INTRODUCTION

Water-resources data for the 2003 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 150 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 21 observation wells. Also included are data for 31 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-03-1.” 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 2003, through cooperative agreement with the Survey are:

Board of Hudson River-Black River Regulating District
City of Albany
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
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

Streamflow during the 2003 water year in eastern New York ranged from slightly below normal to well above normal (fig. 1). Streamflow was highest (110 to150 percent of normal) south of the Mohawk River Valley, and lowest (90 to 100 percent of normal) in the Adirondack Mountains, St. Lawrence River Valley, and Lake Champlain Basin.

Contents of the New York City reservoir system were slightly below normal during October and above normal throughout the remainder of the water year (fig. 2A). Above-normal rainfall in October helped to end the drought that began during the 2002 water year, and consistent precipitation kept the reservoir levels 10 to 20 percent above normal throughout the water year, and near capacity from March through September. Capacities of several reserviors in the system were exceeded, which resulted in flow over the spillways. The volume of water in the Great Sacandaga Lake was 5 to 20 percent above the long-term average (1931-2001) throughout the water year (fig. 2B).

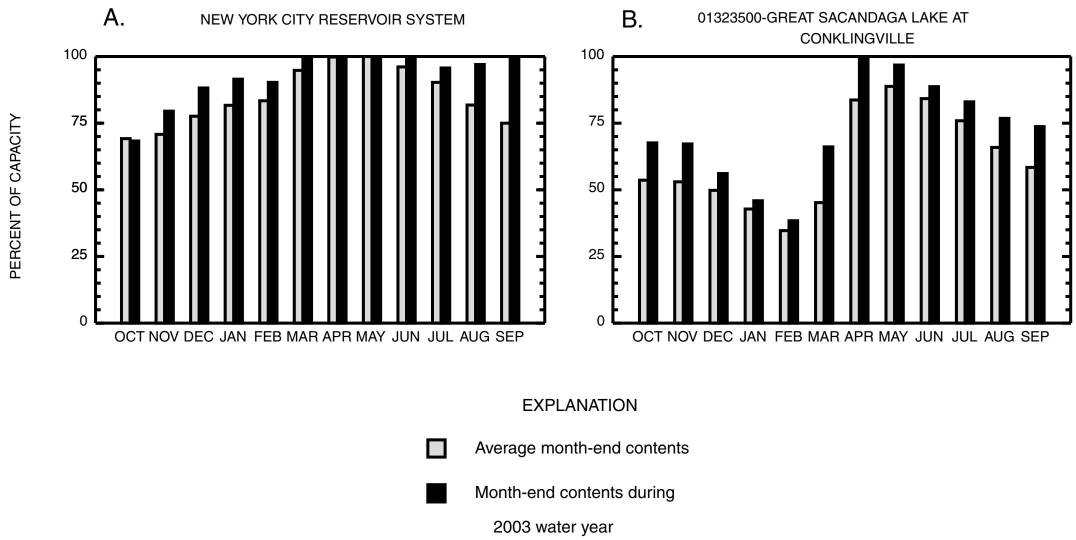

Figure 2.--Comparison of percent of capacity of average month-end reservoir contents and month-end contents during 2003 water year for two selected reservoir systems in eastern New York.

Monthly runoff (in inches) at selected streamflow-gaging stations during 2003, and the average monthly runoff at each site during 1940-99, are plotted in figure 3. Monthly runoff in eastern New York was generally within 1 inch of normal from October through February. March runoff was well above normal throughout eastern New York, and runoff for the remaining months of the water year were mixed--above normal at some stations and below at others. No droughts occurred in this water year.

Daily-discharge hydrographs for the 2003 water year at two unregulated gaging stations in eastern New York—West Branch Oswegatchie River near Harrisville in St. Lawrence County, and Wappinger Creek near Wappingers Falls in Dutchess County, are presented in figures 4 and 5, respectively. Daily streamflow at Wappinger Creek was well above the 25-percent exceedence level (percentage of time that a given discharge is equaled or exceeded) during most of the fall and early winter. A cold winter caused precipitation to be primarily in the form of snow, which resulted in low discharge from late January through early March. A thaw in March melted the snowpack, but below-normal rainfall during April and May caused the discharge to quickly drop to below-median (normal) levels. Normal rainfall was well distributed through early summer, and the above-normal rainfall in August and September caused streamflow to rise to equal the 5-percent exceedence level for both months. 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 during the first half of the water year and in July and September.

