INTRODUCTION

Water-resources data for the 2002 water year for New York consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and ground-water levels and water quality. This volume contains records for water discharge at 147 gaging stations; stage only at 8 gaging stations; stage and contents at 4 gaging stations, and 18 other lakes and reservoirs; water quality at 29 gaging stations; and water levels at 14 observation wells. Also included are data for 32 crest-stage partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program, and are published as miscellaneous measurements and analyses in this volume. Surface-water, ground-water, and water-quality data at all sites are listed in Eastern Standard Time (EST), unless otherwise noted. These data, together with the data in Volumes 2 and 3, represent that part of the National Water Data System operated by the U.S. Geological Survey in cooperation with State, Municipal, and Federal agencies in New York.

Records of discharge and stage of streams, and contents and stage of lakes and reservoirs, were first published in a series of U.S. Geological Survey water-supply papers entitled, “Surface Water Supply of the United States.” Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of water quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled “Quality of Surface Waters of the United States.” Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled “Ground-Water Levels in the United States.” Water-supply papers may be consulted in the libraries of the principal cities and universities in the United States or may be purchased from the U.S. Geological Survey, Branch of Distribution, 604 South Pickett Street, Alexandria, VA 22304.

Since the 1961 water year, streamflow data and since the 1964 water year, water-quality data have been released by the Geological Survey in annual reports on a State-boundary basis. These reports provided rapid release of water data in each state shortly after the end of the water year. Through 1970 the data were also released in the water-supply paper series mentioned above.

Streamflow and water-quality data beginning with the 1971 water year, and ground-water data beginning with the 1975 water year are published only in reports on a State-boundary basis. Beginning with the 1975 water year, these Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this volume is identified as “U.S. Geological Survey Water-Data Report NY-02-1.” Water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices for ordering specific reports, may be obtained from the District Office at the address given on the back of the title page or by telephone (518)285-5600.

COOPERATION

The U.S. Geological Survey and organizations of the State of New York and other agencies have had cooperative agreements for the systematic collection of water records since 1900. Organizations that assisted in collecting data included in Volume 1, water year 2002, through cooperative agreement with the Survey are:

Board of Hudson River-Black River Regulating District
City of New York, Department of Environmental Protection
County of Ulster, County Legislature
Green Island Power Authority
La Chute Hydro Company, Inc.
New York Power Authority
New York State Department of Environmental Conservation
New York State Department of Transportation
Reliant Energy (Orion Power New York)
Village of Nyack

Assistance in the form of funds for collecting records at gaging stations published in this report was also given by the following:

U. S. Department of Energy

The following municipalities, organizations, and agencies aided in collecting records:

Mirant New York, Inc.
National Weather Service
Oswegatchie River-Cranberry Reservoir Commission
Plattsburgh
United Water New York
Utica Board of Water Supply

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Surface Water

The 2002 water year brought no major floods to eastern New York. The late-season snowpack caused no spring floods because the cool, dry weather allowed the snow to melt gradually. A 2001 drought watch in New York was expanded from 8 southern counties in August 2001 to 21 southern counties by November 2001, and was extended to nearly the entire state by February 2002. Drought watches and warnings continued throughout the 2002 water year in much of southeastern New York but were cancelled in the rest of the State in June 2002.

Streamflow during the 2002 water year in eastern New York ranged from above normal to well below normal (fig. 1). Streamflow was highest (90 to 120 percent of normal) in the Adirondack Mountains and Mohawk River Valley, and lowest (30 to 50 percent of normal) in the eastern Catskill Mountains and lower Hudson River Valley.

Contents of the New York City reservoir system were well below normal throughout the water year. The dry summer and fall of 2001 caused the reservoir contents to decrease to 40 percent of normal during the 2001-02 winter. Above-normal rainfall from April through June raised reservoir contents to 90 percent of normal before the dry summer lowered them to about 85 percent of normal by the end of September (fig. 2A). The volume of water in the Great Sacandaga Lake was within 10 percent of the long-term (1931-2001) average during the fall and winter (fig. 2B); snowmelt during the following spring raised the contents to 90 percent of capacity in May. The reservoir contents declined through the spring and summer but were about 10 percent above normal through June, then remained about normal through September.

