QUANTITY AND QUALITY OF STORM RUNOFF IN THE IRONDEQUOIT CREEK BASIN NEAR ROCHESTER, NEW YORK

Part 1. Data-Collection Network and Methods, Quality-Assurance Program, and Description of Available Data

By Phillip J. Zarriello, William E. Harding,
Richard M. Yager, and William M. Kappel

U.S. GEOLOGICAL SURVEY

Open-File Report 84-610

Prepared in cooperation with

IRONDEQUOIT BAY PURE WATERS DISTRICT and

MONROE COUNTY DEPARTMENT OF ENGINEERING

Ithaca, New York
1985

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONVERSION FACTORS AND ABBREVIATIONS

For readers who prefer to use inch-pound units rather than International System (SI) units, conversion factors are given for terms used herein.

Multiply SI unit	*By*	*To obtain inch-pound units*
	Length	
millimeter (mm)	0.03937	inch
meter (m)	3.281	foot (ft)
	1.094	yard (yd)
kilometer (km)	0.6214	mile (mi)
meter per second (m/s)	3.281	foot per second (ft/s)
	Area	
square meter (m^2)	10.76	square foot (ft^2)
	1.196	square yard (yd^2)
	0.0002471	acre
hectare (ha)	2.471	acre
square kilometer (km^2)	0.3861	square mile (mi^2)
	Volume	
cubic meter (m^3)	35.31	cubic foot (ft^3)
	1.308	cubic yard (yd^3)
	0.0008107	acre-foot (acre-ft)
	264.2	gallon (gal)
liter (L)	1.0567	quart (qt)
	Flow	
cubic meter per second (m^3/s)	35.3145	cubic foot per second (ft^3/s)
	Mass	
milligram (mg)	0.0000353	ounce (oz)
gram (g)	0.0353	ounce (oz)
	0.0022	pound (lb)
kilogram (kg)	2.2046	pound (lb)
megagram (Mg)	1.1023	ton (short)
metric ton per hectare (t/ha)	892.18	pound per acre (lb/acre)
	0.4461	ton per acre
gram per square meter (g/m^2)	8.9218	pound per acre (lb/acre)
	Temperature	
degree Celsius (°C)	(1.8 x °C) +32°	degree Fahrenheit (°F)
	Concentration	
milligram per liter (mg/L)	1.0	parts per million (ppm) (approximate)

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ABSTRACT

A 14-month program of storm-precipitation and runoff-data collection was conducted in the Irondequoit Creek basin, a 438-square-kilometer area along the south shore of Lake Ontario in north-central New York, from July 1980 through September 1981. The data form a basis for further study of nutrient inflow to Irondequoit Bay. This report describes the methods used to collect and verify the data and includes some representative examples of the data base.

Stream-discharge and water-quality data were collected at 17 sites representing rural and urban land uses. Precipitation data were collected at five continuous-record gages and 11 daily-total gages. Evaporation data were collected at one site; chemical quality of precipitation and dustfall data were collected at four sites.

Tables list watershed characteristics, precipitation data (including chemical quality of atmospheric deposition, monthly precipitation, and evaporation), and annual loadings of eight selected nutrients and heavy metals from the five major subbasins and three discrete land-use sites. Examples of computer printouts of streamflow, precipitation, and water-quality data available from the Geological Survey's WATSTORE computer system are included.

INTRODUCTION

Before 1978, water-quality studies throughout the United States indicated that storm runoff and discharges from nonpoint sources were major pathways through which pollutants are carried to streams and lakes (Lager and Smith, 1974; Wollschleger and others, 1976; Heaney and others, 1977). Although many point sources of pollution have been eliminated under the provision of Public Law 92-500 and the Clean Water Act Amendments (Public Law 95-217), contamination from nonpoint sources continues and is a major concern in many areas.

In 1978, the U.S. Geological Survey and the U.S. Environmental Protection Agency (USEPA) agreed to study nonpoint-source contamination in storm runoff in urbanized locations throughout the United States. In 1979, Monroe County and the

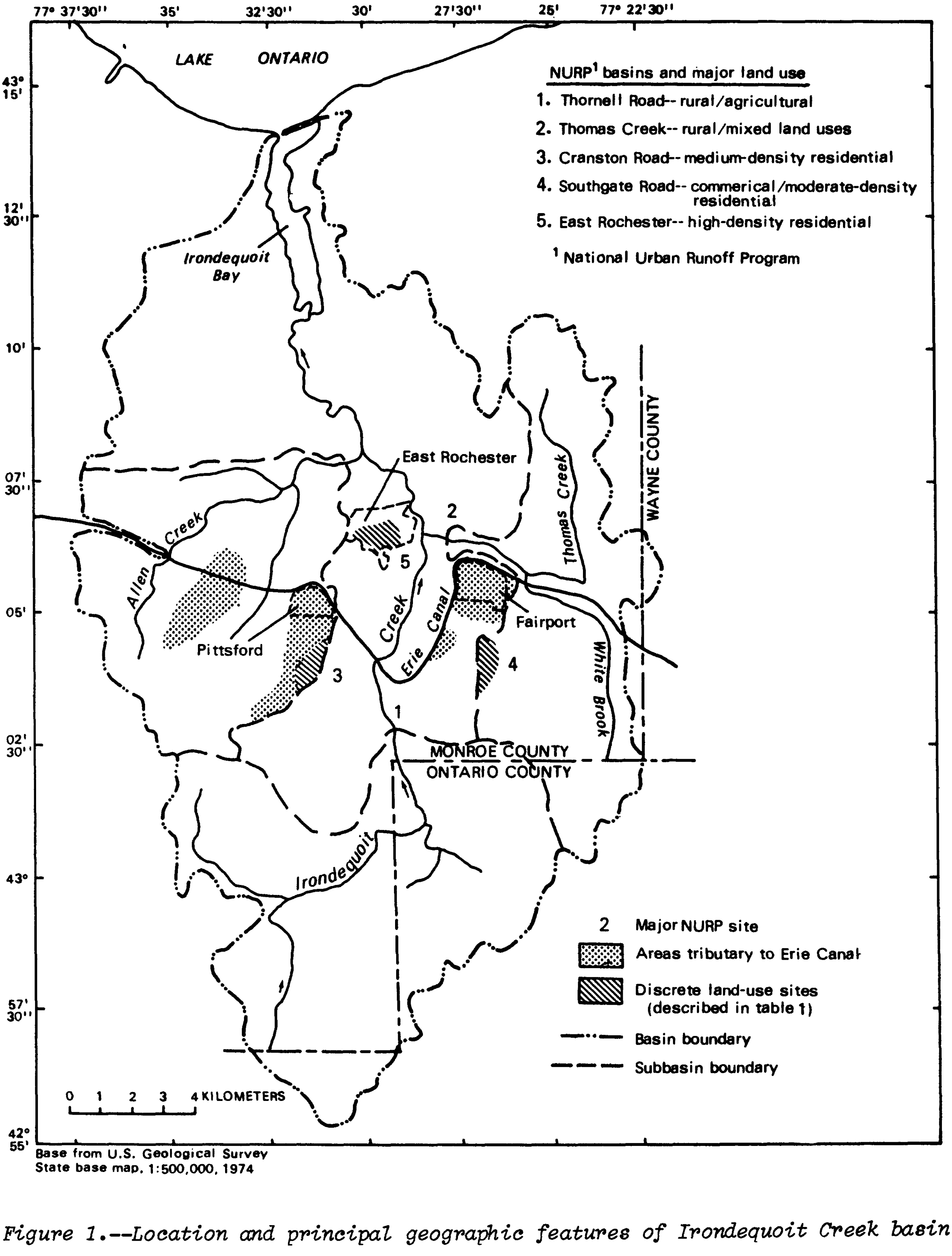

Figure 1.--Location and principal geographic features of Irondequoit Creek basin.

New York State Department of Environmental Conservation entered into an agreement with the USEPA to establish the Irondequoit basin near Rochester (fig. 1) as one of 28 National Urban Runoff Program (NURP) study areas because the county had documented several sources of nutrient contamination within the watershed and was taking steps to reverse the increasing eutrophication of Irondequoit Bay. In 1979, the U.S. Geological Survey entered into a cooperative agreement with Monroe County's Irondequoit Bay Pure Waters District to collect and analyze streamflow and precipitation data within the Irondequoit Creek basin as part of the Irondequoit NURP study.

Purpose and Scope

The purpose of the U.S. Geological Survey study was to measure streamflow and collect precipitation and storm-runoff samples throughout the Irondequoit Creek basin for chemical analysis and to relate chemical constituents of storm runoff from areas of specific land uses to the chemical quality of Irondequoit Creek and its tributaries. The study also sought to calculate total annual loads of selected constituents transported to Irondequoit Bay and to evaluate the Irondequoit wetlands as a possible settling area for removal of sediment and nutrients from the water of Irondequoit Creek. These aspects are described in a companion report (Kappel, Yager, and Zarriello, in press).

This report describes the data-acquisition network, the methods of sample collection, and the quality-assurance program used to verify data collected in the overall study. It presents tables of (1) monthly precipitation and evaporation values, (2) chemical composition of wetfall, dryfall, and bulk precipitation, and (3) results of the quality-assurance program. The unit values of flow and precipitation recorded at 5- or 15-minute intervals and the results of the water-quality analyses are too voluminous for inclusion but are available from the U.S. Geological Survey's WATSTORE[1] Computer System and are on file in the U.S. Geological Survey office in Ithaca, N.Y. Some printouts of the water-quality, precipitation, and runoff data are included to show the general content and format. Results of the U.S. Geological Survey's analysis of the data are described in the companion report.

Acknowledgments

Special thanks are extended to the Monroe County Environmental Health Laboratory for maintaining samplers, for collecting, splitting, and analyzing water samples, and for verifying the data presented in this report. Richard Burton, chief chemist of the laboratory, provided guidance, suggestions, and interpretations throughout the study.

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[1] WATSTORE - National Water Data Storage and Retrieval System maintained by the U.S. Geological Survey. A large-scale computerized storage, retrieval, and processing system for water data acquired through U.S. Geological Survey activities.

DATA-COLLECTION NETWORK

The Irondequoit Creek basin encompasses 438 km^2 in north-central New York (fig. 1). The major land uses in the basin are rural-agricultural in the southern and eastern parts, extensive urbanization in the central and western parts, which include the towns of Pittsford, East Rochester, and Fairport, and moderate urbanization in the northern part surrounding Irondequoit Bay. The New York State Barge Canal traverses the basin, and three small subbasins together draining 21.9 km^2 flow directly to the canal system (fig. 1).