October 2002 brought a respite from the hot late-summer weather. Air temperatures throughout eastern New York were 1 to 2°F below normal . Freezing temperatures had occurred over the region by the end of the month. The lowest recorded air temperature was at Big Moose in Herkimer County (8°F). Rainfall was generally 1 to 2 inches above normal over the region, but some areas of the eastern Catskill Mountains received more than 8 inches of rain. Runoff at two streamflow-gaging stations in that region--Schoharie Creek at Prattsville and Beaver Kill at Cooks Falls (fig.3), was about 2 inches above normal; runoff elsewhere was normal. The New York City reservoir contents were at normal levels, and the Great Sacandaga Lake contents were about 15 percent above normal.

Temperatures in November averaged 1°F cooler than normal and were below 0°F in some parts of the Adirondack Mountains toward the end of the month. Precipitation was normal in most areas except the Mohawk River Valley, which received about 75 percent of the normal precipitation, and the Hudson River Valley, which received about 140 percent of the expected precipitation. A lake-effect storm dumped 4 feet of snow on the Tug Hill Plateau. Runoff was generally normal except in the southeastern region, where it was about 2 inches above normal. Reservoir contents were about 10 percent above normal.

Cool weather continued through December. Temperatures averaged 1°F below normal. Precipitation in the Hudson River Valley was above normal, and that in the Mohawk River Valley was below normal. A Christmas nor’easter blanketed New York with 10 to 39 inches of snow. Cold temperatures in the north caused the formation of river ice, and streamflow decreased to below-normal levels, especially at West Branch Oswegatchie River near Harrisville. Streamflows south of the Mohawk River Valley were generally above normal, and reservoir contents were about 10 percent above normal.

