atlantic region on planning for onshore impacts of offshore development at the State and local level. Both workshops were attended by State and local representatives from New York.

EARTH RESOURCES OBSERVATION SYSTEMS

Earth Resources Observation Systems (EROS) Program contributes to the solution of natural resource, land use, and environmental problems by:

- providing remotely sensed imagery and data of the earth collected from spacecraft and aircraft data of the highest quality;
- training and assisting users of these data;
- sponsoring application demonstration research projects leading to new or improved data applications;
- providing leadership and coordination of Department of the Interior activities using or developing space-related technology.

To obtain a listing of aerial photographs or Landsat images of specific parts of New York State or to purchase them, contact:

EROS Data Center
User Services Section
Sioux Falls, SD 57198
(605) 594-6511

or

National Cartographic Information Center
U.S. Geological Survey
507 National Center
Reston, VA 22092
(703) 860-6045

GEOGRAPHY

The Geography Program:

- Compiles land-use and land-cover maps and data from remotely sensed source materials for the entire United States using a two-level classification system; completed maps at the scale of 1:250,000 and 1:100,000 are placed first on open file, then published in the two-color L series.
- Demonstrates techniques of land-use and land-cover mapping at larger scales and with different combinations of remotely sensed data when needed to complement smaller scale mapping.
- Determines trends in land use and land cover on the basis of a statistical analysis of previous and current land-use and land-cover maps.
- Analyzes land-use and land-cover patterns, trends, and changes associated with areas of critical National concern, such as coastal areas likely to be affected by offshore oil development, areas undergoing energy development, and areas where urban expansion may adversely affect environmental quality.

The following land-use and land-cover and associated maps that include New York are available on open file for reference and reproduction at nominal cost upon request to:

U.S. Geological Survey
536 National Center
Reston, VA. 22092

Map Name	USGS Open-File No.	Scale
New York	77-562	1:250,000
Hartford	76-646	1:250,000
Glens Falls	76-643	1:250,000
Newark	77-665	1:250,000
Providence	77-658	1:250,000
Scranton	77-664	1:250,000
Albany	79-976	1:250,000

Associated Maps Include:

Political unit map
Hydrologic unit map
Census county subdivision map
Federal land ownership map

Included in a new USGS Land-Use Map series are two-color, 1:250,000 scale land-use and land-cover maps of New York State for the following areas. These maps are available for $1.25 each from the USGS Branch of Distribution, Eastern Region (address is given on p. 118)

Map Name	L-Series Map No.
Hartford	L-79
Newark	L-33
New York	L-82
Providence	L-84
Newark	L-35

For further information on Geography Program research, mapping, and data compilation, contact:

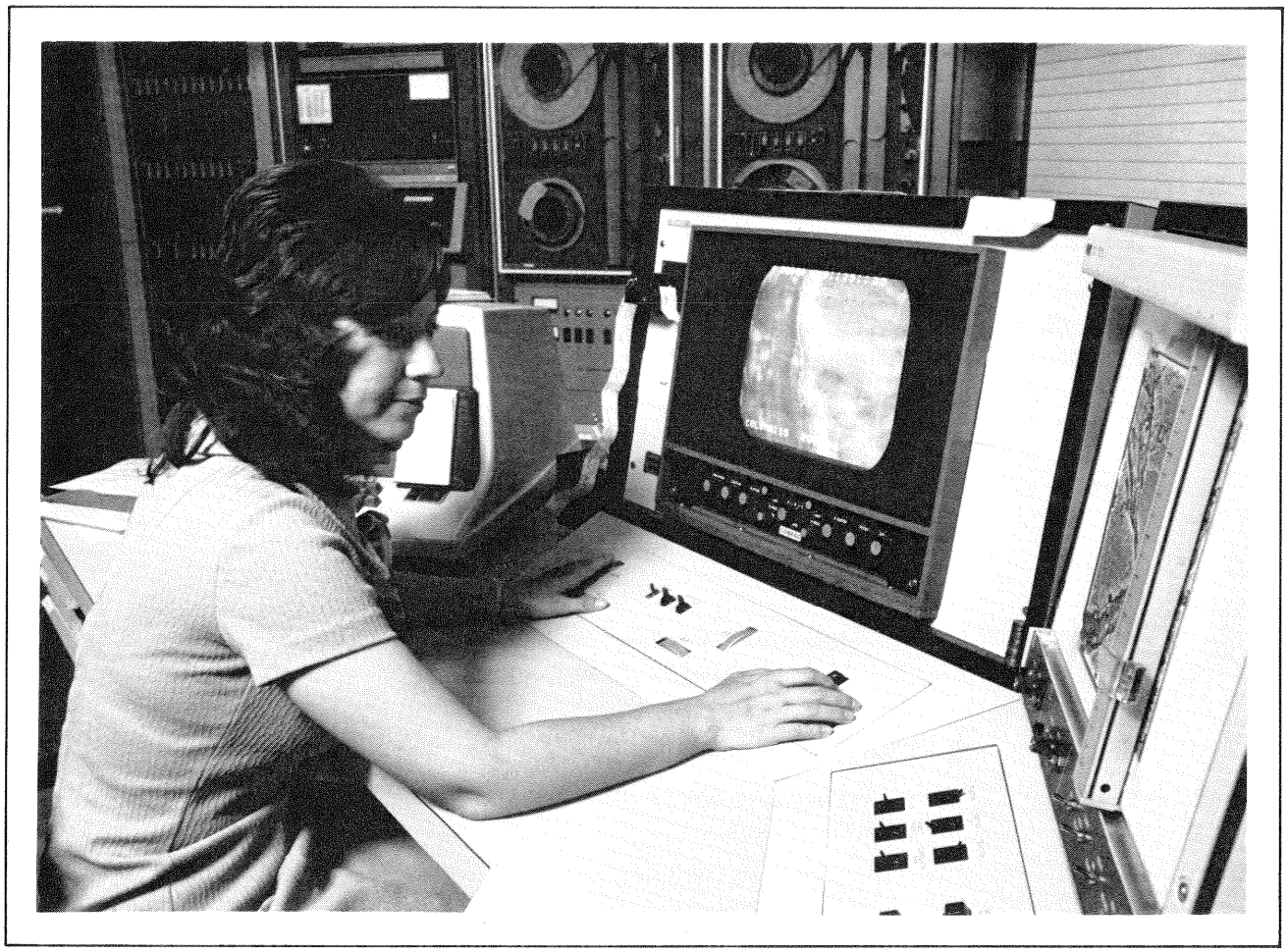
Chief, Geography Program
U.S. Geological Survey
710 National Center
Reston, VA 22092
(703) 860-6961

