UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER RESOURCES IN WESTERN CORTLAND COUNTY, NEW YORK: HYDROLOGIC DATA FOR 1972-75 AND PROGRESS REPORT

by Harold L. Shindel, William Buller, and William H. Johnston

---

Open-File Report 77-525

Prepared in cooperation with

Cortland County Planning Department

Ithaca, New York

September 1977

CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS (Continued)

TABLES

FACTORS FOR CONVERTING ENGLISH UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

Multiply English units	By	To obtain SI units
inches (in)	25.4	millimeters (mm)
feet (ft)	.3048	meters (m)
miles (mi)	1.609	kilometers (km)
square miles (mi^2)	2.590	square kilometers (km^2)
cubic feet (ft^3)	.02832	cubic meters (m^3)
cubic feet per second (ft^3/s)	28.32	liters per second (L/s)
gallons per minute (gal/min)	.06309	liters per second (L/s)
parts per million (ppm)	1.0	milligrams per liter (mg/L)

ABBREVIATIONS USED ON COMPUTER-PRINTOUT TABLES

Cubic feet per second (CFS)

Cubic foot per second per square mile (CFSM)

Water year (WTR YR)

Calendar year (CAL YR)

Maximum (Max)

Minimum (Min)

Gage Height (G.H.)

near (nr)

Creek (Crk)

Tributary (Trib)

WATER RESOURCES IN WESTERN CORTLAND COUNTY, NEW YORK:

HYDROLOGIC DATA FOR 1972-75 AND PROGRESS REPORT

by

Harold L. Shindel, William Buller,
and William H. Johnston

ABSTRACT

Basic data on the surface water, ground water, and water quality of Cortland County are presented with a short explanatory text. Seepage investigations showed that during periods of base flow, the surface-water regime cannot be predicted on the basis of flow-duration figures alone. The investigations also indicate that the streambeds are permeable for extended reaches throughout the areas studied. Inconsistent data on gain or loss for a given reach are assumed to be indicative of the change in rate of ground-water recharge or discharge.

Analysis of surface-water quality since 1972 showed high nitrate (as NO_3) concentrations (4 to 18 mg/L) in the Cortland area and in Factory Brook. The nitrate source seems to be from human activities. Although the ground water in the Gridley Creek basin is moderately hard (34 to 140 mg/L $CaCO_3$), it generally meets standards of the New York State Department of Health.

INTRODUCTION

Some areas in Cortland County, New York, are expected to undergo a substantial increase in population during the next 30 years. In order to plan for future development, it is necessary to survey and evaluate the region's major resources. As part of a cooperative program with the Cortland County Planning Department to evaluate the hydrology of the region, the U.S. Geological Survey collected surface-water, ground-water, and water-quality data from 1972 to 1975 in the Gridley Creek basin and streamflow and water-quality data on other major stream basins in Cortland County. These data are valuable in selection of well-site and gaging-station locations and as basic input for hydrologic modeling and for water management.

This report contains two major sections. The first presents basic surface-water and water-quality data for major streams outside Gridley Creek basin, together with brief discussions of streamflow and water quality of Otter Creek, Dry Creek, Virgil Creek, and West Branch Tioughnioga River. Maps are included to show the location of streams, sampling sites, and wells. Tables and graphs present surface-water data from seepage runs and gaging-station records.

The second part of the report presents basic data on surface water, ground-water levels, and water quality of Gridley Creek basin, with a short discussion and analysis of the streamflow. Well logs and tables of water-quality data are also included.

Acknowledgment

Information on the headwaters of Virgil Creek was obtained through cooperation with Cornell University, College of Agriculture, Ithaca, N.Y.

CORTLAND COUNTY STREAMS EXCLUSIVE OF GRIDLEY CREEK

Streamflow

The streams studied were Otter Creek, Virgil Creek, Dry Creek, Factory Brook, Cold Brook, West Branch Tioughnioga River, and Tioughnioga River. Locations of measurement sites are shown in figures 1-4.

Basic surface-water data were obtained during seepage runs (measurements of streamflow at predetermined sites along the length of a stream and its tributaries to determine variations in rates of flow) and are presented as tables 1 to 4. These seepage runs were made during periods of base flow (periods having no overland runoff for the preceding 48 to 72 hours).

Flow-duration points (a statistical means of describing the percentage of time during which specified discharges were equaled or exceeded in a given period) for each seepage run were taken from records for station 01509000 Tioughnioga River at Cortland, for 1939 through 1967. The flow-duration curve for this station is presented as figure 5.

Comparison of data from the several seepage runs revealed some anomalous discharges. The Otter Creek and Dry Creek seepage investigations of August 17, 1972 and June 13, 1974, both made at 60-percent duration, gave substantially different results. Several factors could have had a bearing on this. First, the duration figure used was that of Tioughnioga River at Cortland, the closest full-time gaging station with adequate record from which to develop a duration curve. However, because it has a much larger drainage area than the two smaller, "flashier" streams, they could easily have been at different duration points. The difference in ground-water level on the two dates was also undoubtedly a factor, as were the difference in soil moisture and rate of evapotranspiration on those two dates. Any one of these factors or a combination thereof may have been the reason for the varying results. Differences of a lesser magnitude also appear in the seepage-investigation data for West Branch Tioughnioga River and its tributaries on the same dates.

Anomalous results of a different study on Virgil Creek may show the effects of surface-water/ground-water interaction. The Virgil Creek seepage investigations made on June 4, 1974 and May 20, 1975 indicate that Virgil Creek Tributary 5 (042336565), with a drainage area of 0.39 mi^2, contributes a considerably greater discharge than Virgil Creek below Virgil (042336563), with a drainage area of 4.56 mi^2. This anomaly may be explained by infiltration if water from the main stream channel flows through permeable soil to the adjacent tributary stream channel at a lower elevation. The seepage investigations as a whole suggest high permeability of the soils in the basin.

Daily discharges for the streams studied are presented in tables 5-10. These tables are reprinted from the annual U.S. Geological Survey report, "Water Resources Data for New York," (1973, 1974, and 1975 issues).

Figures 6-9 show water levels for 1972-75 at well C-19 at the Cortland Water Works.

Water Quality

Water-quality data have been collected periodically by the Geological Survey at West Branch Tioughnioga River (hereafter referred to as West Branch) at Homer and at Factory Brook at Homer since 1972 (tables 11, 12) and also at sites on Dry and Blue Creeks and at five wells since 1974 (table 13).

The data indicate that concentrations of dissolved chemical constituents are quite uniform during low flows on Factory Brook and West Branch. Dissolved-solids concentrations generally range from 170 to 220 mg/L at low flows for West Branch, and from 140 to 190 mg/L at low flows for Factory Brook. Calcium and bicarbonate are the major dissolved solids in both streams. Data for higher flows indicate a dilution effect; for example, concentrations at a flow of nearly 1,700 ft^3/s on the West Branch were about one-third as high as the low-flow concentrations. An exception was potassium, which had a higher concentration at high flow; this suggests that there may be a surface source of potassium, perhaps from fertilizer. Concentration of nitrate was more variable than those of most other constituents. Sources of nitrate are mostly from fertilizers and human and animal wastes rather than rock materials. Nitrate (as NO_3) concentrations in Factory Brook and West Branch ranged from 4 to 18 mg/L, which is considerably higher than in most New York streams, where nitrate concentrations are generally less than 5 mg/L (U.S. Geological Survey, 1972a).

Bacterial data show a wide range in population counts and poor correlation with stream discharge. Bacteria readily attach to sediments, and high bacteria counts often correlate with the high sediment concentrations that occur at higher flows. However, peak sediment concentrations are usually of much shorter duration than the concurrent peak discharges; therefore, a good correlation between bacteria counts and peak discharge based on random samples is unusual.

The ratio of fecal coliform to fecal streptococcus may be used to determine whether pollution is from human or animal wastes (Millipore Corporation, 1973). A high ratio (greater than 4) is evidence of pollution from human wastes, and a low ratio (less than 1) is evidence of animal wastes. Variable die-off rates affect the fecal-coliform/fecal-streptococcus ratio, and this ratio becomes less reliable as the distance between source material and sampling site increases. Data from random monthly samples that do not indicate the proximity of source material cannot be considered reliable indicators of whether the pollution is from human or animal wastes.

Data from well-water samples (table 13) indicate that ground water in the county is high in calcium bicarbonate, but the samples showed considerable variability in concentration and composition. Wells 1 and 4 had a dissolved-solids concentration of near 300 mg/L, and, as is generally the case, these concentrations were higher than those of neighboring surface waters. Well 5 had a very low dissolved-solids concentration (73 mg/L) but a high iron concentration (6.4 mg/L) and a lower calcium/magnesium ratio than surface water from other wells. This indicates that, locally, strata may vary considerably and yield different chemical types of ground water. The apparent anomaly of low dissolved-solids concentration for well 5 may be explained by direct recharge through infiltration of precipitation into material of low solubility,

such as a sand or gravel lens. The upper part of the saturated zone in such a case may yield water of very low mineral content. Water from well 1 is indicative of the ground-water problem in the Cortland area; the high nitrate concentration (34 mg/L as NO_3) and rather high fecal streptococcus count (28 colonies/100 mL) indicate an animal source of pollution.

Available water-quality data do not seem to show any definite trends. Most of the higher nitrate concentrations in surface water occurred during the winter months. This may be due to seasonable variables such as lower nitrogen consumption by plants during the winter months and more effective solution of surface sources of nitrogen by snowmelt. The high nitrate concentration in surface waters and ground waters in the Cortland area, as compared to other areas, indicate a pollution source related to agriculture and animal and human wastes.

GRIDLEY CREEK BASIN

Background

The watershed of the Gridley Creek basin (fig. 10) is of special interest to Cortland County because of increasing local interest in developing the land into a four-season recreational area. Figure 10 shows the topography of the Gridley Creek basin. This development would result in a large increase in population and the number of permanent dwellings and businesses in the area. Cortland County, in planning to accommodate its present and future population, is committed to the precept that overdevelopment should not take place (T. E. Zollendeck, Planning Director, Cortland County Planning Board, oral commun., 1975). One of the prime limiting factors in the development of the Gridley Creek basin could be the supply of potable water. An inadequate water supply may require the importation of water as well as construction of improved sewage-treatment facilities. Environmental damage, such as depletion of dissolved oxygen and an undesirable increase in bacteriological contamination, may also result.

The water-resources investigations are being conducted in four phases: analysis of the flow of Gridley Creek, monitoring of water quality of Gridley Creek, investigation of the ground-water/surface-water relationships, and evaluation of the storage capacity of the aquifer.

Two multiple-depth observation wells have been drilled in the Gridley Creek basin. The well logs are presented as figures 11 and 12.

Streamflow

The flow of Gridley Creek has been continuously monitored at gaging station 01509150 Gridley Creek above East Virgil since July 1974. Table 14 depicts the available mean daily discharge record for this station through September 1975, as published in U.S. Geological Survey annual report, "Water Resources Data for New York." The record is insufficient at this time to reliably compute statistical estimates such as 7-day, 2-year, and 7-day, 10-year low flows for the gaging station.

For a thorough investigation of a given stream and its flow patterns, it would be necessary to maintain several recording gages on several reaches of the stream. The scope of this project, however, does not warrant that type of coverage. Instead, several seepage runs were made during base-flow periods and at selected flow-duration points to identify areas requiring more detailed study. The flow-duration points were based on the long-term record for station 01509000 Tioughnioga River at Cortland. At the time of this writing (1976), only three seepage runs had been obtained, which is inadequate to serve as a reliable basis for statistical analysis. Table 15 presents the data obtained during the seepage runs.

Figure 13 shows graphically the discharges on the main stem, in downstream order, for the three seepage runs. Care should be exercised, however, when using the graphical representation because the contribution from tributaries has been ignored. Figures of gain and loss, as tabulated in table 15, more closely represent base-flow conditions at the time the individual seepage runs were made. The variation in number of sites measured during each seepage run listed in table 15 shows the evolution of a seepage-run program. Data gained from the first runs were used as a basis for refinement of sites selected for later runs.

A high ground-water contribution is indicated on all three runs in the reach just upstream from the present recording-gage site (station 01509150). This trend extends upstream to the preceding site on the main stem (station 01508135) at the higher duration points. The apparent inconsistency in the figures of gain or loss for the reach just upstream from Page Green Road (station 01509120) is assumed to be indicative of variations that may be expected in the rate of ground-water recharge from stream infiltration or variations in ground-water discharge to the stream.

Water Quality

The water-quality data for the Gridley Creek basin include analysis of samples collected monthly at the gaging station beginning in December 1974 and a series of samples collected at miscellaneous sites during a seepage investigation of May 20, 1975. The gaging-station samples were collected at random but covered a range of flow from low to moderately high. The samples at miscellaneous sites were collected during moderately low flow conditions. Water-quality data are given in tables 16 and 17.

The data in tables 16 and 17 indicate that surface water in Gridley Creek basin is of adequate quality (New York State Department of Health, 1971). Sample concentrations of dissolved solids were low (10 to 154 mg/L); chloride and nitrate concentrations were also low, ranging from 4.8 to 12 mg/L and 1.3 to 4.4 mg/L, respectively. With the exception of iron, all constituents determined were well within the recommended limits for drinking water (New York State Department of Health, 1971). Coliform and fecal streptococcus counts were not excessively high but indicate some pollution. Dissolved-oxygen concentrations were near saturation and did not indicate a serious problem.

Samples obtained on May 20, 1975 during the seepage investigation indicate that the water quality is nearly uniform throughout the basin; dissolved-solids concentrations increased moderately downstream. Fecal streptococcus counts were higher upstream from the sewage-treatment plant than downstream from it, but only a single set of samples was obtained and, therefore, may not be representative.

The quality of ground water in the Gridley Creek basin is measured by analysis of base-flow (periods when the surface flow in streams is derived almost entirely from ground-water sources) samples of surface waters. The ground water, aside from being moderately hard (34 to 140 mg/L as $CaCO_3$), generally is of adequate quality (New York State Department of Health, 1971). Iron concentrations may be as high as 1,110 µg/L, and such water may require treatment.

SELECTED REFERENCES

Hewlett-Packard Co., 1975, Applications programs HP-25: Cupertino, Ca., Hewlett-Packard Co., 161 p.

Millipore Corporation, 1973, Biological analysis of water and wastewater, application manual AM-302: Bedford, Mass., Millipore Corp., 84 p.

New York State Department of Health, 1971, Part 170, Subchapter C--Water supply sources of Chapter III, Title 10, (Health): in Official compilation of codes, rules, and regulations of the State of New York.

U.S. Geological Survey, 1973, Water resources data for New York, 1973, part 1, surface-water records: U.S. Geol. Survey open-file rept., 316 p.

_____ 1974, Water resources data for New York, 1974, part 1, surface-water records: U.S. Geol. Survey open-file rept., 328 p.

_____ 1974a, Water resources data for New York, 1974, part 2, water-quality records: U.S. Geol. Survey open-file rept., 360 p.

_____ 1975, Water resources data for New York, 1975, U.S. Geol. Survey water-data rept. NY-75-1, 735 p.

Table 1.--Surface-Water data for West Branch Tioughnioga River seepage investigations

Discharge measurements were made on West Branch Tioughnioga River and its tributaries to study channel gains and losses. The reach is 8.4 mi (13.5 km) in length and extends from culvert on Preble Road near Preble to the recording gage at Homer (01508803), 3.4 mi (5.5 km) upstream from confluence with East Branch Tioughnioga River (fig. 3). Duration figures are based on records for the gaging station on Tioughnioga River at Cortland (01509000). Tributary flow was considered a contribution and not a gain. Indicated gains or losses in relation to records of nearest upstream stations may be substantially in error as affected by small inaccuracies in open-channel measurements.

Data are listed in downstream order; tributaries are indented and are listed in the order in which they enter the main stream.

Site number and location 1/	Distance upstream from mouth of river (mi)	Drainage area (mi^2)	Measured discharge and gain or loss, in cubic feet per second									
			Aug. 17, 1972 60% duration		Sept. 17, 1972 70% duration		Aug. 31, 1973 90% duration		June 13-14, 1974 60% duration		May 20, 1975 35% duration	
			Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss
01508650	11.8	23.7	22.6	- -	11.0	- -	6.76	- -	27.9	- -	44.2	- -
01508652	10.8	24.8	27.7	+5.1	13.5	+2.5	7.34	+.58	32.0	+4.1	43.7	-0.5
01508665	7.7	34.3	31.8	+4.1	- -		- -		- -		- -	
01508700	7.7	15.4	5.9	- -	- -		.13	- -	- -		- -	
01508705	7.3	50.0	- -		22.0	+8.5	10.7	+3.27	49.3	+17.3	75.1	+31.4
01508800	4.8	15.8	7.8	- -	5.7	- -	3.00	- -	11.2	- -	18.8	- -
01508802	3.9	16.1	7.4	-0.4	3.9	-1.8	3.01	+.01	11.5	+.3	19.9	+1.1
01508803	3.4	71.5	62.6	+17.5	38.7	+12.8	20.4	+6.69	63.8	+3.0	100.2	+5.2

1/ ~~West Branch Tioughnioga River at Preble~~
West Branch Tioughnioga River near Preble
West Branch Tioughnioga River at Little York
Cold Brook at Little York (partial-record site - sites where measurements are made on an irregular schedule)
West Branch Tioughnioga River near Homer
Factory Brook at State Highway 281, Homer (recording stream-gaging station)
Factory Brook at State Highway 11, Homer
West Branch Tioughnioga River at Homer (recording stream-gaging station)

Note.--Data from "Water Resources Data for New York, Part 1, Surface Water Records" (1974 and 1975 issues).

