INTRODUCTION

Water resources data for the 2003 water year for New York consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; ground-water levels and water quality; and precipitation quality. This volume contains records for water discharge at 72 gaging stations; stage only at 14 gaging stations; stage and contents at 6 gaging stations; water quality at 7 gaging stations, 62 wells, and 19 partial-record stations; water levels at 27 observation wells; daily precipitation totals at 3 sites, and chemical quality of precipitation at 1 site. Also included are data for 39 crest-stage partial-record stations. Locations of these sites are shown on figure 1. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as measurements made at miscellaneous sites. 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 1 and 2 represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in New York.

Records of discharge and stage of streams, and contents or 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 chemical 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 in the United States or may be purchased from the Distribution Branch, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

For water years 1961 through 1970, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1970 were similarly released either in separate reports or in conjunction with streamflow records.

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–02–3." These 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 Chief 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 3, water year 2003, through cooperative agreement with the Survey are:

New York State Department of Environmental Conservation

New York State Department of Transportation

New York State Thruway Authority

County of Chautauqua, Planning Department

County of Monroe, Department of Health

County of Onondaga, Department of Water Environment Protection

County of Onondaga, Water Authority Commission

County of Onondaga, Soil and Water Conservation District

City of Auburn

City of Ithaca

Town of Amherst, Erie County

Town of Cheektowaga, Erie County

Irondequoit Bay Pure Waters District

Village of Victor

Assistance in the form of funds for collecting records at gaging stations published in this report was also given by the U.S. Army Corps of Engineers, National Weather Service, Onondaga Lake Management Conference, and U.S. Environmental Protection Agency.

The following organizations aided in collecting records:

Municipalities of Batavia, Canandaigua, Jamestown, Lancaster, Oneida, Rochester, Syracuse; Cornell University; New York State Electric and Gas Corporation; Niagara Mohawk Power Corporation (Orion Power New York); Rochester Gas and Electric Corporation.

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS[1]

Surface Water

Streamflow in western New York during the 2003 water year was characterized by above-average annual mean discharges at most index sites (table 1). The greatest departures from normal occurred during June, July, August, and September (table 2), when monthly mean discharges averaged 254, 290, 568, and 368 percent of the normal monthly means. Departures from the median discharges at two index stations—Susquehanna River at Conklin and Allegheny River at Salamanca—are shown in figures 1 and 2.

The 2003 water year began with variable amounts of precipitation and near-normal air temperatures. Streamflow during October 2002 was excessive (upper 25 percent of the record) in the Eastern Plateau and the Central Lakes regions and normal to deficient (lower 25 percent of the record) further to the west. November was cooler with normal precipitation. Streamflow conditions throughout western New York remained essentially the same as they were during October.

Air temperatures in December averaged colder than normal. Precipitation during the month throughout western New York was above normal. Most of the precipitation fell as snow. Snowfall across western New York ranged from about 14 inches in Elmira to over 40 inches in Rochester and Syracuse. Streamflow remained at or decreased to normal at most index sites.

Air temperatures in January 2003 remained below normal for the month (5.5^{o} F below), and precipitation was above normal. Rochester and Syracuse again reported more than 40 inches of snow and Oswego reported 77.7 inches of snow for the month. Streamflowin January was normal at all index sites. February was the fifth consecutive month with colder-than-normal temperatures. Precipitation for the month was at or near normal, although large amounts of snow fell over parts of western New York. Streamflow either remained normal or decreased to deficient at all index sites.

March marked then end of the string of consecutive colder-than-normal months. The average temperature across the State equalled the long-term norm. Snow continued to fall across the State during the month but precipitation was slightly below normal. Streamflow, however, increased at all index sites in response to snowmelt from warm temperatures at the end of the month. In April, temperatures and precipitation were below normal. Streamflow decreased to either normal or deficient at all index sites

Temperatures in May were again below normal across the State. Precipitation throughout much of western New York was above normal for the month. As a result, streamflow was normal at all index sites. In June, the pattern of below normal temperatures continued. Precipitation ranged from normal to above normal across western New York. Streamflow at all index sites either remained normal or increased to excessive for the month.

July brought warm, wet weather to the western part of the State. The Statewide average precipitation was 4.67 inches (123 percent of normal). The Western Plateau averaged 7.43 inches of rain, which was nearly twice the normal monthly rainfall. Streamflow was excessive at most index sites for the month of July. The Genesee River at Wellsville had its highest monthly mean discharge on record for July, and the Allegheny River at Salamanca had its second highest monthly mean discharge on record for July.