The Irondequoit Creek basin was divided into six subbasins on the basis of stream configuration and land use (fig. 2). A gaging station was established at the mouth of each subbasin, and three additional sites representing discrete land uses were also established. Eight additional sites within the basin were established for less frequent data collection. This 17-station data-collection network was designed to document the discharge and chemical quality of flows leaving each land-use area as well as each subbasin. The three sites representing discrete land uses (Cranston Road, Southgate Road, and East Rochester) and two subbasins (Thornell Road and Thomas Creek) were designated as NURP monitoring basins. Within these basins, intensive land-use information and water-quality and precipitation data (fig. 1) were collected.

The water-quality data were used to estimate total annual loads of eight constituents to Irondequoit Bay and can be used to calibrate runoff-quality models of the three land-use sites, which in turn can be used to model the entire Irondequoit basin. The physical characteristics of the 17 sites are summarized in table 1; the station locations within the Irondequoit basin are shown in figure 2.

METHODS OF DATA COLLECTION

Streamflow

Seven streamflow-gaging sites used graph and punched tape-stage recorders to collect the water-stage data needed to compute continuous records of discharge. The gaging stations on Allen Creek and Irondequoit Creek at Linden Avenue (fig. 1) used punched-tape recorders only. The downstream wetland site (Wetland Narrows, fig. 2) used a combination of a Marsh-McBirney Model 201[1] velocity probe and U.S. Geological Survey velocity-stage interface for discharge computations. The East Rochester site used a Marsh-McBirney Model 250 velocity-modified recording flowmeter to record stormflows in the 1.37-m storm sewer.

Streamflow measurements were made at selected stages to verify computer-generated ratings (discharge versus water stage) for culvert sites and to develop ratings for nonculvert sites. Measurements made at the East Rochester storm sewer were verified by streamflow-measurement techniques for flows less than 0.140 m^3/s and by dye-dilution techniques (Rantz and others, 1982) for higher flows.

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[1] Use of brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

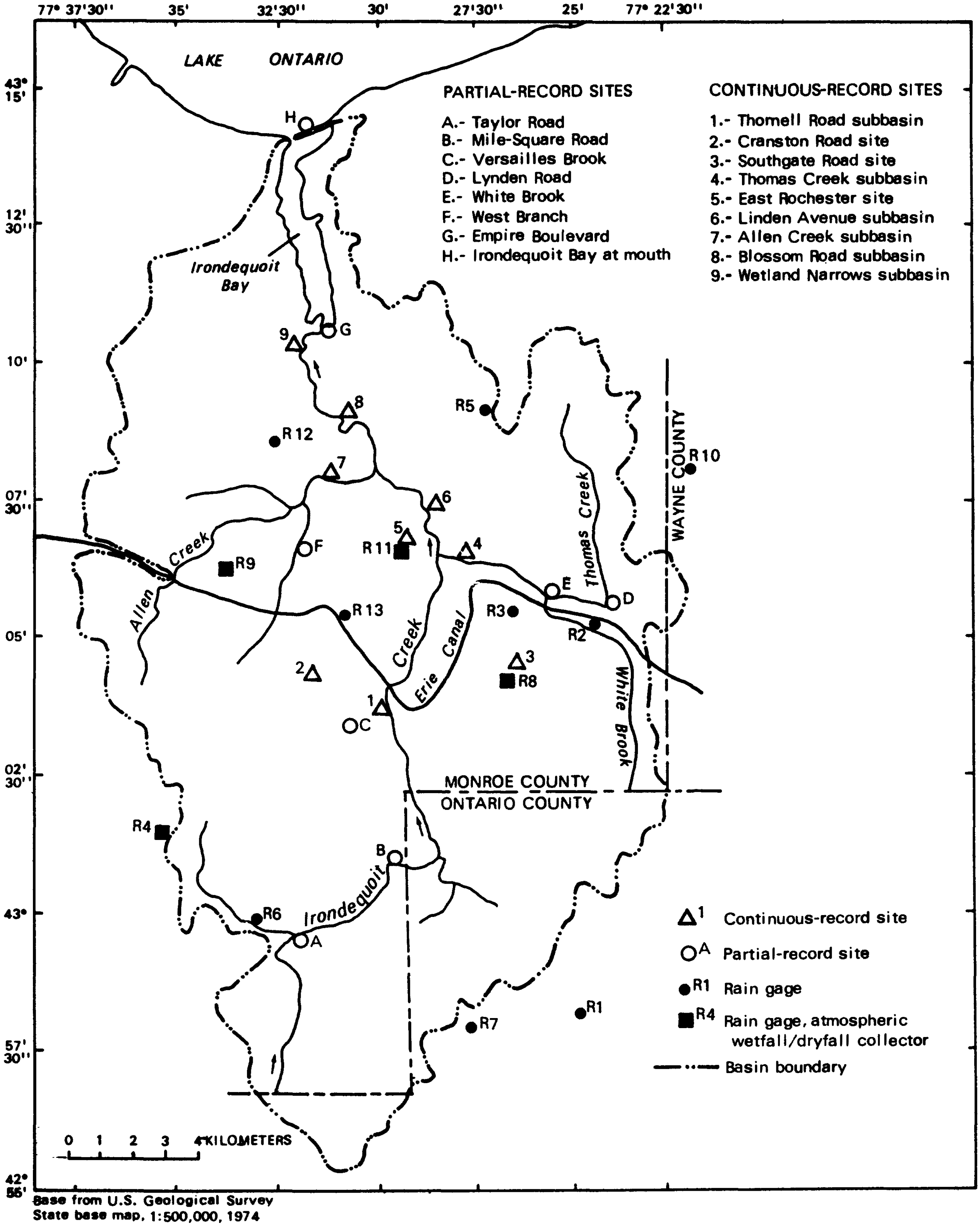

Figure 2.--Location of gaging stations within Irondequoit Creek basin.

Table 1.--Data-collection site locations, hydrologic characteristics, and principal land use of Irondequoit Creek subbasins.

[Locations are shown in fig. 2.]

	Number on fig.1 and Station no.[1]	Station name (common name used in report)	Drainage area (km²)	Basin characteristics and principal land use
NURP SITES & SUBBASINS	1 04232040 430315077292800	Irondequoit Creek near Pittsford (Thornell Road)	115.0	Subbasin is agricultural, rural, undeveloped, with open-channel streams. Soils moderately well drained.
	2 430403077311500	Tributary to Barge Canal tributary near Pittsford (Cranston Road)	0.673	Moderate-density residential site, storm sewers and concrete lined swales. Soils moderately well drained.
	3 430428077261100	White Brook Tributary near Fairport (Southgate Road	.725	Shopping plaza site surrounded by residential development, storm sewers, and unlined ditches. Flow moderately well drained.
	4 04232046 430623077274300	Thomas Creek at Fairport (Thomas Creek)	73.8	Subbasin is rural, with undeveloped headwaters, transitional urbanization downstream, generally open-channel streams, contiguous wetlands. Soils moderataly to excessively well drained.
	5 430649077285500	Irondequoit Creek Tributary (storm sewer) at East Rochester (East Rochester)	1.55	High-density residential site, storm sewered throughout. Soils excessively well drained.
OTHER SUBBASINS	6 04232047 430715077283800	Irondequoit Creek at Linden Avenue (Linden Avenue)	262*	Mixed residential/commercial subbasin, storm sewers with some open channels. Soils poorly to moderately well drained.
	7 04232050 430749077310800	Allen Creek near Rochester (Allen Creek)	78.0	Subbasin is moderate- to high-density residential, with some commercial areas, storm sewers, some open-channel streams. Soils poorly to moderately well drained.
	8 430850077304600	Irondequoit Creek at Blossom Road (Blossom Road)	370	Subbasin includes characteritics of all preceding sites.
	9 430958077315600	Irondequoit Creek at Landfill Narrows (Wetland Narrows)	373	Subbasin includes characteristics of all sites as well as the Irondequoit wetland.

Table 1.--Data-collection site locations, hydrologic characteristics, and principal land use of Irondequoit Creek subbasins. (continued)

PARTIAL-RECORD SITES & SUBBASINS

Letter on fig.1 and Station no.[1]	Station name (common name used in report)	Drainage area (km2)	Basin characteristics and principal land use
A 425904077323100	Irondequoit Creek at Taylor Road near Mendon (Taylor Road)	30.0	Rural, agricultural.
B 430036077294000	Irondequoit Creek at Mile Square Road near Mendon (Mile Square)	62.2	Rural, agricultural.
C 430311077301803	Versailles Brook near Pittsford (Versailles)	.906	Transitional residential construction, approximately 2/3 developed, 1/3 undeveloped.
D 430528077241000	Thomas Creek at Lynden Road near Fairport (Lynden Road)	28.2	Rural undeveloped, Thomas Creek subbasin north of New York State Barge Canal.
E 430528077251903	White Brook below Barge Canal at Fairport (DPW)	37.3	Rural in headwaters, development in lower half of watershed, Thomas Creek subbasin south of New York State Barge Canal, agricultural, rursl.
F 430654077314000	West Branch at Oak Hill Country Club near Brighton (Oak Hill)	31.6	Transitional - agricultural, rural in headwaters, moderate development elsewhere.
G 431034077313700	Irondequoit Creek at mouth (Empire Blvd) near Rochester (Empire)	391	Irondequoit Creek at Irondequoit Bay including one combined sewer overflow from City of Rochester.
H 4314050773205	Irondequoit Bay at mouth at Rochester	438	Irondequoit watershed including Irondequoit Bay and two combined sewer overflows from City of Rochester (Bay surface area 6.79 km^2.)

[1] 8-digit number is standard downstream order station number; 15-digit number is the latitude and longitude station number.

* Intervening area between Linden Avenue site and the Thornell Road and Thomas Creek subbasins is 72.8 km^2.

Stream Quality

Water samples were collected at the five NURP sites and the four other subbasin sites (table 1) by Manning or Isco automatic water samplers. The samplers were activated as the stream reached a predetermined stage or when a flowmeter indicated that a specified volume of water had flowed past the gaging station. At the partial-record sites, discrete samples were obtained with hand-held samplers, and discharge was computed from instantaneous stage observations and stage-discharge relationships developed for the site. The types of equipment and their method of operation are described in table 2.

