INTRODUCTION

Water resources data for the 2004 water year for Western 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 71 gaging stations; stage only at 15 gaging stations; stage and contents at 6 gaging stations; water quality at 12 gaging stations, 29 wells, and 22 partial-record stations; water levels at 29 observation wells; daily precipitation totals at 1 site, and chemical quality of precipitation at 1 site. Also included are data for 38 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–04–3.” 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) 285–5602.

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 2004, 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 2004 water year was characterized by above-average annual mean discharges at all index sites (table 1). The greatest departures from normal occurred during July, August, and September (table 2), when monthly mean discharges averaged 381, 543, and 1,208 percent, respectively, of the normal monthly means. Daily discharge hydrographs showing departures from the median discharges at two unregulated index stations—Susquehanna River at Conklin and Allegheny River at Salamanca—are presented in figures 1 and 2 respectively. Daily streamflow at both sites 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. Cold temperatures in January and February caused precipitation to be primarily in the form of snow, which in turn resulted in below-normal discharges for the last part of January and all of February at both index sites. A thaw at the beginning of March melted the snowpack, and near-normal precipitation caused discharges at both index sites to be at or near the median levels throughout June. Above-average precipitation in July and August and the effects of two tropical storms in September caused daily streamflows to rise well above the 25-percent exceedence levels at both sites from July through September.

The summer rains of 2003 continued into the 2004 water year. The monthly average precipitation for the State was 152 percent of normal calculated for October 2003. The only part of the State that reported a deficit was the Western Plateau, where precipitation was 98 percent of normal. Streamflow was excessive (upper 25 percent of the record) at most index sites in western New York (table 3).

Air temperatures in November were 3.4 degrees F warmer than normal throughout the State, and precipitation continued to be above normal. Some of the precipitation in parts of western New York fell as snow; Syracuse and Allegheny State Park received more than 10 inches and Morrisville received 25 inches. November streamflow was in the excessive range at all index sites. Genesee River at Wellsville and Oneida Creek at Oneida both had their third highest monthly mean discharges on record for November.

Warm weather continued into December. Air temperatures averaged 1.4 degrees warmer than normal. The greatest departure was along the Great Lakes, where monthly air temperatures averaged 3.2 degrees above normal. December was New York's sixth consecutive month with above-normal precipitation. Oneida Creek at Oneida had its second highest monthly mean discharge on record, and Flint Creek at Phelps and Fall Creek near Ithaca had their third highest monthly mean discharges on record for December. Large amounts of snow fell during the month; totals ranged from 11 inches in Allegheny State Park to 43 inches in Oswego.

Air temperatures in January 2004 averaged 7.3 degrees below normal and periodically dropped below zero throughout western New York. Regions southeast of Lake Ontario received heavy lake-effect snow during the last few days of the month; monthly total snowfall at Oswego was 105 inches. As a result of the cold temperatures, streamflow decreased to normal at all index sites.

Below normal air temperatures continued through February. Temperatures remained below zero throughout much of the State. Precipitation for the month was below normal; thus, streamflow either remained normal or decreased to the deficient range (lower 25 percent of the record) at all index sites.

March brought warmer temperatures across the State. Air temperatures averaged 3.1 degrees warmer than normal, and in some areas, rose into the low 70's toward the end of the month. March was the third consecutive month with below-normal precipitation. State precipitation totals ranged from less than 1 inch at a few locations to 4.44 inches at Bridgehampton in eastern New York. The warmer air temperatures caused rapid snowmelt, which in turn caused streamflow to increase into the normal range or just into the excessive range at all index sites.