Table 2.--Surface-Water data for Dry Creek seepage investigations

Seven series of discharge measurements were mae between August 1972 and June 1975 on Dry Creek and its major tributary, Blue Creek, to study channel gains and losses. The reach is 3.1 mi (5.0 km) in length and extends from a point just downstream from a small pond and unnamed tributary northeast of Kinney Gulf Road and 0.2 mi (0.3 km) upstream from Sweeney Road, to the mouth, lat 42°36'55", long 76°10'55". Duration figures are based on records for the gaging station on Tioughnioga River at Cortland (01509000). Tributary flow was considered a contribution and not a gain. Indicated gains or losses may be substantially in error as affected by small inaccuracies in open-channel measurements. Refer to figure 3.

Data listed in downstream order along the main stream, and sites on tributaries are listed between stations on the main stem.

Site number and location [1]	Distance upstream from mouth of river (mi)	Drainage area (mi^2)	Measured discharge and gain or loss, in cubic feet per second													
			Aug. 17, 1972 60% duration		Sept. 17, 1972 70% duration		[2]Mar. 26, 1973 8% duration		[2]Apr. 16, 1973 15% duration		Sept. 1, 1973 90% duration		June 13, 1974 60% duration		May 20, 1975 35% duration	
			Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss
01508902	3.1	2.75	- -		- -		14.1	- -	- -		- -		- -		- -	
01508905	2.9	3.20	0.98	- -	0.66	- -	- -		7.6	- -	0.21	- -	0.27	- -	3.65	- -
01508910	3.7	3.53	- -		- -		26.6	- -	5.6	- -	.10	- -	.81	- -	2.45	- -
01508911	3.0	3.99	- -		- -		- -		6.6	-1.0	- -		- -		- -	
01508913	2.5	4.30	- -		- -		- -		8.1	+1.5	.22	+.12	1.78	+.97	2.80	+0.35
015089132	2.3	4.32	- -		- -		- -		- -		- -		- -		2.21	-.59
01508914	2.2	4.33	- -		- -		24.7	-1.9	10.4	+2.3	.02	-.20	.90	-.88	2.99	+.78
01508915	2.1	8.19	1.13	+.15	.32	-.34	- -		18.3	+.3	.21	-.02	2.67	+1.50	6.69	+.05
01508918	1.3	8.42	1.69	+.56	.55	+.23	46.7	+7.9	17.1	-1.2	.29	+.08	3.20	+.53	7.10	+.41
01508925	.6	8.66	.63	-1.06	0	-.55	41.2	-5.5	14.8	-2.3	0	-.29	1.42	-1.78	5.84	-1.26

1/ Dry Creek eff Kinney Gulf Road near Cortland above Sweeny Road
Dry Creek near Cortland at Sweeney Road
Blue Creek near Cortland at Cosmos Road
Blue Creek at Blue Creek near Cortland
Blue Creek at Cortland at Kinney Gulf Road
Blue Creek below Kinney Gulf Road at Cortland at infiltration zone
Blue Creek at mouth at Cortland
Dry Creek below Blue Creek
Dry Creek above Cortland at State Highway 281
Dry Creek at Hamlin Street at Cortland

2/ Not at base flow

Note.--Data from "Water Resources Data for New York, Part 1, Surface Water Records 1975."

Table 3.--Surface-Water data for Otter Creek seepage investigations

Five series of discharge measurements were made between August 1972 and June 1974 on Otter Creek and its tributaries, to study channel gains and losses. The reach is 4.1 mi (6.6 km) in length and extends from McLean Road, 1.1 mi (1.8 km) southwest of Cortland, to Main Street in Cortland, 0.2 mi (0.3 km) upstream from the mouth, lat 42°36'33", long 76°10'51". Duration figures are based on records for the gaging station Tioughnioga River at Cortland (01409000). Tributary flow was considered a contribution and not a gain. Indicated gains or losses in relation to records of nearest upstream stations may be substantially in error as affected by small inaccuracies in open-channel measurements. Refer to figure 3.

Data are listed in downstream order; tributaries are indented and inserted in the order in which they enter the main stream.

Site number and location [1]	Distance upstream from mouth of river (mi)	Drainage area (mi^2)	Measured discharge and gain or loss, in cubic feet per second									
			Aug. 17, 1972 60% duration		Sept. 17, 1972 70% duration		Aug. 31, 1973 90% duration		June 13, 1974 60% duration		May 20, 1975 35% duration	
			Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss
01508940	3.1	8.98	3.24	- -	0	- -	0	- -	3.45	- -	7.42	- -
01508945	4.1	2.58	.14	- -	0	- -	0	- -	.39	- -	.86	- -
01508948	3.2	3.18	0	-.14	0	0	0	0	.20	-.19	.46	-.40
01508951	2.1	13.52	2.48	-.76	0	0	0	0	2.86	-.79	9.91	+2.03
01508955	.8	14.05	1.41	-1.07	.03	+.03	.03	+.03	3.75	+.89	10.16	+.25
01508960	.2	14.26	1.37	-.04	0	-.03	0	-.03	5.57	+1.82	10.52	+.36

[1] Otter Creek near Cortland at McLean Road
Otter Creek tributary near Cortland at Sears Road
Otter Creek tributary near Cortland at Fairview Drive
Otter Creek above Cortland at State Highway 281
Otter Creek at State Highway 222 at Cortland
Otter Creek at Cortland at N. Main Street

Note.--Data from "Water Resources Data for New York, Part 1, Surface Water Records" (1974 and 1975 issues).

Table 4.--Surface-Water data for Virgil Creek seepage investigations

Two series of discharge measurements were made during 1974 on Virgil Creek and its tributaries, to study channel gains and losses in the vicinity of the town of Virgil, N.Y. The reach is 2.9 mi (4.7 km) in length and extends from a point 1.9 mi (3.1 km) north to a point 0.5 mi (0.8 km) south of Virgil. Gaging station Virgil Creek at Freeville, N.Y. (04233700) is 11.8 mi (19.0 km) downstream from the reach. The measurements were made during periods of constant base flow of the streams. Duration figures are based on records for Fall Creek near Ithaca, N.Y. (04234000). Tributary flow was considered a contribution and not a gain. Indicated gains or losses in relation to records of nearest upstream stations my ba substantially in error as affected by small inaccuracies in open-channel measurements. Refer to figure 2.

Data are listed in downstream order. Tributaries are indented and inserted in the order in which they enter the main stream.

Site number and location	Distance upstream from mouth of river (mi)	Distance and direction from Virgil (main intersection)	Drainage area (mi^2)	Measured discharge and gain or loss, in cubic feet per second: June 4, 1974 50% duration		May 20, 1975 35% duration	
				Discharge	Gain or loss	Discharge	Gain or loss
042336540 Virgil Creek near Virgil	14.8	2.1 mi north	0.63	0.09	- -	0.44	- -
042336551 Virgil Creek above Virgil	13.1	.3 mi north	2.35	.82	+.73	2.49	+2.05
042336553 Virgil Creek at Virgil	12.7	.1 mi east	2.50	0	-.82	2.08	-0.41
042336557 Virgil Crk trib to trib 4 at Virgil	13.3	.9 mi northeast	.23	.06	- -	.25	- -
042336559 Virgil Creek trib 4 at N.Y. 90, Virgil	12.6	.5 mi east	.96	.02	-.04	.52	+.27
042336560 Virgil Creek trib 4 at Shultz Road, Virgil	12.4	.3 mi southeast	1.48	0	-.02	.45	-.07
042336563 Virgil Crsek below Virgil	11.8	.5 mi south	4.56	.18	+.18	.19	-2.34
042336565 Virgil Creek trib 5 at Virgil	11.9	.5 mi south	.39	.80	- -	3.43	- -
Virgil Creek below trib 5 at Virgil	12.6	.5 mi south	- -	1/ .98	0	1/ 3.62	0

1/ Sum of discharge of Virgil Creek below town of Virgil and Virgil Creek tributary 5 at Virgil

Note.--Data from "Water Resources Data for New York-Part 1., Surface Water Records" (1974 and 1975 issues).

Table 5.-Data for gaging station 01508803 West Branch Tioughnioga River at Homer, N.Y., 1973[1/]

LOCATION.--Lat 42°38'13", long 76°10'37", Cortland County, on left bank at downstream side of bridge on Wall Street at Homer and 3.4 mi (5.5 km) upstream from confluence with East Branch.

DRAINAGE AREA.--71.5 mi^2 (185 km^2).

PERIOD OF RECORD.--November 1966 to September 1968, October 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,114.81 ft (339.794 m) above mean sea level. Prior to Oct. 1, 1968, water-stage recorder at bridge on Water Street 500 ft (152 m) upstream at same datum.

EXTREMES.--Current year: Maximum discharge, 1,530 ft^3/s (43.3 m^3/s) Sept. 26 (gage height, 6.76 ft or 2.060 m); minimum, 19 ft^3/s (0.54 m^3/s) Aug. 21, 23-24 (gage height, 1.28 ft or 0.390 m).
Period of record: Maximum discharge, 1,770 ft^3/s (50.1 m^3/s) Apr. 4, 1974 (gage height, 7.22 ft or 2.201 m), minimum discharge, 9.6 ft^3/s (0.27 m^3/s) Nov. 22, 1966 (gage height, 1.98 ft or 0.604 m) at site then in use; minimum gage height, 1.14 ft (0.347 m) Sept. 3, Oct. 27, 28, 1973.
Flood of June 23, 1972, reached a stage of 7.46 ft (2.274 m) (8.05 ft or 2.454 m at Water Steet site), from floodmarks; discharge, about 1,900 cfs (53.8 m^3/s); flood of Mar. 5, 1964 was considerably higher (discharge not determined).

REMARKS.--Records good except those for winter periods, which are fair and those for periods of no gage-height record, which are poor. A constant 2.8 ft^3/s (0.079 m^3/s) is diverted for manufacturing purposes from Cate House Pond upstream from station into Onondaga Creek basin (St. Lawrence River basin).

REVISIONS.--WRD N.Y. 1974: 1973 (P).

NOTE.--No gage height record May 3-June 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	46	160	740	110	76	206	125	100	47	33	20
2	52	87	140	520	170	88	367	124	97	45	33	19
3	49	141	130	440	545	96	490	131	91	43	35	18
4	48	99	120	350	326	234	409	129	89	43	36	20
5	46	95	120	300	269	251	612	125	86	42	33	20
6	47	85	450	250	220	226	499	116	89	36	31	29
7	68	79	800	210	206	212	477	107	76	40	30	26
8	72	157	500	190	196	225	389	103	78	40	27	30
9	63	328	480	180	170	194	337	106	75	41	30	30
10	60	246	420	170	140	173	332	107	72	37	37	29
11	54	194	380	160	130	166	331	120	68	35	32	29
12	52	174	329	150	120	185	290	126	69	34	30	29
13	54	148	318	140	120	195	260	130	71	34	28	29
14	51	189	283	140	119	225	235	115	65	34	31	34
15	55	200	232	136	123	278	214	112	66	37	33	46
16	52	171	220	131	110	248	199	110	68	35	29	35
17	50	146	190	128	100	304	185	106	69	35	26	32
18	49	152	220	141	100	421	175	116	86	33	26	37
19	48	148	210	136	100	318	166	115	78	32	29	34
20	46	160	200	173	101	279	157	125	70	32	26	31
21	44	150	190	125	100	250	151	178	69	34	29	30
22	43	130	260	159	99	223	141	171	68	34	28	28
23	49	120	250	253	95	202	161	151	67	33	27	30
24	56	110	230	191	88	199	141	140	64	31	26	28
25	50	100	240	185	86	205	129	129	62	31	25	28
26	47	180	260	156	84	268	123	120	59	34	25	27
27	45	280	250	154	78	226	125	118	57	47	24	27
28	44	230	230	149	74	193	168	113	56	38	24	27
29	50	190	220	140	---	176	154	114	59	40	22	26
30	54	170	200	120	---	167	134	109	51	34	19	25
31	48	---	480	110	---	160	---	105	---	33	20	---
TOTAL	1610	4705	8692	6525	4179	6655	7737	3796	2169	1144	884	853
MEAN	51.9	157	280	210	149	215	258	122	72.3	36.9	28.5	28.4
MAX	72	328	800	760	545	421	612	178	100	47	37	46
MIN	43	46	120	110	74	76	123	103	51	31	19	18
CFSM	.73	2.20	3.92	2.94	2.08	3.01	3.61	1.71	1.01	.52	.40	.40
IN.	.84	2.45	4.52	3.39	2.17	3.46	4.03	1.97	1.13	.60	.46	.44

WTR YR 1973 TOTAL 48949 MEAN 134 MAX 800 MIN 18 CFSM 1.87 IN 25.47

Peak discharge (base, 480 cubic feet per second)

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
12-7	Unknown	Unknown	2/ 1,200	2-3	0515	4.87	771
12-23	1115	5.27	900	3-18	0230	4.84	762
1-1	Unknown	Unknown	2/ 1,000				

Note.--No gage-height record Nov. 20 to Dec. 11

1/ Data from U.S. Geological Survey, 1973, Surface Water Records, Part 1, p. 157.
2/ About.

Table 6.--Data for gaging station 01508803 West Branch Tioughnioga River at Homer, N.Y., 1974[1/]

LOCATION.--Lat 42°38'13", long 76°10'37", Cortland County, on left bank at downstream side of bridge on Wall Street at Homer and 3.4 mi (5.5 km) upstream from confluence with East Branch.

DRAINAGE AREA.--71.5 mi^2 (185 km^2).

PERIOD OF RECORD.--November 1966 to September 1968, October 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,114.81 ft (339.794 m) above mean sea level. Prior to Oct. 1, 1968, water-stage recorder at bridge on Water Street 500 ft (152 m) upstream at same datum.

EXTREMES.--Current year: Maximum discharge, 1,770 ft^3/s (50.1 m^3/s) Apr. 4 (gage height, 7.22 ft or 2.201 m); minimum, 14 ft^3/s (0.40 m^3/s) Oct. 27, 28 (gage height, 1.14 ft or 0.347 m).
Period of record: Maximum discharge, 1,770 ft^3/s (50.1 m^3/s) Apr. 4, 1974 (gage height, 7.22 ft or 2.201 m), minimum discharge, 9.6 ft^3/s (0.27 m^3/s) Nov. 22, 1966 (gage height, 1.98 ft or 0.604 m) at site then in use; minimum gage height, 1.14 ft (0.347 m) Sept. 3, Oct. 27, 28, 1973.
Flood of June 23, 1972, reached a stage of 7.46 ft (2.274 m) (8.05 ft or 2.454 m at Water Steet site), from floodmarks; discharge, about 1,900 cfs (53.8 m^3/s); flood of Mar. 5, 1964 was considerably higher (discharge not determined).

REMARKS.--Records good except those for winter periods, which are fair. A constant 2.8 ft^3/s (0.079 m^3/s) is diverted for manufacturing purposes from Gate House Pond upstream from station into Onondaga Creek basin (St. Lawrence River basin).

REVISIONS.--The figures of peak discharge for water year 1973 have been revised as shown in the following table. They supersede figures published in WRD N.Y. 1973.