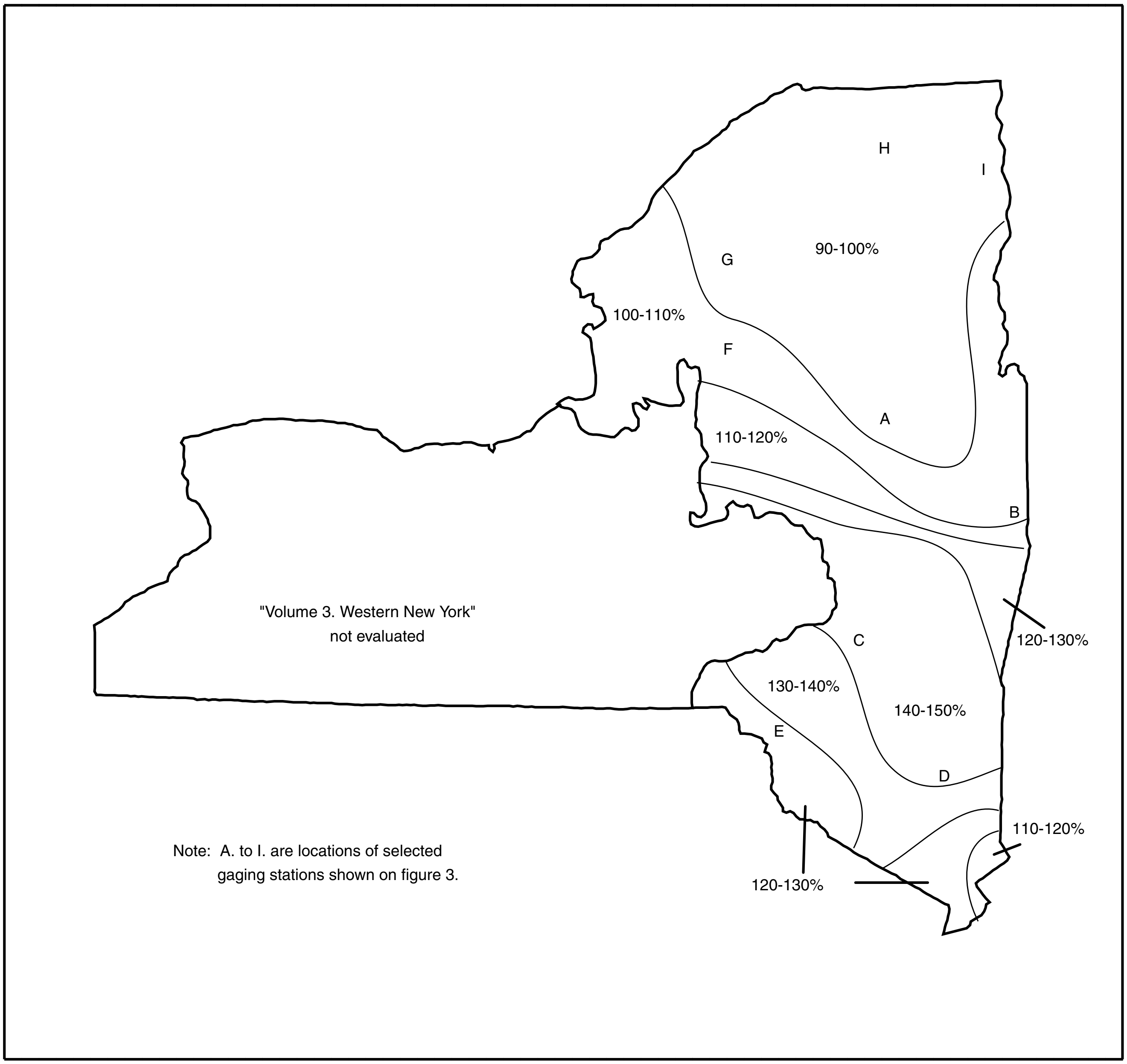

Figure 1.--2003 water year runoff as a percentage of the average annual runoff for 1940-99 for eastern New York excluding Long Island.