Table 1.--Mean discharges for selected streams for water year 2004 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 2004 water year	Percent difference
01502500	Unadilla River at Rockdale	1930-33, 37-95, 2003	844	1,151	+ 36.4
01503000	Susquehanna River at Conklin	1913–2003	3,582	4,924	+ 37.5
01512500	Chenango River near Chenango Forks	1913–2003	2,420	3,576	+ 47.8
01531000	Chemung River at Chemung	1906–13, 1915–2003	2,623	4,763	+ 81.6
03011020	Allegheny River at Salamanca	1904–2003	2,773	4,032	+ 45.4
04213500	Cattaraugus Creek at Gowanda	1940-97, 2003	746	1,020	+ 36.7
04217000	Tonawanda Creek at Batavia	1944–2003	213	305	+ 43.2
04221000	Genesee River at Wellsville	1955-58, 1973-2003	388	623	+ 60.6
04230500	Oatka Creek at Garbutt	1946-2003	215	301	+ 40.0
04234000	Fall Creek near Ithaca	1926–2003	186	304	+ 63.4
04235250	Flint Creek at Phelps	1960–1995, 2003	89.8	158	+ 75.9
04243500	Oneida Creek at Oneida	1950–2003	168	251	+ 49.4

Table 2.--Monthly mean discharge for water year 2004 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		
			July	Aug	Sep
01502500	Unadilla River at Rockdale	1930-33, 1937-95, 2003	368	757	762
01503000	Susquehanna River at Conklin	1913–2003	290	557	972
01512500	Chenango River near Chenango Forks	1913–2003	456	801	788
01531000	Chemung River at Chemung	1906–13, 1915–2003	506	769	2,647
03011020	Allegheny River at Salamanca	1904–2003	239	356	1,363
04213500	Cattaraugus Creek at Gowanda	1940-97, 2001-03	292	177	565
04217000	Tonawanda Creek at Batavia	1944-2003	447	323	1,335
04221000	Genesee River at Wellsville	1955-58, 1973-2003	307	635	1,447
04230500	Oatka Creek at Garbutt	1946–2003	221	208	886
04234000	Fall Creek near Ithaca	1926–2003	529	793	800
04235250	Flint Creek at Phelps	1960-95, 2003	572	308	2,491
04243500	Oneida Creek at Oneida	1950–2003	345	830	442

April was warmer than normal, and precipitation was above-normal. Streamflow either decreased into the normal range, or remained normal at all index sites, however.

May was the third consecutive month with a statewide average air temperature above normal, and precipitation was above normal throughout the State. The wettest region was the Central Lakes, where precipitation was 205 percent of normal for the month. Streamflow responded by increasing slightly at all index sites. Flint Creek at Phelps had its third highest monthly mean discharge on record for the month of May.

June began with cooler-than-normal beginning air temperatures; the statewide temperature average was 1.4 degrees below normal and dipped to as low as 32 degrees in several parts of the Western and Northern Plateaus. Precipitation was also below normal throughout the State in June. Streamflow decreased accordingly but remained in the normal range at all index sites.

Cool weather continued through July. Precipitation was abundant during the month; the State received an average of 5.77 inches of rain; 151 percent of normal for July. Waverly received more than 10 inches of rain during the month. This was the 7th wettest July since records began in 1895. Streamflow increased sharply and was in the excessive range at all index sites. Three streams—Unadilla River at Rockdale, Fall Creek near Ithaca, and Flint Creek at Phelps had their third highest monthly mean discharges for July, and Chenango River near Chenango Forks, Oatka Creek at Garbutt, and Oneida Creek at Oneida had their fourth highest.

August was cool and wet. The State received an average of 5.86 inches of rain—152 percent of normal for August, making this the 5th wettest August on record. Streamflow at all index sites remained in the excessive range. Four streams—Unadilla River at Rockdale, Chenango River near Chenango Forks, Fall Creek near Ithaca, and Oneida Creek at Oneida—had their highest monthly mean August discharges on record (table 3). Susquehanna River at Conklin had the second highest monthly mean August discharge on record, and Oatka Creek at Garbutt had the third highest.

