SUMMARY OF HYDROLOGIC CONDITIONS

Surface Water

Streamflow in Western New York during the 2005 water year (October 2004 through September 2005) was characterized by annual mean discharges that deviated moderately from the respective period-of-record averages (table 1). Generally, streamflows for the fall and winter months were somewhat above average, and those for the spring and summer months were somewhat below average (**table 2**). Departure from the median discharges at two index stations on unregulated streams (Susquehanna River at Conklin and Allegheny River at Salamanca) are presented in **figures 1 and 2**.

Table 1. Mean discharges for selected streams for water year 2005 and mean annual discharges for the period of record.

[Locations are shown in fig. 3. Discharges are in cubic feet per second.]

Station no.	Name	Period of Record	Mean annual discharge for period of record	Mean discharge for 2005 water year	Percent difference
01502500	Unadilla River at Rockdale	1930-33, 37-95, 2003-04	849	929	+ 9.4
01503000	Susquehanna River at Conklin	1913-2004	3,597	3,846	+ 6.9
01512500	Chenango River near Chenango Forks	1913-2004	2,433	2,710	+ 11.4
01531000	Chemung River at Chemung	1906-13, 1915-2004	2,709	3,222	+ 18.9
03011020	Allegheny River at Salamanca	1904-2004	2,786	2,546	- 8.6
04213500	Cattaraugus Creek at Gowanda	1940-1997, 2003-04	750	777	+ 3.6
04217000	Tonawanda Creek at Batavia	1944-2004	215	257	+ 19.5
04221000	Genesee River at Wellsville	1955-58, 1973-2004	395	385	- 2.5
04230500	Oatka Creek at Garbutt	1946-2004	217	267	+ 23.0
04234000	Fall Creek near Ithaca	1926-2004	188	212	+ 12.8
04235250	Flint Creek at Phelps	1960-1995, 2003-04	91.6	113	+ 23.4
04243500	Oneida Creek at Oneida	1950-2004	169	205	+ 21.3

Table 2. Monthly mean discharge for water year 2005 at selected sites, as percentage of period-of-record monthly median discharge.

[Locations are shown in fig. 3]

Station no.	Name	Period of Record	Monthly mean discharge, as percentage of monthly median discharge						
			Dec	Jan	Feb	May	Jun	Jul	Aug
01502500	Unadilla River at Rockdale	1930-33, 37-95, 2003-04	206	183	116	62	64	112	72
01503000	Susquehanna River at Conklin	1913-2004	208	184	126	55	54	89	44
01512500	Chenango River near Chenango Forks	1913-2004	236	185	122	51	77	86	52
01531000	Chemung River at Chemung	1906-13, 1915-2004	292	397	168	41	82	75	66
03011020	Allegheny River at Salamanca	1904-2004	183	243	114	44	53	91	65
04213500	Cattaraugus Creek at Gowanda	1940-1997, 2003-04	143	203	120	65	64	80	91
04217000	Tonawanda Creek at Batavia	1944-2004	145	222	120	67	197	92	93
04221000	Genesee River at Wellsville	1955-58, 1973-2004	202	284	101	51	44	54	75
04230500	Oatka Creek at Garbutt	1946-2004	178	230	132	82	132	95	89
04234000	Fall Creek near Ithaca	1926-2004	182	222	139	52	71	67	49
04235250	Flint Creek at Phelps	1960-1995, 2003-04	203	302	184	85	112	248	71
04243500	Oneida Creek at Oneida	1950-2004	259	186	141	75	112	93	75

A Cursory Review of Two Index Stations

Susquehanna River Basin above Conklin: Streamflow passing the Susquehanna River gage at Conklin originates from New York's Eastern Plateau (figure 1, inset map). The month of October (beginning of the 2005 water year) for this region began with below-normal precipitation, yet streamflow for October was excessive; that is, above the 25-percent exceedance level (the percentage of time that a given discharge is equaled or exceeded). The previous September had been much wetter than normal, which resulted in excessive October streamflows. November streamflows decreased into the normal range (between the 25-percent and 75-percent exceedance levels), but December and early January were warmer and wetter than normal and thereby caused excessive streamflows for these months. February and March precipitation was normal and allowed streamflow to decrease into the normal range, but these normal conditions changed on