REVISED PEAK DISCHARGE.--1973: Dec. 7 (unknown) about 1,200 cfs (unknown); Dec. 23 (1115) 900 cfs (5.27 ft); Jan. 1 (unknown) about 1,000 cfs (unknown); Feb. 3 (0515) 771 cfs (4.87 ft); Mar. 18 (0145) 540 cfs (4.10 ft); Apr. 5 (0230) 762 cfs (4.84 ft).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	28	61	212	189	140	139	157	118	54	47	44
2	40	32	55	174	171	137	172	139	100	52	44	41
3	70	30	52	165	157	149	274	133	92	91	46	87
4	53	28	52	153	140	265	1,180	130	87	113	48	97
5	25	28	75	120	130	376	1,210	120	79	111	52	69
6	25	26	117	120	120	336	750	120	72	103	48	61
7	42	26	85	120	110	282	561	121	71	95	45	56
8	23	26	75	110	110	251	513	113	70	90	43	51
9	22	25	123	100	110	228	440	123	69	78	41	48
10	36	25	160	100	100	225	383	156	69	73	39	44
11	34	25	117	98	100	196	362	139	84	68	36	40
12	32	25	100	96	107	179	408	177	79	61	35	38
13	30	24	90	94	105	153	390	349	71	56	35	58
14	30	24	93	90	100	144	393	246	66	53	35	72
15	28	25	80	96	90	138	591	208	59	51	33	50
16	19	30	70	96	80	154	428	181	63	49	31	44
17	17	29	62	91	80	186	365	248	64	48	33	42
18	19	28	60	86	88	149	323	222	68	47	35	41
19	22	28	60	90	88	149	292	108	59	48	33	39
20	24	27	70	86	92	140	259	170	61	48	31	38
21	25	26	160	93	90	139	236	156	67	46	30	46
22	25	28	120	114	173	135	222	145	70	46	29	56
23	20	27	120	147	208	132	228	147	62	45	28	48
24	17	30	100	178	140	138	212	142	58	57	28	44
25	16	55	88	142	130	126	194	135	57	57	27	42
26	15	60	250	131	120	122	177	123	67	52	27	44
27	14	55	574	253	120	119	164	120	70	50	31	42
28	14	66	434	274	130	116	154	114	68	48	45	40
29	16	72	330	273	------	111	150	127	59	47	51	48
30	29	66	303	232	------	121	144	123	57	50	58	56
31	26	------	246	212	------	148	------	113	------	48	48	------
TOTAL	831	1,024	4,382	4,346	3,370	5,366	11,314	4,885	2,120	1,935	1,190	1,526
MEAN	26.8	34.1	141	140	120	173	377	158	70.7	62.4	38.4	50.9
MAX	70	72	574	274	200	376	1,210	349	118	113	58	97
MIN	14	24	52	86	80	111	139	113	57	45	27	38
CFSM	.37	.48	1.97	1.96	1.68	2.42	5.27	2.21	.99	.87	.54	.71
IN.	.43	.53	2.28	2.26	1.75	2.79	5.89	2.54	1.10	1.01	.62	.79

CAL YR 1973 TOTAL 40,179 MEAN 110 MAX 740 MIN 14 CFSM 1.54 IN 20.90
WTR YR 1974 TOTAL 42,289 MEAN 116 MAX 1,210 MIN 14 CFSM 1.62 IN 22.00

Peak discharge (base, 480 cubic feet per second)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
12-27	1145	4.66	708	4-15	0430	4.82	756
4-04	2145	7.22	1,770				

1/ Data from U.S. Geological Survey, 1974, Surface Water Records, Part 1, p. 147

Table 7.-Data for gaging station 01508803 West Branch Tioughnioga River at Homer, N.Y., 1975[1/]

LOCATION.--Lat 42°38'13", long 76°10'37", Cortland County, on left bank at downstream side of bridge on Wall Street at Homer and 3.4 mi (5.5 km) upstream from confluence with East Branch.

DRAINAGE AREA.--71.5 mi^2 (185 km^2).

PERIOD OF RECORD.--November 1966 to September 1968, October 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,114.81 ft (339.794 m) above mean sea level. Prior to Oct. 1, 1968, water-stage recorder at bridge on Water Street 500 ft (152 m) upstream at same datum.

EXTREMES.--Current year: Maximum discharge, 1,530 ft^3/s (43.3 m^3/s) Sept. 26 (gage height, 6.76 ft or 2.060 m); minimum, 19 ft^3/s (0.54 m^3/s) Aug. 21, 23-24 (gage height, 1.28 ft or 0.390 m).
Period of record: Maximum discharge, 1,770 ft^3/s (50.1 m^3/s) Apr. 4, 1974 (gage height, 7.22 ft or 2.201 m), minimum discharge, 9.6 ft^3/s (0.27 m^3/s) Nov. 22, 1966 (gage height, 1.98 ft or 0.604 m) at site then in use; minimum gage height, 1.14 ft (0.347 m) Sept. 3, Oct. 27, 28, 1973.
Flood of June 23, 1972, reached a stage of 7.46 ft (2.274 m) (8.05 ft or 2.454 m at Water Steet site), from floodmarks; discharge, about 1,900 cfs (53.8 m^3/s); flood of Mar. 5, 1964 was considerably higher (discharge not determined).

REMARKS.--Records good except those for winter periods, which are fair and those for periods of no gage-height record, which are poor. A constant 2.8 ft^3/s (0.079 m^3/s) is diverted for manufacturing purposes from Gate House Pond upstream from station into Onondaga Creek basin (St. Lawrence River basin).

REVISIONS.--WRD N.Y. 1974: 1973 (P).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	49	44	140	100	180	260	150	180	200	44	34	36
2	57	44	157	98	150	210	270	250	140	42	33	32
3	76	42	150	94	140	180	350	260	120	42	31	29
4	74	52	120	96	120	170	450	250	120	41	30	27
5	71	142	120	94	120	150	350	370	150	39	34	26
6	63	153	110	86	120	140	330	350	300	38	33	27
7	59	117	110	88	110	170	310	540	300	38	33	26
8	56	103	102	84	110	150	290	450	190	37	30	25
9	52	93	575	110	98	140	260	360	150	38	28	23
10	49	86	372	130	94	140	250	300	140	38	26	22
11	48	81	311	324	96	120	250	250	110	37	28	21
12	47	81	277	628	98	140	250	220	120	36	26	88
13	47	247	255	298	86	130	230	230	130	119	26	64
14	46	174	234	220	84	110	220	200	110	58	26	49
15	44	154	210	190	82	110	270	180	90	53	26	39
16	68	136	198	170	84	100	300	240	84	49	27	41
17	61	126	204	150	88	144	400	190	86	48	26	55
18	53	120	187	140	100	313	470	170	80	42	25	42
19	50	116	172	140	121	476	560	150	84	40	23	44
20	50	208	160	120	110	400	600	140	83	44	21	39
21	49	290	150	100	104	330	500	130	71	42	20	36
22	47	220	142	100	111	300	350	120	62	39	21	33
23	49	183	135	100	232	280	300	120	58	37	20	32
24	47	249	130	100	942	270	350	110	55	46	30	39
25	48	270	120	124	802	330	400	110	53	107	27	183
26	49	210	110	185	498	250	210	100	49	63	27	957
27	45	190	110	137	389	200	200	150	48	51	36	660
28	44	180	110	120	327	180	190	100	48	46	30	388
29	43	170	110	110	---	160	190	98	48	41	28	278
30	42	170	109	408	---	160	190	94	46	39	74	221
31	43	---	103	249	---	150	---	150	---	36	44	---
TOTAL	1648	4453	5793	4953	5585	6413	9430	6562	3323	1467	925	3582
MEAN	53.2	148	187	160	200	207	314	212	111	47.3	29.8	119
MAX	76	290	575	628	942	476	600	540	300	119	74	957
MIN	42	42	103	84	82	100	150	94	46	34	20	21
CFSM	.74	2.07	2.62	2.24	2.80	2.90	4.39	2.97	1.55	.66	.42	1.66
IN.	.86	2.32	3.01	2.58	2.91	3.34	4.91	3.41	1.73	.76	.48	1.86

CAL YR 1974 TOTAL 47946 MEAN 131 MAX 1210 MIN 27 CFSM 1.83 IN 24.95
WTR YR 1975 TOTAL 54145 MEAN 148 MAX 957 MIN 20 CFSM 2.07 IN 28.17

Peak discharge (base, 480 cubic feet per second)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
12-08	2400	4.86	768	3-19	Unknown	4.20	570
01-11	2330	4.39	627	4-20	Unknown	Unknown	2/ 700
01-30	0130	4.26	588	5-07	Unknown	Unknown	2/ 600
02-24	1300	6.01	1,180	9-26	1730	6.76	1,530

Note.--No gage height record May 3 to June 17.

1/ Data from U.S. Geological Survey, 1975, Surface Water Records, Part 1, p. 174.
2/ About.

Table 8.--Data for gaging station 01509000 Tioughnioga River at Cortland, N.Y. 1973[1/]

LOCATION.--Lat 42°36'10", long 76°09'35", Cortland County, on right bank at east end of Elm Street at Cortland, 0.4 mi (0.6 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--292 mi^2 (756 km^2) (including 14.0 mi^2 (36.3 km^2), the flow from which may be diverted into De Ruyter Reservoir in Oswego River basin).

PERIOD OF RECORD.--May 1938 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,084.92 ft (330.683 m) above mean sea level. Prior to Oct. 1, 1939, water-stage recorder at datum 4.00 ft (1.219 m) higher; Oct. 1, 1939 to Sept. 30, 1963, water-stage recorder at datum 3.00 ft (0.914 m) higher.

AVERAGE DISCHARGE.--35 years, 486 ft^3/s (13.76 m^3/s) (22.60 in/yr or 574.0 mm/yr).

EXTREMES.--Current year: Maximum discharge, 5,030 ft^3/s (142 m^3/s) Dec. 7 (gage height, 8.69 ft or 2.649 m); minimum 54 ft^3/s (1.53 m^3/s)Sept. 12-14 (gage height, 2.65 ft or 0.808 m).
Period of record: Maximum discharge, 13,000 ft^3/s (368 m^3/s) Mar. 5, 1964 (gage height, 12.49 ft or 3.807 m); minimum 9.8 ft^3/s (0.28 m^3/s) Sept. 20, 1939, Sept. 29, 1959; minimum daily, 17 ft^3/s (0.48 m^3/s) Sept. 26, 27, 1959.

REMARKS.--Records good. Diurnal fluctuation at low and medium flow caused by powerplants in mills on West Branch. Slight diversion from East Branch for operation of Erie (Barge) Canal. A constant 2.8 ft^3/s (0.079 m^3/s) is diverted for manufacturing purposes from Gate House Pond on West Branch upstream from station into Onondaga Creek basin (St. Lawrence River basin).

REVISIONS.--WRD N.Y. 1968: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	221	182	711	3950	540	330	833	521	445	249	111	50
2	201	288	667	3150	800	340	1730	510	477	225	111	58
3	185	724	637	1920	2810	420	2470	543	425	217	108	58
4	178	549	613	1500	1960	1028	2150	643	360	233	108	58
5	164	486	625	1300	1300	1150	3080	565	337	253	105	58
6	154	430	2490	980	944	1050	2658	521	319	221	99	71
7	197	400	4410	760	888	1030	2310	466	292	209	80	76
8	257	692	2030	700	838	1250	1820	435	274	201	66	66
9	253	1888	2590	668	680	1140	1410	440	253	185	76	58
10	221	1900	2308	620	580	930	1350	486	237	174	02	58
11	197	1140	1870	600	560	867	1480	538	233	164	82	58
12	185	929	1350	568	500	928	1230	560	249	154	76	56
13	185	757	1300	540	490	1000	1050	661	265	146	71	56
14	182	867	1180	580	480	1070	915	560	233	141	68	58
15	185	999	1010	690	482	1600	867	532	233	138	66	90
16	205	835	908	670	450	1320	822	687	233	132	99	93
17	193	718	660	660	440	1500	766	521	233	132	80	76
18	182	637	740	520	450	2200	685	585	261	129	68	70
19	175	577	703	808	430	1600	649	711	274	126	85	93
20	164	698	762	856	421	1270	607	631	229	123	90	88
21	157	685	728	560	417	1080	571	1130	225	123	76	73
22	150	589	1100	680	410	940	538	1300	229	120	68	71
23	168	538	1330	1760	398	840	625	985	221	117	66	66
24	213	510	1190	1310	370	834	556	815	241	114	62	66
25	197	499	1110	919	360	837	499	718	229	111	60	64
26	185	915	1210	815	357	1170	472	631	225	108	58	62
27	175	1440	1200	766	320	1020	466	595	221	117	58	62
28	168	1040	1050	747	320	831	661	580	229	123	60	60
29	171	874	889	699	---	752	692	556	332	128	58	60
30	205	744	856	560	---	702	589	516	292	117	56	60
31	201	---	1630	540	---	673	---	505	---	114	56	---
TOTAL	5874	23502	40519	30470	18975	31696	36519	19327	8311	6034	2409	1997
MEAN	189	783	1307	983	678	1022	1151	623	277	156	77.7	66.6
MAX	257	1900	4410	3950	2810	2200	3080	1300	477	253	111	93
MIN	150	182	613	460	320	330	466	435	221	108	56	56
CFSM	.65	2.68	4.48	3.37	2.32	3.50	3.94	2.13	.95	.53	.27	.23
IN.	.75	2.99	5.16	3.88	2.42	4.04	4.40	2.46	1.06	.62	.31	.25

CAL YR 1972 TOTAL 296298 MEAN 810 MAX 7020 MIN 98 CFSM 2.77 IN 37.75
WTR YR 1973 TOTAL 222631 MEAN 609 MAX 4410 MIN 56 CFSM 2.09 IN 28.36

Peak discharge (base, 4,400 cubic feet per second)

Date	Time	Gage height	Discharge
12-7	0815	5,030	

1/ Data from U.S. Geological Survey, 1973, Surface Water Records, Part 1, p. 158.

Table 9.--Data for gaging station 01509000 Tioughnioga River at Cortland, N.Y., 1974[1/]

LOCATION.--Lat 42°36'10", long 76°09'35", Cortland County, on right bank at east end of Elm Street at Cortland, 0.4 mi (0.6 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--292 mi^2 (756 km^2) (including 14.0 mi^2 (36.3 km^2), the flow from which may be diverted into De Ruyter Reservoir in Oswego River basin).

PERIOD OF RECORD.--May 1938 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,084.92 ft (330.683 m) above mean sea level. Prior to Oct. 1, 1939, water-stage recorder at datum 4.00 ft (1.219 m) higher; Oct. 1, 1939 to Sept. 30, 1963, water-stage recorder at datum 3.00 ft (0.914 m) higher.

AVERAGE DISCHARGE.--36 years, 487 ft^3/s (13.79 m^3/s) (22.65 in/yr or 575.3 mm/yr).

EXTREMES.--Current year: Maximum discharge, 9,100 ft^3/s (258 m^3/s) Apr. 5 (gage height, 11.11 ft or 3.386 m); minimum, 56 ft^3/s (1.59 m^3/s) Oct. 6, 16-18; minimum gage height, 2.64 ft (0.805 m) Oct. 16-18.
Period of record: Maximum discharge, 13,000 ft^3/s (368 m^3/s) Mar. 5, 1964 (gage height, 12.49 ft or 3.807 m); minimum, 9.8 ft^3/s (0.28 m^3/s) Sept. 20, 1939, Sept. 29, 1959; minimum daily, 17 ft^3/s (0.48 m^3/s) Sept. 26, 27, 1959.

REMARKS.--Records good. Diurnal fluctuation at low and medium flow caused by powerplants in mills on West Branch. Slight diversion from East Branch for operation of Erie (Barge) Canal. A constant 2.8 ft^3/s (0.079 m^3/s) is diverted for manufacturing purposes from Gate House Pond on West Branch upstream from station into Onondaga Creek basin. (St. Lawrence River basin).

REVISIONS.--WRD N.Y. 1968: Drainage area. Revised figures of discharge, in cubic feet per second, for water year 1973, superseding those published in WRD N.Y. 1973, are given herewith:

DISCHARGE IN CUBIC FEET PER SECOND, 1973

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
Aug. 7	80	Aug. 12	76	Aug. 17	80	Aug. 22	68
8	64	13	71	18	68	23	66
9	76	14	68	19	85	24	62
10	82	15	68	20	90	25	60
11	82	16	99	21	76		

Month	cfs-days	Mean	Maximum	Minimum	cfsm	Inches
August 1973	2,409	77.7	111	56	0.27	0.31
WTR YR 1973	222,431	609	4,410	54	2.09	28.34

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	78	293	900	880	605	560	509	361	171	144	151
2	66	99	257	680	720	593	703	463	329	154	132	129
3	96	94	226	674	620	613	1,580	439	292	717	117	301
4	86	91	213	560	520	1,390	5,310	445	270	2,040	126	730
5	60	83	307	460	440	2,350	7,670	401	237	1,290	108	420
6	56	76	1,160	460	440	2,570	4,180	383	209	749	138	275
7	66	76	742	440	440	1,790	2,620	412	197	533	120	213
8	60	73	523	360	420	1,460	2,160	375	190	431	111	175
9	58	73	747	320	380	1,190	1,790	397	179	361	105	157
10	62	71	1,680	310	360	1,070	1,470	684	179	315	102	141
11	66	69	1,090	300	350	884	1,400	640	229	279	99	129
12	73	69	735	300	340	760	1,790	713	245	245	94	126
13	64	69	587	280	340	560	1,810	1,710	193	213	94	338
14	64	71	575	280	340	520	1,830	1,300	175	186	91	578
15	62	71	494	314	280	500	2,720	907	171	171	86	338
16	58	83	360	300	260	566	2,120	728	186	157	80	245
17	56	132	290	280	260	736	1,490	1,280	221	148	86	205
18	56	126	200	260	260	489	1,200	1,490	205	141	91	190
19	60	119	190	260	250	480	1,020	950	168	135	88	175
20	66	115	400	240	270	480	877	737	161	132	83	164
21	71	109	1,100	260	270	480	783	632	164	124	78	190
22	66	108	1,270	484	600	460	723	562	266	120	76	347
23	62	108	1,100	609	1,500	460	791	565	237	117	73	270
24	60	109	934	966	900	450	734	549	175	151	73	213
25	60	215	812	879	700	440	671	520	161	197	69	193
26	60	303	1,850	567	560	446	587	460	201	154	69	213
27	58	238	3,710	1,220	540	436	533	427	270	138	80	193
28	58	278	3,260	1,760	520	398	492	405	213	129	123	175
29	58	324	2,020	1,550	------	376	468	457	182	123	168	193
30	64	327	1,510	1,230	------	423	452	477	193	229	270	301
31	83	------	1,110	1,040	------	572	------	390	------	197	221	------
TOTAL	1,995	3,857	29,745	18,343	13,760	24,547	50,532	20,407	6,459	10,249	3,455	7,468
MEAN	64.4	129	960	592	491	792	1,684	658	215	331	111	249
MAX	96	327	3,710	1,760	1,500	2,570	7,670	1,710	361	2,040	270	730
MIN	56	69	190	240	250	376	452	375	161	117	69	126
CFSM	.22	.44	3.29	2.03	1.68	2.71	5.77	2.25	.74	1.13	.38	.85
IN.	.25	.49	3.79	2.34	1.75	3.13	6.44	2.60	.82	1.31	.44	.95

CAL YR 1973 TOTAL 188,133 MEAN 515 MAX 3,950 MIN 54 CFSM 1.76 IN 23.97
WTR YR 1974 TOTAL 190,817 MEAN 523 MAX 7,670 MIN 56 CFSM 1.79 IN 24.31

Peak discharge (base, 4,400 cubic feet per second)

Date	Time	Gage height	Discharge
04-5	0400	11.11	9,100

1/ Data from U.S. Geological Survey, 1974, Surface Water Records, Part 1, p. 148.