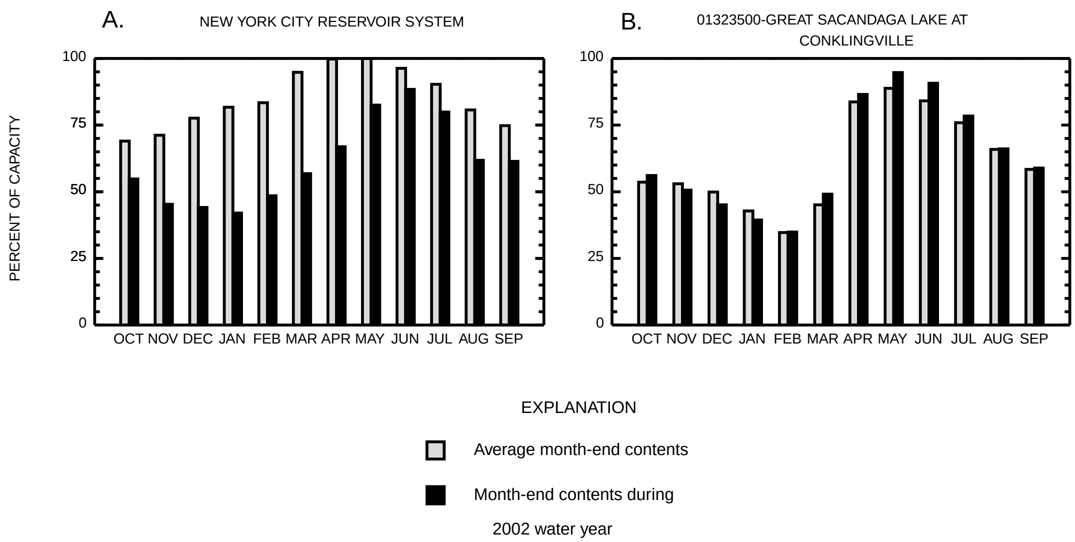

Figure 2.--Comparison of percent of capacity of average month-end reservoir contents and month-end contents during 2002 water year for two selected reservoir systems in eastern New York.

Monthly runoff at selected streamflow-gaging stations during 2002, and the average monthly runoff at each site during 1940-2001, are plotted in figure 3. Monthly runoff was generally 1 to 2 inches below normal in southeastern New York through April.

Daily-discharge hydrographs for the 2002 water year at two unregulated gaging stations in eastern New York, Wappinger Creek near Wappingers Falls in Dutchess County and West Branch Oswegatchie River near Harrisville in St. Lawrence County, are presented in figures 4 and 5, respectively. The drought caused streamflow at Wappinger Creek to be well below the 75-percent exceedence level (percentage of time that a given discharge is equaled or exceeded) from September through May. Rainfall in May and June contributed to above normal runoff during those months, but drought conditions returned from July through September. Streamflow of West Branch Oswegatchee River increased to well above the 25-percent exceedence level many times during the year; the periods of below-normal flow occurred mostly from July through September.

The summer drought of 2001 continued into the 2002 water year. October precipitation averaged 1 to 3 inches below normal from the central Adirondack Mountains to the lower Hudson Valley; only the St. Lawrence Valley had near-normal precipitation. Air temperatures were 1 to 4°F above normal throughout eastern New York, except in the lower Hudson Valley, where they were slightly below normal. Scattered snowfall occurred in the Adirondack and Catskill Mountains. October runoff was about 30 percent of normal in the lower Hudson Valley and Catskill Mountains but was normal in the north. The New York City reservoir contents were at 85 percent of normal, whereas the Great Sacandaga Lake contents were normal.

November 2001 was the third-warmest and second-driest November in 107 years of record. Temperatures ranged from 3 to 8°F above normal, and precipitation was generally 2 to 4 inches below normal. Only the northern tier received normal amounts of precipitation. Very little snow fell throughout the region, and this was the first snow-free November at Buffalo in 122 years of record. Streamflow south of the Adirondack Mountains remained 1 to 2 inches below normal, but was normal to the north. The low streamflow decreased the contents of the New York City reservoirs to 75 percent of normal, but the Great Sacandaga Lake contents at the end of November were normal.