Temperatures and precipitation were again above normal during August. The Eastern Plateau was the wettest region with 151 percent of normal precipitation. Streamflow in August was excessive at all index sites. The Genesee River at Wellsville and the Allegheny River at Salamanca both had their highest monthly mean discharges on record for August. Flint Creek at Phelps, Chemung River at Chemung, and Unadilla River at Rockdale had their third highest monthly mean discharges on record for August.

September was the third consecutive month with above average temperatures and precipitation. The Statewide precipitation average was 5.49 inches. The Eastern Plateau was the wettest region with over 8 inches of rain (207 percent of normal). Streamflow either remained excessive or decreased to normal at all index sites. The Chemung River at Chemung again had its third highest monthly mean discharge on record and the Genesee River at Wellsville had its fourth highest mionthly mean discharge on record for September.

[1]Climatological data used in this summary are from monthly weather summaries published by the Northeast Regional Climate Center, Cornell University, Ithaca, N.Y.

Table 1.--Mean discharges for selected streams for water year 2003 and mean annual discharges for the period of record.
[Locations are shown in fig. 4. Discharges are in cubic feet per second.]

Station no.	Name	Period of record	Mean annual discharge for period of record	Mean discharge for 2002 water year	Percent difference
01502500	Unadilla River at Rockdale	1930-33, 37-95, 2002	841	1,057	+ 25.7
01503000	Susquehanna River at Conklin	1913–2002	3,572	4,522	+ 26.6
01512500	Chenango River near Chenango Forks	1913–2002	2,414	2,991	+ 23.9
01531000	Chemung River at Chemung	1906–13, 1915–2002	2,554	3,451	+ 35.1
03011020	Allegheny River at Salamanca	1904–2002	2,769	3,224	+ 16.4
04213500	Cattaraugus Creek at Gowanda	1940-97, 2002	748	774	+ 3.5
04217000	Tonawanda Creek at Batavia	1944–2002	213	219	+ 2.8
04221000	Genesee River at Wellsville	1955-58, 1973-2002	385	505	+ 31.2
04230500	Oatka Creek at Garbutt	1946-2002	215	210	- 2.3
04234000	Fall Creek near Ithaca	1926–2002	186	214	+ 15.0
04235250	Flint Creek at Phelps	1960–1995	89.7	92.3	+ 2.9
04243500	Oneida Creek at Oneida	1950–2002	166	237	+ 42.8

Table 2.--Monthly mean discharge for water year 2003 at selected sites, as percentage of period-of-record monthly median discharge.
[Locations are shown in fig. 4.]

Station no.	Name	Period of record	Monthly mean discharge, as percentage of monthly median discharge			
			June	July	Aug	Sep
01502500	Unadilla River at Rockdale	1930-33, 1937-95, 2002	230	202	356	372
01503000	Susquehanna River at Conklin	1913–2002	317	156	252	475
01512500	Chenango River near Chenango Forks	1913–2002	256	247	378	328
01531000	Chemung River at Chemung	1906–13, 1915–2002	368	541	1,100	758
03011020	Allegheny River at Salamanca	1904–2002	231	551	887	566
04213500	Cattaraugus Creek at Gowanda	1940-97, 2001-02	175	209	274	166
04217000	Tonawanda Creek at Batavia	1944-2002	276	119	413	228
04221000	Genesee River at Wellsville	1955-58, 1973-2002	211	652	1,800	792
04230500	Oatka Creek at Garbutt	1946–2002	244	126	216	127
04234000	Fall Creek near Ithaca	1926–2002	172	318	300	258
04235250	Flint Creek at Phelps	1960-95	269	163	602	211
04243500	Oneida Creek at Oneida	1950–2002	302	200	237	132

Water Quality

Samples of atmospheric deposition, ground water, and surface water were collected at several sites throughout Monroe County for chemical analysis. (Locations are shown in fig. 5). Analyses indicated no significant changes from previous years. Concentrations of all constituents monitored were within the historical range of the period of record for each station. Sites are periodically added to, or dropped from, this monitoring network, which currently emphasizes the Irondequoit Creek basin but is being expanded to other parts of Monroe County. Constituent concentrations were used with streamflow data to calculate long-term trends in concentration and constituent loadings, which are used by county managers to assess environmental effects of land-use changes and water-resource-management practices. Water samples were analyzed by the Monroe County Environmental Health Laboratory in Rochester, N.Y.