September brought warm weather to New York. Air temperatures for the State averaged 3.6 degrees warmer than normal. Precipitation was abundant throughout the State as two tropical storms passed through during the month. The first one, tropical storm Frances, dumped heavy rains on central Pennsylvania and western New York during September 8-10. Salamanca received 3.65 inches and Jamestown received 3.70 inches on the 9th. On September 18-19 an interaction between a strong, slow-moving cold front and remnants of Hurricane Ivan produced heavy rain and moderate to major flooding throughout the Susquehanna River basin. Many areas were still saturated from the previous storm. Waverly and Rockdale received the most rain, with 3.89 inches and 4.59 inches respectively. Streamflow at all index sites was in the excessive range (table 4.). Monthly mean discharges at all index sites equaled either the first, second, or third highest monthly mean 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 3.--Monthly mean discharge for water year 2004 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		
			Oct	Nov	Dec
01502500	Unadilla River at Rockdale	1930-33, 1937-95, 2003	443	222	198
01503000	Susquehanna River at Conklin	1913–2003	426	236	221
01512500	Chenango River near Chenango Forks	1913–2003	404	235	241
01531000	Chemung River at Chemung	1906–13, 1915–2003	443	364	359
03011020	Allegheny River at Salamanca	1904–2003	319	239	174
04213500	Cattaraugus Creek at Gowanda	1940-97, 2001-03	202	193	140
04217000	Tonawanda Creek at Batavia	1944-2003	327	339	150
04221000	Genesee River at Wellsville	1955-58, 1973-2003	407	268	211
04230500	Oatka Creek at Garbutt	1946–2003	156	371	186
04234000	Fall Creek near Ithaca	1926–2003	388	219	263
04235250	Flint Creek at Phelps	1960-95, 2003	263	308	417
04243500	Oneida Creek at Oneida	1950–2003	313	252	294

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 water year 2004 indicated highly variable sediment concentrations due to mudboil activity within the MDA and another mudboil area downstream from the MDA. Sediment loading to Onondaga Creek averaged about 1.0 tons per day, which is about the same as last years and reflects several months of mudboil activity and some land subsidence within the MDA, as well as sediment discharge at the downstream mudboil-containment area. The increased sediment dischareg is attributed to higher-than-average artesian pressures in the aquifer system.

Chemical analyses of springs within the Onondaga Lake basin, from the headwaters to Onondaga Lake, in the 2004 water year indicate that (1) fresh water and brackish water discharge from the glacial aquifer system in the Tully and West Branch valleys, (2) fresh water discharges from bedrock springs in the central part of the Onondaga Valley (southern part of the city of Syracuse), and (3) while a mixture of fresh to briny springs discharge to Onondaga Lake from the glacial aquifer system in the northern part of the Onondaga Valley near Onondaga Lake.

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 12 samples fromeach of 6 surface-water and 2 ground-water sites in western New York were analyzed for 60 or more pesticides and degradates. 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 streams in the towns of Dryden and Caroline in Tompkins County to characterize the hydrologic framework, ground-water flow system, and quality of water in the valley. The results provide information to be used for a comprehensive water-management strategy for continued availability of safe drinking water for these towns. Samples were analyzed for nutrients, major ions, and pesticides. Nitrogen concentrations were less than 5 μg/L and chloride concentrations were less than 35 μg/L. The Secondary Maximum Contaminant Level (SCML) for chloride is 250 μg/L. Traces of atrazine and metolachlor were found in some samples, but the concentrations did not exceed federal or New York State drinking-water standards. Analytical detection limits for pesticides ranged from 0.001 to 0.05 μg/L.

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 snowmelt, 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 and transpiration by vegetation of both surface water and ground water. 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. Summer storms typically provide only minor recharge to shallow aquifers. 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 diminshed recharge through 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 2004 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 near the median from October through December 2003. From January to August 2004, water levels were below the median and from August through September, they were at or just above the median. Water levels at well Og-23 were above the median from October through December, just above or below the median from January through mid July, and well above the median throughout the remainder of the water year reflecting the abundant summer rainfall. Water levels were at and near their maximum values late in July. Water levels at well Cm-622 were well above the median throughout the 2004 water year except for parts of February, June, and July, when they were near or just above the median. Water levels at this well were affected by water-level changes in Newtown Creek.