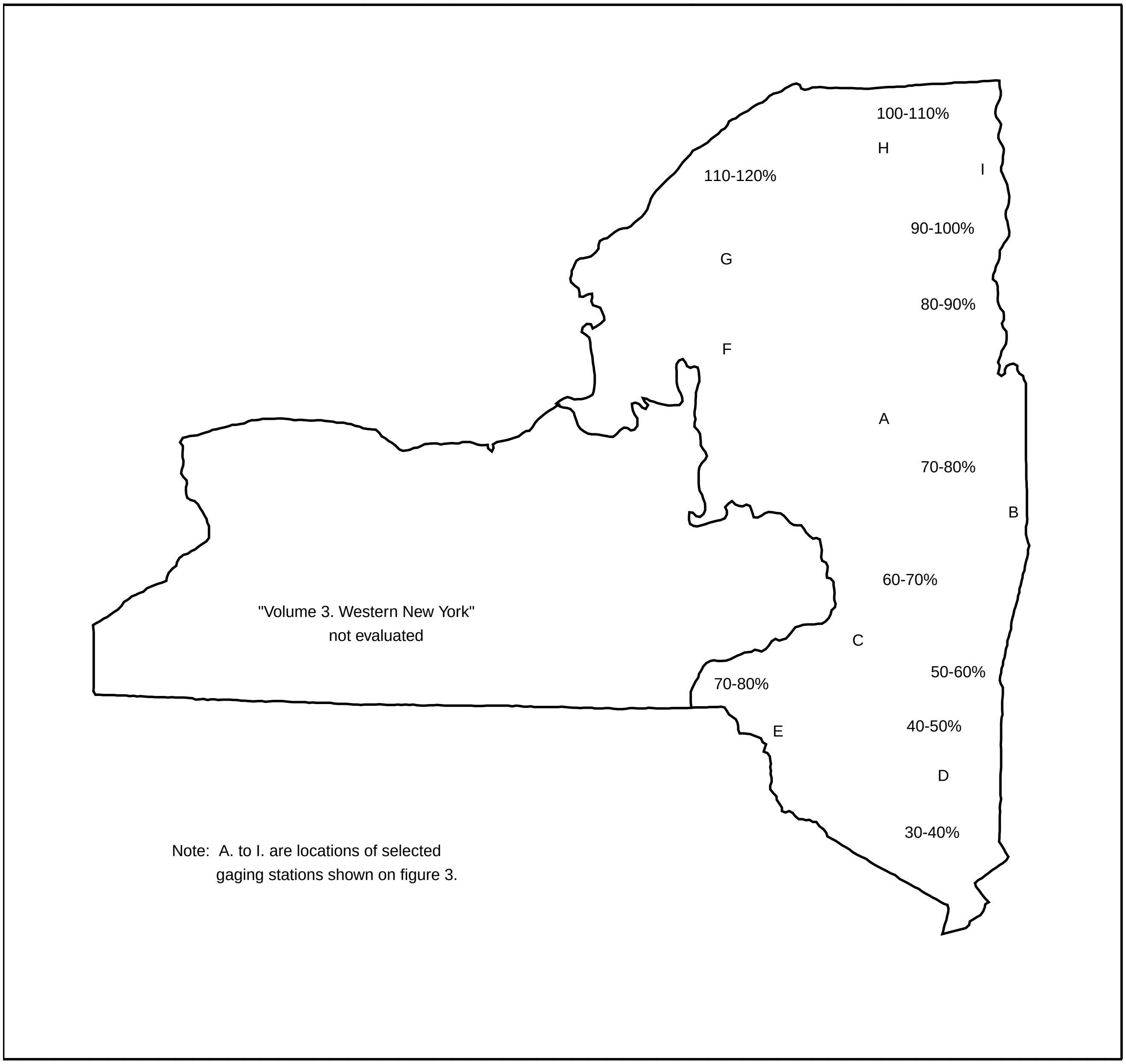

Figure 1.--2002 water year runoff as a percentage of the average annual runoff for 1940-2001 for eastern New York excluding Long Island.