Sampling Techniques

The Monroe County Environmental Health Laboratory and the U.S. Geological Survey used local and regional weather forecasts and the National Weather Service radar from Buffalo, N.Y., 110 km to the west, to locate and track storms approaching the Rochester area. When a storm system showed potential for causing significant runoff, each NURP site was monitored by the Environmental Health Laboratory to ensure correct operation of equipment and to facilitate sample handling. During major storms, the Geological Survey and Environmental Health Laboratory collected additional samples for quality control and made discharge measurements for rating-curve verification.

The water sampler at each station was set to begin sampling at a predetermined stage, when the flow would be passing the monitoring site at a given rate. Each sampler was set to begin sampling at its fastest rate during the initial (rising) phase of each storm and was manually adjusted as the storm progressed. The small land-use sites were sampled according to specified flow volumes or at 3.7-minute intervals; flows from the larger basins were sampled at 5- or 15-minute intervals. These intervals were adjusted by the Environmental Health Laboratory according to the rainfall and flow characteristics and the weather forecast. The mode of operation for each site is described in table 2.

The storms were classified into four types according to precipitation intensity, total amount of rainfall, and the number of antecedent dry days. As a storm progressed, the interval of sampling was adjusted manually according to the type of storm. The storm-type classification and corresponding sample-collection schedule is summarized in table 3.

Sample Preparation

All water samples were taken to the Monroe County Environmental Health Laboratory, where they were logged in and composited according to storm type and total number of samples collected. The actual compositing of samples was done by the field technician who collected them.

After the samples were composited, they were split into 10 aliquots by a cone splitter (U.S. Geological Survey, written commun., 1980). Separate aliquots were immediately measured for pH and conductivity, and others were analyzed for fecal coliform, biological or chemical oxygen demand, and organic

Table 2.--Automatic streamflow-sampler equipment used at measuring site, with mode of operation and intake characteristics.

[Site locations are shown in fig. 2.]

Site name and number	Sampler type[1]	Mode of operation	Sampler-intake characteristics
Thornell Road 04232040	Manning model S-4040 sequential sampler	Stage activated/time mode: Activation switch connected to sampler power supply allowing time mode samples to be collected 0.137 m above base flow. (Sampler initially activated on a flow proportional basis after 2,100 m^3.) Sampler set at 500-mL sample (two per bottle) on 15, 30, or 60-minute intervals depending on flow.	6 m of line with a 1.2-m vertical lift
Cranston Road 430403077311500	Manning model S-4040 sequential sampler	Flow-proportional sampler activated primarily by a Manning model F-3000A flow meter. A 500-mL sample (two per bottle) was initiated every 44.0 m^3 when the stage reached approximately 0.122 m above base flow. Sample interval changed depending on flow condition.	45 m of line with a 1.5-m vertical lift
Southgate Road 430428077261100	Manning model S-4040 sequential sampler	Flow proportional-sampler primarily activated by a Manning Model F-3000A flow meter. A 500-mL sample (two per bottle) was initiated every 170 m^3 after the stage activation switch closed approximately 0.122 m above base flow. Sample times were recorded as an offset on flow-meter chart. Sample interval switched according to flow conditions.	6 m of line with a 1.5-m vertical lift
Thomas Creek 04232046	Manning model S-4040 sequential sampler	Flow-proportional sampler activated after every 512 m^3 by a Manning model F-3000A flow meter. Sampler set at 400-mL sample size (2 per bottle) and samling interval changed or sampler switched to a time mode depending on flow conditions.	10.6 m of line with a 3.6-m vertical lift
East Rochester 430649077285500	Manning model S-4050 sequential sampler	Flow-proportional Sampler activated after every 49 m^3 by a model 250 Marsh-McBirney velocity modified flow meter. Sampler set at two 500-mL samples per bottle. Sample times were recorded on a 4/20 M-amp Rustrack recorder wired to the power supply of the vacuum pump. Sample interval varied depending on flow conditions.	6 m of line with a 4.8-m vertical lift
Linden Avenue 04232047	Manning Model S-4040 sequential sampler	Stage activated/time mode: Sampler set for two 500-mL samples per bottle at intervals of 30 or 60 min, depending on flow conditions.	6 m of line with a 3-m vertical lift
Allen Creek 04232050	Manning model S-4040 sequential sampler	Stage activated/time mode: Sampler set for two 500-mL samples per bottle at intervals of 30 or 60 min, depending on flow conditions.	7.6 m of line with a 3-m vertical lift
Blossom Road 430850077304600	Manning model S-4040 sequential sampler	Time mode: Sampler set for two 500-mL samples at intervals of 30 or 60 min, depending on flow conditions	24 m of line with a 3-m vertical lift
Wetland Narrows 430958077315600	ISCO Model 1680 sampler	Time mode: Sampler set for two 500-mL samples at intervals of 30 or 60 min, depending on flow conditions.	18 m of line with a 1.6-m vertical lift

[1] Use of brand names is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

carbon concentrations. The remaining aliquots during the first 5 months of the study (July through November 1980) were preserved and shipped to the U.S. Geological Survey water-quality laboratory in Atlanta, Ga. for analysis; after November 1980, they were analyzed by the Monroe County Environmental Health Laboratory.

All suspended-sediment concentrations were measured and particle-size analyses done by the U.S. Geological Survey sediment laboratory in Columbus, Ohio. Resulting data from all laboratories were sent to the U.S. Geological Survey office in Ithaca, N.Y., and entered in the WATSTORE data-storage system.

Table 3.—Storm-classification criteria and corresponding streamflow-sampling regimen for Irondequoit basin study, 1980-81.

[Dashes indicate no criteria]

Storm characteristics	Storm type I	II	III	IV
Precipitation, total (mm)	>17.5	5.0 to 17.5	>5.0	<5.0
Greatest hourly intensity (mm/h)	>10.0	>5.0	<5.0	<5.0
Number of antecedent dry days	>14	> 7	-	-
Stream-discharge phase	**Minimum number of samples**			
Rising	4	2	} 1	
Peak	2	1	} 1	} 1
Recession	1	1		

Precipitation and Evaporation

Precipitation was recorded at 5-minute intervals, to the nearest 0.25 mm, at the five NURP sites. Daily records of precipitation were also collected at 12 other locations throughout the basin by volunteer observers. Site locations are shown in fig. 1; the type of data collected at each site are summarized in table 4. During the 1980-81 winter, snowfall depths and water equivalents for major winter storms were reported at nine of the 12 sites. At the Mendon Ponds site, in the southwestern part of the basin (site R4, fig. 2), precipitation was recorded continuously from a weighing-bucket rain gage, and evaporation was measured daily from a class-A evaporation pan.

Wetfall and Dryfall Sampling

Atmospheric-deposition data collection occurred at four sites within the Irondequoit basin (fig. 2). Aerochemetrics Model 301 wetfall/dustfall samplers were used at three sites—Mendon Ponds Park (R4), East Rochester Middle School (R11), and Perinton Square Mall (R8). A bulk-deposition container was used at the fourth site, R9 near Pittsford (fig. 2); data collection was done from March through November of each year at this site. All dustfall and bulk-collection containers were removed on the first Tuesday of each month and their contents analyzed; wetfall containers were removed after selected storms totaling at least 12.5 mm. Field collection and sample analysis were done by Monroe County Environmental Health Laboratory in accordance with procedures outlined by U.S. Geological Survey.

Table 4.--Daily-record meteorologic station locations and types of data.

[Locations are shown in fig. 1]

Site number in fig. 1	Latitude and longitude	Type of data
R1	42°58'00" 77°24'43"	Precipitation, snowfall (water equivalent)
R2	43°05'10" 77°24'22"	Precipitation, snowfall (water equivalent)
R3	43°05'14" 77°26'17"	Precipitation
R4	43°01'17" 77°35'61"	Precipitation, wetfall/dryfall, bulk collector, Evaporation pan, snowfall (water equivalent)
R5	43°09'10" 77°27'07"	Precipitation, snowfall (water equivalent)
R6	42°59'34" 77°32'34"	Precipitation, snowfall (water equivalent)
R7	42°57'42" 77°27'16"	Precipitation
R8	43°04'15" 77°26'29"	Precipitation, wetfall/dryfall
R9	43°06'04" 77°33'03"	Precipitation, bulk collector, Snowfall (water equivalent)
R10	43°07'57" 77°21'56"	Precipitation, snowfall (water equivalent)
R11	43°06'38" 77°29'06"	Precipitation, wetfall/dryfall
R12	43°08'31" 77°32'29"	Precipitation, snowfall (water equivalent)
R13	43°05'15" 77°30'34"	Precipitation, snowfall (water equivalent)

COMPUTATIONS OF MEAN CONCENTRATION AND LOAD

Data collection in the Irondequoit basin focused primarily on storm runoff and associated stream-water quality, but the sampling was comprehensive enough to enable calculation of annual sediment and chemical loads to Irondequoit Bay. Annual loads of eight constituents were estimated from concentration and flow data obtained at eight gaging sites in the Irondequoit Creek basin upstream from Blossom Road (fig. 2) from August 5, 1980 through August 13, 1981.

The most intensively sampled period during this study was the growing season, which in this region extends from May through October. Frequent sampling was also done during the snowmelt period of 1981 (February) because it was assumed that runoff loads during snowmelt would contribute a major part of the total annual load. During the remainder of the study (winter and spring), samples were collected less frequently but at least monthly. This period included both base-flow conditions and storms. An example of the seasonal sampling frequency in relation to storm discharges is shown in the stream hydrograph in figure 3.

Runoff loads of the winter and spring periods were calculated from the flow-weighted mean concentration of each constituent recorded during each seasonal period, multiplied by the calculated volume of streamflow during that period. Loads produced by storms during the growing season and snowmelt period were computed separately from the rest. Because sampling typically did not extend through the entire duration of the storm, the flow-weighted mean concentration of each constituent was computed for storms in which samples were obtained during at least 60 percent of the event, and at least five samples were analyzed. This flow-weighted mean concentration was then applied to the total runoff recorded for the storm to obtain the load.