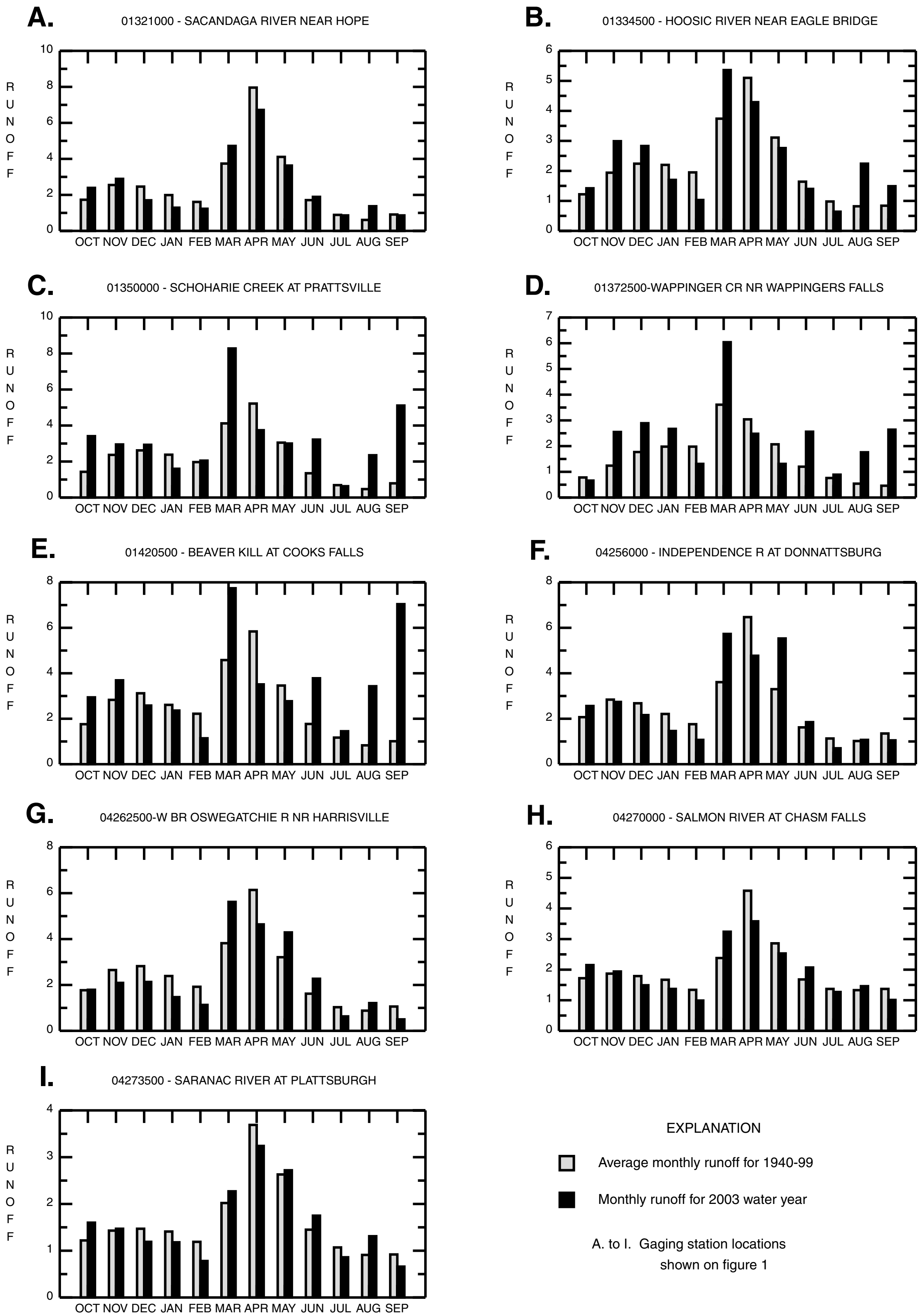

Figure 3.--Comparison of monthly runoff (in inches) for 2003 water year and average monthly runoff for 1940-99 for selected gaging stations in eastern New York (site locations are shown on figure 1).

SUMMARY OF HYDROLOGIC CONDITIONS--Continued

Air temperature in January was about 6°F colder than normal, and temperatures below 0°F occurred throughout the region. Several weather stations in the Adirondack Mountains reported temperatures as low as -37°F. Heavy lake-effect snowfall occurred in the Tug Hill Plateau and western Adirondack Mountain regions; monthly total depths of 70 to 114 inches were reported. Normal precipitation occurred to the south and east. Streamflow at most stations was slightly below normal, but at Wappinger Creek near Wappingers Falls, runoff was about 1 inch of above normal. The New York City reservoir contents were at 90 percent of capacity (10 percent above normal) by January 31; the Great Sacandaga Lake contents decreased to about 60 percent of capacity, also about 10 percent above normal, by the end of January.

Cold weather continued through February. Temperatures averaged about 5°F below normal, and several towns in the Adirondack Mountains recorded temperatures of -30°F. Precipitation throughout the region was near normal . Streamflow was about 1 inch below normal as the low temperatures kept moisture locked in the snowpack. The New York City reservoir contents remained at 90 percent of capacity whereas the level of the Great Sacandaga Lake was drawn down to about 35 percent of capacity. The levels of both reservoir systems were about 10 percent above normal at the end of February.

Early March remained cold, but temperatures rebounded to 60 to 70°F by the end of the month. Although precipitation was within 1 inch of normal, the warm tempertures resulted in snowmelt and caused streamflow to be abundant throughout the region. Runoff ranged from 1 to 4 inches above normal. A new March monthly maximum-discharge record was recorded at East Branch Delaware River at Harvard. Runoff at Wappinger Creek and West Branch Oswegatchie River was about 2 inches above normal. Most streamflow-gaging stations throughout southeastern New York recorded their annual maximum instantaneous discharge during March. The New York City reservoir system was at nearly 100 percent of capacity. Contents of the Great Sacandaga Lake increased to about 65 percent in response to the late winter snowmelt; which was 20 percent above normal for the end of March.

April was cooler and drier than normal. Many areas recieved only 50 to 75 percent of the expected precipitation. Consequently, streamflow rapidly decreased to below normal levels throughout eastern New York. The New York City reservoir system and the Great Sacandaga Lake were at 100 percent of capacity by April 30, however.

Cool weather prevailed over eastern New York during May. Air temperatures were 1 to 2°F below normal, and most areas received normal rainfall. The western Adrondack Mountain region was the wettest with rainfall about 2 inches above normal. Leaf emergence triggered transpiration and, combined with the dry soils, caused streamflow to decline to about an inch below normal in most areas. In the northwest however, streamflows of West Branch Oswegatche River and Independence River at Donnattsburg were 2 to 3 inches above normal, respectively. Reservoir contents remained near 100 percent of capacity.

June temperatures in eastern New York were about 1 to 2°F below normal , except in the northern areas where they were about normal. Rainfall was quite variable and amounts ranged from about 8 inches (200% of normal) in extreme southeastern areas to 3 inches (about 1 inch below normal) in the Adirondack Mountain region. Runoff south of the Mohawk River was about 200 percent of normal, but was normal from there northward. Reservoir contents in the New York City system remained about 100 percent of capacity, and the Great Sacandaga Lake contents were above normal at 85 percent of capacity.