April 2, when a strong Atlantic storm brought heavy rainfall to this drainage basin. This rain, combined with the attendant melting of the snowpack, resulted in the annual peak discharge for this gage on April 3, and streamflow for the month of April was in the excessive range. May and June rainfall throughout the upper Susquehanna drainage basin was below normal, and streamflow was deficient (below the 75-percent exceedance level). Recorded discharge for May was only 55 percent of the historical median for May, and that for June was only 54 percent of the median. July, August and September received near-normal precipitation, which produced normal streamflows in July and September and deficient streamflow in August.

Allegheny River at Salamanca: The Allegheny River drainage above the Salamanca gage lies in the Appalachian Highlands in the western part of New York (figure 2, inset map). October and November precipitation in this basin was slightly below normal and resulted in slightly below-normal streamflow for each of these months. Precipitation in December was higher than normal in this region and produced streamflow in the excessive range at the Salamanca gage. An early-January warm front that moved through western New York brought heavy rain and snowmelt that produced the annual peak flow for this gage on January 14. Streamflow for January was 243 percent of the monthly median. February was unusually dry, and streamflow receded into the normal range. March saw continued dry weather that further lowered streamflow into the deficient range. A large storm in the beginning of April brought streamflow back to the normal range, but May and June saw the return of dry conditions and deficient streamflows for each of these months; streamflow for May was only 44 percent of the median, and streamflow for June was 53 percent of the median. July and August were drier than normal but received enough precipitation to keep streamflows in the normal range. September began with heavy rainfall and moderately high flows, but the streamflow average for the month was just within the normal range.

Overview of Monthly Conditions for 12 Index Stations

October 2004 broke a string of wet months in Western New York as rainfall was just 67 percent of the October normal. Streamflows at most of the 12 index stations returned to the normal range from the excessive streamflows recorded for the previous month (September 2004).

November saw the continuation of a warm trend that made the State's monthly air-temperature average 1.7ºF warmer than normal. November also remained slightly drier than normal; New York's Western Plateau received 71 percent of the long-term average precipitation. November streamflow recorded by 10 of 12 index stations was in the normal range..

December air temperatures in Western New York were close to the historical averages for this month, but precipitation was considerably above average. December precipitation totals exceeding 4 inches were common throughout the region, and streamflows recorded at 11 of the 12 index stations were in the excessive range. For example, the December 2004 discharge of Chenango River near Chenango Forks was 236 percent of normal, and that of Chemung River at Chemung was 292 percent of normal.

A warm front in the second week of January brought rain and a subsequently melting snowpack. This combination caused many annual peak discharges for the 2005 water year at gages throughout the state. All 12 index stations recorded excessive streamflows for January. The latter part of the month brought lower temperatures and caused streamflows to decline as potential runoff became frozen.

The first week of February saw a moderate warming trend that released some of the frozen storage. A passing cold front in the second week of February returned potential runoff to storage, and streamflows declined. In general, streamflows for this month were normal or only slightly above normal.

Most of March saw below-average air temperatures; statewide temperatures were 3.8ºF cooler than normal. The last few days of March saw a significant warming trend, however. There were no significant precipitation events during March, and New York State received 88 percent of the normal value for this month. Streamflows at 10 of 12 index stations in Western New York were in the normal range; the two exceptions were at Chenango River at Chenango Forks and Allegheny River at Salamanca, where March streamflows were moderately deficient.

April was warmer and wetter than average. The monthly air temperatures were the warmest for April since 1991, and the statewide average of 4.77 inches of precipitation made this the ninth-wettest April since record keeping began in 1895. Much of this precipitation fell as rain in the first few days of the month. This rainfall, combined with subsequent snowmelt, caused streamflows to increase proportionately throughout the region. Annual peak discharges for many stations throughout New York State were recorded on April 2, 3 or 4. Weather patterns and streamflow moderated thereafter, yet 8 of the 12 index stations recorded excessive streamflow for April.