Table 10.-Data for gaging station 01509000 Tioughnioga River at Cortland, N.Y. 1975[1/]

LOCATION.--Lat 42°36'10", long 76°09'35", Cortland County, on right bank at east end of Elm Street at Cortland, 0.4 mi (0.6 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--292 mi² (756 km²) (including 14.0 mi² (36.3 km²), the flow from which may be diverted into De Ruyter Reservoir in Oswego River basin).

PERIOD OF RECORD.--May 1938 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,084.92 ft (330.683 m) above mean sea level. Prior to Oct. 1, 1939, water-stage recorder at datum 4.00 ft (1.219 m) higher; Oct. 1, 1939 to Sept. 30, 1963, water-stage recorder at datum 3.00 ft (0.914 m) higher.

AVERAGE DISCHARGE.--37 years, 490 ft³/s (13.88 m³/s) (22.79 in/yr or 578.9 mm/yr).

EXTREMES.--Current year: Maximum discharge, 6,750 ft³/s (191 m³/s) Feb 25 (gage height, 9.94 ft or 3.030 m); minimum, 64 ft³/s (1.81 m³/s) Sept. 9-11 (gage height, 2.70 ft or 0.823 m).
Period of record: Maximum discharge, 13,000 ft³/s (368 m³/s) Mar. 5, 1964 (gage height, 12.49 ft or 3.807 m); minimum, 9.8 ft³/s (0.28 m³/s) Sept. 20, 1939, Sept. 29, 1959; minimum daily, 17 ft³/s (0.48 m³/s) Sept. 26, 27, 1959.

REMARKS.--Records good. Diurnal fluctuation at low and medium flow caused by powerplants in mills on West Branch. Slight diversion from East Branch for operation of Erie (Barge) Canal. A constant 2.8 ft³/s (0.079 m³/s) is diverted for manufacturing purposes from Gate House Pond on West Branch upstream from station into Onondaga Creek basin (St. Lawrence River basin).

REVISIONS.--WRD N.Y. 1968: Drainage area. WRD N.Y. 1974: 1973.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	229	154	580	370	840	1100	780	490	571	120	132	105
2	241	147	583	350	640	883	626	670	385	114	129	95
3	329	141	577	320	540	755	1120	693	329	111	126	90
4	319	201	580	340	440	640	1540	670	329	108	126	88
5	292	692	420	330	460	600	1030	1060	410	103	129	88
6	253	1080	430	280	480	560	938	961	863	95	129	85
7	225	770	400	310	440	540	885	1960	849	95	132	85
8	213	607	1730	300	390	760	800	1460	653	93	129	85
9	197	516	3740	450	390	560	717	1020	532	100	120	76
10	185	455	2480	685	350	520	687	794	440	126	117	64
11	178	420	1520	1640	370	500	699	675	380	114	117	64
12	171	400	1190	2670	360	450	693	604	400	98	114	189
13	164	1390	1070	1660	320	582	637	642	415	195	111	209
14	171	1240	985	1000	310	560	609	571	351	123	111	135
15	225	957	860	820	324	670	768	505	297	108	111	108
16	319	774	780	720	314	630	821	659	275	111	111	93
17	265	661	841	640	300	460	1180	549	275	114	111	98
18	221	589	776	580	370	510	1410	465	266	108	108	90
19	197	543	685	580	494	908	1960	420	258	103	105	90
20	189	936	619	500	466	2490	2210	390	262	111	103	95
21	185	1540	540	400	400	2440	1470	360	209	132	103	98
22	182	1180	538	410	395	1700	1000	342	177	144	103	93
23	182	882	490	400	730	1490	835	333	165	135	100	85
24	178	1100	470	400	3070	1930	965	306	156	147	111	90
25	174	1320	460	472	6120	1780	1080	275	150	270	100	587
26	185	1080	430	848	3740	1860	794	262	144	213	98	3090
27	171	860	410	600	2060	1210	675	420	141	168	100	4610
28	164	802	420	500	1450	1000	609	333	138	156	100	2370
29	157	724	400	920	---	960	549	266	135	147	98	1230
30	154	655	395	1880	---	880	500	250	129	138	162	794
31	150	---	370	1100	---	780	---	405	---	132	129	---
TOTAL	6486	22818	25469	22475	26563	29889	28547	18810	10084	4032	3575	15879
MEAN	209	761	828	725	949	964	952	607	336	130	115	529
MAX	328	1540	3740	2670	6120	2490	2210	1960	863	270	162	4610
MIN	150	141	370	280	300	430	500	250	129	93	98	64
CFSM	.72	2.61	2.84	2.48	3.25	3.30	3.26	2.08	1.15	.45	.39	1.81
IN.	.83	2.91	3.27	2.88	3.38	3.81	3.64	2.40	1.28	.51	.46	2.02

CAL YR 1974 TOTAL 210191 MEAN 574 MAX 7670 MIN 49 CFSM 1.97 IN 26.78
WTR YR 1975 TOTAL 214824 MEAN 589 MAX 6120 MIN 44 CFSM 2.02 IN 27.37

Peak discharge (base, 4,400 cubic feet per second)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
2-25	0945	9.94	6,750	9-26	1645	8.88	5,260

1/ Data from U.S. Geological Survey, 1975, Surface Water Records, Part 1, p. 175.

Table 11 .--Water Quality data for gaging station 01508803 West Branch Tioughnioga River at Homer, N.Y.

Date	Magnesium (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Hardness (mg/l)	Bicarbonate (mg/l)	Carbonate (mg/l)	Sulfate (mg/l)	Chloride (mg/l)
7-28-72	14	51	7.7	0.8	185	186	0	18	16
8-21-72	14	50	7.7	.8	182	168	5	18	16
9-18-72	14	51	9.6	1.1	185	177	0	20	19
10-24-72	8.9	44	5.6	1.3	147	149	0	18	13
11-17-72	10	46	6.5	1.1	156	151	0	17	12
12-14-72	9.3	47	6.5	1.0	156	143	0	17	14
1-17-73	13	57	7.6	1.0	196	187	0	20	18
2-14-73	13	61	7.3	1.0	206	193	0	20	15
3-22-73	10	45	6.8	.8	154	141	0	17	15
4-11-73	9	44	7.0	.9	147	143	0	18	13
5-15-73	12	46	7.2	1.0	164	162	0	18	14
6-19-73	13	44	8.1	.8	163	167	0	16	15
7-16-73	14	45	10	.9	170	174	0	16	20
11-19-73	13	49	9.5	1.3	176	184	0	21	17
2-13-74	12	49	7.8	1.1	172	170	0	19	17
4-04-74	4	18	3.5	2.0	61	59	0	13	7.2
6-13-74	13	45	8.3	.9	165	175	0	17	19
9-30-74	10	40	7.5	1.4	141	147	0	12	29
12-16-74	9.6	40	7.2	.8	140	146	0	16	12
3-21-75	8.8	36	6.4	1.1	130	122	0	19	14

Date	Nitrate as NO_3 (mg/l)	Stream discharge (ft^3/s)	pH	Specific conductance (micromhos)	Total dissolved solids (mg/l)	Ratio Fecal coli/ Fecal strep	Fecal coli (colonies/100 ml)	Fecal strep (colonies/100 ml)	Total coli (colonies/100 ml)
7-28-72	5.75	65	8.1	379	208	1.0	220	220	720
8-21-72	6.19	46	8.5	364	204	1.8	450	250	6900
9-18-72	3.98	45	8.3	408	208	.80	380	480	5000
10-24-72	4.42	51.2	8.2	304	173	.66	720	1100	2500
11-17-72	6.63	149	8.1	315	178	1.7	134	78	380
12-14-72	6.63	281	7.7	310	176	2.1	67	32	190
1-17-73	10.61	132	8.0	386	223	.3	10	29	150
2-14-73	11.05	126	8.2	391	227	2.0	28	14	110
3-22-73	7.5	228	7.6	313	175	2.0	32	16	1400
4-11-73	7.08	326	7.8	303	166	.75	15	20	230
5-15-73	6.6	107	7.4	346	188	1.3	47	37	1600
6-19-73	5.2	79	7.8	342	188	2.6	680	260	2000
7-16-73	5.3	35	7.9	371	201	2.5	560	220	6200
11-19-73	6.6	27	7.5	420	208	- -	- -	- -	- -
2-13-74	8.8	96	7.8	420	199	- -	- -	- -	- -
4-04-74	5.3	1670	6.9	149	82	- -	- -	- -	- -
6-13-74	6.2	79	7.7	420	196	11	460	41	11000
9-30-74	4.4	56	7.3	370	177	3.4	7100	2100	24000
12-16-74	4.0	196	7.8	- -	162	4.0	170	43	440
3-21-75	6.6	317	7.4	211	149	.60	78	130	750

Table 12.--Water Quality data for gaging station 01508800 Factory Brook at Homer, N.Y.

Date	Magnesium (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Hardness (mg/l)	Bicarbonate (mg/l)	Carbonate (mg/l)	Sulfate (mg/l)	Chloride (mg/l)
6-15-72	8.9	46	3.6	0.9	151	147	0	17	7
7-28-72	10.0	51	3.3	.7	169	159	2	16	6.5
8-21-72	10.0	51	3.2	1.2	169	149	11	16	6.2
9-18-72	10.0	52	3.4	1.0	171	149	11	16	6.5
11-09-72	4.0	24	2.3	1.6	76	60	0	16	4.5
11-17-72	8.4	42	3.6	1.0	139	127	0	17	6.5
12-14-72	7.9	43	3.4	.8	140	120	0	17	6.3
1-17-73	9.7	51	3.5	.8	167	152	0	17	7.4
2-14-73	9.3	47	3.4	.7	156	145	0	17	7.5
3-23-73	7.6	38	3.4	.8	126	109	0	16	8.0
4-11-73	6.8	36	4.3	.8	118	107	0	16	8.0
5-15-73	8.3	40	3.4	.8	134	126	0	16	6.0
6-19-73	9.4	44	3.6	.9	149	144	0	14	13
7-16-73	10.0	47	3.3	1.0	159	162	0	14	6
9-17-73	10.0	44	3.6	1.0	151	158	1	17	5.7
8-31-73	10.0	40	3.4	1.1	141	141	0	15	5.5
1-16-74	10	46	4.6	1.0	156	148	0	16	8.3
3-18-74	8.4	40	3.2	.9	138	135	0	15	8
6-13-74	9.8	44	3.5	1.0	150	155	0	15	7.5
11-04-74	10	39	3.5	1.2	139	142	0	28	11
12-16-74	8.5	39	3.5	.8	130	126	0	16	8.3
1-20-75	9.8	45	3.9	.8	150	147	0	17	6.8
3-21-75	5.6	27	3.3	1.0	90	77	0	14	7.8

Date	Nitrate as NO_3 (mg/l)	Stream Discharge (ft^3/s)	pH	Specific conductance (micromhos)	Total dissolved solids (mg/l)	Ratio Fecal coli/ Fecal strep	Fecal coli (colonies/100 ml)	Fecal strep (colonies/100 ml)	Total coli (colonies/100 ml)
6-15-72	13	19	8.2	308	172	- -	- -	- -	- -
7-28-72	17	10	8.4	334	189	2.04	490	240	1800
8-21-72	15	6	8.7	328	192	2.42	2900	1200	4100
9-18-72	16	5.7	8.8	324	194	.52	410	780	800
11-09-72	7.5	87	7.6	161	94	- -	- -	- -	- -
11-17-72	15	33	8.2	284	161	2.82	172	61	270
12-14-72	16	52	7.6	275	158	6.03	290	48	310
1-17-73	17	21	8.3	316	185	1.0	20	21	10
2-14-73	18	22	8.0	305	178	4.0	4	1	33
3-23-73	13	48	7.9	254	144	1.0	15	16	290
4-11-73	13	57	7.8	249	129	1.0	17	18	20
5-15-73	12	25	7.7	272	153	1.4	76	54	210
6-19-73	12	13	8.3	290	172	2.06	890	430	5100
7-16-73	12	64	8.3	318	179	3.6	15000	2400	26000
9-17-73	13	4	8.4	321	179	5.9	1300	220	1500
8-31-73	11	3	7.8	282	158	- -	- -	- -	- -
1-16-74	17	--	8.0	321	163	.47	520	1100	1200
3-18-74	--	25	7.9	269	146	- -	80	- -	53
6-13-74	--	--	8.1	295	- -	11.7	2100	180	8000
11-04-74	12	12	7.2	350	178	6.0	7200	1200	8700
12-16-74	16	40	8.1	380	143	2.8	200	71	230
1-20-75	17	22	8.0	365	160	1.4	22	16	430
3-21-75	10	70	7.4	155	100	3.2	210	66	680

Table 13.--Water-quality data for selected sites on Dry and Blue Creeks and Wells 1 to 5.

Date	Magnesium (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Hardness (mg/l)	Bicarbonate (mg/l)	Carbonate (mg/l)	Sulfate (mg/l)	Chloride (mg/l)	Nitrate as NO_3 (mg/l)	Stream discharge (ft^3/s)	pH	Specific conductance (micromhos)	Total dissolved solids (mg/l)	Ratio Fecal coli/ Fecal strep	Fecal coli (colonies/100 ml)	Fecal strep (colonies/100 ml)	Total coli (colonies/100 ml)
						01508905 Dry Creek at Cortland at Sweeney Road												
6/13/74	5.4	34	3.8	1.0	107	106	0	14	6.9	7.5	.30	7.6	275	124	3.2	1200	380	9900
						01508915 Dry Creek below Blue Creek at Cortland												
6/13/74	5.4	34	4.0	1.1	107	101	0	14	8.8	5.3	2.7	6.9	270	122	1.2	300	250	1900
						01508918 Dry Creek above Cortland at Route 281												
6/13/74	5.4	36	4.1	1.1	112	101	0	14	7.6	6.6	3.2	7.8	260	125	6.9	440	64	5200
						01508925 Dry Creek at Cortland at Hamlin Street												
6/13/74	5.4	32	4.0	1.0	102	102	0	14	7.8	6.6	1.4	7.8	255	121	2.1	600	290	4200
						01508910 Blue Creek near Cortland												
6/13/74	5.2	28	4.3	1.0	91	95	0	12	7.7	1.2	.806	7.2	230	106	4.6	1300	280	1700
						01508913 Blue Creek at Cortland at Kinney Gulf Rd.												
6/13/74	5.2	30	3.6	1.0	96	100	0	13	6.1	2.6	1.8	7.2	250	110	--	- -	- -	- -
						Well 1, Clark Road at Slab City												
8/27/74	22	72	13	.8	270	228	0	22	21	34	--	7.4	680	318	.04	1	28	320
						Well 2, at Pratt Corners												
8/27/74	6.2	32	7.1	.6	105	101	0	14	11	8.9	--	7.3	310	130	.18	2	11	450
						Well 3, White Bridge Road near Pratt Corners												
8/27/74	6.5	39	2.3	.5	124	118	0	14	3.7	2.7	--	7.7	260	127	.33	3	9	100
						Well 4, Route 11 near Pratt Corners												
8/27/74	17	77	16	8.6	262	128	0	18	56	22	--	7.4	730	272	.08	1	12	210
						Well 5, at Homer												
6/13/74	5.1	11	3.7	1.4	48	32	0	21	8.8	0	--	8.7	152	73	--	20	--	75

Table 14.--Data for gaging station 01509150 Gridley Creek above East Virgil, N.Y. 1974-1975

LOCATION.--Lat 42°30'04", long 76°07'38", Cortland County, on right bank 100 ft (30 m) downstream from bridge on Tone Road, 250 ft (75 m) south of State Highway 90, 1.6 mi (2.6 km) northwest of East Virgil, 3.2 mi (5.1 km) northwest of Messengerville, and 3.5 mi (5.6 km) upstream from mouth.