Air temperatures in July were normal, and rainfall were within an inch of normal. Streamflow decreased but remained near normal. Reservoir contents decreased about 10 percent but stayed within the normal range.

August monthly mean temperatures ranged from 2 to 4°F above normal but readings rarely exceeded 90°F. Rainfall was slightly above normal except in the Catskill Mountains and lower Hudson Valley, where it was 150 percent of normal. A weather station near Slide Mountain in Ulster County received 11 inches of rain during August. Consequently, runoff south of the Mohawk River was well above normal. New August monthly maximum discharges were recorded at two stations in the Catskill Mountains. Reservoir contents were near capacity in the New York City reservoir system, and about 15 percent above normal in the Great Sacandaga Lake.

Air temperature in September was about 2°F warmer than normal. The region south of the Adirondack Mountains was fairly wet; the Catskill Mountains and lower Hudson River Valley received more than 9 inches of rainfall--twice the normal amount. In contrast, the St. Lawrence River and Lake Champlain Valleys received only about 3 inches of rain. The New York City reservoir contents were about 15 percent below normal for September, whereas the Great Sacandaga Lake contents remained normal. The antecedent moisture from August combined with this month's abundant rainfall resulted in record September monthly discharges at several long-term streamflow-gaging stations in the Catskill Mountain region as shown in the following table.

Station number and name	Period of record	Previous September maximum of record		New September maximum of record (ft^3/s)
		Discharge (ft^3/s)	Water year	
01365000 Rondout Cr nr Lowes Corners	1937-	185	1987	243
01414500 Mill Bk nr Dunraven	1937-	116	1938	166
01417500 East Br Delaware R at Harvard	*1955-	653	1964	1,524
01420500 Beaver Kill nr Cooks Falls	1913-	946	1938	1,521
01420980 East Br Delaware R abv Read Cr at Fishs Eddy	*1955-	1,838	1960	3,386
01434025 Biscuit Bk abv Pigeon Bk nr Frost Valley	1983-	17.4	1987	27.0
01435000 Neversink R nr Claryville	1937-49, 1951-	336	1979	504

* Since construction of Pepacton Reservoir.