Suspended-sediment samples from the Tully Valley mudboil/depression area (MDA) for the 2003 water year indicated a variable rate of sediment loading to Onondaga Creek from active mudboils, but the average sediment load increased to about 1.4 tons per day. This loading rate is slightly higher than previous water years due to several months of mudboil activity within the MDA as well as additional sediment discharge from another mudboil containment area just downstream from the MDA. The location of the sediment sampling point was moved downstream on Tributary #6 from the MDA flume to include the second mudboil area. Discharge of sediment to Onondaga Creek Tributary #6 from this newer mudboil area varies, but usually has a similar sediment concentration to that formerly measured at the sampling point just downstream of the MDA.

Water-quality analyses of springs along Onondaga Creek from the headwaters to Onondaga Lake during the 2003 water year indicated that mineralized discharges occur in the central and northern part of Tully Valley segment (from mudboils, depressurizing wells, and landslide areas at the base of Bare Mountain) and from brine springs adjacent to Onondaga Lake. Freshwater springs discharge from the Tully Moraine and from springs located on the east and west valley walls near the southern part of the city of Syracuse.

Water samples were collected for pesticide analyses from selected lakes, reservoirs, and wells that serve as sources of drinking water throughout upstate New York, as part of the Statewide Pesticide Monitoring Project in cooperation with the New York State Department of Environmental Conservation. More than 22 samples from 6 surface-water and 2 ground-water sites in western New York were analyzed for 60 or more pesticides or degradates this year. The analytical detection limits ranged from 0.001 to 0.05 µg/L. Trace levels of a few pesticides—mainly atrazine, metolachlor, and their degradates—were detected at several sites, but the concentrations did not exceed any Federal or New York State standards for drinking water.

Water samples were collected from selected public-supply wells and private resdential wells to describe the chemical quality of ground water throughout the Chemung River basin upgradient of Waverly, New York. Samples of raw, untreated water from these wells were analyzed for physical properties, inorganic constituents, nutrients, metals, radionuclides, pesticides, and volatile organic compounds. Two samples exceeded the chloride Secondary Maximum Contaminant Level (SMCL) of 250 milligrams per liter. The U.S. Environmental Protection Agency Drinking Water Advisory for sodium (30 to 60 milligrams per liter) was exceeded in 11 samples. The SMCL for aluminum (200 micrograms per liter) was exceeded in one sample. The Maximum Contaminant Level (MCL) for barium (2,000 micrograms per liter) was exceeded in one sample. The SMCL for iron (300 micrograms per liter) was exceeded in 11 samples. The SMCL for manganese (50 micrograms per liter) was exceeded in 20 samples. The MCL fro radon (300 Pico curies per liter) was exceeded in 34 samples.

Ground Water

Ground-water levels in shallow, unconfined aquifers in western New York typically show a seasonal pattern—a sharp rise during the spring in response to aquifer recharge from precipitation, and a gradual decline from summer through early fall. Aquifer recharge varies locally and seasonally and is affected by many factors, including the timing and amount of precipitation, the soil-moisture content, the amount of local runoff, and the rate of evapotranspiration. Evapotranspiration consists of physical evaporation, transpiration by vegetation, and ground-water evapotranspiration. Typically, recharge is greatest during the late fall and from early to mid-spring, when transpiration is minimal, and the ground is not frozen and allows infiltration. Water levels rise during the spring and typically exceed those reached in the preceding fall, mainly as a result of recharge from the melting snowpack. Water levels decline during the late spring and summer, when plant growth and rising water temperatures increase the rate of evapotranspiration and, thus, reduce the rate of recharge. Storms of sufficient intensity and duration provide minor recharge to shallow aquifers during summer. Precipitation in New York is (on average) fairly evenly distributed from month to month; thus, the annual summer decline in ground-water levels is due primarily to a reduction in recharge from increased evapotranspiration.

Water levels in confined aquifers generally are less responsive to individual storms than those in unconfined aquifers; the response in confined aquifers is generally subdued and delayed because their hydraulic connection to the overlying unconfined aquifers is indirect.