DRAINAGE AREA.--10.4 mi^2 (26.9 km^2).

PERIOD OF RECORD.--Discharge measurements, seepage investigation, water year 1974, July 1974 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,270.00 ft (387.096 m) above mean sea level.

EXTREMES.--July to September 1974: Maximum discharge during period, about 30 ft^3/s (0.85 m^3/s) Sept. 29; minimum, 1.4 ft^3/s (0.040 m^3/s) Aug. 15 (gage height, 4.90 ft or 1.494 m).
Water year 1975: Maximum discharge, 2,530 ft^3/s (71.6 m^3/s) Sept. 26 (gage height, 7.77 ft or 2.368 m); minimum, 0.9 ft^3/s (0.025 m^3/s) Aug. 8 (gage height, 4.74 ft or 1.445 m).

REMARKS.--Records poor.

DISCHARGE, IN CUBIC FEET PER SECOND, JULY TO SEPTEMBER 1974

DAY	JULY	AUG	SEPT	DAY	JULY	AUG	SEPT	DAY	JULY	AUG	SEPT
1	6.0	2.0	2.4	11	3.0	1.9	3.3	21	2.0	2.5	5.8
2	4.6	2.0	3.1	12	2.9	1.8	4.0	22	2.0	2.3	6.6
3	4.3	2.0	10	13	2.9	1.8	5.0	23	2.0	2.3	6.2
4	4.6	2.3	6.0	14	2.7	1.8	6.0	24	4.5	3.2	4.4
5	4.4	2.2	4.4	15	2.7	1.9	5.4	25	2.6	3.1	4.4
6	4.0	2.1	4.0	16	2.6	2.0	4.8	26	2.4	2.9	5.0
7	3.8	2.0	3.8	17	2.4	2.3	4.3	27	2.2	2.7	4.6
8	3.6	1.9	3.6	18	2.4	2.2	4.0	28	2.0	2.6	4.1
9	3.4	2.0	3.5	19	2.2	2.1	3.8	29	2.7	2.7	8.6
10	3.2	2.1	3.4	20	2.0	2.0	3.6	30	2.7	2.9	9.4
								31	2.2	2.6	
TOTAL									95.0	70.2	147.5
MEAN									3.06	2.26	4.92
MAX									6.0	3.2	10
MIN									2.0	1.8	2.4
CFSM									.29	0.22	.47
IN.									.33	.25	.53

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.0	10	14	7.6	14	20	21	28	8.2	2.0	1.5	2.1
2	11	10	15	7.2	12	16	18	42	7.5	1.9	1.5	2.3
3	8.4	10	14	7.0	10	14	98	24	7.3	1.9	1.5	2.2
4	7.6	33	11	9.0	9.0	16	34	106	7.6	1.9	1.5	1.8
5	7.2	97	9.8	7.8	10	9.9	39	91	21	1.8	1.4	1.7
6	7.0	56	9.7	7.2	12	9.1	32	142	69	1.9	1.6	1.8
7	7.0	40	11	7.6	9.0	13	29	97	24	1.8	1.5	1.7
8	7.2	32	277	7.8	7.8	20	24	60	18	1.8	1.4	4.4
9	7.4	26	104	47	9.0	19	23	25	14	2.4	1.4	5.6
10	7.2	22	60	32	6.4	13	24	21	11	2.0	1.4	2.7
11	7.0	20	42	221	6.8	14	26	19	9.2	2.0	1.4	2.3
12	7.0	32	36	89	6.6	14	25	38	18	1.9	1.3	51
13	7.6	91	34	42	6.8	22	20	34	13	1.9	1.4	18
14	7.0	36	29	29	6.8	17	25	20	9.5	1.9	1.4	10
15	9.4	29	24	22	7.0	15	31	32	7.8	1.9	1.3	7.4
16	10	24	23	19	7.1	14	44	60	6.9	1.9	1.5	5.8
17	8.6	22	23	15	7.8	14	49	25	5.9	1.8	1.4	5.7
18	7.6	19	20	13	15	30	52	23	4.9	1.8	1.3	6.0
19	7.0	17	17	16	19	100	79	22	6.3	2.1	1.2	14
20	8.0	62	15	12	13	170	55	21	5.3	2.1	1.2	10
21	7.6	52	14	9.0	11	70	37	20	4.0	1.9	1.2	9.8
22	7.4	32	12	9.4	16	45	32	17	3.6	1.8	1.2	6.6
23	8.0	28	11	10	68	34	29	15	3.2	3.4	1.2	7.9
24	9.0	43	11	11	260	57	56	13	3.0	4.7	8.9	17
25	11	37	11	28	120	84	35	11	2.9	6.0	2.3	307
26	14	27	10	33	67	45	28	10	2.7	3.0	1.9	621
27	12	23	10	17	29	40	24	23	2.6	2.1	1.6	200
28	12	22	9.7	15	23	31	21	12	2.5	2.0	1.5	80
29	11	19	9.6	59	---	32	18	9.6	2.3	1.8	2.1	50
30	11	16	9.7	36	---	30	18	9.9	2.1	1.6	12	37
31	11	---	8.3	20	---	22	---	8.7	---	1.5	3.3	---
TOTAL	271.0	985	904.6	864.6	769.1	1054.0	1052	1059.2	283.3	68.5	65.3	1492.8
MEAN	8.74	32.8	29.2	27.9	27.5	34.1	35.1	34.2	9.44	2.21	2.11	49.8
MAX	14	97	277	221	260	170	98	142	69	6.0	12	621
MIN	7.0	10	8.3	7.0	6.4	9.1	18	8.7	2.1	1.5	1.2	1.7
CFSM	.84	3.15	2.81	2.68	2.64	3.28	3.38	3.29	.91	.21	.20	4.79
IN.	.97	3.52	3.24	3.09	2.75	3.78	3.76	3.79	1.01	.24	.23	5.34

WTR YR 1975 TOTAL 8871.4 MEAN 24.3 MAX 621 MIN 1.2 CFSM 2.34 IN 31.73

Peak discharge (base, 500 cubic feet per second)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
12-8	1445	6.96	586	5-06	1815	6.70	525
1-11	1730	6.92	565	9-26	0745	7.77	2,530

Note.--Date from "Water Reaources Data for New York, Part 1, Surface Water Records 1975."

Table 15.--Surface-Water data for Gridley Creek seepage investigations

Three series of discharge measurements were made 1973 - 1975 on Gridley Creek and tributaries to study channel gains and losses. The reach is 6.2 mi (10.0 km) in length and extends from a point 1.1 mi (1.8 km) east of Virgil, New York, and 0.4 mi (0.6 km) east of the north-south drainage divide between the Susquehanna River and Lake Ontario basins, to the mouth, lat 42°29'25", long 76°04'24". The measurements were made during periods of constant base flow of the streams. Tributary flow was considered a contribution and not a gain. Indicated gains or losses in relation to records of nearest upstream stations may be substantially in error as affected by small inaccuracies in open-channel measurements. Refer to figure 2.

Measurements are listed in downstream order, and each tributary is inserted in the order in which it enters the main stream.

Station number and name	Distance upstream from mouth of river (mi)	Drainage area (mi^2)	Measured discharge and gain or loss, in cubic feet per second					
			Oct. 23, 1973 90% duration		June 4, 1974 50% duration		May 20, 1975 35% duration	
			Discharge	Gain or loss	Discharge	Gain or loss	Discharge	Gain or loss
01509104 Gridley Creek at Page Green Road nr Blodgett Mills	7.6	1.63	- -		- -		1.77	- -
01509108 Gridley Creek near Blodgett Mills	6.7	2.96	- -		- -		2.77	+1.00
01509110 Gridley Creek above Page Green Road nr Virgil	5.8	3.46	- -		0.82	- -	4.10	+1.33
01509115 Gridley Creek trib 3 nr Virgil	6.2	.35	- -		.01	- -	.43	- -
01509116 Gridley Crk trib to trib 3 nr Virgil	6.2	.10	- -		.15	- -	.47	- -
01509118 Gridley Creek trib 3 at mouth nr Virgil	5.8	.53	- -		.73	+0.57	2.22	+1.32
01509120 Gridley Creek at Page Green Road nr Virgil	5.6	4.26	0	- -	2.12	+.57	6.29	-0.03
01509125 Gridley Creek at State Highway 90 nr Virgil	5.2	4.67	0	0	2.47	+.35	7.16	+.87
01509127 Gridley Creek trib nr Virgil at State Highway 90	5.1	2.56	.17	- -	.92	- -	3.25	- -
01509135 Gridley Creek at Greek Peak nr Virgil	4.4	7.74	.10	-0.07	3.48	+.09	14.30	+3.89
01509145 Gridley Creek trib 2 nr East Virgil	3.9	1.87	.01	- -	1.02	- -	2.85	- -
01509150 Gridley Creek above East Virgil 1/	3.6	10.36	1.42	+1.31	5.76	+1.26	18.84	+1.69
01509190 Gridley Creek at State Highway 90 nr Virgil	2.0	12.31	1.61	+.19	8.38	+2.62	23.22	+4.38
01509198 Gridley Creek nr Messengerville	1.6	12.49	1.70	+.09	- -		- -	
01509200 Gridley Creek at Messengerville	.1	16.1	2.19	+.49	11.70	+3.32	27.47	+4.25

1/ Recording stream-gaging station since July 1974.

Note.--Data from "Water Resources Data for New York-Part 1., Surface Water Records" (1974 and 1975 issues).

Table 16.--Water-quality data for Gridley Creek above East Virgil, N.Y.

Sampling Date	Time	Magnesium (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Hardness as $CaCO_3$ (mg/l)	Bicarbonate (mg/l)	Carbonate (mg/l)	Sulfate (mg/l)	Chloride (mg/l)	Nitrate as NO_3 (mg/l)	Nitrite as NO_2 (mg/l)	Fluoride (mg/l)
12-16-74	1030	3.7	17	3.7	0.5	58	45	0	13	5.9	3.5	0	0.1
1-20-75	1100	4.2	21	4.2	.7	70	60	0	14	5.6	4.4	0	.1
2-19-75	0930	3.6	18	6.5	1.1	60	45	0	12	12	3.6	0	.1
3-21-75	1400	2.1	10	2.8	.7	34	21	0	11	4.9	2.5	0	.1
4-23-75	0900	2.9	14	3.0	.6	47	38	0	18	7.1	2.3	0	.2
5-16-75	1100	2.0	13	3.3	.5	41	36	0	10	6.0	1.3	0	.2
5-20-75	1015	2.5	18	3.8	1.0	55	56	0	11	5.6	1.6	0	.3
6-19-75	1330	5.1	26	4.8	1.0	86	88	0	15	8.3	2.4	0	.0
8-01-75	0900	8.1	41	6.5	1.0	140	142	0	13	9.6	2.6	0	.0
9-18-75	0900	7.0	30	5.8	1.0	100	106	0	19	12	1.8	0	.1
10-07-75	0930	4.8	22	7.3	1.1	75	68	0	13	7.9	2.0	0	.2
11-21-75	0900	3.0	18	3.5	1.0	57	50	0	14	6.3	1.9	0	.1
12-18-75	1000	3.7	16	6.6	.7	55	49	0	15	5.4	2.5	0	.1
2-19-76	1030	2.0	8.5	3.4	.7	29	20	0	11	4.8	2.7	0	.1

Sampling Date	Time	Iron (mg/l)	Manganese (ug/l)	Silica (mg/l)	Dissolvad oxygen (mg/l)	Dissolved oxygen percent saturation	Total dissolved solids (mg/l)	pH	Specific conductance (micromhos)	Stream temp °C	Fecal coli (colonies/100 ml)	Fecal strep (colonies/100 ml)	Total coli (colonies/100 ml)	Stream discharge (ft^3/s)
12-16-74	1030	320	60	4.5	13.8	97	70	7.4	140	1.0	44	11	1300	22
1-20-75	1100	70	0	4.7	13.9	95	84	7.4	177	0	14	14	400	12
2-19-75	0930	210	10	4.2	13.1	90	80	7.4	163	0	330	310	1400	21
3-21-75	1400	380	20	4.0	10.6	80	46	6.8	75	4	18	86	320	56
4-23-75	0900	90	10	4.0	13.5	100	68	7.1	111	3	42	5	490	28
5-16-75	1100	340	20	4.2	9.2	86	57	7.6	109	13	180	62	1200	45
5-20-75	1015	150	10	4.2	- -	--	74	8.4	143	12	43	21	460	19
6-19-75	1330	260	10	4.1	8.3	86	108	7.6	220	17	110	81	520	7.6
8-01-75	0900	530	20	4.4	7.8	82	154	7.8	308	15	25	430	370	1.6
9-18-75	0900	130	10	4.4	10.0	93	132	7.8	234	12	53	74	1600	4.7
10-07-75	0930	230	20	5.3	9.4	83	95	7.7	179	10	54	140	230	14
11-21-75	0900	340	30	4.1	9.2	80	75	7.5	140	9	130	390	270	21
12-18-75	1000	140	0	4.6	12.6	92	76	7.6	148	1	130	210	310	17
2-19-76	1030	1110	30	3.9	13.4	94	44	7.7	95	1	73	89	1110	123

Note.--Data through September 19, 1975 from "Water Resources Data for New York Water Year 1975", Section 2, Water-Quality Records.

Table 17.--Water-quality data for Gridley Creek above and below East Virgil

Station	Date	Time	Magnesium (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Hardness as $CaCO_3$ (mg/l)	Bicarbonate (mg/l)	Carbonate (mg/l)	Sulfate (mg/l)	Chloride (mg/l)	Nitrate as NO_3 (mg/l)	Nitrite as NO_2 (mg/l)
01509104	5-20-75	1400	2.2	11	3.4	1.0	37	24	0	13	6.2	4.0	0
01509108	Do.	1525	2.3	11	3.6	0.9	37	34	0	10	4.5	3.0	0
01509110	Do.	1555	2.3	12	3.9	1.0	39	29	0	12	5.4	2.3	0
01509115	Do.	1340	2.0	8.4	3.1	1.2	29	23	0	12	5.5	.8	0
01509116	Do.	1335	5.3	32	3.7	.9	100	89	0	13	7.0	5.8	0
01509118	Do.	1555	5.4	29	3.9	1.4	95	97	0	14	7.1	6.2	0
01509120	Do.	1535	3.2	19	3.6	1.1	61	56	0	13	7.1	3.4	0
01509125	Do.	1440	3.4	18	4.9	1.2	59	56	0	13	8.2	3.1	0
01509127	Do.	1320	1.9	8.7	1.9	.7	30	22	0	12	1.1	.0	0
01509135	Do.	1230	3.4	18	3.8	.9	59	54	0	12	5.8	2.1	0
01509145	Do.	1125	1.8	7.9	1.5	.8	27	19	0	13	1.1	.0	0
01509150	Do.	1015	2.5	18	3.8	1.0	55	56	0	11	5.6	1.6	0
01509190	Do.	0920	3.2	18	3.5	.8	58	55	0	12	5.8	1.5	0
01509200	Do.	0810	3.0	16	3.4	.8	52	56	0	12	5.9	1.5	0

Station	Date	Time	Fluoride (mg/l)	Iron (ug/l)	Manganese (ug/l)	Silica (mg/l)	Total dissolved solids (mg/l)	pH	Specific conductance (micromhos)	Stream temp °C	Fecal coli (colonies/100 ml)	Fecal strep (colonies/100 ml)	Total coli (colonies/100 ml)	Stream discharge (ft^3/s)
01509104	5-20-75	1400	0.1	160	10	4.9	54	6.8	100	18	- -	- -	- -	1.8
01509108	Do.	1525	.2	200	10	4.5	54	6.9	106	21	- -	- -	- -	2.8
01509110	Do.	1555	.2	140	10	4.0	55	8.0	100	24	- -	- -	- -	4.1
01509115	Do.	1340	.2	190	.0	5.1	49	7.0	94	22	- -	- -	- -	.43
01509116	Do.	1335	.2	240	20	3.6	110	7.1	248	22	- -	- -	- -	.47
01509118	Do.	1555	.2	280	40	4.1	113	7.3	232	19	- -	- -	- -	2.2
01509120	Do.	1535	.2	190	20	3.9	79	7.4	153	21	- -	- -	- -	6.3
01509125	Do.	1440	.2	240	20	3.6	80	7.7	173	21	- -	- -	- -	7.2
01509127	Do.	1320	.1	50	10	4.7	42	6.9	80	18	- -	- -	- -	3.2
01509135	Do.	1230	.1	150	10	4.0	75	8.5	143	16	36	105	126	14
01509145	Do.	1125	.1	60	10	5.2	41	7.4	64	14	- -	- -	- -	2.8
01509150	Do.	1015	.3	150	10	4.2	74	8.4	143	13	43	21	460	19
01509190	Do.	0920	.2	90	10	4.0	75	7.6	140	12	- -	- -	- -	23
01509200	Do.	0810	.2	110	10	3.9	73	7.3	142	12	76	12	730	28