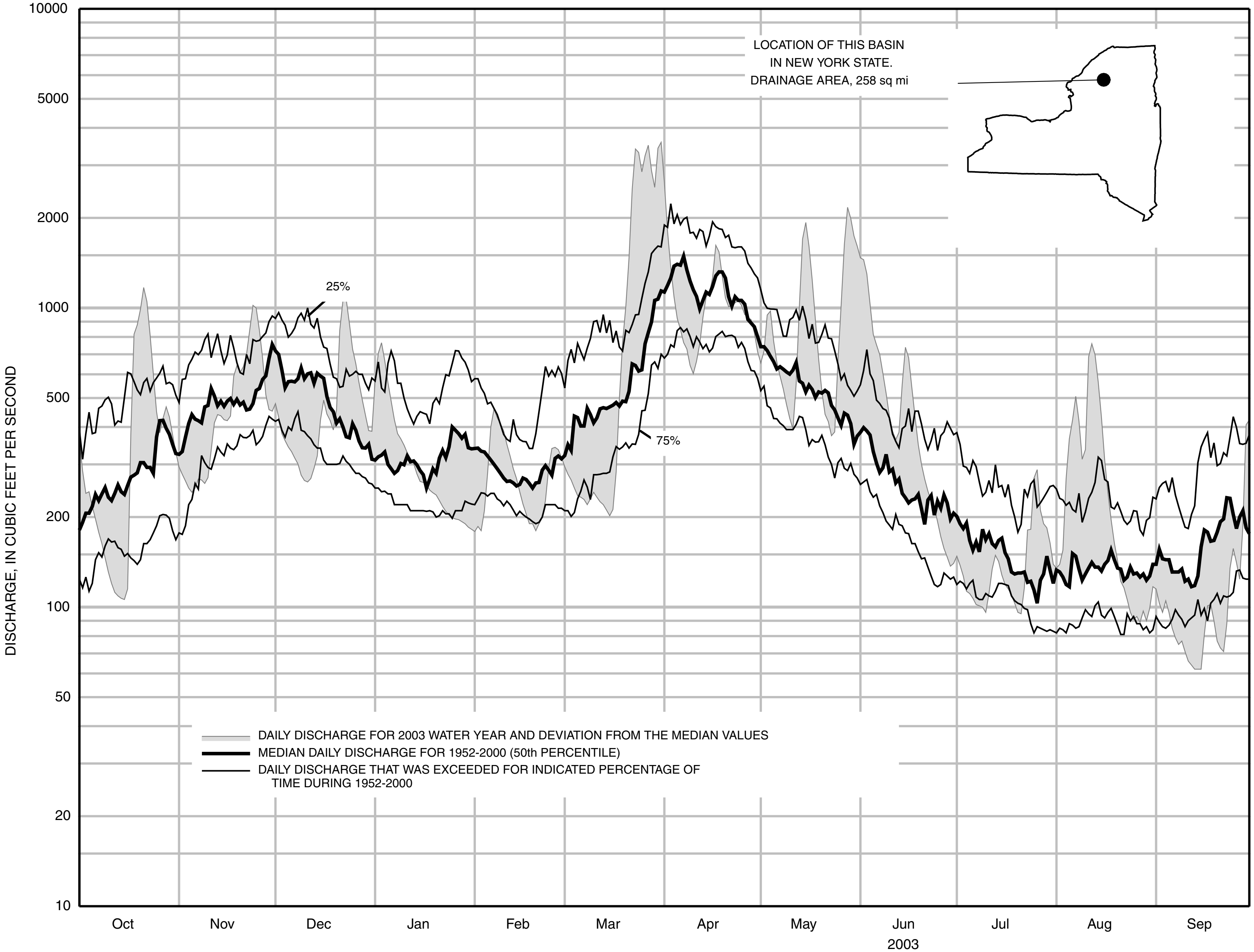

FIGURE 4.--HYDROGRAPHIC COMPARISONS, WEST BRANCH OSWEGATCHIE RIVER NEAR HARRISVILLE, NY

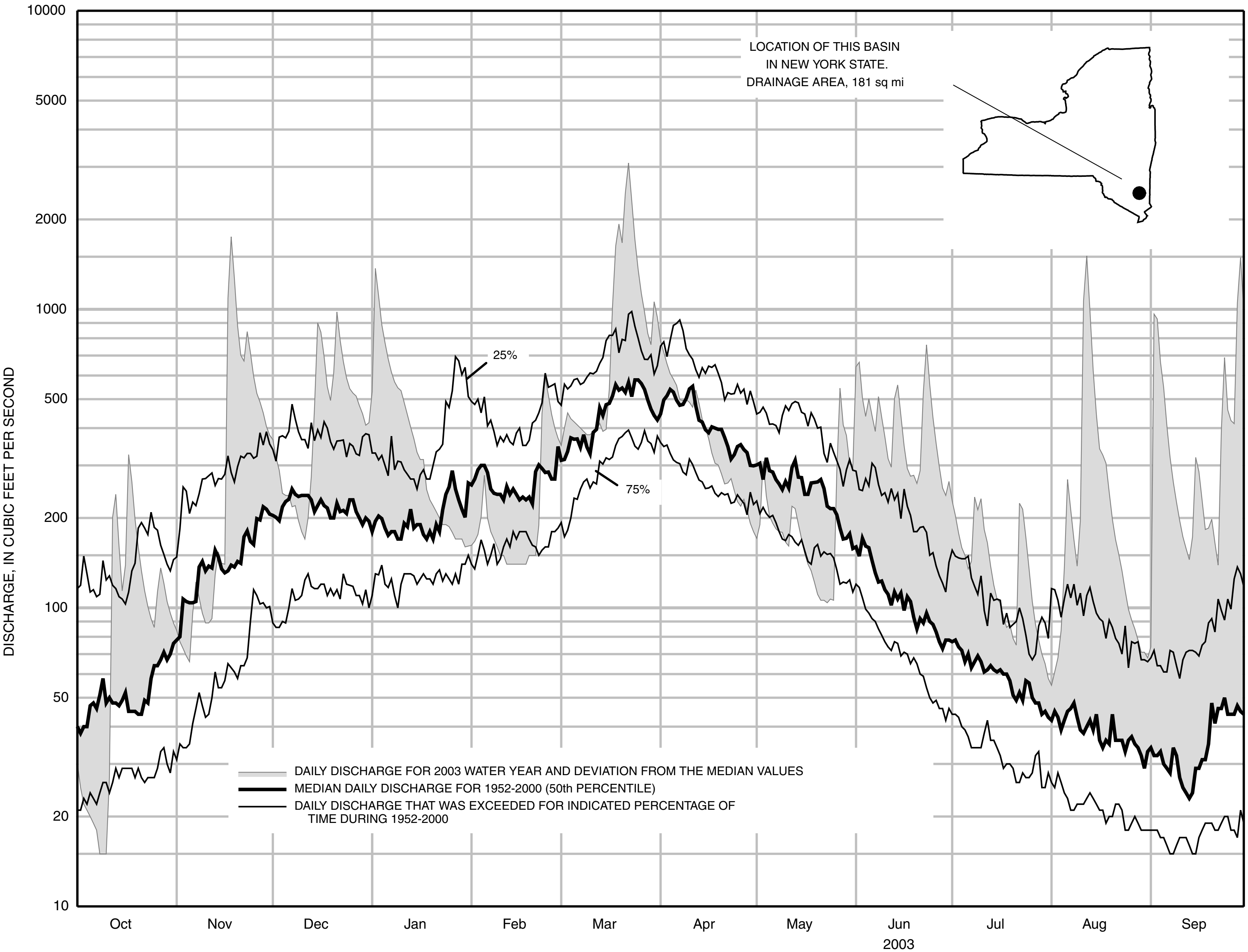

FIGURE 5.--HYDROGRAPHIC COMPARISONS, WAPPINGER CREEK NEAR WAPPINGERS FALLS, NY

Water Quality

The water-quality data presented herein include water temperature, specific conductance, and concentrations of nutrients, major ions, pesticides, 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.

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, specific conductance, and temperature at all three sites were within the ranges reported for period of record (1991-2003 for West Point; 1992-2003 for Poughkeepsie and Hastings-on-Hudson). The salt front in 2003 moved from less than 10 to 77 miles upstream from the Battery in New York City—a range of more than 67 miles. This upstream movement has been exceeded four times during 11 years of data collection; in 1995 the salt front moved as far as 82 miles upstream from the Battery.

Daily minimum, maximum, and mean water-temperature data were collected at seven sites in the Hudson River Basin and at 12 sites in the Delaware River Basin. The maximum recorded water temperature at sites in the Hudson River Basin was 28.5°C on August 22 at the Hudson River south of Hastings-on-Hudson; the maximum recorded water temperature at sites in the Delaware River Basin was 29.0°C on July 6 and 8 at the Delaware River above Lackawaxen River near Barryville. Water temperatures at all sites were within the ranges reported for the period of record, except Patroon Creek above Northern Boulevard at Albany, which is a new site.

Daily sediment-concentration samples were collected throughout the year in the Hudson River at Waterford to monitor movement of sediment in the upper Hudson River basin. Daily mean suspended-sediment discharges were within the reported range for the period of record (1977-2002).