The minimum, maximum, median long-term monthly, and current water levels at three observation wells during the 2003 water year are shown in the hydrographs in figure 3. The hydrograph for well Ct-121 in Cattaraugus County (western New York) illustrates the water-level fluctuations under natural (nonpumping) conditions in a confined sand and gravel aquifer; the hydrograph for well Og-23 in Otsego County (central New York) illustrates seasonal water-level fluctuations under natural conditions in a shallow, unconfined till aquifer; and the hydrograph for well Cm-622 in Chemung County (south-central New York) illustrates water-level fluctuations under natural conditions in an unconfined sand and gravel aquifer.

Water levels under confined conditions at well Ct-121 were below the median throughout the entire water year except for part of August, when they were above the median. Water levels at well Og-23 were above the median from October to November, just above or below the median in December through mid July, and well above the median throughout the remainder of the water year; water levels were at and near maximum values in early August. Water levels at well Cm-622 were below the median in October, above the median during November through mid-April, then declined to below the median in for the rest of April and May. In June, water levels were again above the median before dropping to just below the median during the first part of July. From mid-July through September, water levels were well above the median. Water levels at this well were affected by water-level changes in Newtown Creek.

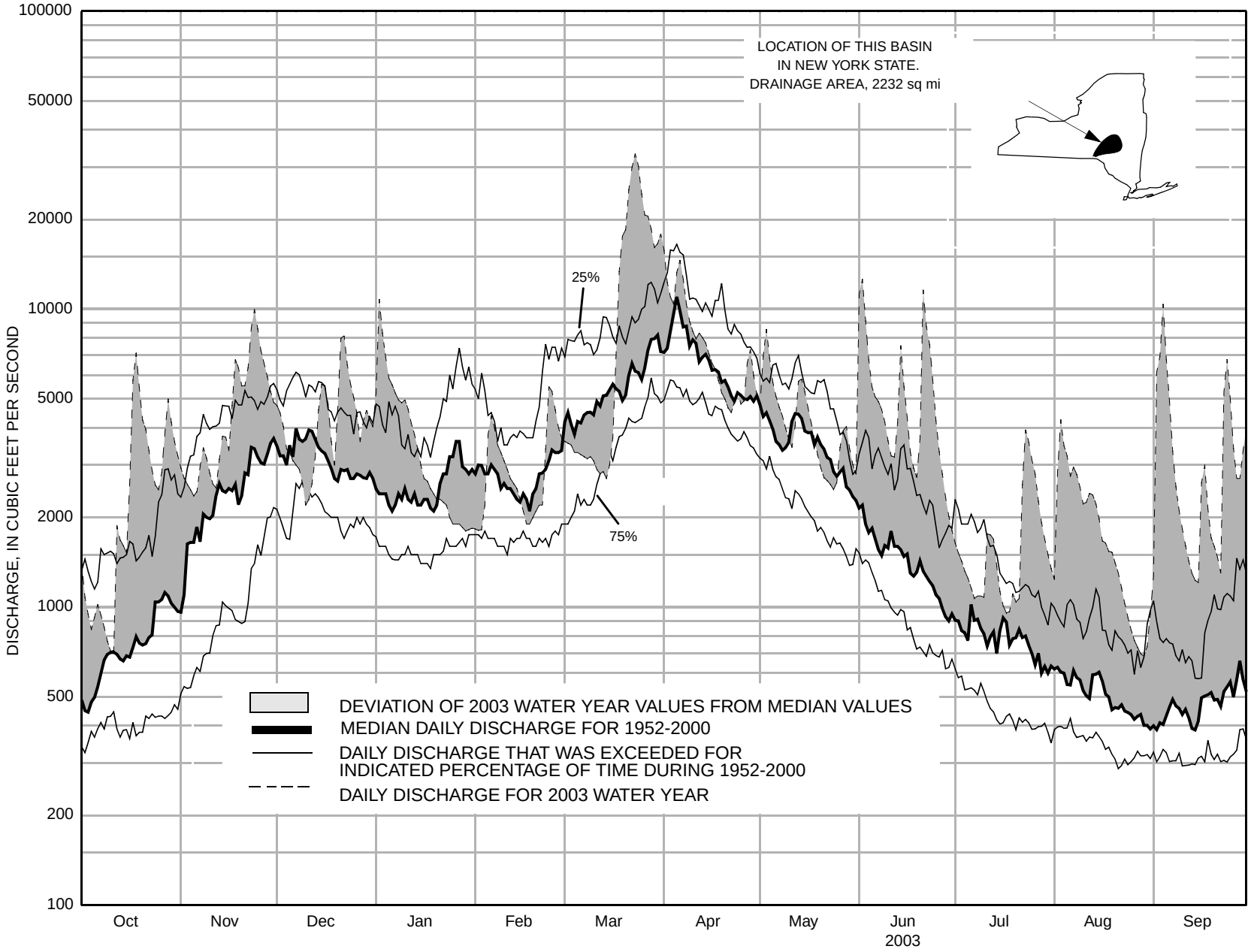

Figure 1.--Hydrographic Comparisons, Susquehanna River at Conklin, N.Y.

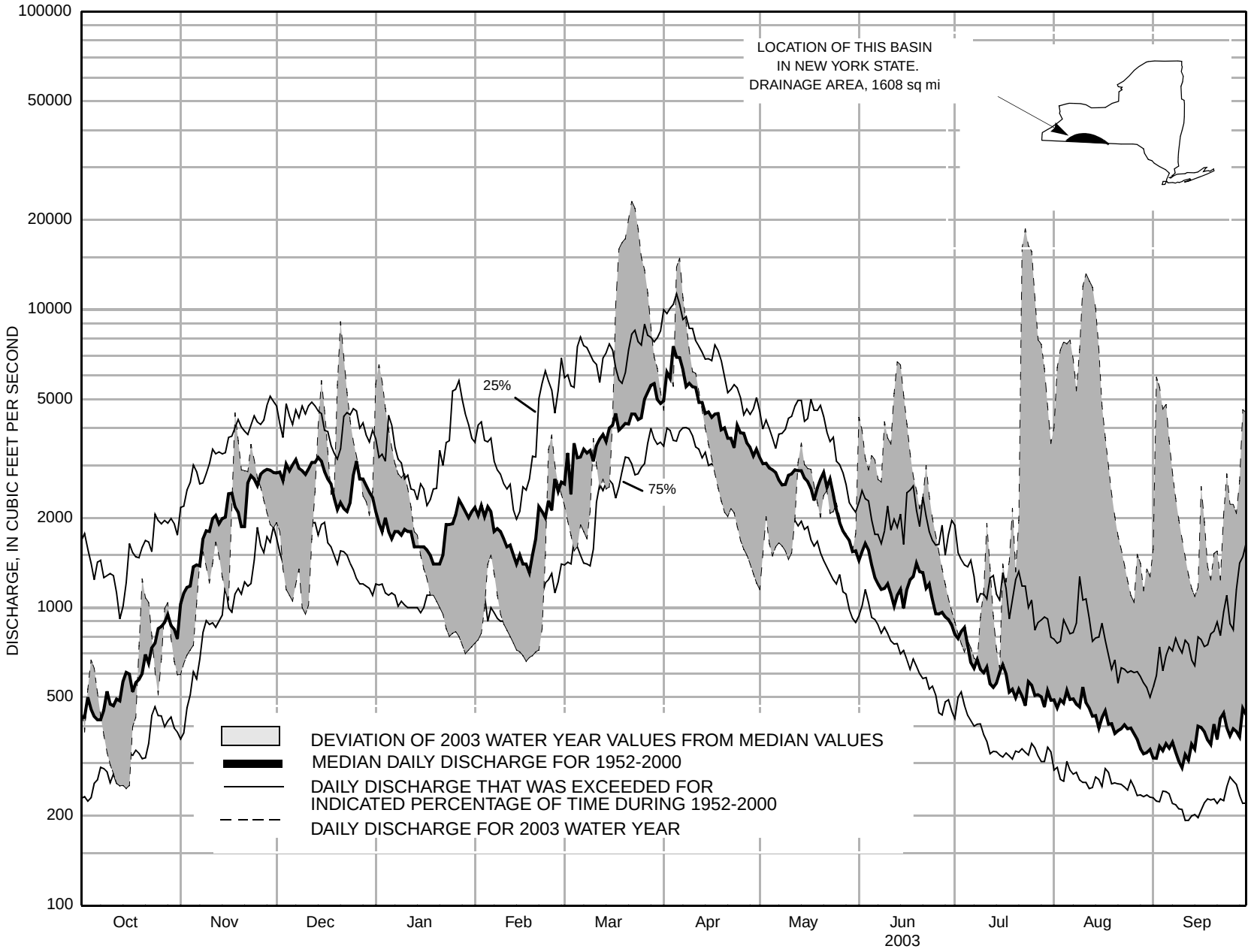

Figure 2.--Hydrographic Comparisons, Allegheny River at Salamanca, N.Y.