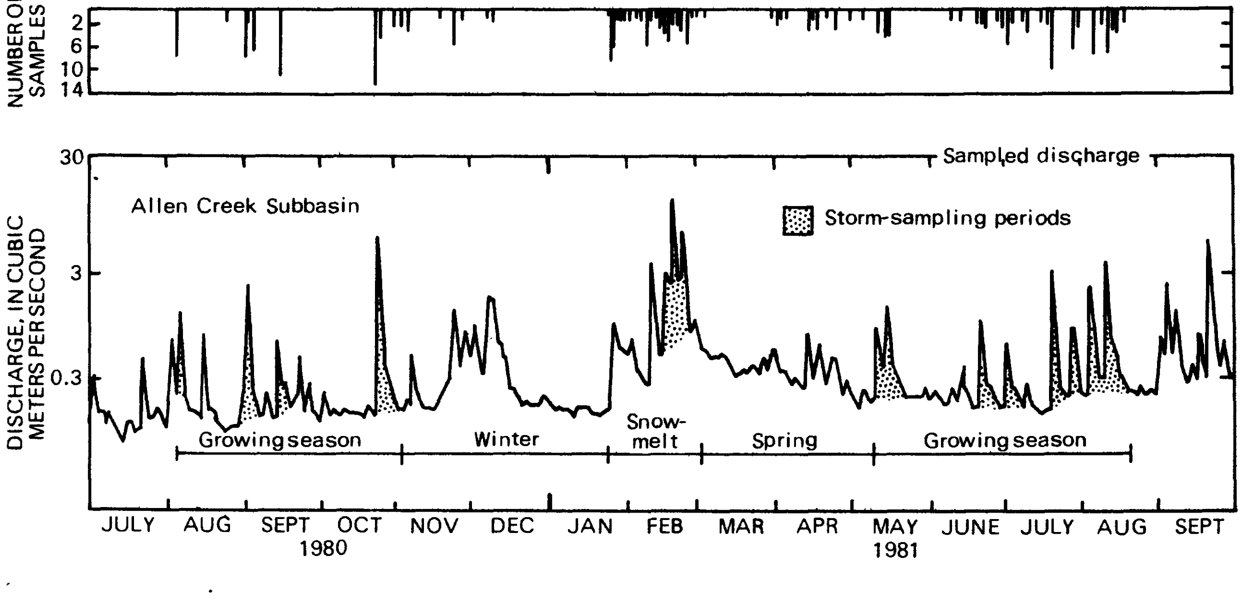

Figure 3.--Example of stream hydrograph showing data-collection periods and sampling frequency.

The total load produced during the study was estimated by summing the contributions from base-flow periods and storms. The runoff loads calculated for eight stations are given in table 9 (at end of report); these are the five NURP sites and the three major downstream subbasins--Allen Creek, Linden Avenue, and Blossom Road (fig. 2). In this table the runoff volume measured during each of the five sampling periods (1980 growing season, 1980-81 winter, 1981 snowmelt, 1981 spring, and 1981 growing season) is given with the flow-weighted mean concentration and load computed for each of eight sampled constituents.

Annual loads of several constituents that were not sampled during the winter period were estimated from the loads calculated for the nonwinter period. The nonwinter daily yield of each constituent was calculated by dividing the load calculated for the nonwinter period by the drainage area upstream of the station and the number of days in the sampling period. Table 9 includes the loads calculated for the nonwinter period and the daily yield of each constituent at all sites except East Rochester; this site is omitted because difficulties in measuring storm-sewer discharges restricted the data base to 1981 storms. Equipment malfunction in 1980 and a variable septic base flow, which could not be accurately measured, precluded the calculation of nonstorm loads and yields.

Daily yields at Blossom Road, the station furthest downstream before the Irondequoit wetlands and bay, were estimated for the 1980 growing season and the first 45 days of the 1980-81 winter, when discharge records were not available. The daily yield of the 1980 growing season was assumed to be equal to that of the 1981 growing season, and daily yield during the first 45 days of the 1980-81 winter were assumed to be equal to that calculated for the remainder of the winter. These estimated daily yields were then used in calculating total annual loads.

QUALITY-ASSURANCE PROGRAM

An integral part of the data-collection effort was the quality-assurance/quality-control program. The program was divided into three parts--stream-discharge verification, automatic sampler efficiency, and laboratory analytical accuracy and precision.

Verification of Stream Discharge

Discharge measurements were made and ratings developed in accordance with standard techniques (Carter and Davidian, 1968; Buchannan and Somers, 1965) at bridge or open-channel sites, and computer-generated stage-discharge relations were developed for culvert sites (Bodhaine, 1968). Current-meter measurements were made throughout the study to develop and verify discharge-rating curves for each site. In the 1.35-m storm sewer in East Rochester (site 5, fig. 1), tracer-dilution techniques (Rantz and others, 1982) were used to verify storm discharges calculated from data recorded by a velocity-modified flowmeter. The results of this technique indicated that the data recorded by the flowmeter were within 10 percent of the flow determined by the tracer-dilution technique for two storms.

Accuracy of Automatic Water Sampler

The second part of the program was to determine whether the automatic water samplers were collecting samples that were representative of water passing the monitoring site. Periodically at each site throughout the study, depth-integrated cross-sectional water samples were collected concurrently with samples collected by the automatic water sampler and were analyzed for total phosphorus, total kjeldahl nitrogen, suspended sediment, and chloride. Results from the cross-sectional water samples were then compared to those obtained from the automatic sampler. In September 1980, these data were plotted to detect systematic bias in sample collection; results indicated that the automatic samplers were collecting higher suspended-sediment concentrations than the cross-sectional samples. To reduce this bias, the intake shields on the automatic point samplers were modified by removing the bottom third of each shield. The sampler correlations thereafter displayed less variance than before, as indicated by the plots for the four constituents before and after intake modification (fig. 4).

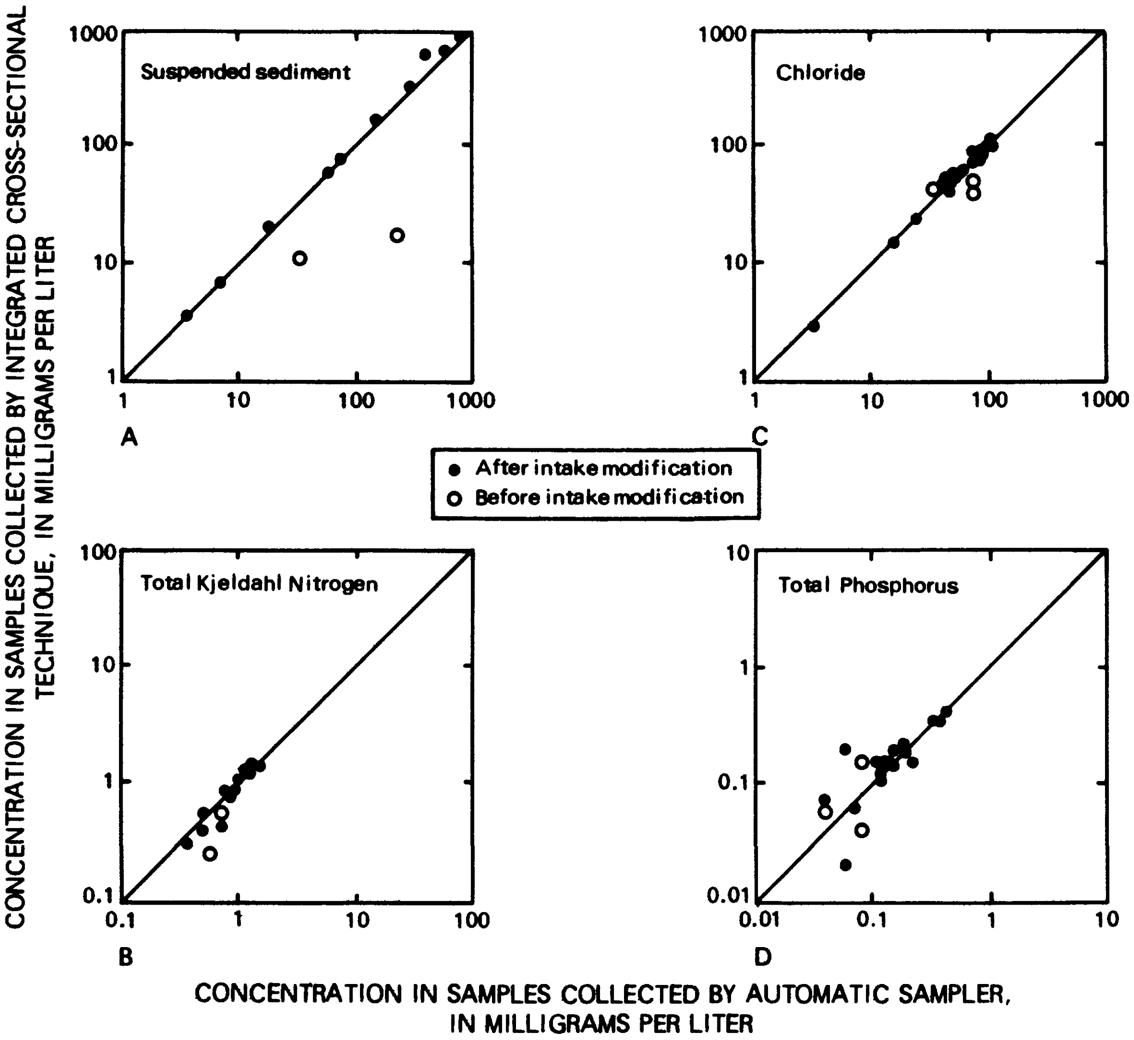

Figure 4.--Concentrations of selected constituents in samples from automatic samplers in relation to concentrations in samples from depth-integrated cross-sectional samplers.

Later in the data-collection program, samples collected at two larger subbasins (Thornell Road and Thomas Creek, fig. 1) were statistically analyzed through Spearman's rank correlation (Conover, 1971). This nonparametric analysis was used to determine whether differences in the two sampling methods were significant (cross-sectional versus automatic sampler). This analysis was chosen over others because it is used for non-normally distributed data and ranks matched pairs of data points to compute a correlation coefficient. Results of the Spearman test (table 5) indicate that constituent concentrations (except phosphorus) collected at these sites by two sampling methods were not significantly different 95 percent of the time ($1-\alpha$). Phosphorus was not significantly different 90 percent of the time.

Table 5.--Results of Spearman[1] ranking analysis to compare cross-sectional sample data with automatic-sampler data from two large subbasins to determine degree of mixing.

[Site locations are shown in fig. 1.]

Site	Constituent	Number of paired samples	Computed (rs)*	Table value r†	Null hypothesis rejected[2] at α =
Thornell Road	Phosphorus	6	0.750	0.600	0.10
	Chloride	6	.902	.88	.01
	Nitrite + nitrate	6	.902	.88	.01
Thomas Creek	Phosphorus	8	.607	.500	.10
	Total kjeldahl nitrogen	6	.998	.950	.005
	Chloride	8	.992	.930	.005
	Nitrite + nitrate	8	.630	.620	.05

1 Conover (1971)

2 Rejection of null hypothesis at the α level shown above (at least 0.10) indicates that the two sampling methods were not statistically different and that mixing is therefore complete.