ENVIRONMENTAL IMPACT ANALYSIS

The Environmental Impact Analysis (EIA) program was established in 1975 to provide the Geological Survey's response to the National Energy Policy Act requirement for preparation and review of environmental impact statements. Federal agencies are required to prepare a detailed statement of any possible environmental impacts resulting from Federal activities having potentially significant effects on the quality of the environment. This law requires Federal agencies with appropriate jurisdiction and expertise to review statements prepared by other Federal agencies. The Geological Survey is a lead agency in the preparation of statements that result from the Conservation Division's supervision of the exploration, development, extraction, and reclamation operations for mineral resources on Federal lands. The Survey is a nonlead agency in the preparation of other statements as a result of its supervisory function with respect to mineral resources on Federal Lands and of its special expertise in geology, hydrology, and mining and petroleum engineering. Survey review of EIS's focuses on the adequacy with which (a) pertinent aspects of the geologic and hydrologic environment are described, (b) potential environmental impacts are discussed, and (c) mitigating measures and alternatives are considered.

The EIA Program also performs oilspill trajectory analyses using a computer simulation model. The results of these risk analyses are used by the Bureau of Land Management in their EIS's on proposed Outer Continental Shelf lease sales. New York is a potentially affected State in lease sales occurring in the north and mid-Atlantic. To date, analyses in these areas have been performed for Lease Sales 40, 42, and 49. An analysis for Lease Sale 52 in the mid-Atlantic will be performed during 1980.

GENERAL INFORMATION



Collecting cartographic data in digital form on the Gestalt Photomapper II.

WHERE TO OBTAIN ADDITIONAL INFORMATION ON U.S. GEOLOGICAL SURVEY PROGRAMS IN NEW YORK

WATER

District Chief
U.S. Geological Survey
343 U.S. Post Office & Courthouse
Post Office Box 1350
Albany, New York 12201

Phone: (518) 472-3107

NATIONAL MAPPING

Chief
Eastern Mapping Center
U.S. Geological Survey
567 National Center
Reston, Virginia 22092

Phone: (703) 860-6352

CONSERVATION

Eastern Regional Manager
Conservation Division
U.S. Geological Survey
1725 K Street, N.W.
Washington, D.C. 20006

Phone: (201) 254-3137

LAND INFORMATION & ANALYSIS

Chief
Land Information & Analysis Office
U.S. Geological Survey
104 National Center
Reston, Virginia 22092

Phone: (703) 860-7488

GEOLOGY

Regional Geologist, Eastern Region
U.S. Geological Survey
953 National Center
Reston, Virginia 22092

Phone: (703) 860-6631

GENERAL INFORMATION

Assistant Director, Eastern Region
U.S. Geological Survey
109 National Center
Reston, Virginia 22092

Phone: (703) 860-7414

OR

Information Office
U.S. Geological Survey
119 National Center
Reston, Virginia 22092

Phone: (703) 860-7444

WHERE TO OBTAIN GEOLOGICAL SURVEY PUBLICATIONS

Current releases are described in a monthly pamphlet, "New Publications of the Geological Survey." To receive this publication monthly, write:

U.S. Geological Survey
329 National Center
Reston, VA 22092

Professional Papers, Bulletins, Water Supply Papers, Techniques of Water Resources Investigations, Earthquake Information Bulletin, single copies of the Journal of Research, and popular leaflets, pamphlets, and booklets may be purchased from the above address. Additional information is given in "A Guide to Obtaining Information from the U.S. Geological Survey, 1978," Geological Survey Circular 777, available without cost from the above address.

Open-file reports are available for inspection at the office from which the report originated. They may be purchased through

Open-File Services Section, Branch of Distribution
U.S. Geological Survey
Box 25425, Federal Center
Denver, Co. 80225

Flood-prone areas maps may be obtained from the Water Resources Division Office in Albany, N.Y.

Map, benchmark, and aerial-photograph information is available from

National Cartographic Information Center
U.S. Geological Survey
507 National Center
Reston, Va. 22092

Requests for miscellaneous water information and information on water-resources programs in other States may be referred to

Water Resources Division
440 National Center
Reston, Va. 22092

The Geological Survey National Center maintains a library with an extensive earth-sciences collection. Local libraries may obtain books, periodicals, and maps through interlibrary loan by writing to

U.S. Geological Survey Library
950 National Center
Reston, Virginia 22092

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SUBJECT INDEX

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