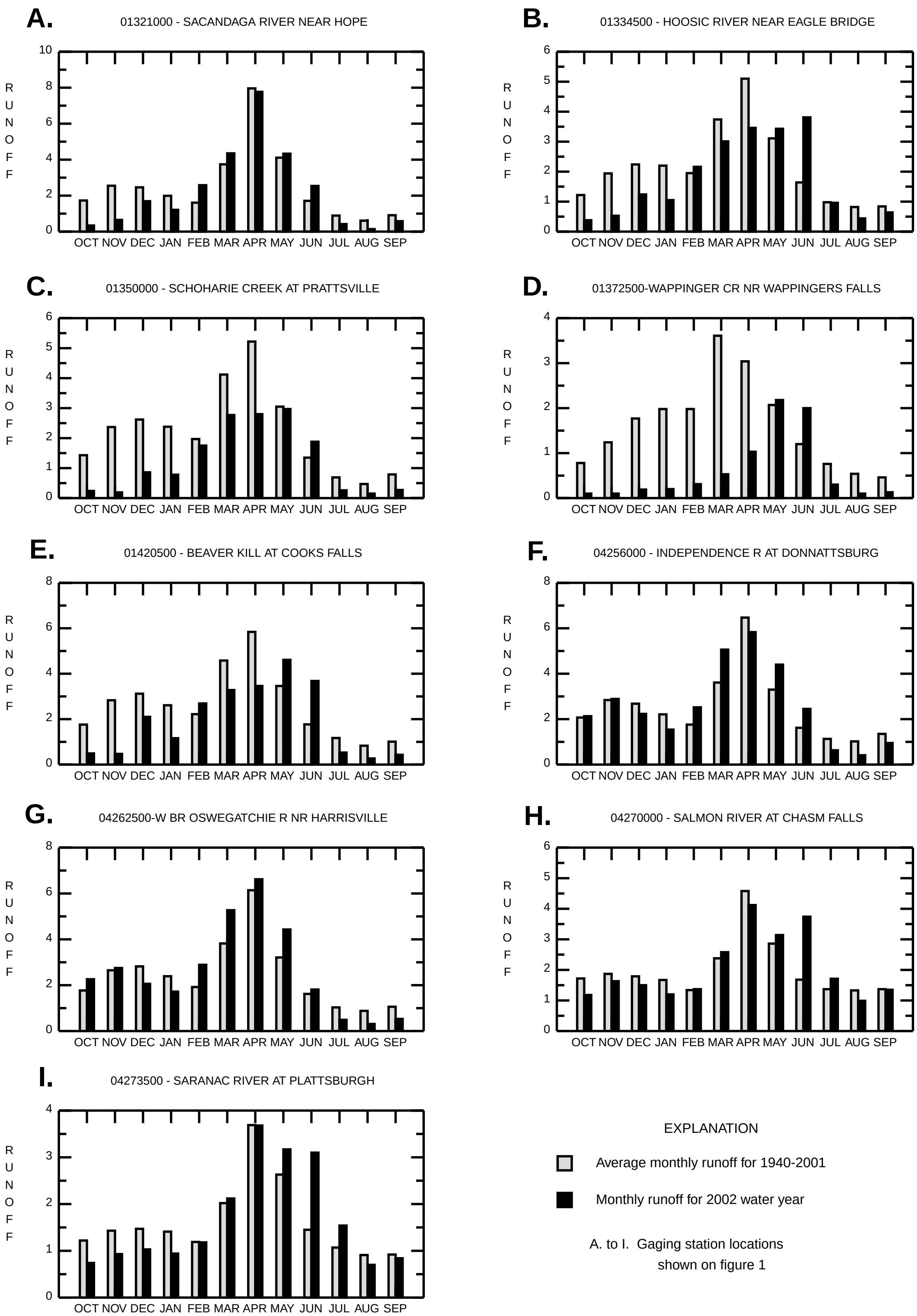

Figure 3.--Comparison of monthly runoff (in inches) for 2002 water year and average monthly runoff for 1940-2001 for selected gaging stations in eastern New York (site locations are shown on figure 1).

SUMMARY OF HYDROLOGIC CONDITIONS--Continued

Warm weather continued through December 2002 and made this the warmest December on record. Temperatures were 7 to 11°F above normal throughout the region. Temperatures in the 60s and lower 70s were common throughout the State but dropped to near normal by the end of December. Precipitation in eastern New York averaged slightly below normal except for a massive lake-effect snowstorm that lasted from December 24 through January 1 and dumped 80 to 120 inches of snow on the Tug Hill Plateau. Streamflow for December was below normal throughout eastern New York. The Great Sacandaga Lake contents were normal at the end of December, at which time the New York City reservoirs were at only 60 percent of normal.

Eastern New York's warm winter weather continued through January. Temperatures ranging 8 to 13°F above normal were recorded throughout the region. Monthly precipitation was close to normal in the north but gradually decreased southward to 3 inches below normal in the lower Hudson Valley. Streamflow was slightly below normal throughout the region. The New York City reservoir contents were at 50 percent of normal, which was 40 percent of capacity by January 31; the Great Sacandaga Lake contents were only slightly below normal by the end of January.

The warm temperatures of February made this winter (December-February) the warmest statewide in 107 years of climate record. Temperatures during the month ranged 5 to 8°F above normal. Precipitation was near normal throughout the region. Streamflow increased to about 1/2 inch above normal throughout the region except in the lower Hudson Valley, where the drought continued. Reservoir contents were normal in the north, wheras the Catskill and Croton reservoirs were at 50 percent of capacity (normally 83 percent by the end of February).

March 2002 was the eigth consecutive warmer-than-normal month recorded in the State. Temperatures averaged 1 to 3°F above normal, and precipitation was within 1 inch of normal. Continuing below-normal precipitation in extreme southeastern New York resulted in drought conditions, as defined by the New York State Drought Management Task Force. Streamflow was about 1 inch above normal north of the Mohawk Valley, below normal to the south. Runoff at Wappinger Creek was about 3 inches below normal. The New York City reservoir system would normally be at 90 percent of capacity by the end of March, but this year the system was at only 60 percent of capacity. Content of the Great Sacandaga Lake was at 50 percent of capacity, which is normal for late winter before snowmelt begins.

Warmer-than-normal temperatures were recorded throughout eastern New York during April. A 3-day heat wave during midmonth broke many long-term records throughout the Northeast. Many areas experienced temperatures above 90°F. Above-normal precipitation helped to alleviate drought conditions in southeastern New York, but streamflow remained below normal in the Catskill Mountains and lower Hudson Valley. Snowmelt helped to maintain normal streamflow north of the Mohawk Valley. The New York City reservoir system, normally full in April, was at only 65 percent of capacity by April 30. The Great Sacandaga Lake contents increased to 85 percent of capacity.

Cooler and wetter-than-normal conditions prevailed throughout eastern New York during May. Temperatures were 3 to 5°F below normal, and most areas received 1 to 2 inches of excess rainfall. All streamflow-gaging stations recorded above-normal runoff. This was the first month of the 2002 water year in which many streamflow-gaging stations south of the Mohawk Valley recorded above-normal runoff. Reservoir contents increased 20 percent and 10 percent in the south and north, respectively.

Normal temperatures returned in June. Rainfall was abundant (4 to 9 inches) and ranged from more than 3 inches above normal in the Lake Champlain region to 1 inch above normal elsewhere and eased the drought conditions somewhat throughout eastern New York. Runoff remained 1 to 2 inches above normal across the region. Reservoir contents increased but were still about 10 percent below normal in the New York City system. The Great Sacandaga Lake contents were above normal—at 85 percent of capacity.

Dry conditions returned during July; most of the area received only about half of the normal 4 inches of rainfall, and the Mohawk Valley received only 25 percent of the expected amount. July also was hot; many areas sweltered in the mid-to-upper 90s, and scattered readings of 100°F were recorded throughout the State. The heat and lack of rainfall caused the flow of many rivers to drop below normal. Streamflow decreased, in all but the northern tier region, where it remained above normal. Reservoir contents decreased about 10 percent but stayed within the normal range.