* rs = Spearman rank coefficient of correlation (computed) that is compared to the given value at the 0.05 significance level.

† r = Spearman coefficient of correlation at the indicated "α" value.

Analytical Precision of Water-Quality Analyses

The third aspect of the quality-control program concerned the analysis of water-quality samples. Both the U.S. Geological Survey Central Laboratory in Atlanta, Ga., and the Monroe County Environmental Health Laboratory in Rochester, N.Y., followed analytical procedures of Skougstad and others (1979). Quality-control procedures for laboratory determinations are described in Friedman and Erdmann (1983).

Results of the U.S. Geological Survey quality-control program during the time the Atlanta laboratory was used indicated acceptable results for the nutrient and metals samples. The quality-control reports for that laboratory during July through November 1980 are on file with the U.S. Geological Survey Quality of Water Branch in Reston, Va. These reports cover quality-assurance samples submitted as blinds through field offices by the quality-control coordinator for the Central Laboratory system. The results of quality-control samples used in the laboratory analysis sections and those submitted by laboratory management daily are on file at the Central Laboratory. The results indicate that the analytical procedures used in the laboratory provided sufficiently accurate and precise results for all constituents analyzed.

From November 1980 to the end of the study, the Monroe County Environmental Health Laboratory was responsible for all chemical analyses. Results of their quality-control program for nutrient and metal analyses produced results similar to those of the Geological Survey Laboratory in Atlanta. The quality assurance/quality control workplan for the County Environmental Health Laboratory included analysis of laboratory-prepared standard solutions, duplicates, and spiked samples. Results of these analyses for the major constituents analyzed during December 1980 through March 1982 are presented in table 10 (at end of report).

As part of the U.S. Geological Survey quality-assurance program for cooperating laboratories, the Monroe County Environmental Health Laboratory also participated in a standard reference water-sample analysis program; results are given in table 6.

Table 6.--Rating of Monroe County Environmental Health Laboratory's analysis of U.S. Geological Survey standard reference water samples, June 1980 through January 1982.

Report date	Constituent designation and number of sample	Rating
June 1980	Major 72	3.27
	Minor 73	-
	Nutrient 3	2.56
December 1980	Major 74	3.43
	Minor 75	2.57
	Nutrient 4	3.17
June 1981	Major 76	3.00
	Minor 77	2.14
	Nutrient 5	3.22
January 1982	Major 78	3.40
	Minor 79	2.73
	Nutrient 6	4.00

Under this program, reference samples (major constituents, trace minor constituents, and nutrients) were submitted twice yearly to laboratories analyzing water-quality samples as part of a local cooperative program. The analytical results from all laboratories were sent to the U.S. Geological Survey Central Laboratory in Denver and statistically analyzed. Each laboratory's results were compared against the average of results from all laboratories through use of increments of standard deviation. The rating for each laboratory was based upon the following scale:

Standard deviation from mean	Analysis rating
0.00 to 0.50	4 (excellent)
0.51 to 1.00	3 (good)
1.01 to 1.50	2 (fair)
1.51 to 2.00	1 (questionable)
>2.00	0 (poor)

DESCRIPTION OF AVAILABLE DATA

The precipitation, streamflow, and water-quality data from the Irondequoit Creek basin are stored in separate but compatible data files in the Geological Survey's WATSTORE computer system and are also available as paper copy from the Survey office in Ithaca, N.Y. Examples of the format in which these data appear are given in figures 5-10 to show the arrangement and content. The data from this study can be used to construct rainfall/runoff hydrographs for individual subbasins and storms. The water-quality data for specific sites and storms can also be used to develop similar graphs of constituent inputs (precipitation) and outflows (runoff) during specific storms.

Streamflow Data

Daily-value streamflow data for the three land-use sites (Cranston Road, Southgate Road, and East Rochester) and the five subbasins (Thornell Road, Thomas Creek, Linden Avenue, Allen Creek, and Blossom Road) (fig. 2) are published by the U.S. Geological Survey (1982, 1981). An example of water year 1981 daily streamflow values at Irondequoit Creek near Pittsford (Thornell Road station) is shown in figure 5.

Unit values of streamflow, recorded at 5- or 15-minute intervals, are available for the three land-use sites and five subbasins mentioned above. An example of unit-value file streamflow data from the Thornell Road station is displayed in figure 6. Unit-value data for these stations are stored in the WATSTORE computer system under the 8- or 15-digit number.

04232040 IRONDEQUOIT CREEK NEAR PITTSFORD, NY

LOCATION.--Lat 43°03'15", long 77°29'28", Monroe County, Hydrologic Unit 04140101, on right bank 140 ft (43 m) upstream from bridge on Thornell Road, 0.9 mi (1.4 km) south of creek passage under Erie (Barge) Canal, and 2.7 mi (4.3 km) southeast of Pittsford.

DRAINAGE AREA.--44.4 mi^2 (115.0 km^2).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1955, 1961-62, 1964-66, 1968, and annual maximum, water years 1962-63, 1965-66, 1968-70, 1972. March 1980 to current year.

REVISED RECORDS.--WDR NY-81-3: Drainage area.

GAGE.--Water-stage recorder. Prior to March 1980, nonrecording gage and crest-stage gage at site 150 ft (46 m) downstream at same datum. Altitude of gage is 405 ft (123 m), from Corps of Engineers river-profile map.

REMARKS.--Records good except those above 350 ft^3/s (9.91 m^3/s) and those for period Aug. 5-19, which are fair. Unpublished water-quality records are available in files of Geological Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,140 ft^3/s (32.3 m^3/s) Mar. 12, 1962, gage height, 8.6 ft (2.62 m); minimum discharge measured, 8.10 ft^3/s (0.23 m^3/s) Sept. 17, 1964; minimum gage height at present site, 3.14 ft (0.957 m) July 16, 18, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 532 ft^3/s (15.1 m^3/s) Mar. 14 at 0345 hours, gage height, 7.46 ft (2.274 m), no other peak above base of 360 ft^3/s (10.2 m^3/s); minimum daily, 11 ft^3/s (0.31 m^3/s) Aug. 17-19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	33	34	56	33	28	55	24	30	19	15	13
2	29	31	39	68	33	30	48	24	44	17	15	16
3	44	29	36	50	32	27	47	23	28	16	16	27
4	35	28	33	128	31	26	51	22	25	16	15	18
5	29	27	32	180	29	31	44	22	37	16	16	15
6	32	34	31	78	29	30	42	24	180	16	15	14
7	41	39	30	62	30	32	40	22	92	15	14	15
8	46	37	39	42	32	27	42	45	46	17	14	14
9	37	32	47	37	32	26	50	68	35	15	14	14
10	29	29	39	28	28	27	63	37	30	14	14	14
11	26	29	35	25	27	45	56	30	29	14	13	13
12	24	27	33	28	28	212	50	27	32	15	12	13
13	23	26	32	30	27	270	45	26	59	13	12	12
14	23	26	33	31	28	414	42	25	45	13	12	12
15	23	26	34	31	30	195	38	24	32	13	12	27
16	23	75	34	30	44	121	36	24	29	12	12	17
17	22	103	32	25	52	194	36	23	33	12	11	15
18	22	66	30	25	50	124	33	22	29	12	11	15
19	21	53	28	27	52	110	32	22	26	13	11	14
20	21	88	26	28	52	95	32	27	23	24	22	14
21	21	96	30	26	56	107	32	26	22	17	16	13
22	21	66	33	25	53	98	30	24	22	14	14	13
23	28	49	106	27	47	79	28	27	22	13	15	15
24	29	42	218	26	44	69	27	24	22	12	14	16
25	24	38	91	27	40	64	27	27	20	12	28	15
26	33	36	60	27	42	78	27	25	23	12	18	14
27	49	37	51	29	34	72	31	24	24	12	15	33
28	81	36	48	30	31	54	28	28	21	22	15	24
29	63	36	52	31	---	54	26	34	24	26	14	18
30	44	34	46	32	---	52	25	27	23	17	13	17
31	36	---	42	34	---	53	---	31	---	15	14	---
TOTAL	1004	1308	1454	1323	1046	2844	1163	858	1107	474	452	490
MEAN	32.4	43.6	46.9	42.7	37.4	91.7	38.8	27.7	36.9	15.3	14.6	16.3
MAX	81	103	218	180	56	414	63	68	180	26	28	33
MIN	21	26	26	25	27	26	25	22	20	12	11	12
CFSM	.73	.98	1.06	.96	.84	2.07	.87	.62	.83	.35	.33	.37
IN.	.84	1.10	1.22	1.11	.88	2.38	.97	.72	.93	.40	.38	.41

CAL YR 1981 TOTAL 12468 MEAN 34.2 MAX 309 MIN 11 CFSM .77 IN 10.45
WTR YR 1982 TOTAL 13523 MEAN 37.0 MAX 414 MIN 11 CFSM .83 IN 11.33

Figure 5.--Example of streamflow daily values for 1981 water year. (From U.S. Geological Survey, 1982, p. 101.)

```
STATION ID =        04232040          PARAMETER CODE     = 00060          STATISTIC CODE   = 00011

DEPTH      =999999.00                 CREATE DATE OF REC = 810411         STATE CODE       = 36          RCD RET DATE =      0
X-SECTION  =999999.00                 ACCOUNT NUMBER     =**********      AGENCY CODE      = USGS        PROCESS CODE = B

DATE: OCT. 26. 1980                   READINGS PER DAY   =   96           NO VALUE INDICATOR=999999.00            RCD DISP =
```

HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE
00.15.00	180.00	00.30.00	184.00	00.45.00	184.00	01.00.00	185.00	01.15.00	185.00	01.30.00	185.00
01.45.00	185.00	02.00.00	185.00	02.15.00	187.00	02.30.00	185.00	02.45.00	185.00	03.00.00	185.00
03.15.00	184.00	03.30.00	180.00	03.45.00	180.00	04.00.00	179.00	04.15.00	179.00	04.30.00	175.00
04.45.00	175.00	05.00.00	172.00	05.15.00	170.00	05.30.00	168.00	05.45.00	168.00	06.00.00	163.00
06.15.00	161.00	06.30.00	159.00	06.45.00	157.00	07.00.00	155.00	07.15.00	154.00	07.30.00	151.00
07.45.00	150.00	08.00.00	147.00	08.15.00	147.00	08.30.00	144.00	08.45.00	142.00	09.00.00	140.00
09.15.00	139.00	09.30.00	136.00	09.45.00	134.00	10.00.00	132.00	10.15.00	129.00	10.30.00	129.00
10.45.00	127.00	11.00.00	124.00	11.15.00	123.00	11.30.00	123.00	11.45.00	119.00	12.00.00	119.00
12.15.00	118.00	12.30.00	115.00	12.45.00	115.00	13.00.00	113.00	13.15.00	113.00	13.30.00	112.00
13.45.00	110.00	14.00.00	109.00	14.15.00	109.00	14.30.00	106.00	14.45.00	106.00	15.00.00	104.00
15.15.00	103.00	15.30.00	103.00	15.45.00	101.00	16.00.00	100.00	16.15.00	99.00	16.30.00	99.00
16.45.00	96.00	17.00.00	96.00	17.15.00	96.00	17.30.00	93.00	17.45.00	92.00	18.00.00	92.00
18.15.00	90.00	18.30.00	89.00	18.45.00	88.00	19.00.00	88.00	19.15.00	86.00	19.30.00	85.00
19.45.00	84.00	20.00.00	84.00	20.15.00	81.00	20.30.00	80.00	20.45.00	80.00	21.00.00	80.00
21.15.00	78.00	21.30.00	78.00	21.45.00	75.00	22.00.00	75.00	22.15.00	74.00	22.30.00	74.00
22.45.00	72.00	23.00.00	72.00	23.15.00	72.00	23.30.00	70.00	23.45.00	70.00	24.00.00	70.00

```
CARD DATA UPDATE FOR STATION     04232040     PARM= 00060     STAT= 00011     RPD=  96     DATE: OCT. 26. 1980
```

Figure 6.--Example of streamflow-unit-values printout from WATSTOPF.

Water-Quality Data

Water-quality data are available for the three land-use sites (Cranston Road, Southgate Road, and East Rochester) and the Thornell Road, Thomas Creek, Linden Avenue, Allen Creek, and Blossom Road subbasins (fig. 2) Additional data are available for the Wetland Narrows subbasin and the eight partial-record stations listed in table 1.

The water-quality-data file for each of the nine continuous-record subbasins or sites is divided into four sections, examples of which are shown in figures 7A through 7D. In these examples, the first column lists the date the sample was collected; the second, third, and fourth columns list the time during which the sample was collected and composited; the fifth column lists the laboratory that analyzed the sample (80010 is the Geological Survey's Atlanta laboratory; 83611 is the Monroe County Environmental Health Laboratory), and the remaining columns list the constituent names and concentrations.

The first section (fig. 7A), denoted by an 8-digit station number or a 15-digit station number ending in 00, signifies water-quality samples taken by the station's automatic sampler. These data were used in all water-quality modeling aspects of the study.

The second section of each station's water-quality data (fig. 7B) pertains to samples collected within the stream-channel cross section. This section is denoted by the 15-digit station number ending in 01. These samples were matched with samples collected by the automatic sampler during the same time interval to determine whether the automatic sampler was collecting data representative of the entire stream cross section.

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY
04232040 - IRONDEQUOIT CREEK AT THORNELL ROAD NEAR PITTSFORD, NY

WATER QUALITY DATA

DATE	TIME	STARTING TIME (2400 HOURS) (82073)	ENDING TIME (2400 HOURS) (82074)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	DISCHARGE, IN CUBIC FEET PER SECOND (00060)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P) (00671)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L) (00530)
FEB , 1981												
25-26	2145	1020	0915	83611	94	.020	--	1.20	1.1	.069	.016	--
26-27	2120	0950	0850	83611	77	.010	--	.80	1.1	.034	.005	--
27-28	2120	0950	0850	83611	73	<.010	--	1.10	1.1	.048	<.005	--
28...	1645	1000	2130	83611	70	<.010	--	--	1.2	--	--	--
28-01	0345	2200	0930	83611	--	.010	--	1	1.1	.060	.005	--
MAR												
01-03	0930	1000	0900	83611	50	<.010	--	.90	1.2	.040	<.005	--
03-05	1600	1330	1130	83611	48	<.010	--	1	1.2	.026	.006	--
30...	1550	1450	1650	83611	36	<.010	.60	.80	.80	.061	<.005	--
31-01	2026	0841	0811	83611	42	<.010	--	--	.80	.045	<.005	--
APR												
01...	1525	1440	1610	83611	38	<.010	.40	.60	.80	.055	<.005	--
14...	1208	0823	1550	83611	34	.020	.40	.70	.90	.044	<.005	--
14-15	0008	1620	0753	83611	34	.020	.40	.60	1.0	.049	<.005	--
18...	0900	0730	1030	83611	39	.010	.60	1.10	.90	.033	<.005	--
18...	1505	1040	1940	83611	38	.030	.70	.90	1.0	.058	.012	7
23-24	0047	1720	0917	83611	38	<.010	.80	.60	.80	.044	<.005	--
24-25	2100	0945	0845	83611	43	.010	.90	1	.80	.036	<.005	--
25...	1620	0910	2330	83611	44	<.010	.70	.90	.80	.021	<.005	--
MAY												
06-07	1950	0835	0705	83611	26	.010	.70	.60	.90	.016	<.005	--
11...	1600	0845	2320	83611	33	<.010	.60	.80	.80	.043	<.005	15
12...	0508	0143	0813	83611	32	.020	.60	.80	.80	.048	<.005	--
12-13	2015	0830	0800	83611	39	.300	.90	1.00	.70	.055	<.005	27
15...	0515	0200	0830	83611	26	.020	.90	1.00	.80	.034	.021	--
16...	1520	9500	2240	83611	31	.040	1.1	1.50	.70	.191	<.005	95
16-17	0320	2310	0835	83611	59	.400	1.0	1.40	.60	.124	<.005	75
17-18	2035	0920	0750	83611	44	.250	.90	1.20	1.6	.070	<.005	35
30-31	0550	1840	1810	83611	18	.090	.60	.70	1.0	.053	.005	--
JUN												
03-04	0045	1720	0915	83611	17	.010	.50	.70	1.0	.064	.020	--
09-10	1955	0810	0740	83611	16	.070	.70	1.00	1.1	.043	.012	--
16-18	0745	2100	1830	83611	--	.060	.80	1.10	.90	.098	.023	--
21...	1154	0754	1550	83611	22	.060	.40	.80	1.0	.086	.016	46
21...	2044	1650	2350	83611	21	.030	.40	.30	1.1	.084	.012	37
22...	0354	0054	0654	83611	20	.080	.60	.80	1.0	.069	.015	37
22...	1030	0845	1220	83611	26	.060	.80	2.50	.80	.341	.007	93
22...	1400	1250	1520	83611	39	.050	.60	.80	.80	.135	.016	320

Figure 7A.--Example of first section of water-quality data file representing samples taken by automatic sampler. (Printout from WATSTORE.)

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY
430315077292801 - IRONDEQUOIT CREEK AT THORNELL ROAD NEAR PITTSFORD, NY

WATER QUALITY DATA (CROSS SECTIONAL)

DATE	TIME	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	DISCHARGE, IN CUBIC FEET PER SECOND (00060)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L) (00530)	SEDIMENT, SUSPENDED (MG/L) (80154)	SOLIDS, RESIDUE AT 105 DEG. C, DISSOLVED (MG/L) (00515)
MAY , 1980												
23...	0800	80010	26	.040	.30	.24	.96	.040	.020	10	17	--
JUN												
20...	1345	80010	39	.030	.36	.38	1.1	.080	.020	47	43	--
SEP												
03...	1000	80010	33	.050	.47	.36	.60	.140	.030	51	63	--
FEB , 1981												
20...	1245	80010	268	.060	.49	2.40	1.7	.290	.030	982	1100	380
20...	1335	80010	271	--	--	--	--	--	--	--	--	--

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	PH (UNITS) (00400)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	ALKALINITY FIELD (MG/L AS CACO3) (00410)	HARDNESS (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
MAY , 1980											
23...	700	--	--	190	--	--	--	--	--	49	210
JUN											
20...	687	--	929	230	--	--	--	--	--	49	210
SEP											
03...	634	7.5	922	190	410	110	33	27	3.4	53	210
FEB , 1981											
20...	--	--	--	--	220	61	17	32	3.2	63	75
20...	--	--	--	--	--	--	--	--	--	--	--

DATE	ARSENIC TOTAL (UG/L AS AS) (01002)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L) (00340)
MAY , 1980											
23...	--	--	--	--	--	--	--	--	--	--	12
JUN											
20...	--	--	--	--	--	--	--	--	--	--	--
SEP											
03...	1	<1	3	7	1800	9	130	4	30	.1	32
FEB , 1981											
20...	--	--	--	--	--	--	--	--	--	--	100

Figure 7B.--Example of second section of water-quality data file representing samples taken by depth-integrated cross-section sampler. (Printed from WATSTORE.)

The third section (fig. 7C), denoted by the 15-digit station number ending in 02, pertains to samples that were used in the quality-control program. Duplicate samples were generally sent to both laboratories for comparative analyses or were sent to the same laboratory as two samples collected at different times. The data reported in this section are paired with analytical results from the first section of each station's data listing.

The fourth section of water-quality data (fig. 7D), denoted by the 15-digit station number ending in 03, represents discrete or "grab" samples collected by Monroe County Environmental Health Laboratory. Before this study began, the county was using this method to collect water samples at many sites within the basin. Early in the study, data obtained by this method of collection were compared to automatic sampler (00) data and cross-sectional (01) data to determine how representative the grab-sample data were. Even though the samples could be considered only as individual points on storm or annual hydrographs, the data were useful in plotting seasonal and annual trends for most chemical and physical water-quality constituents.