May was cooler than average, and precipitation was below average. Statewide, New York received an average of 1.64 inches of precipitation, making this the driest May since 1980. As a result, streamflows were fairly low, and monthly flows were in the deficient range at 8 of the 12 index stations. For example, May streamflow for Chemung River at Chemung was 41 percent of normal, and that for Fall Creek at Ithaca was 52 percent of normal.

June was the warmest since climate record keeping began in 1895. The record-high air temperatures, accompanied by less-than-normal precipitation throughout Western New York, kept the flows of most streams within either the deficient or normal ranges. The exception to this trend was Tonawanda Creek at Batavia, where local heavy thunderstorms in the first part of June pushed the monthly value into the excessive range. July was warmer and drier than average throughout the region. Locally heavy thunderstorms caused excessive streamflow for Flint Creek at Phelps, but monthly discharges for nine of the other 11 index stations were normal, and discharges for the remaining two were in the deficient range.

The record heat continued into August, which was the warmest since 1955. Scattered thunderstorms were common throughout Western New York, and the precipitation from these storms kept streamflows for 9 of the 12 index stations in the normal range. Discharges for the three exceptions (Fall Creek at Ithaca, Chenango Creek near Chenango Forks, and Susquehanna River at Conklin) were in the deficient range.

September saw continued record warm weather and was the third-warmest September on record for New York. Most of Western New York received slightly less precipitation than average, but rainfall from local storms kept most streams in the normal range. The only index station at which this trend was broken was Tonawanda Creek at

Batavia, where several locally heavy rainfall events pushed streamflow into the excessive range at 716 percent of normal.

Water Quality

Samples of surface water were collected at several sites throughout Monroe County for chemical analysis. The analyses indicated no significant changes from previous water years. Concentrations of all constituents monitored were within the historical range of the period of record for each site. Sites are periodically added to, or dropped from, this monitoring network, which currently emphasizes the Irondequoit Creek basin but is being expanded to include other parts of Monroe County. Constituent concentrations were combined 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 for Water Year 2005 from the Tully Valley mudboil/depression area (MDA) and the downstream “Rogue” mudboil area contained variable sediment concentrations that are attributed to seasonal changes in mudboil activity. Sediment loading to Onondaga Creek averaged about 0.7 tons per day. This loading rate is somewhat less than that of last year because the dredging of a moat around the MDA increased the time available for sediment to settle out before leaving the MDA. The higher-than-average artesian pressure in the underlying aquifer system is related to greater-than-normal precipitation, which increased the discharge of water and sediment from the mudboil areas.

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 hydraulic properties of the soil and rock, the soil-moisture content, the amount of local runoff, and the rate of evapotranspiration (evapotranspiration consists of evaporation plus transpiration by vegetation and affects ground water as well as surface water). Typically, recharge is greatest during the late fall and from early to mid-spring, when transpiration in 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, decrease 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 diminished 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 by their lack of direct hydraulic connection to the overlying unconfined aquifers.

The minimum, maximum, and median long-term monthly water levels, and the current water levels, at three observation wells during the 2005 water year are shown in the hydrographs in figure 3. The hydrograph for well Ct-121 in Cattaraugus County (Southwestern 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 (central Southern New York) illustrates water-level fluctuations under natural conditions in an unconfined sand and gravel aquifer.

Overview of Monthly Conditions for Three Wells

Well Ct-121: Water levels under confined conditions at well Ct-121 were near the monthly median from October 2004 through May 2005, and then fell below the median from June through September 2005 as the region received below- normal precipitation. Water levels at Ct-121 were highest during the April and lowest in late September.

Well Og-23: Water levels at well Og-23 were near the monthly median from October 2004 through April 2005. May and June were slightly drier than normal, as reflected in the Og-23 water levels for that period. Short-term recharge occurred in July, August, and September as a result of local thunderstorms. Water levels were at and near their maximum values late in March and early April and were lowest in late August.