Rainfall in the Adirondack Mountains and from there northward was 2 to 3 inch below normal in August. Wildfires in the Adirondack Mountains prompted the New York State Department of Environmental Conservation to impose a fire ban on all State lands. Temperatures ranged from 2 to 3°F above normal; the National Weather Service reported a high temperature of 104°F at West Sand Lake in Rensselaer County on August 15, and temperatures in many other towns throughout eastern New York reached the mid-90s on several days during the month. Streamflow throughout eastern New York was 20 to 50 percent below normal. Reservoir contents were normal in the Great Sacandaga Lake but 20 percent below normal in the New York City reservoir system.

The 2002 water year ended with the third-warmest September on record. Temperatures ranged from 2°F above normal in the southeast to 7°F above normal in the north. Eleven of the last 12 months in New York State were warmer than normal; only May was cooler than normal. Rainfall was close to normal throughout the region during September, and runoff was normal except south of the Adirondack Mountains where it was about half an inch below normal. The Great Sacandaga Lake contents remained normal, whereas the New York City reservoir contents remained about 15 percent below normal.

Runoff recorded by many streamflow-gaging stations in southeastern New York during the 2002 water year was 7 to 15 inches less than normal. These departures are significant in that average annual yields range from 24 to 30 inches.

Water Quality

The water-quality data presented herein include water temperature, specific conductance, and concentrations of nutrients, major ions, pesticides, polychlorinated biphenyls (PCB's), and sediment at selected ground-water and surface-water sites in New York State. Additional water-quality data are periodically collected for other programs or projects and are usually published in separate project reports.