Data collected for the Hudson River Basin National Water-Quality Assessment program document the physical properties of surface water at four surface-water sites in the basin and the concentrations of pesticides, sediment, nutrients, and major ions. Data collected for the Statewide Pesticide Monitoring Project document 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 characterize pesticide concentrations in water used for public drinking-water supplies. Data from the Croton Pesticide Monitoring Project document 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 document suspended sediment concentrations at a wide range of stream flow conditions.

Ground Water

Ground-water levels in shallow, water-table aquifers under natural (non-pumping) 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 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. Storms, if of sufficient intensity and duration, can provide minor recharge to shallow aquifers during summer. Precipitation in New York is (on the average) 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.

During the 2003 water year, ground-water levels generally were near or above long-term medians. Minimum, maximum, and median long-term monthly water levels and water levels during the 2003 water year at seven selected observation wells 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 above the median most of the 2003 water year, except during October and November when levels were at or below the median. Water levels in well Du-1009 were above the median for most of the water year except during February and May when levels were at or below the median. In November, December, and March, new monthly maximum water levels were measured for the period-of-record in well Du-1009.

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 the water year except April through August, when levels were above the median. Water levels in well St-40 were at or above the median for the water year, except during February and September when they were below the median. Water levels in well W-533 were at the median for the water year except for November and March when they were above the median. In November, a new monthly maximum water level was measured for the period of record in well W-533.