Well Cm-622: Water levels at well Cm-622 were close to the monthly median from October 2004 to April 2005 but fell during the remainder of the water year as a result of the unusually dry summer, and early fall. Water levels at Cm-622 were highest in early April and lowest in late August.

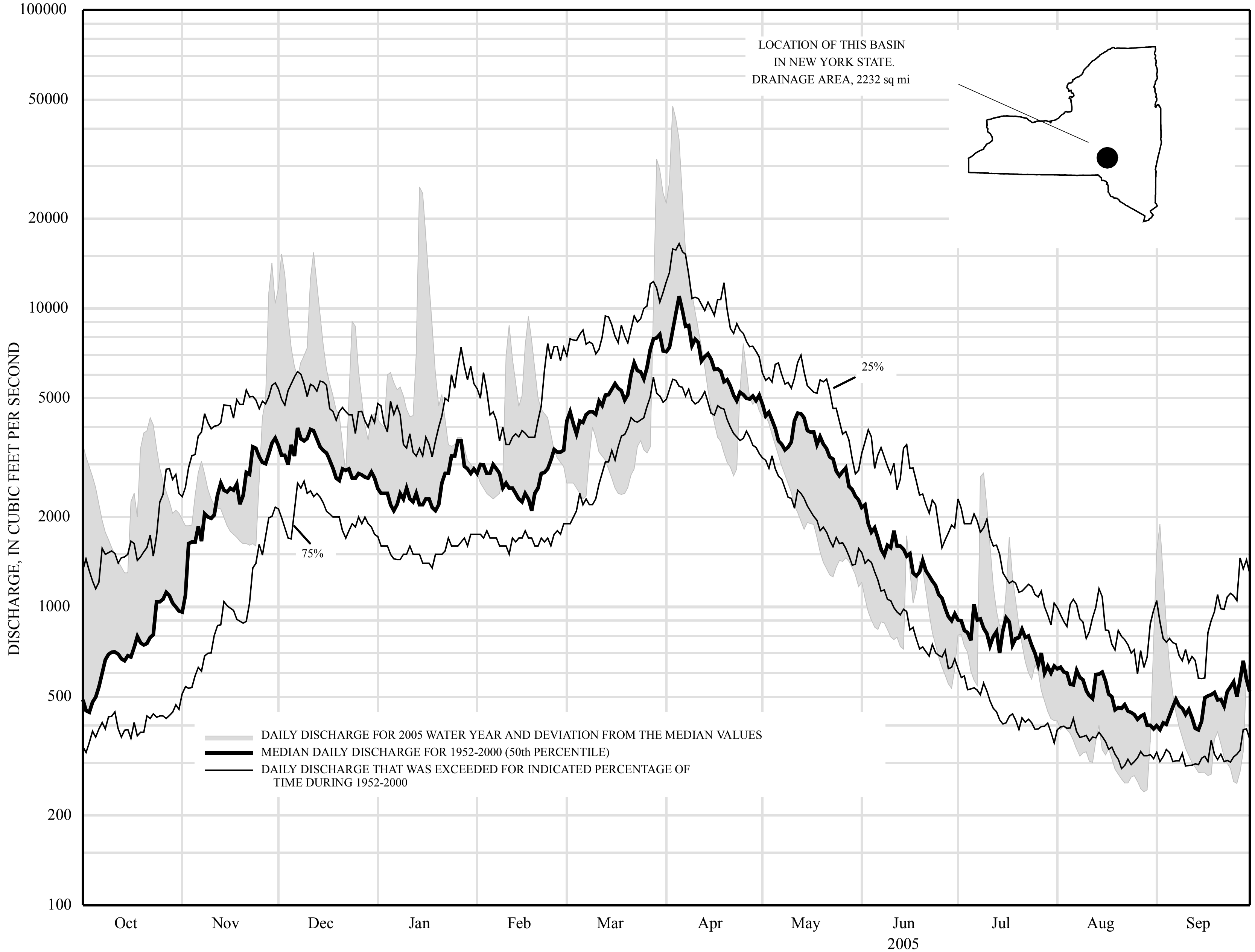

FIGURE 1.--SUSQUEHANNA RIVER AT CONKLIN

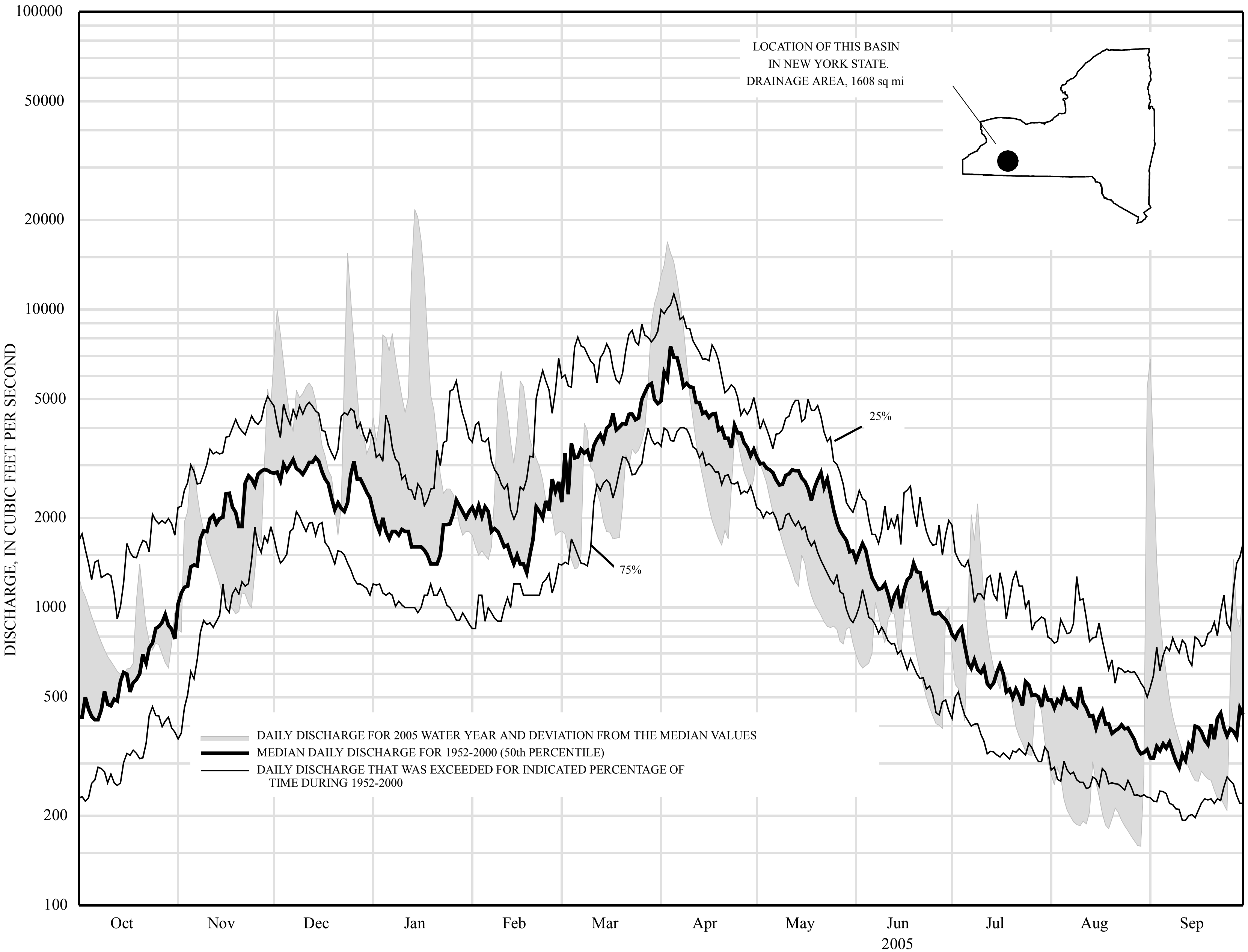

FIGURE 2.--ALLEGHENY RIVER AT SALAMANCA