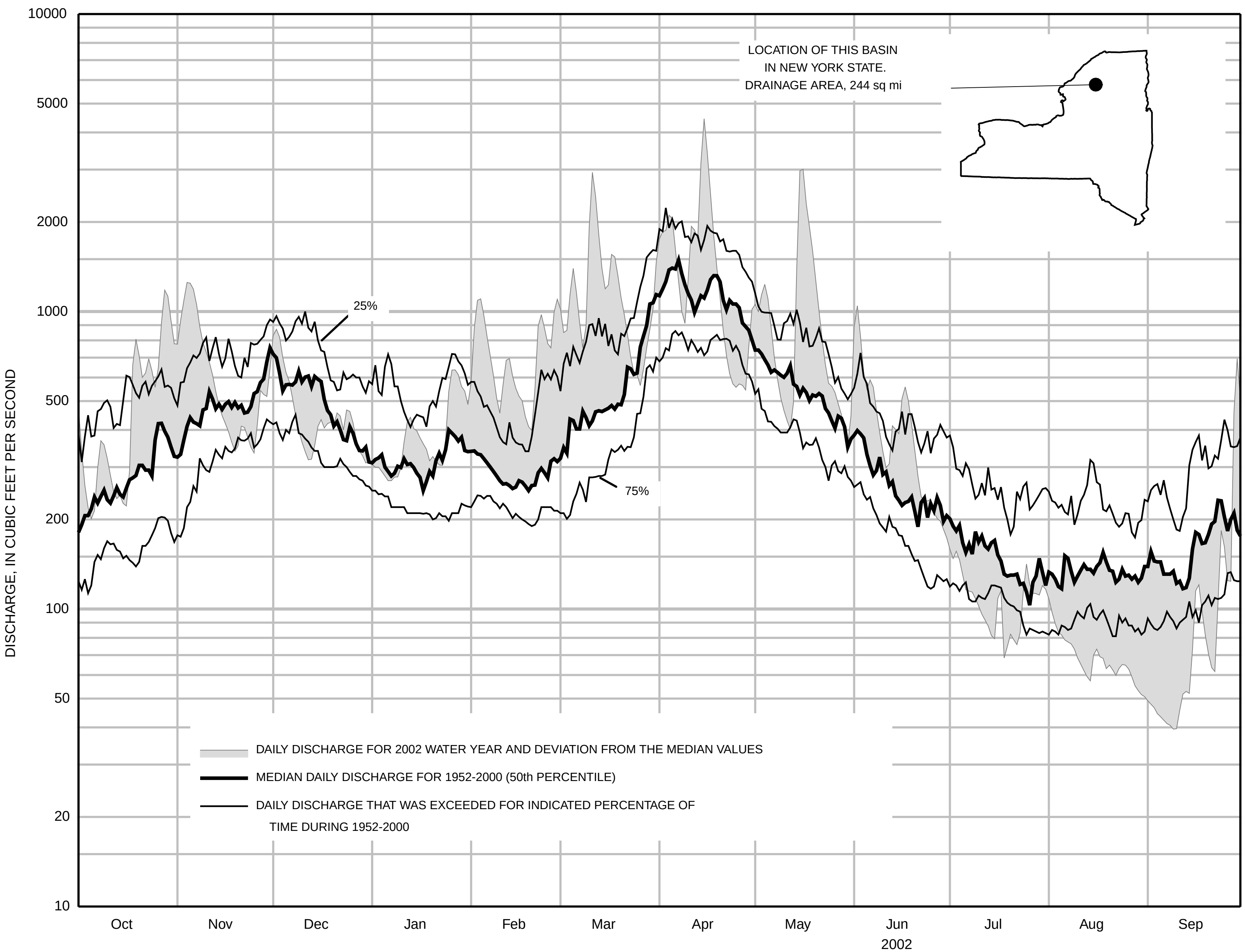

FIGURE 4.--HYDROGRAPHIC COMPARISONS, WEST BRANCH OSWEGATCHIE RIVER NEAR HARRISVILLE, NY

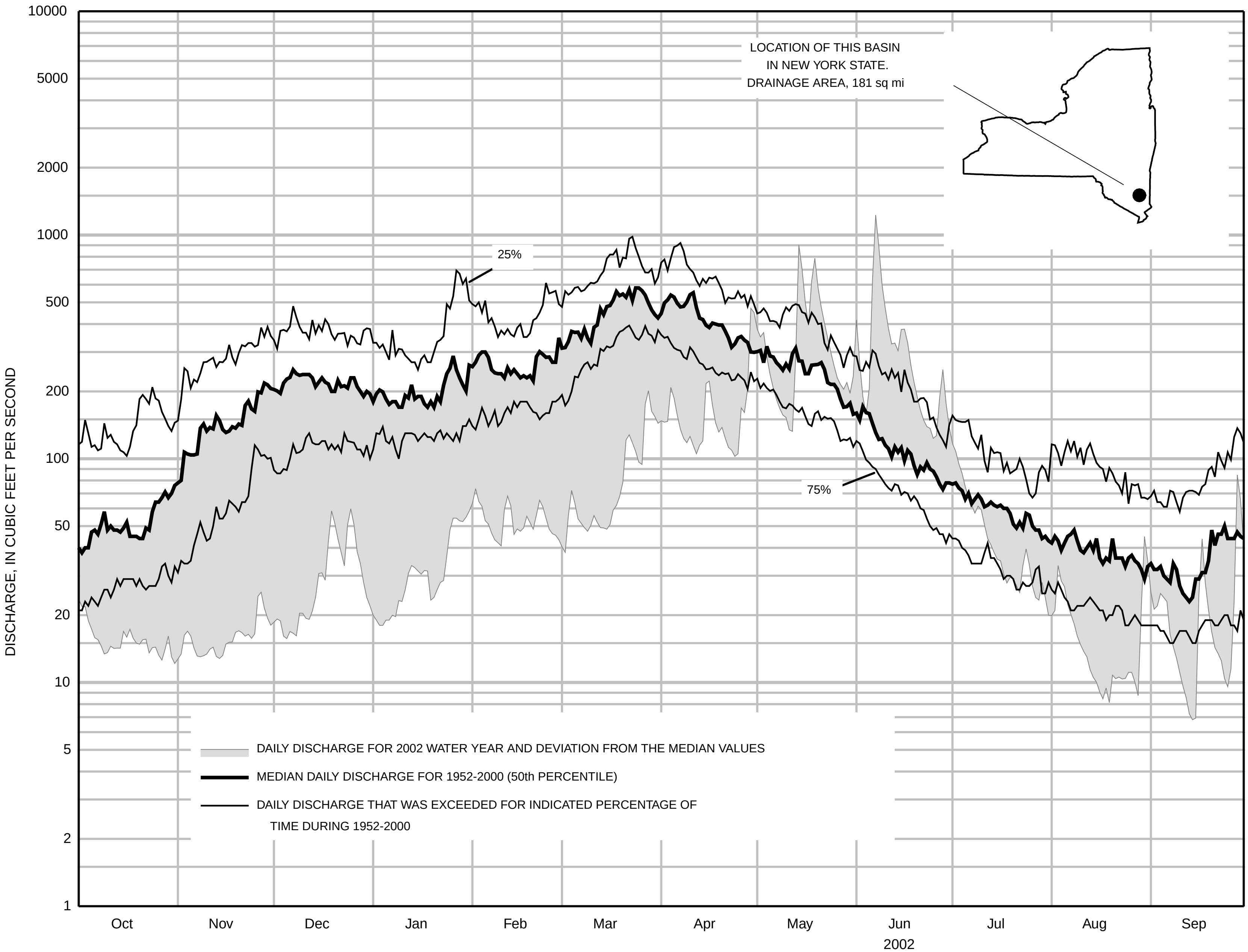

FIGURE 5.--HYDROGRAPHIC COMPARISONS, WAPPINGER CREEK NEAR WAPPINGERS FALLS, NY

Data on water-surface elevation, specific conductance, and water temperature were collected from three sites in the Hudson River estuary (below Poughkeepsie, at South Dock at West Point, and south of Hastings-on-Hudson) and were analyzed to locate the salt front (saltwater/freshwater interface), defined as the location where the specific conductance is 500 microsiemens per centimeter at 25.0°C (µS/cm). Water-surface elevation and temperature at Poughkeepsie were within the range reported for period of record (1992-2002), but the maximum specific conductance (2,900 µS/cm on September 8) exceeded the previous maximum (1995) for the period of record. All data at West Point were within the range for the period of record (1991-2002). Water-surface elevation and specific conductance at Hastings-on-Hudson were within the range reported for the period of record (1992-2002), but the maximum water temperature (29.5°C on August 2 and 4) exceeded the previous maximum (1999) for the period of record. The salt front in 2002 moved within a 51-mile range—from 30 to 81 miles upstream from the Battery in New York City. This upstream movement has been exceeded only once during 10 years of data collection; in 1995 the salt front moved upstream as much as 82 miles upstream from the Battery. The salt front reached or passed the Poughkeepsie gage (01372058, 72.3 miles above the Battery) on 94 days in water year (WY) 2002 and on 51 days in WY 1995.