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, August, and September, when they were at or above the median. In March, a new monthly minimum water level was measured for the period of record in well Cl-145. Water levels in Ro-18 were at or below the median for most of the water year except in June and September. In March, a new monthly maximum water level was measured for the period of record in well Ro-18.

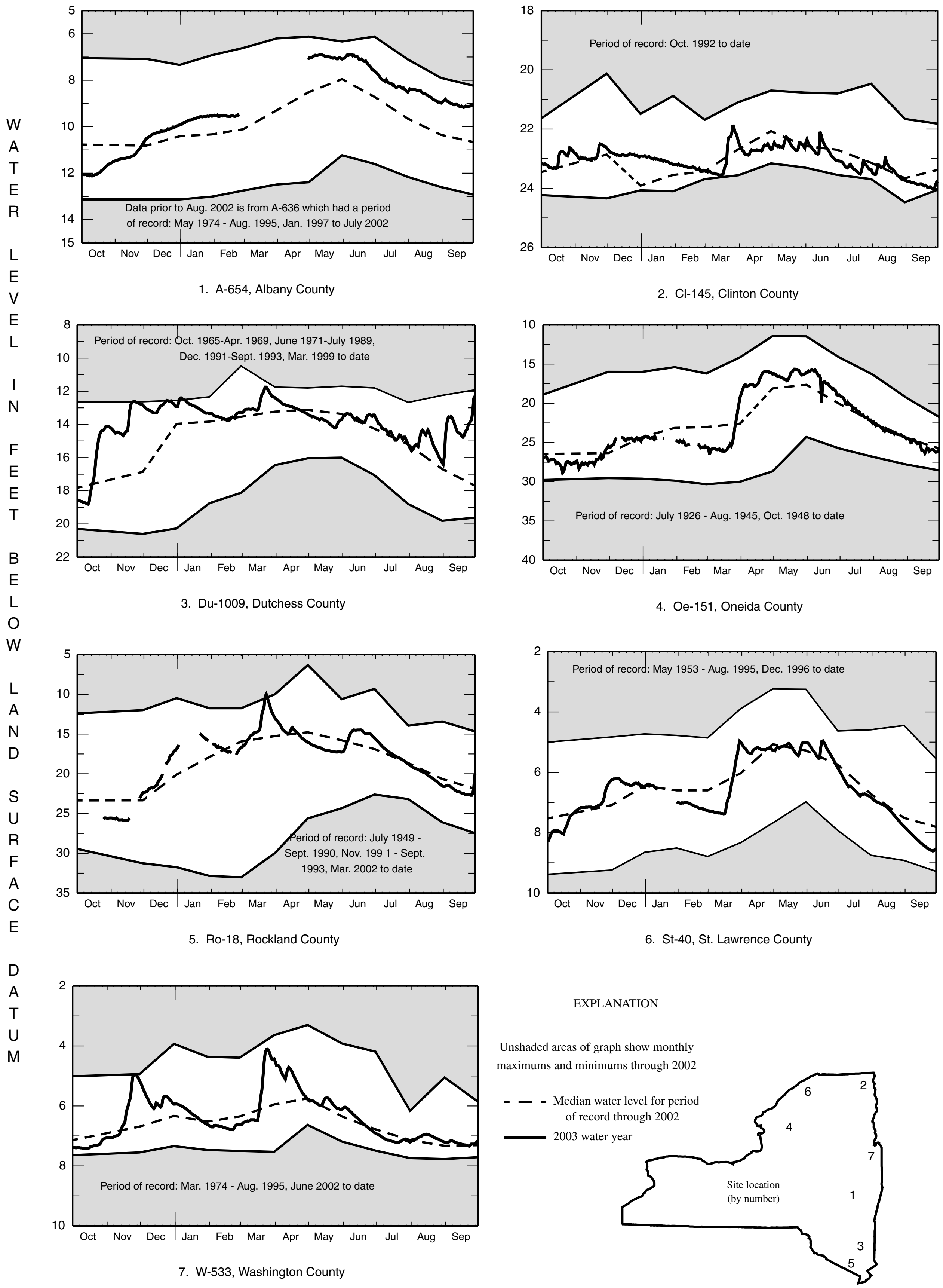

Figure 6.--Ground-water levels at selected observation wells in eastern New York.