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY
430315077292802 - IRONDEQUOIT CREEK AT THORNELL ROAD NEAR PITTSFORD, NY

WATER QUALITY DATA (QUALITY CONTROL)

DATE	TIME	START-ING TIME (2400 HOURS) (82073)	END-ING TIME (2400 HOURS) (82074)	AGENCY ANA-LYZING SAMPLE (CODE NUMBER) (00028)	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)
MAY , 1980										
23...	1100	--	--	80010	26	.060	.54	.55	.40	.080
SEP										
03...	1100	--	--	80010	33	.050	.37	.49	.60	.120
FEB , 1981										
20...	1250	--	--	80010	268	.080	.45	2.10	1.7	.080
JUL										
21...	0440	0155	0725	83611	26	.050	1.0	1.30	.80	.172
29...	0422	0307	0537	83611	29	.120	1.0	1.20	1.9	.141
AUG										
04...	1702	1420	1950	83611	20	<.010	.50	1.00	1.0	.080

DATE	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SOLIDS, RESIDUE AT 105 DEG. C, DIS-SOLVED (MG/L) (00515)	SOLIDS, VOLA-TILE, SUS-PENDED (MG/L) (00535)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	PH (UNITS) (00400)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	ALKA-LINITY FIELD (MG/L AS CACO3) (00410)
MAY , 1980										
23...	.050	--	--	225	--	--	627	--	--	250
SEP										
03...	.040	--	56	108	--	--	619	7.5	922	190
FEB , 1981										
20...	.030	--	918	1080	373	--	--	--	--	--
JUL										
21...	--	.024	--	--	--	--	--	8.1	875	200
29...	--	.014	--	--	--	--	--	8.2	1020	224
AUG										
04...	--	.005	19	--	727	<9	--	8.0	1012	211

Figure 7C.--Example of third section of water-quality data file representing quality-control samples. (Printout from WATSTORE.)

Also compiled in this fourth section of water-quality data are the seven partial-record sites--Irondequoit Creek at Taylor Road, Irondequoit Creek at Mile Square Road, Versailles Brook near Pittsford, Thomas Creek at Lyden Road, White Brook below Erie Barge Canal, West Brook at Oak Hill Country Club, and Irondequoit Creek at Empire Boulevard (fig. 1).

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY
430315077292803 - IRONDEQUOIT CREEK AT THORNELL ROAD NEAR PITTSFORD, NY

WATER QUALITY DATA (GRAB)

DATE	TIME	AGENCY ANA-LYZING SAMPLE (CODE NUMBER) (00028)	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	PH (UNITS) (00400)
JUN , 1980												
24...	0855	80010	21	.110	.14	.29	.76	.050	.010	--	--	--
28...	1515	80010	25	.020	.26	.20	.96	.070	.020	--	--	--
29...	--	80010	31	.020	.13	.35	.87	.070	.020	--	--	--
JUL												
08...	1006	80010	20	.040	.38	.31	1.1	.050	.020	--	--	--
15...	1050	80010	15	.020	.18	.19	.77	.050	.020	--	--	--
15...	1200	80010	16	.020	.23	.19	.84	.050	.020	--	--	--
15...	1315	80010	16	.010	.18	.22	1.1	.030	.050	--	--	--
29...	1055	80010	20	.030	.19	.22	.99	.040	.020	--	--	--
AUG												
05...	0900	80010	24	.050	.17	.18	1.1	.030	.040	--	--	--
06...	1035	80010	30	.050	.21	.18	.83	.100	.040	--	--	--
12...	0855	80010	17	.070	.17	.41	.77	.040	.010	--	--	--
19...	0930	80010	15	.060	.31	.21	1.1	.190	.040	--	--	--
NOV												
07...	1200	83611	--	--	--	.35	.76	.038	--	.007	--	8.1
08...	0900	83611	43	--	--	.33	.85	.032	--	.007	--	7.9
14...	0906	83611	26	--	--	.77	1.5	.026	--	.008	--	--
DEC												
22...	1500	83611	24	--	--	.70	1.4	.021	--	<.005	--	--
MAR , 1981												
31...	0809	83611	45	.020	.60	.50	1.4	.029	--	<.005	--	8.0
JUN												
19...	0940	83611	15	.060	.30	.70	1.1	.058	--	.012	--	7.9
22...	1115	80010	30	--	--	--	--	--	--	--	63	--
22...	1353	80010	36	--	--	--	--	--	--	--	333	--
JUL												
16...	0850	83611	8.3	.070	1.0	.80	1.0	.487	--	.014	33	8.0

Figure 7D.--Example of fourth section of water-quality data file representing discrete "grab" samples. (Printout from WATSTORE.)

Precipitation and Evaporation Data

Quantity

Monthly total precipitation and evaporation data are given in table 7. Daily values for both continuous-record and partial-record precipitation and evaporation sites are available for all precipitation sites indicated in figure 2 and in table 4. An example of the 1981 daily-values for the Thornell Road station is shown in figure 8. These data are available on a disk file at the Geological Survey office in Ithaca, N.Y., and from the WATSTORE computer system under the 8- or 15-digit station number.

Unit values of precipitation recorded at 5-minute intervals at the Thornell Road, Cranston Road, Thomas Creek, and Southgate Road sites (fig. 2) are available. An example of unit-value precipitation data from the Thornell Road station is displayed in figure 9. These data are stored in the WATSTORE computer system under the 8- or 15-digit station number (table 1).

Table 7.--Monthly total precipitation and evaporation in Irondequoit Creek basin, July 1980 through August 1981.

[Locations are shown in fig. 2; all values are in millimeters. Dashes indicate no record, p indicates partial record.]

	1980					1981								
Site	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
						EVAPORATION								
Mendon Ponds (R4)	45.4	41.2	35.5	19.0	2.8	--	--	--	--	16.9	21.8	37.3	47.6	34.2
						PRECIPITATION								
Rochester Airport*	48.3	87.4	90.7	94.7	64.0	62.2	31.5	79.5	26.4	49.5	57.7	68.6	116.8	112.8
Thornell Road	47.2	75.7	124.0	88.4	35.1	-	-	45.7p	9.7p	28.7	42.7	64.8	96.0	104.4
Thomas Creek	27.7p	93.7	126.7	85.1	62.0	-	-	60.5p	11.4p	48.5p	61.5	74.2	92.7	89.2
Cranston Road	38.1	65.0	124.2	93.5	55.1	-	-	63.8p	12.4p	43.9	49.5	57.7	88.9	101.3
Southgate Road	32.8p	97.0	113.3	108.7	47.2p	-	-	56.4p	14.0p	49.3	35.1p	58.9	82.6	92.7
R1	36.8	19.3	96.5	98.3	62.7	76.2	38.9	59.7	25.4	63.5	62.2	85.1	122.7	60.5
R2	51.6	91.7	114.3	109.7	57.9	93.2	56.1	70.9	25.1	50.5p	56.6p	82.0	96.0	74.2
R3	47.2	74.9	137.2	170.7	83.8	127.0	-	-	-	-	26.7	54.6	109.2	110.5
R4	46.5	56.4	109.5	97.8	64.0	66.5	22.1	81.3	26.2	55.1	55.4	59.9	73.2	117.9
R5	50.8	91.4	128.3	114.3	66.0	76.2	64.8	74.9	43.2	50.8	62.2	74.9	134.6	86.4
R6	27.9	26.2	114.3	102.9	64.8	45.7	19.1p	74.9	33.0	53.3	52.1	72.9	83.8	112.5
R7	43.2	19.8	98.0	88.4	68.1p	40.1p	-	54.4p	26.9	56.1	75.7	111.8	74.2	89.4
R8	-	81.3	105.4	166.4	53.3	-	-	-	-	-	-	76.2	87.4	95.3
R9	40.1	89.2	58.3	110.2	73.7	62.0	33.3	72.9	19.6	58.7	67.3	64.5	126.0	103.4
R10	39.4	52.1	123.2	92.7	57.2	38.1	49.5	64.8	29.2	38.1	45.7	61.0	113.0	50.8
R11	62.0	44.7p	55.9p	71.4	57.2	10.2p	-	21.6p	11.4	44.5	40.6	47.0	87.6	90.2
R12	34.3	87.9	116.8	114.3	69.9	74.9	55.9	91.4	44.7	53.3	69.9	80.0	119.4	110.5
R13	39.4	95.3	142.2	120.9	101.9	94.0	82.6	105.4	68.6	59.7	53.3	50.3	102.9	100.3
Mean for Rochester* (1831-1981)	73.4	75.4	59.7	66.5	71.9	59.7	57.2	61.5	65.3	69.6	71.1	64.5	73.4	75.4

*National Weather Service Data

04232040 IRONDEQUOIT CREEK NEAR PITTSFORD, N.Y. (Thornell Road)

RAINFALL, ACCUMULATED (CENTIMETERS), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
DAILY SUMMATION VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.03	---	---	---	---	.28	.00	.00	.03	.00	.00
2	.30	.00	---	---	---	---	.00	.00	.00	1.35	.00	1.52
3	.46	.03	---	---	---	---	.00	.00	.25	.00	.00	.08
4	.00	.58	---	---	---	---	.08	.00	.10	.00	1.57	1.50
5	.00	.03	---	---	---	---	.03	.00	.00	.03	1.14	.51
6	.10	.03	---	---	---	---	.00	.28	.00	.00	.03	.15
7	.18	.00	---	---	---	---	.00	.00	.00	.00	.00	.00
8	.00	.03	---	---	---	---	.00	.00	.00	.00	.03	1.14
9	.00	.10	---	---	---	---	.05	.00	.15	.33	.00	.13
10	.00	.00	---	---	---	---	.00	.94	.23	.00	.99	.00
11	.23	.00	---	---	---	---	.00	.64	.00	.00	3.84	.00
12	.00	.00	---	---	---	---	.13	.48	.00	.00	.00	.00
13	.08	.00	---	---	---	---	.00	.00	.08	.00	.33	.00
14	.00	.18	---	---	---	---	.81	.00	.76	.00	.00	.33
15	.00	.00	---	---	---	---	.03	.43	.61	.00	1.17	.00
16	.10	.00	---	---	---	---	.00	1.12	.23	.00	.03	.00
17	.00	.38	---	---	---	---	.33	.00	.03	.00	.00	1.37
18	.13	.30	---	---	---	---	.28	.00	.00	.03	.00	.00
19	.05	.00	---	---	.25	---	.00	.00	.00	.00	.00	.00
20	.00	.00	---	---	2.13	---	.05	.00	.00	4.52	.00	.00
21	.38	.00	---	---	.00	.00	.00	.00	.91	.25	.00	1.63
22	.00	.00	---	---	.00	.00	.00	.00	1.73	.00	.00	1.68
23	.00	.03	---	---	1.68	.00	.53	.00	.00	.00	.00	.30
24	.00	1.35	---	---	.03	.00	.05	.00	.00	.00	.28	.00
25	6.63	.00	---	---	.08	.00	.03	.00	.69	.00	.00	.00
26	.10	.05	---	---	.00	.00	.00	.08	.00	.36	.00	.00
27	.03	.23	---	---	.00	.33	.00	.00	.00	.00	.00	.53
28	.08	.13	---	---	.41	.00	.13	.03	.00	2.21	.10	.13
29	.00	.05	---	---	---	.00	.08	.00	.00	.51	.03	.00
30	.00	.00	---	---	---	.64	.00	.28	.71	---	.05	.00
31	.00	.00	---	---	---	.00	---	.00	---	---	.86	---
TOTAL	8.84	3.51	.00	.00	4.57	.97	2.87	4.27	6.48	9.60	10.44	11.00

Figure 8.--Example of precipitation (daily values) printout from WATSTORE.