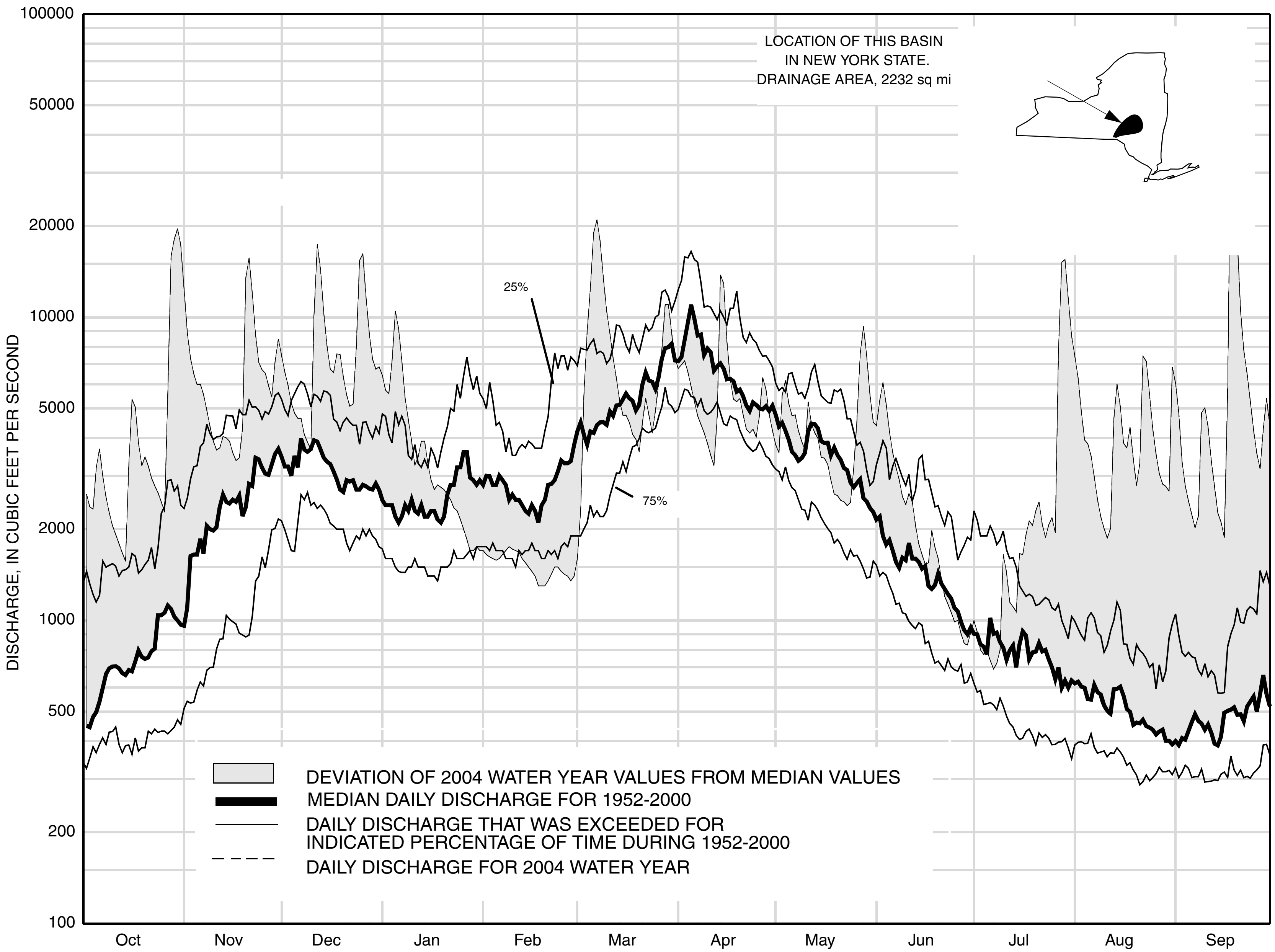

Figure 1.--Hydrographic Comparisons, Susquehanna River at Conklin, N.Y.