Daily minimum, maximum, and mean water-temperature data were collected at six sites in the Hudson River Basin and 12 sites in the Delaware River Basin. The maximum recorded water temperature at sites in the Hudson River Basin was 29.5°C on August 2 and 4 at the Hudson River south of Hastings-on-Hudson. The maximum recorded water temperature at sites in the Delaware River Basin was 32.0°C on July 4 at the Delaware River above Lackawaxen River near Barryville. Water-temperature maximums in the Hudson River Basin for the period of record were exceeded at the Diversion from the Schoharie Reservior (1997-2002) on August 6 (24.0°C) and Esopus Creek at Coldbrook (1996-2002) on August 3 and 19 (26.5°C). The water-temperature maximum in the Delaware River Basin for the period of record (1993-2002) was equaled at the Delaware River near Hankins on July 3 and 4 (27.5°C). Water temperatures at all other sites were within the ranges reported for the period of record.

Water samples were collected in the upper Hudson River to monitor movement of PCB’s and sediment. Periodic PCB data were collected at Fort Edward, Stillwater, and Waterford from October through March. Daily sediment-concentration samples were collected at Stillwater from October through March, and at Waterford from October through September. Most (65 percent) of the PCB concentrations were below the method detection limit of 0.005 micrograms per liter, and all PCB concentrations were within the range reported for the period of record (1975-2002) at each site. A new minimum daily mean suspended-sediment discharge at the Hudson River at Stillwater occurred on January 4 (3.3 tons per day); all other daily mean suspended-sediment discharges were within reported ranges for the period of record (1977-2002) at both sites.

Water-quality data from 23 ground-water sites in the Mohawk River Basin were collected in co-operation with the New York State Department of Environmental Conservation. These data describe the ground water’s physical properties and concentrations of major ions, nutrients, heavy metals, volatile organic compounds, agricultural pesticides, and pesticide-degradation products.

Data collected for the Hudson River Basin NAWQA program describe the physical properties and concentrations of pesticides, sediment, nutrients, and major ions, at four surface-water sites in the basin. Data collected for the Statewide Pesticide Monitoring Project describe the concentrations of pesticides and pesticide-degradation products at 6 ground-water sites and 10 surface-water sites statewide and are published in volume 3 (western New York). Data collected at 10 sites on reservoirs for the New York City Reservoir Pesticide Monitoring Project and at the Poughkeepsie water-treatment plant characterize pesticide concentrations in water used for public drinking-water supplies. Data from the Croton Pesticide Monitoring Project describe the concentrations of pesticides and pesticide-degradation products of 30 surface-water sites in the Croton River basin that receive urban and residential runoff.

Suspended-sediment concentration samples were collected at the Hudson River below Poughkeepsie in cooperation with the New York State Department of Environmental Conservation for the Poughkeepsie sediment project. Data were collected to characterize suspended sediment concentrations at a wide range of stream flow conditions.

Surface-water data were collected at two sites in the Delaware River Basin in New York for the Pennsylvania Water-Quality Network. The data describe the water’s physical properties and concentrations of major ions, nutrients, heavy metals, and organic carbon.

Ground Water

Ground-water levels in shallow, water-table aquifers under natural (nonpumping) conditions in eastern New York typically show a seasonal pattern of change during the water year. Water levels rise in response to aquifer recharge from precipitation. Rates of aquifer recharge vary locally and are affected by many factors, including the timing and amount of precipitation, the rate of evapotranspiration, the soil-moisture content, and the amount of local runoff. Evapotranspiration includes physical evaporation, transpiration by vegetation, and ground-water evapotranspiration. Recharge typically is greatest during the late fall and from early to mid-spring, when transpiration is minimal, and the ground is not frozen. Water levels rise during the spring in response to recharge and generally exceed those that occur in the fall, primarily because the melting snowpack provides additional recharge. Water levels decline during the late spring and summer, when plant growth and water temperatures increase the rate of evapotranspiration and thereby reduce the rate of recharge. Storms, if of sufficient intensity and duration, can provide minor recharge to shallow aquifers during summer. Precipitation in New York is (on the average) fairly evenly distributed by month; thus, the annual summer decline in ground-water levels is due primarily to the decrease in recharge that results from increased evapotranspiration.

Confined aquifers are less responsive to recharge events than water-table aquifers. Water levels in confined aquifers generally show a subdued and delayed water-level response to recharge events because their hydraulic connection to the overlying unconfined aquifers is indirect. Changes in atmospheric pressure can cause transient, but significant, water-level changes in wells that tap confined aquifers.

The minimum, maximum, and median long-term monthly water levels and the water levels at seven selected observation wells during the 2002 water year are plotted in hydrographs in figure 6. The hydrographs for well A-654 in Albany County (east-central New York) and well Du-1009 in Dutchess County (southeastern New York) illustrate seasonal water-level fluctuations in water-table, sand and gravel aquifers. Water levels in well A-654 were below the median throughout the 2002 water year. Water levels in well Du-1009 were below the median for most of the water year except during April through June when levels were at or above the median.