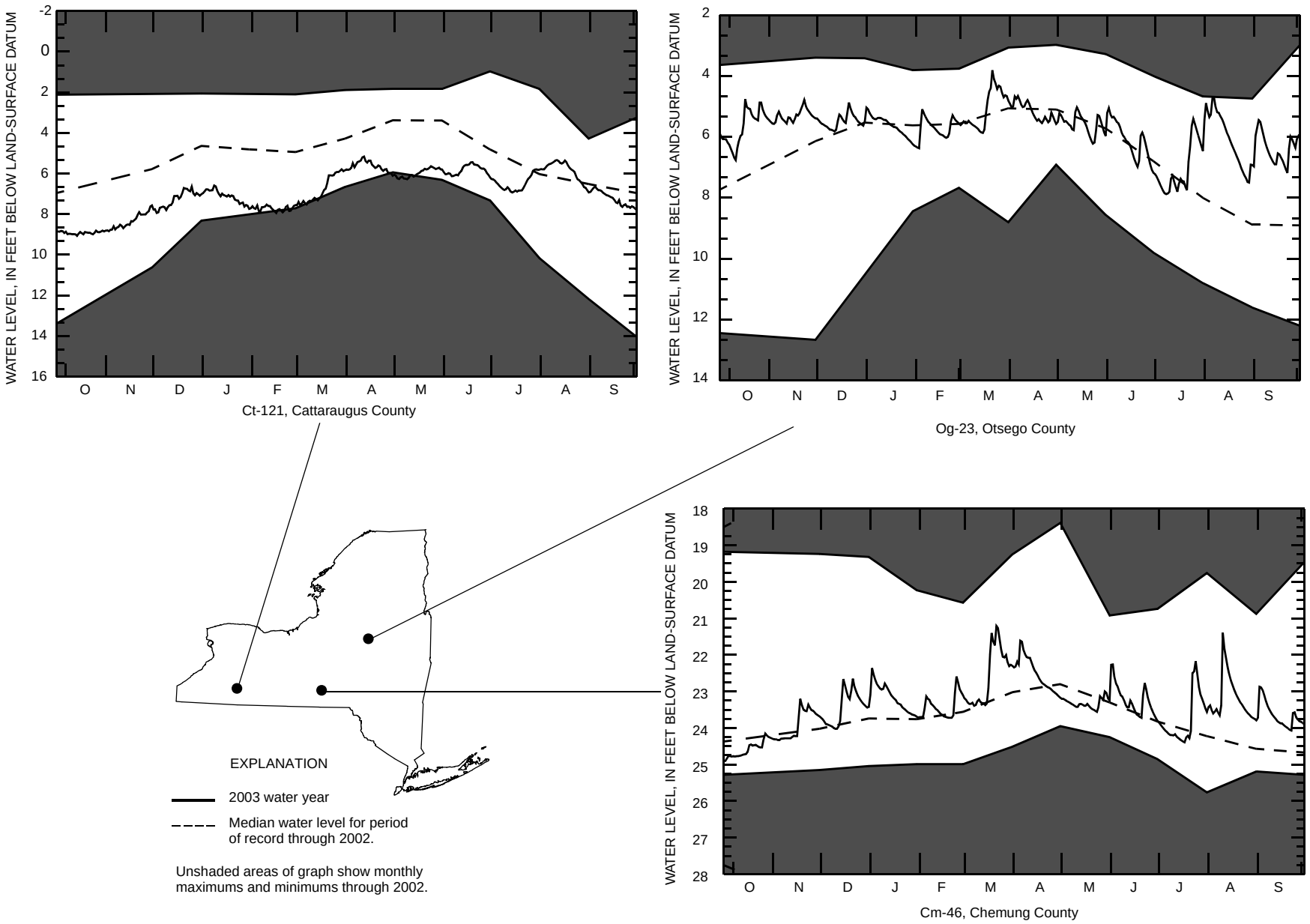

Figure 3.-Comparison of ground-water levels at selected observation wells in New York during 2003 water year with median, maximum, and minimum levels for period of record.