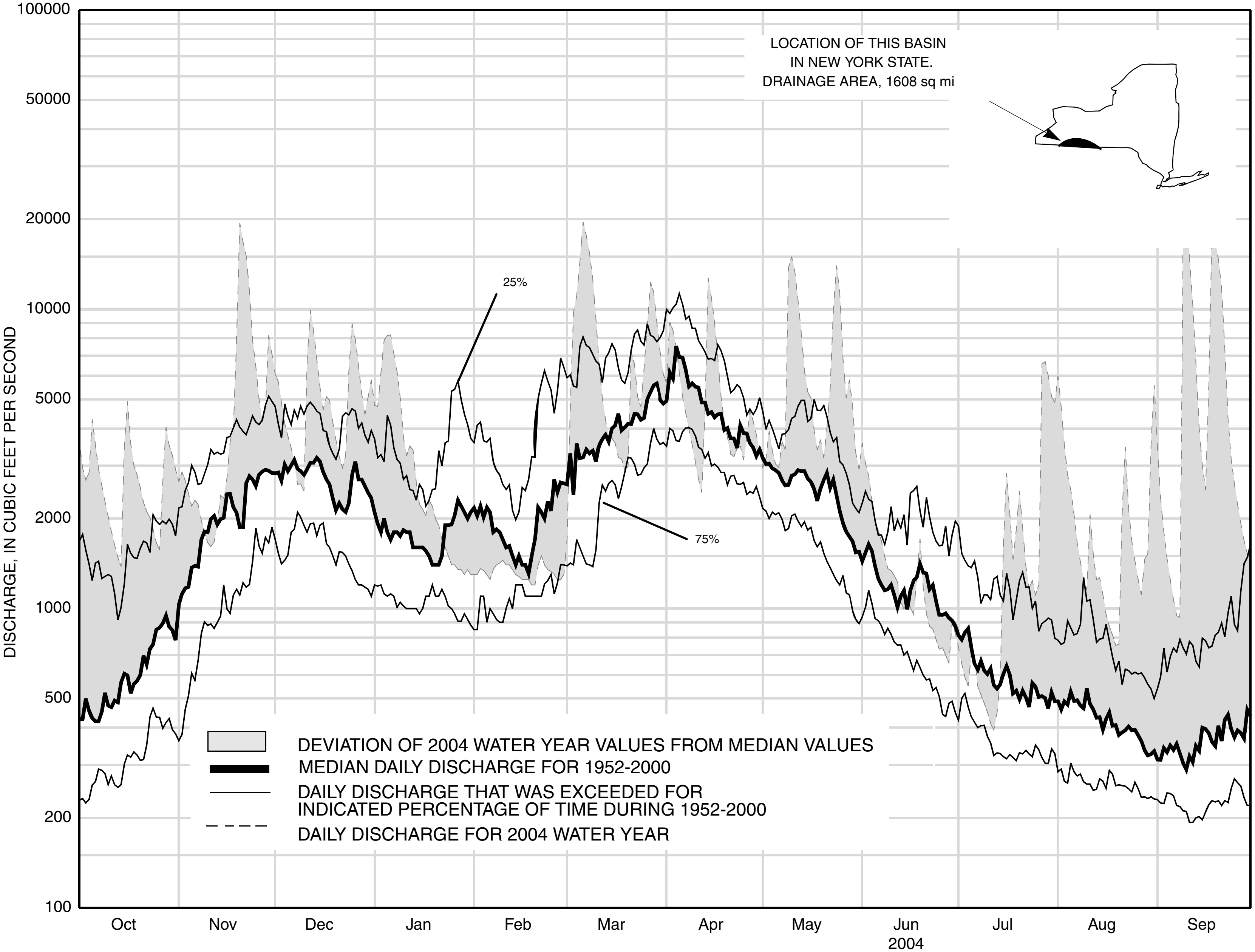

Figure 2.--Hydrographic Comparisons, Allegheny River at Salamanca, N.Y.