Well Oe-151 in Oneida County (northern New York), St-40 in St. Lawrence County (extreme northern New York), and W-533 in Washington County (east-central New York) also reflect seasonal fluctuations in water-table, sand and gravel aquifers. Water levels in well Oe-151 were at or below the median during most of the water year except in mid-March through mid-May, when they were above the median. Water levels in well St-40 were at or above the median for the water year, except during the beginning and end of the water year when they were below the median. Water levels in well W-533, which was re-established back into the network during the 2002 water year, started above the median in June before dropping slightly below the median during July through September.

Water-level conditions at well Cl-145 in Clinton County (extreme northeastern New York) and Ro-18 in Rockland County (southeastern New York) illustrate seasonal fluctuations in semi-confined, bedrock aquifers. Water levels in well Cl-145 were below the median during most of the water year except in May and June, when they were at or above the median. New period-of-record monthly minimum water levels were measured in well Cl-145 for October through February and September. Water levels in Ro-18, which was re-established during the 2002 water year, were at or below the median for May through September.

In summary, the ground-water levels generally were below the long-term median during the 2002 water year except during the spring recharge period when they were at or above the median.

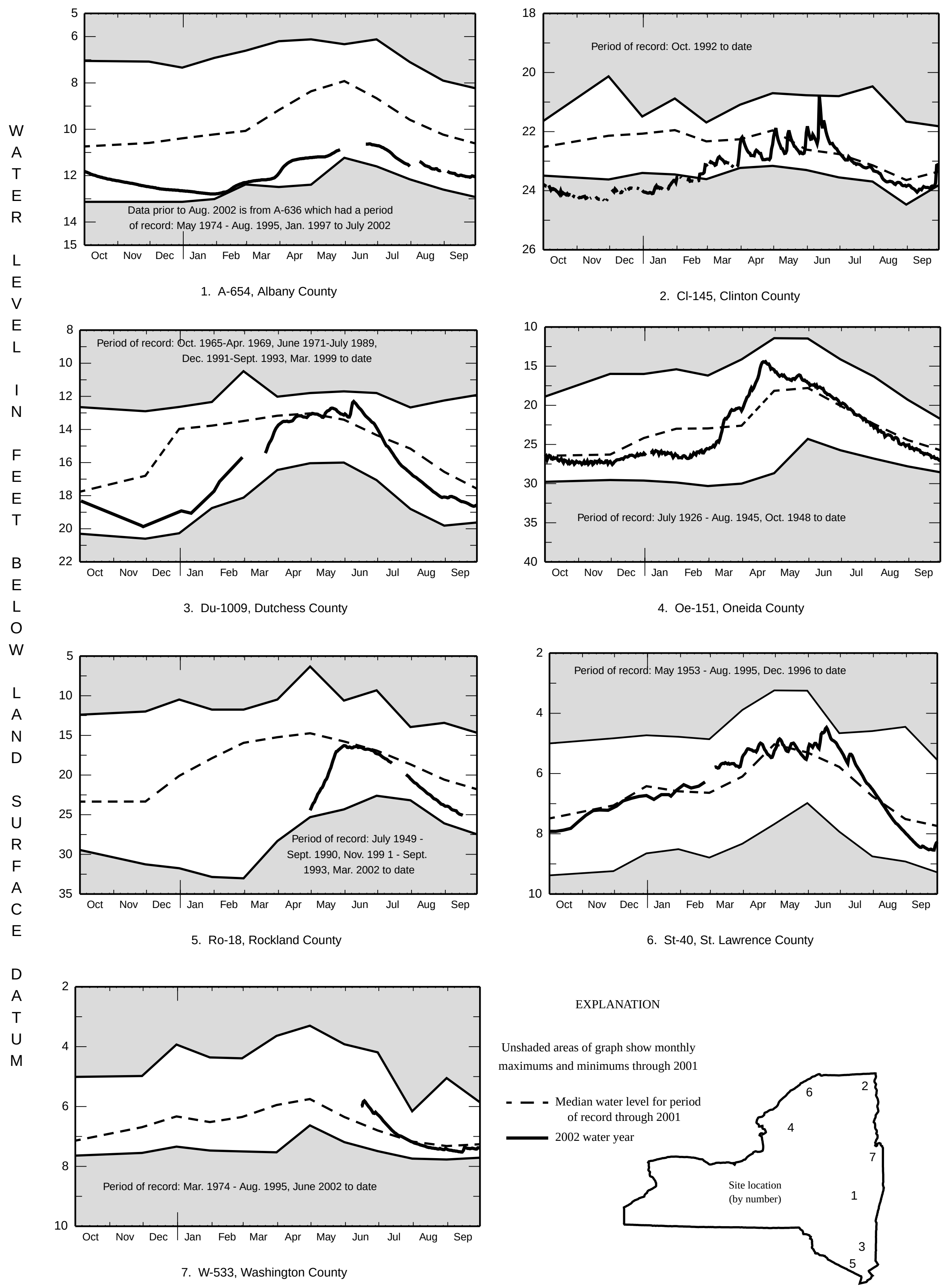

Figure 6.--Ground-water levels at selected observation wells in eastern New York.