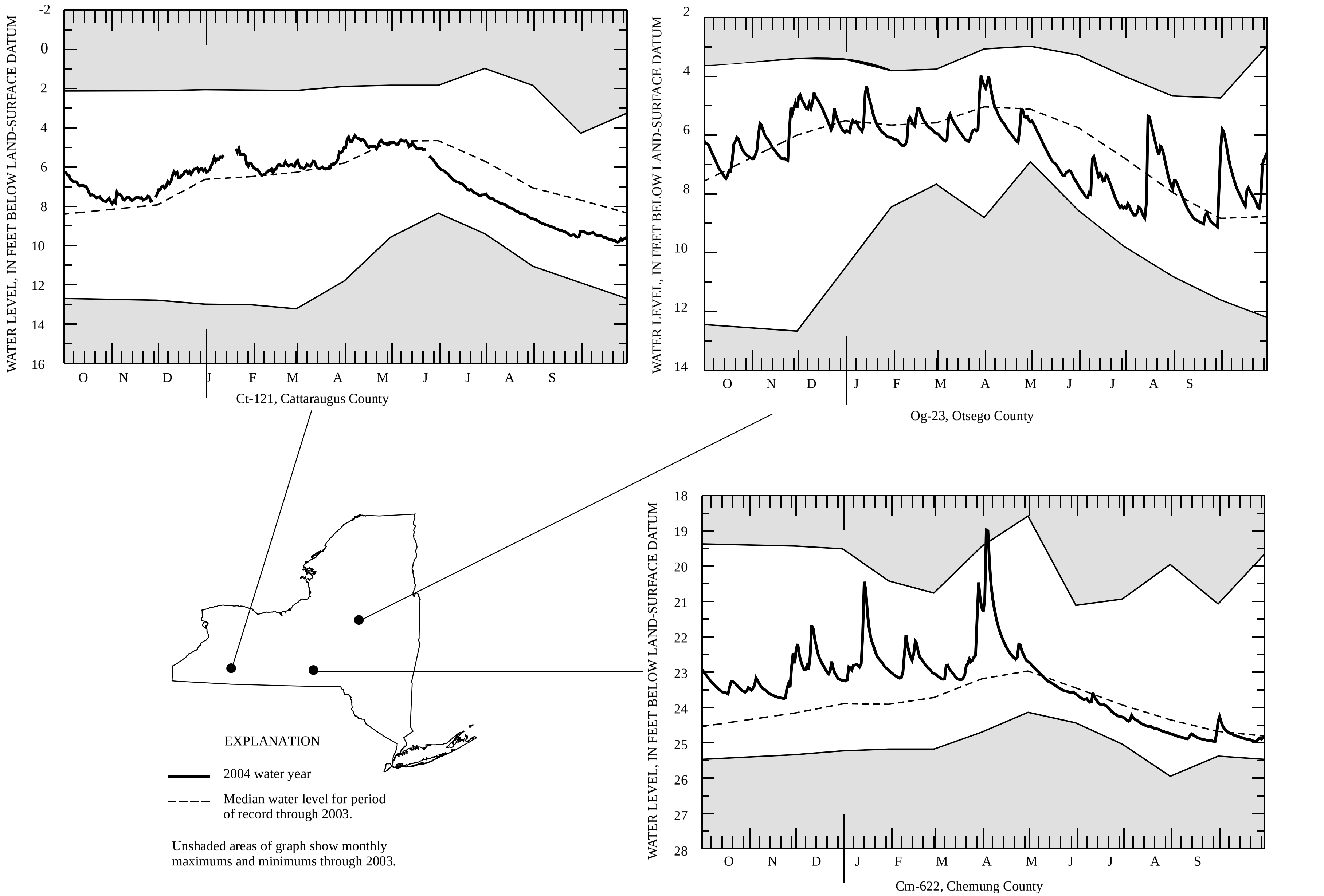

Figure 3.-Ground-water levels at selected observation wells in New York during the 2005 water year, with median, maximum, and minimum levels for period of record.