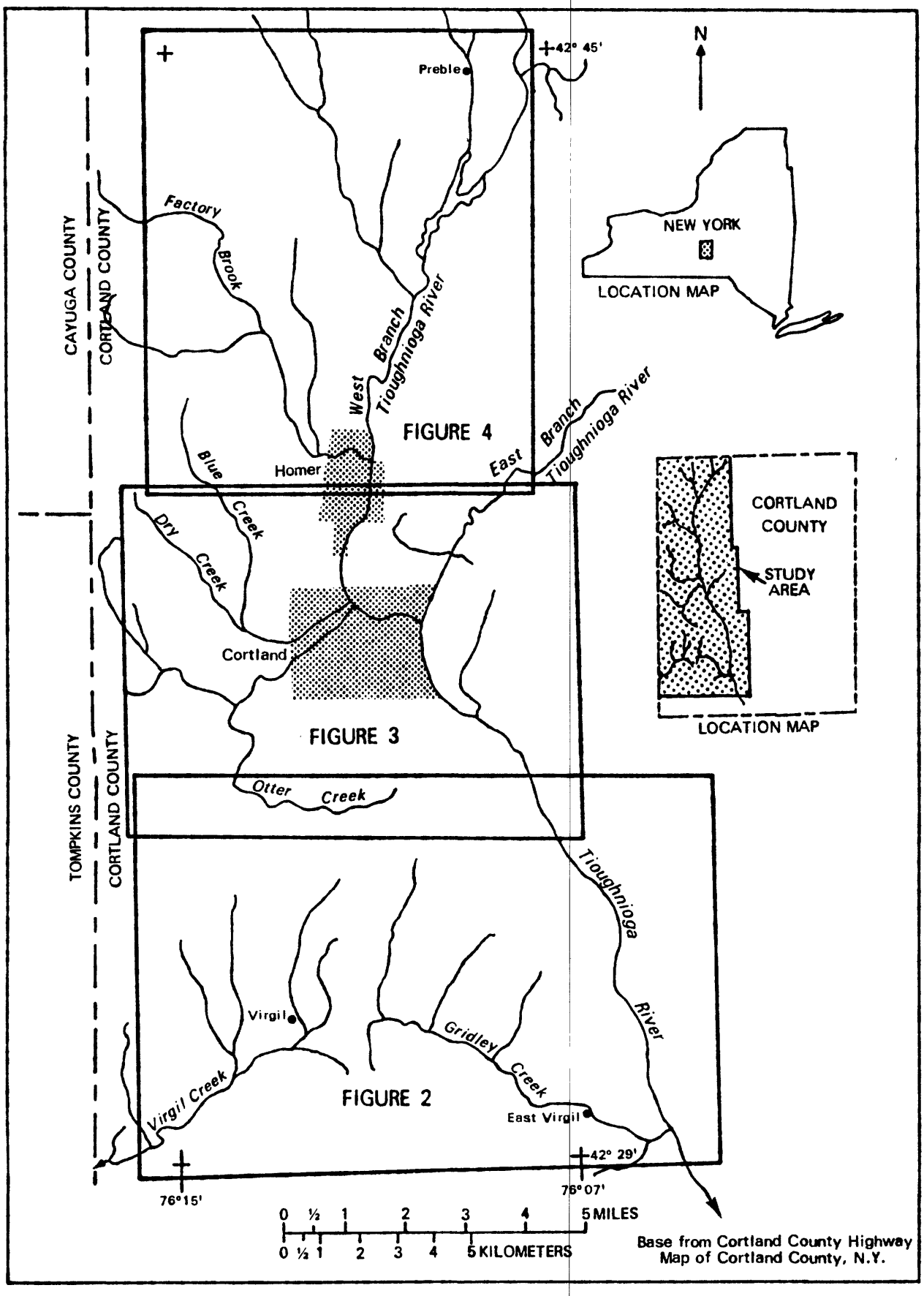


Figure 1.--Cortland County streams and location of areas depicted in figures 2-4.

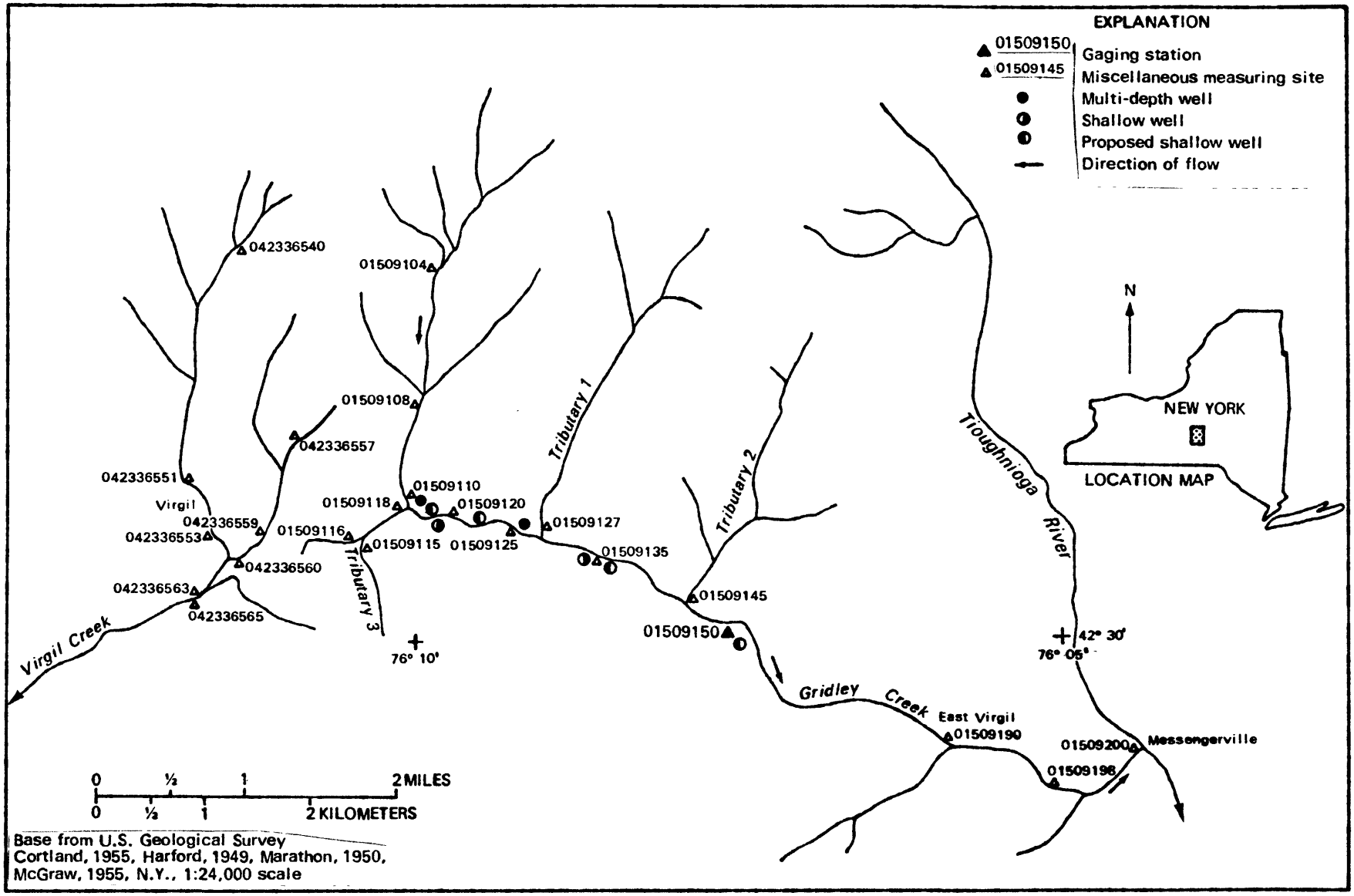


Figure 2.--Location of U.S. Geological Survey ground-water and surface-water measurement sites on Virgil and Gridley Creeks.

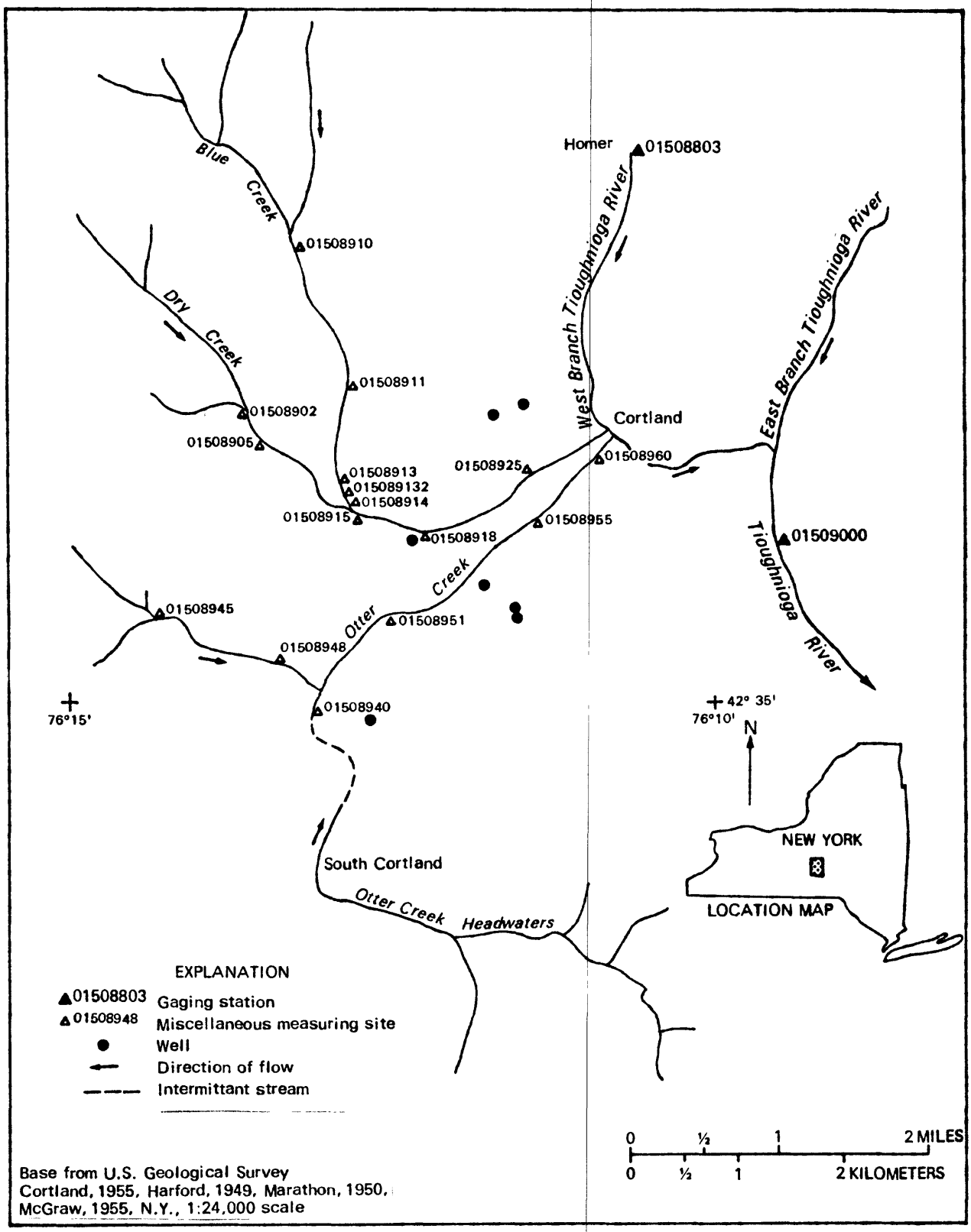


Figure 3.--Location of U.S. Geological Survey ground-water and surface-water measurement sites on Dry Creek, Blue Creek, Otter Creek, West Branch Tioughnioga River, and Tioughnioga River.

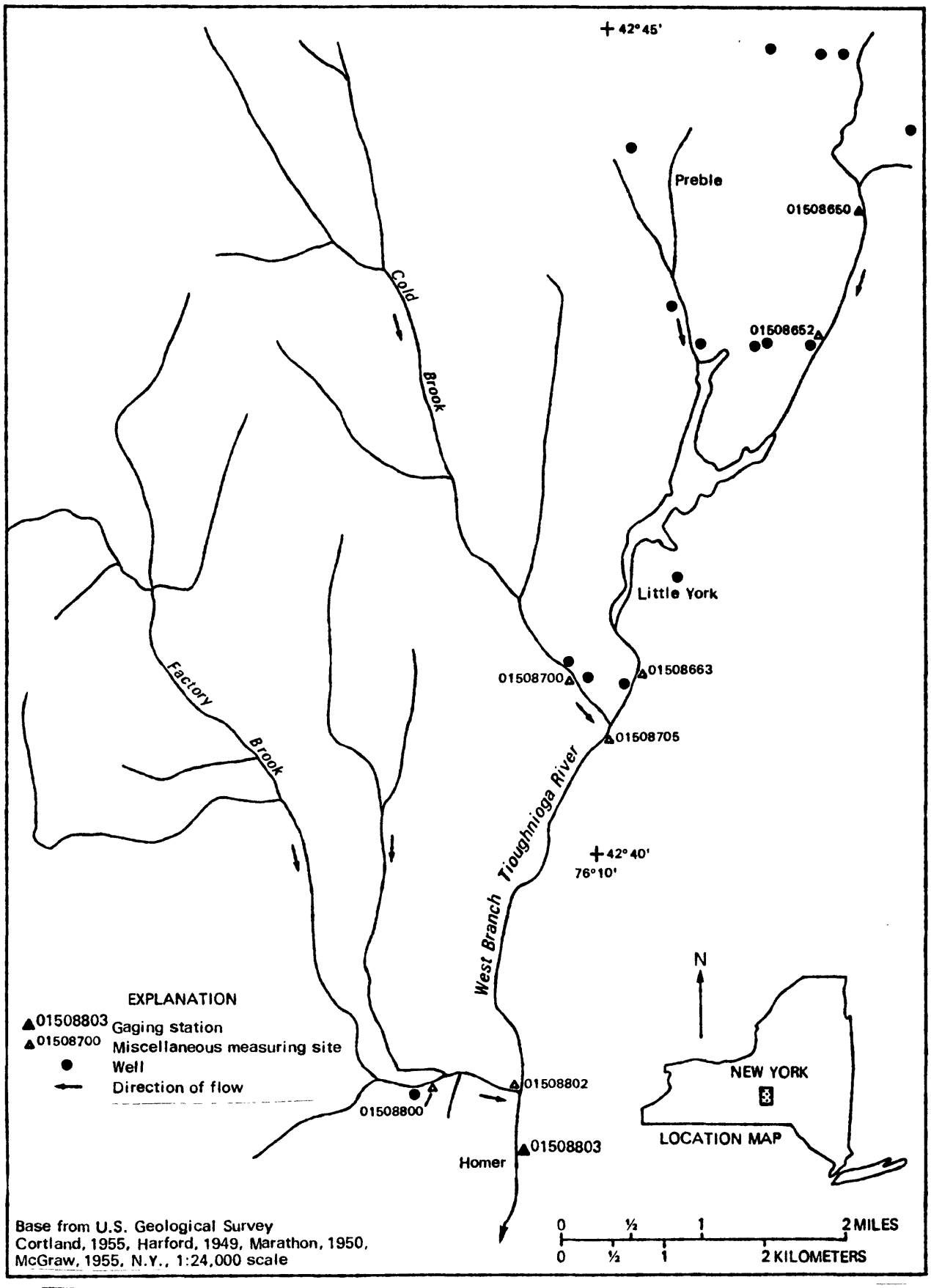


Figure 4.--Location of U.S. Geological Survey ground-water and surface-water measurement sites on Cold Brook, Factory Brook, and West Branch Tioughnioga River.