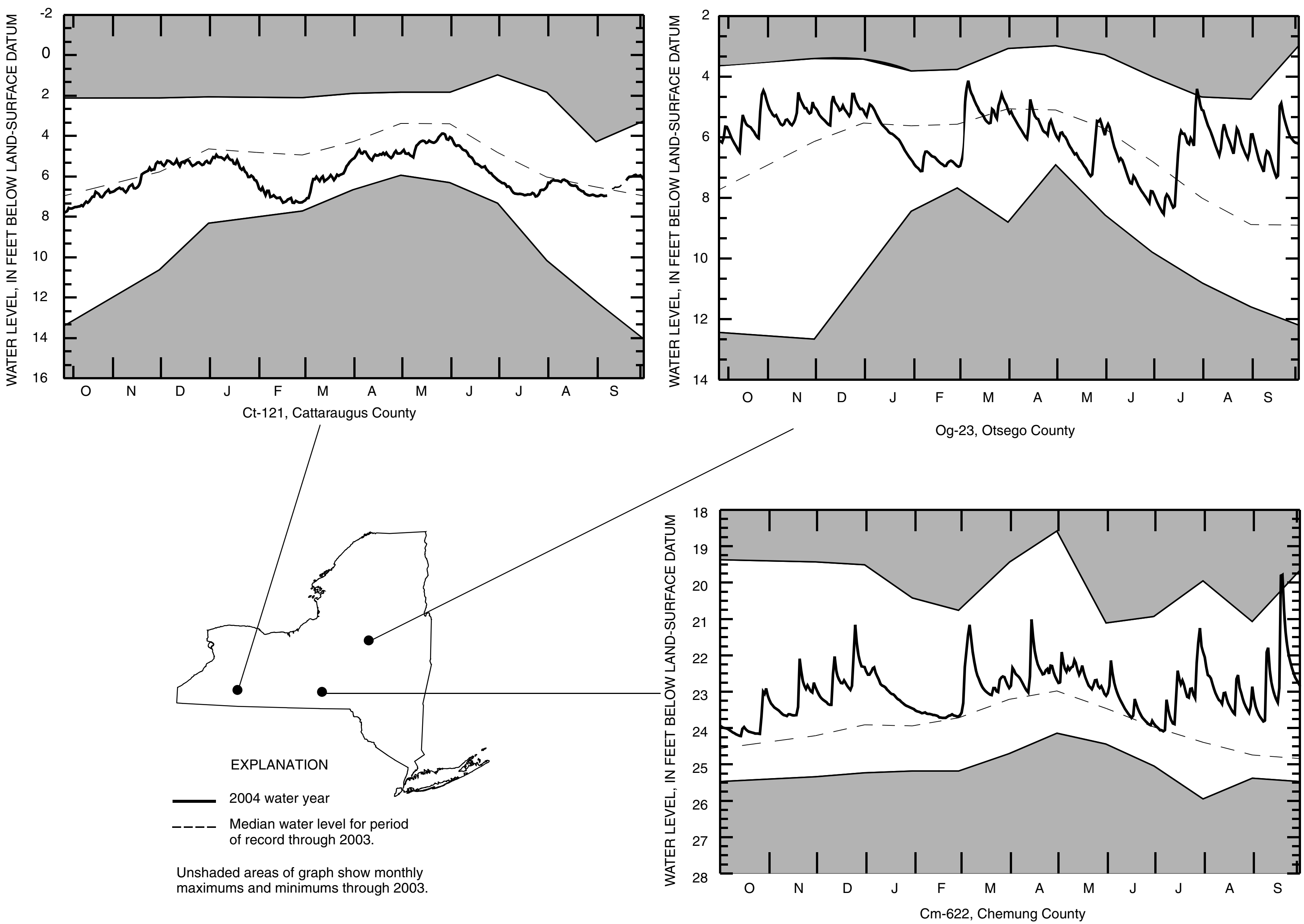

Figure 3.-Ground-water levels at selected observation wells in New York during the 2004 water year, with median, maximum, and minimum levels for period of record.