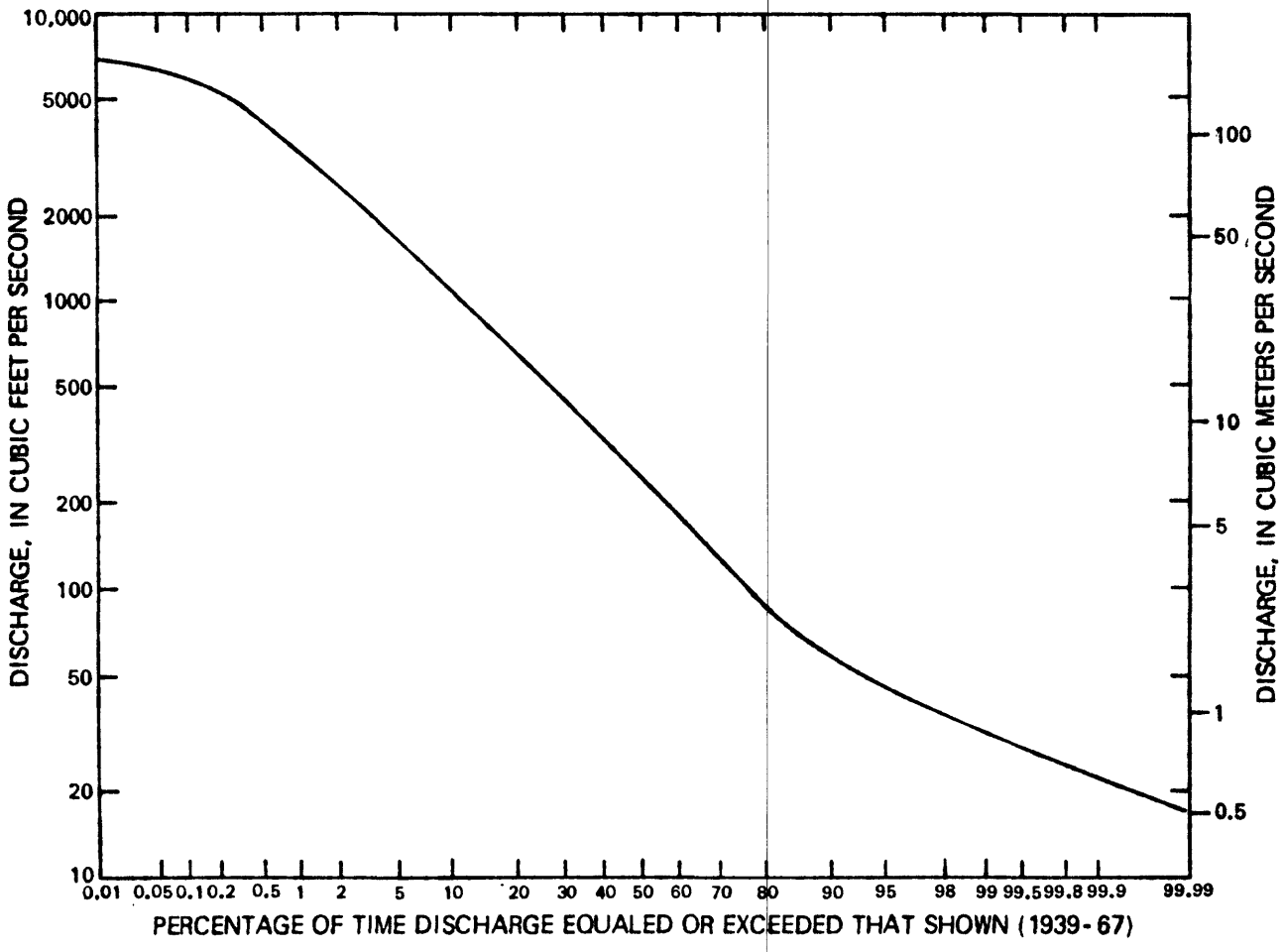


Figure 5.--Duration curve of daily mean flows, station 01509000 Tioughnioga River at Cortland (1939-1967).

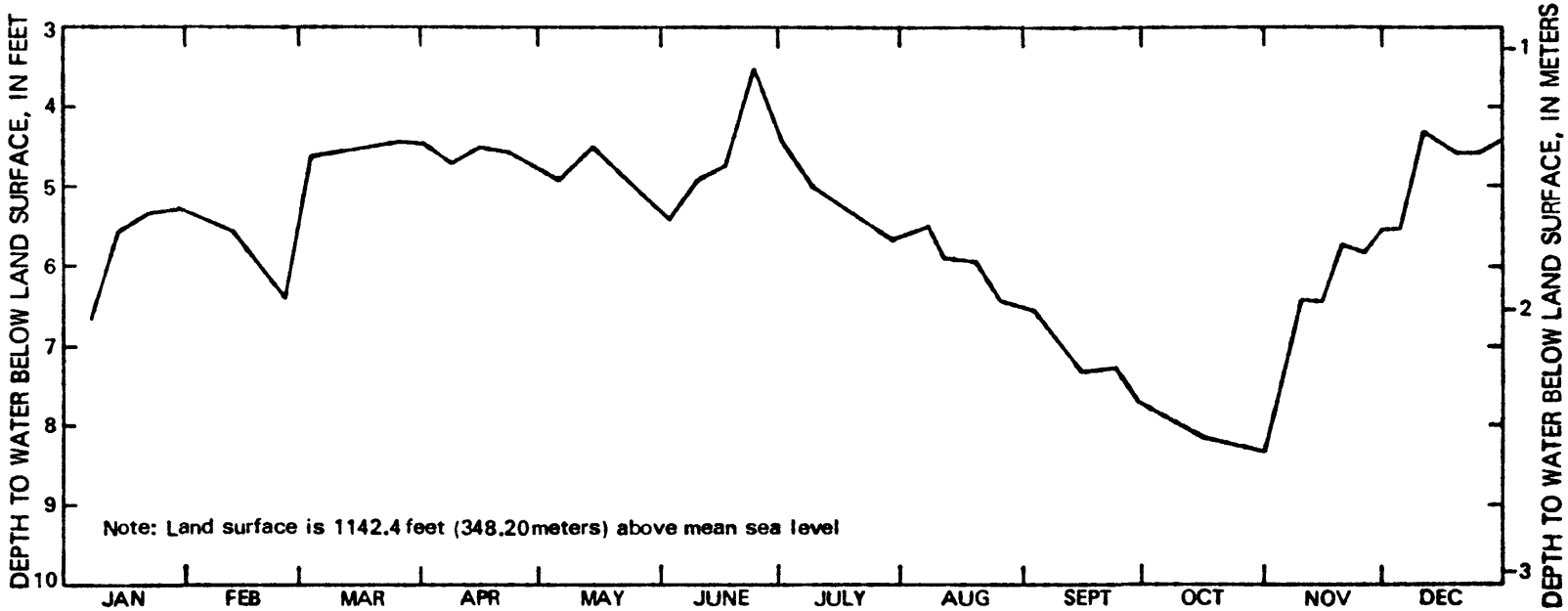


Figure 6.--Graph showing water levels for well C-19, calendar year 1972.

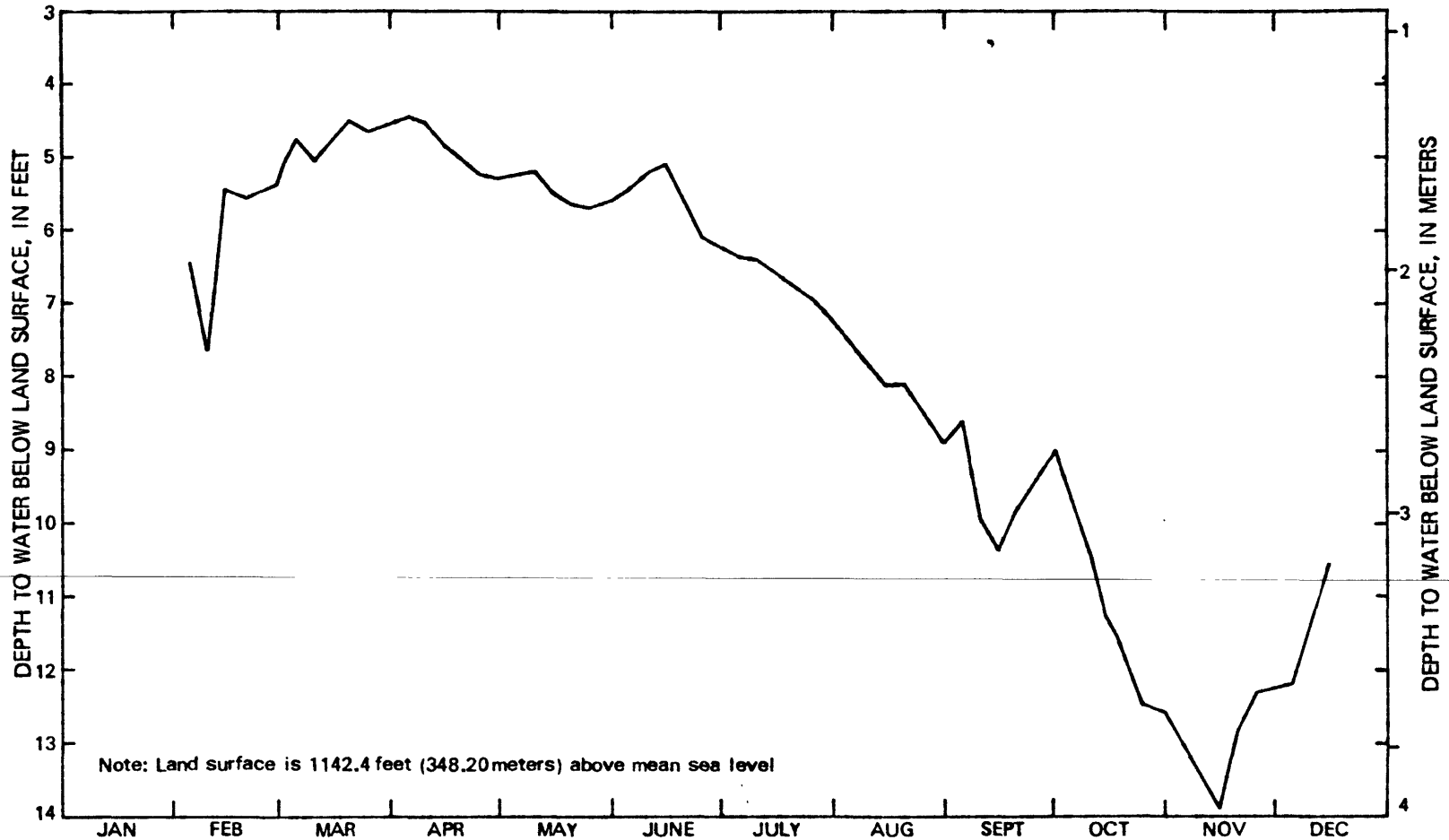


Figure 7.--Graph showing water levels for well C-19, calendar year 1973.

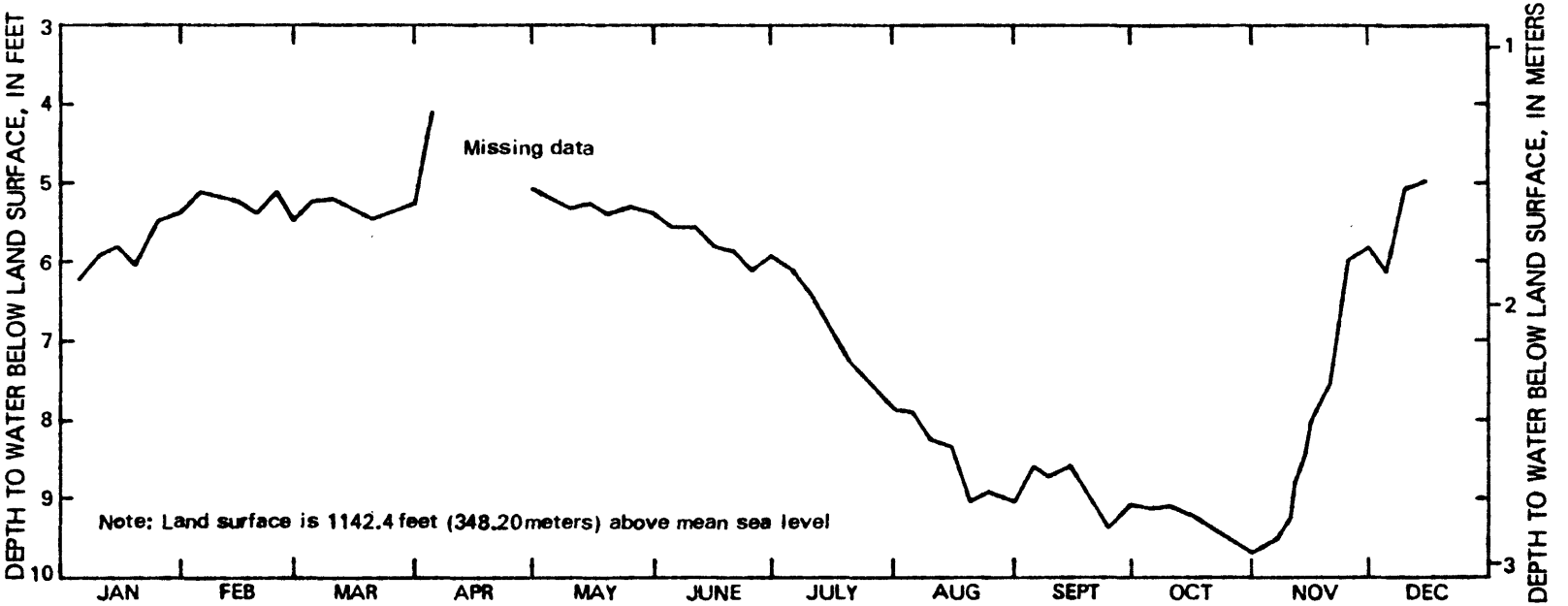


Figure 8.--Graph showing water levels for well C-19, calendar year 1974.

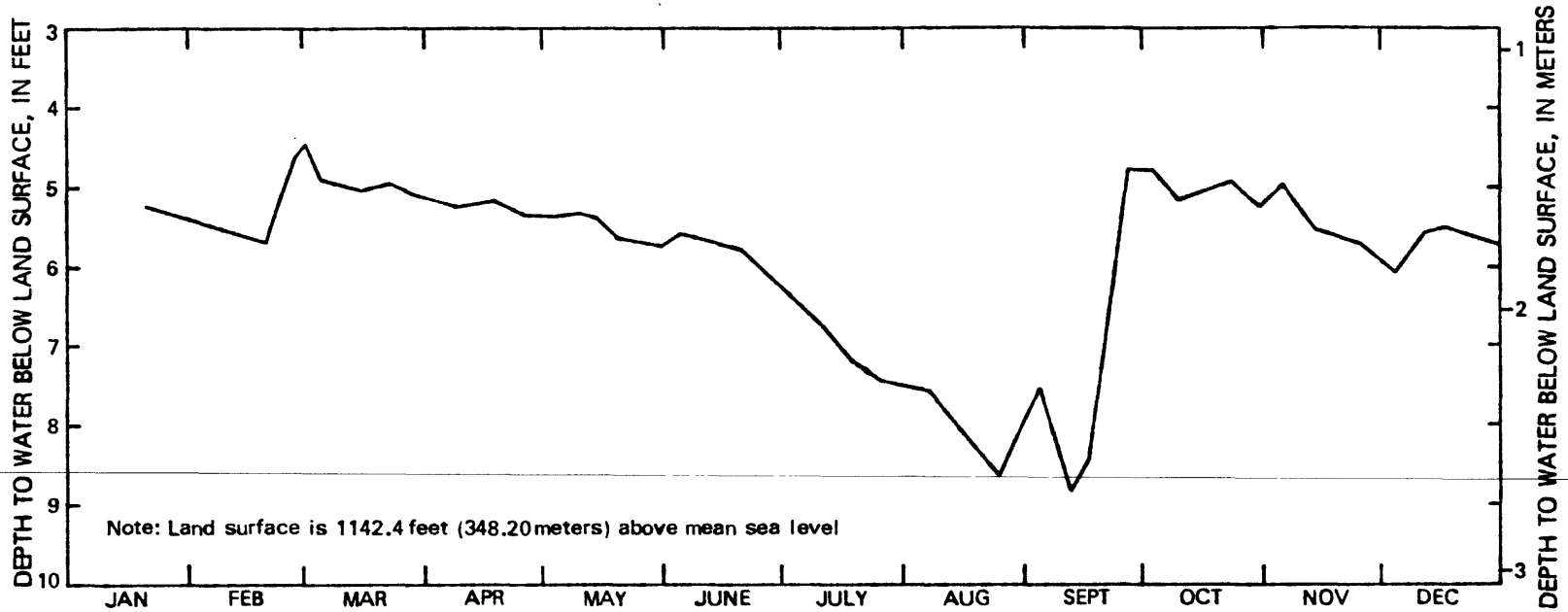


Figure 9.--Graph showing water levels for well C-19, calendar year 1975.

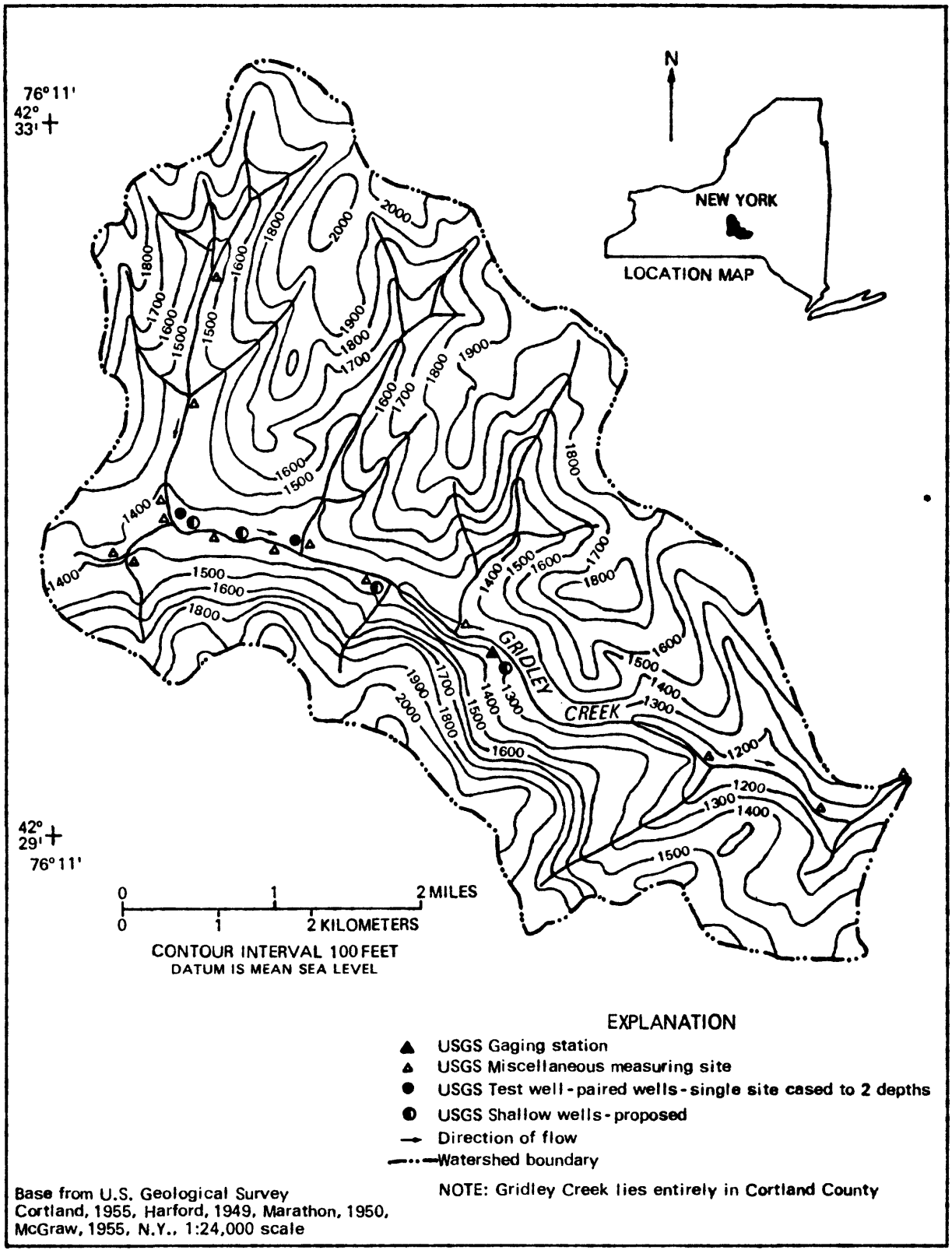
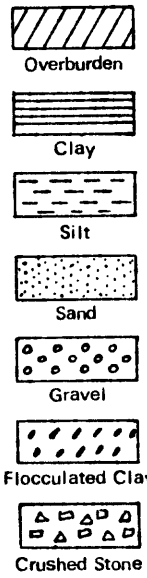
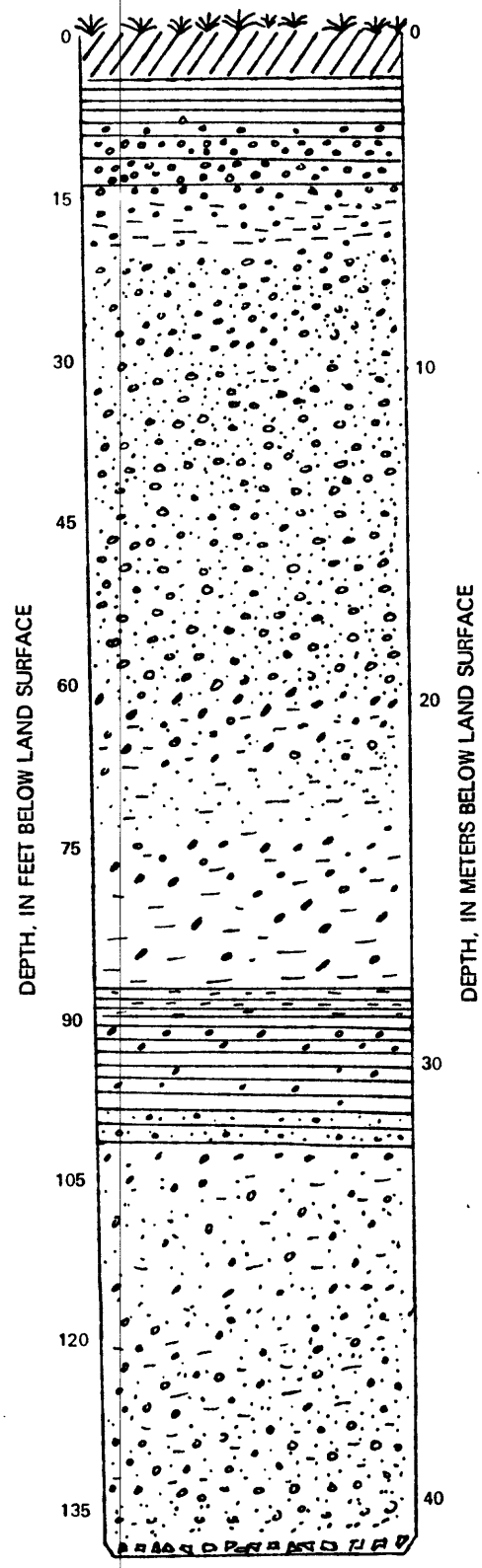


Figure 10.--Relief map of Gridley Creek basin showing location of U.S. Geological Survey ground-water and surface-water measurement sites.

DEPTH, IN FEET	
0-4	Topsoil and swamp muck
4-15	Clay and fine gravel, begin making water
15-20	Fine gravelly silt
20-27	Fine to coarse sand and gravel
27-30	Sand and gravel
30-40	Sand, medium–coarse gravel
40-42	Coarse sand and fine gravel
42-49	Sand and fine gravel
50-54	Coarse sand and gravel to 10 mm
54-56	Coarse sand and gravel to 40 mm
56-60	Coarse sand and gravel to 50 mm
60-62	Coarse sand and gravel to 10 mm
62-70	Coarse sand and fine gravel with lumps of clayey silt
70-74	Fine and coarse sand, fine gravel, some silt
74-80	Silt clay lumps with gravel in them
80-88	Silt and clay lumps
88-90	Clay and silt
90-93	Clay with flocculated lumps, cased out of water
93-100	Clay, large lumps
100-102	Clay with some gravel, making water again
102-103	Silt, sand, fine gravel
103-108	Flocculated clay
108-110	Silt, sand, and flocculated clay
110-117	Sand, gravel, flocculated clay
117-120	Sand, gravel, silt, some clay
120-127	Fine sand, clay, and stone
127-134	Coarse sand and gravel with stone
134-138	Bedrock

EXPLANATION

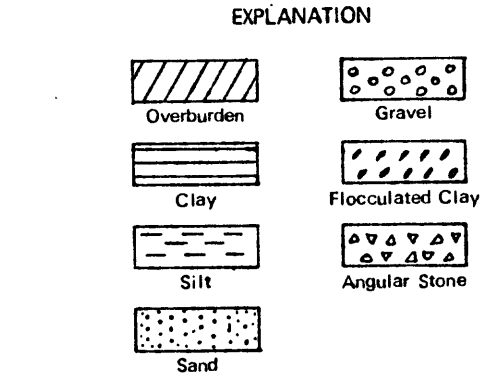




Filled with crushed stone
Casing driven 136 feet below land surface
Drilled to 138 feet below land surface

Figure 11.--Log of well site 1, Gridley Creek basin.

DEPTH, IN FEET	
0-5	Topsoil
5-7	Clay, loam, angular stone
7-8	Gravel, silt, clay
8-10	Mostly silt, some clay and gravel
10-15	Sand and gravel, making water
15-18	Well–sorted sand
18-19	Sand and gravel
19-20	Gravel
20-30	Fine sand with cobble and gravel
30-31	Well–sorted sand and pebbles
31-35	Gravel, cobble, coarse sand
35-36	Uniform sand, 2–4 mm
36-38	Pebbles up to 10 mm
38-40	Well–sorted sand, 2–3 mm. No pebbles
40-45	Fine well–sorted sand, 2 mm, few cobbles 25–50 mm and 15% pebbles, 5 mm. Good water gravel
45-50	Fine sand, uniform, sorted, subrounded
50-51	Clumps of clay mixed with sand, 2–5 mm
51-56	Some pebbles up to 10 mm, amber, black, pink clay; fine sand
56-60	Clay and fine–grained sand, clay very slippery and dark gray
60-66	Clay and some fine–grained sand
66-71	Med. brown clay with sand grains about 2 mm, grain angular
71-76	Creamy clay with sand grains 2 mm
76-77	Creamy gray clay, angular sand 2–5 mm
77-78	Some flocculation, sand 2–5 mm, making water
78-80	Sand 2–4 mm, subangular, red, amber, black
80-82	Clay flocculation with fine–grained sand
82-84	Creamy gray clay, no water in clay
84-89	Pebbles in clay, 5–10 mm, black pebbles subangular, subrounded, unsorted
89-90	Clay flocculate with fine–grained sand, 2–3 mm
90-94	Clay clumps with fine angular sand, 2–4 mm
94-95	Creamy clay with angular sand, 2 mm
95-104	Sand, clay with water, extra–fine gray clay
104-113	Fine–grained sand with gray clay, water
113-120	Fine clay with fine, gritlike sand
120-124	Clay clumps with fine–grained sand, 2 mm
124-128	Large, angular sand, gray clay
128-129	Clay, loose–grained gravel, 2–10 mm
130	Bedrock



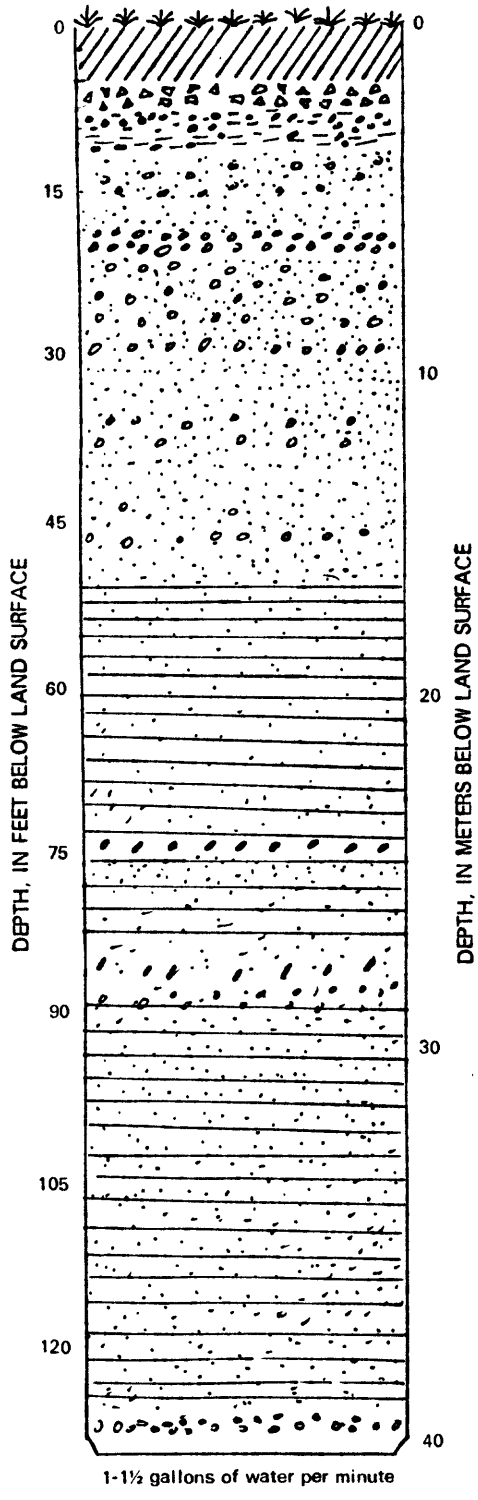


Figure 12.--Log of well site 2, Gridley Creek basin.

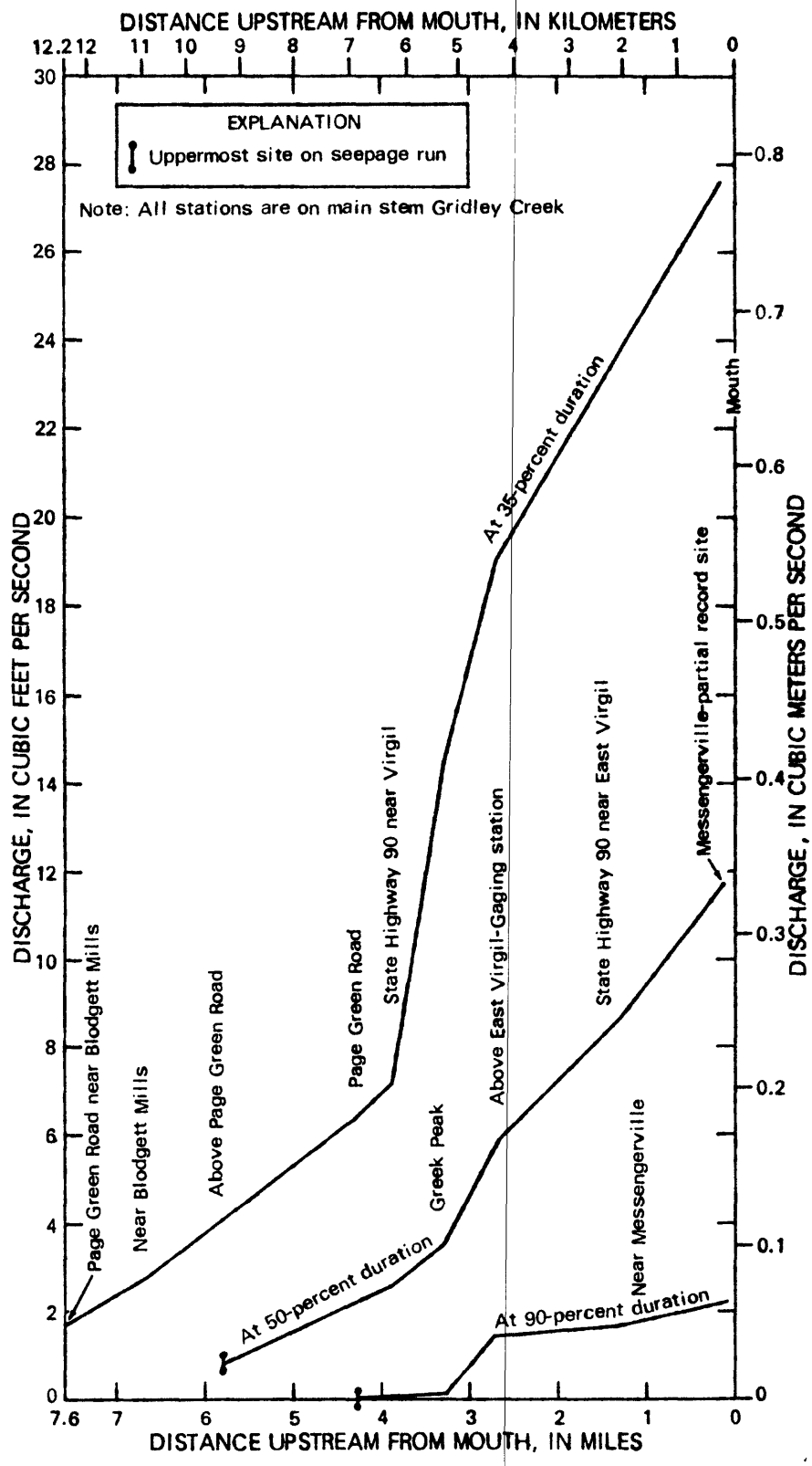


Figure 13.--Measured discharges on Gridley Creek at 90-, 50-, and 35- percent duration.