STATION ID = 04232040 PARAMETER CODE = 00045 STATISTIC CODE = 00006

DEPTH =999999.00 CREATE DATE OF REC = 810413 STATE CODE = 36 RCD RET DATE =
X-SECTION =999999.00 ACCOUNT NUMBER =********** AGENCY CODE = USGS PROCESS CODE = A

DATE: SEP. 14, 1980 READINGS PER DAY = 96 NO VALUE INDICATOR=999999.00 RCD DISP =

HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE	HR.MIN.SEC	VALUE
02.00.00	0.01	02.15.00	0.00	02.30.00	0.00	02.45.00	0.00	03.00.00	0.00	03.15.00	0.03
03.30.00	0.03	03.45.00	0.02	04.00.00	0.01	04.15.00	0.01	04.30.00	0.00	04.45.00	0.00
05.00.00	0.00	05.15.00	0.00	05.30.00	0.00	05.45.00	0.00	06.00.00	0.05	06.15.00	0.11
06.30.00	0.01	06.45.00	0.00	07.00.00	0.00	07.15.00	0.00	07.30.00	0.00	07.45.00	0.00
08.00.00	0.00	08.15.00	0.00	08.30.00	0.00	08.45.00	0.00	09.00.00	0.00	09.15.00	0.00
09.30.00	0.00	09.45.00	0.00	10.00.00	0.01	10.15.00	0.02	10.30.00	0.01	10.45.00	0.01
11.00.00	0.00	11.15.00	0.01	11.30.00	0.00	11.45.00	0.00	12.00.00	0.00	12.15.00	0.00
12.30.00	0.00	12.45.00	0.00	13.00.00	0.00	13.15.00	0.00	13.30.00	0.00	13.45.00	0.00
14.00.00	0.00	14.15.00	0.00	14.30.00	0.00	14.45.00	0.51	15.00.00	0.31	15.15.00	0.01
15.30.00	0.00	15.45.00	0.00	16.00.00	0.00	16.15.00	0.00	16.30.00	0.00	16.45.00	0.00
17.00.00	0.00	17.15.00	0.00	17.30.00	0.01	17.45.00	0.00	18.00.00	0.00	18.15.00	0.00
18.30.00	0.00	18.45.00	0.00	19.00.00	0.00	19.15.00	0.00	19.30.00	0.00	19.45.00	0.01
20.00.00	0.00	20.15.00	0.00	20.30.00	0.00	20.45.00	0.01	21.00.00	0.00	21.15.00	0.00
21.30.00	0.00	21.45.00	0.01	22.00.00	0.00	22.15.00	0.01	22.30.00	0.01	22.45.00	0.02

Figure 9.--Example of precipitation (unit values at 15-minute intervals) printout from WATSTORE.

Quality

Three wetfall/dustfall atmospheric-quality collection systems (Perinton Square Mall, East Rochester Middle School, and Mendon Ponds Park) and one bulk atmospheric-quality collector (bulk collector near Pittsford) were used to determine atmospheric quality. The seasonal concentration and yield data for these four sites are presented in table 8.

The data are presented in a format similar to that of the water-quality tables (figs. 7A-7D); the data are categorized as wetfall, dustfall, and bulk. The 15-digit number ending in 10 represents wetfall, 11 represents dustfall, and 12 represents bulk deposition. An example of a printout from the dustfall section is given in figure 10.

430415077262911 - PERINTON SQUARE MALL NEAR FAIRPORT, NY

DRYFALL ATMOSPHERIC QUALITY DATA

DATE	AGENCY ANA-LYZING SAMPLE (CODE NUMBER) (00028)	PH (UNITS) (00400)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)
1980											
JUL 29-AUG 05 ...	80010	5.4	3	--	--	--	.33	--	.050	--	--
AUG 05-SEP 02 ...	80010	5.3	23	--	--	--	.36	--	.050	--	--
SEP 02-OCT 02 ...	80010	6.4	35	--	--	--	.93	--	.090	--	--
OCT 02-NOV 04 ...	80010	6.3	9	<.01	.070	.06	.17	.25	.030	.010	--
NOV 04-DEC 02 ...	80010	6.7	31	--	--	--	.52	--	.030	--	--
DEC 02-JAN 06 ...	80010	5.8	35	--	--	--	.65	--	.020	--	--
1981											
JAN 06-FEB 03 ...	80010	5.5	29	--	--	--	.98	--	.030	--	--
FEB 03-MAR 03 ...	80010	6.0	48	.11	.240	.35	.44	1.3	.020	<.010	--
APR 07-MAY 05 ...	83611	6.3	115	.69	.610	1.3	2.20	2.8	.210	--	.014
MAY 05-JUN 19 ...	83611	6.5	45	.70	.100	.80	2.00	1.2	.337	--	.086
JUN 19-JUL 08 ...	83611	6.2	--	.35	.050	.40	.70	.60	.090	--	.020
JUL 05-AUG 03 ...	83611	6.4	33	.57	.030	.60	1.00	.70	.057	--	.008
AUG 03-SEP 02 ...	83611	4.0	32	.20	.300	.50	.50	.50	.005	--	.011

DATE	ALKA-LINITY FIELD (MG/L AS CACO3) (00410)	HARD-NESS (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SOLIDS, RESIDUE AT 105 DEG. C, DIS-SOLVED (MG/L) (00515)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)
1980												
JUL 29-AUG 05	--	--	--	--	--	--	--	--	6	2.9	--	12
AUG 05-SEP 02	--	--	--	--	--	--	--	--	45	4.3	--	19
SEP 02-OCT 30	--	--	--	--	--	--	--	--	82	6.1	--	--
OCT 02-NOV 04	--	3	1.0	.2	.1	.1	1.0	3.6	12	4.2	--	11
NOV 04-DEC 02	--	--	--	--	--	--	--	--	--	3.7	--	--
DEC 04-JAN 06	--	--	--	--	--	--	--	--	40	3.4	--	--
1981												
JAN 06-FEB 03	--	--	--	--	--	--	--	--	43	10	--	--
FEB 03-MAR 03	--	9	2.6	.5	2.4	.1	4.1	5.3	150	2.6	--	--
APR 07-MAY 05	4	--	--	--	--	--	<1.0	28	--	--	99	53
MAY 05-JUN 19	--	--	--	--	--	--	3.0	12	--	--	--	65
JUN 19-JUL 08	--	--	--	--	--	--	<10	<10	--	--	--	19
JUL 08-AUG 03	--	--	--	--	--	--	<10	6.6	--	--	--	--
AUG 03-SEP 02	--	--	--	--	--	--	<10	9.1	--	--	<50	--

Figure 10.--Example of precipitation-quality data, dryfall category. (Printout from WATSTORE.)

Table 8.--Concentration and yield of selected constituents in wetfall, dustfall, and bulk precipitation at four sites in Irondequoit Creek basin, July 1980 through September 1981.

[Site locations are shown in figure 1. Spring = March-May, Summer = June-Aug., Fall = Sept.-Nov., Winter = Dec.-Feb.]

Site and period of record[1]	No. of samples	Average seasonal concentration (mg/L) Spring	Summer	Fall	Winter	Yearly	Computed yield[2] (kg/ha) Spring	Summer	Fall	Winter	Total
A. TOTAL PHOSPHORUS											
Wetfall											
Perinton Square	13	0.104	0.024	0.010	0.020	0.041	0.116	0.027	0.011	0.022	0.252
East Rochester	16	.030	.025	.080	.020	.036	.026	.090	.056	.028	.200
Mendon Ponds	20	.032	013	.006	.008	.012	.011	.068	.022	.013	.114
Dustfall											
Perinton Square	13	0.115	0.094	0.057	0.025	0.078	0.036	0.088	0.027	0.008	0.158
East Rochester	15	.198	.188	.058	.047	.126	.062	.176	.036	.021	.295
Mendon Ponds	16	.103	.432	.107	.008	.210	.048	.404	.066	.003	.521
Bulk precipitation											
Pittsford	14	0.052	0.359	0.096	-	0.184	0.036	0.141	0.418	-	0.595
B. TOTAL KJELDAHL NITROGEN											
Wetfall											
Perinton Square	14	1.47	0.621	0.391	0.230	0.821	2.22	3.48	0.436	0.350	6.49
East Rochester	17	1.25	.651	.777	.380	.798	1.27	2.56	1.47	.526	5.83
Mendon Ponds	19	.805	.504	.380	.225	.467	.587	2.22	.865	.406	4.08
Dustfall											
Perinton Square	13	1.32	0.842	0.487	0.815	0.829	0.411	0.786	0.228	0.253	1.68
East Rochester	15	1.15	1.32	.525	.800	.981	.358	1.23	.327	.373	2.29
Mendon Ponds	15	2.20	1.64	.793	.327	1.32	1.03	1.54	.370	.152	3.09
Bulk precipitation											
Pittsford	14	1.04	3.74	1.08	-	2.04	1.02	4.9	5.07	-	21.0
C. TOTAL LEAD											
Wetfall											
Perinton Square	3	-	0.011	0.014	-	0.012	-	0.019	0.016	-	0.035
East Rochester	3	-	.010	.007	-	.009	-	.021	.008	-	.029
Mendon Ponds	15	.013	.019	.014	.018	.017	.021	.060	.025	.035	.141
Dustfall											
Perinton Square	7	-	0.006	0.046	0.042	0.034	-	0.009	0.216	0.129	0.354
East Rochester	8	-	.060	.028	.063	.049	-	.185	.131	.293	.609
Mendon Ponds	15	.008	.010	.010	.020	.012	.024	.088	.048	.096	.256
Bulk precipitation											
Pittsford	5	-	0.017	0.013	-	0.014	-	0.025	0.026	-	0.051

Table 8.--Concentration and yield of selected constituents in wetfall, dryfall, and bulk precipitation at four sites in Irondequoit Creek basin, July 1980 through September 1981 (continued).

Site and period of record[1]	No. of samples	Average seasonal concentration (mg/L)					Computed yield[2] (kg/ha)				
		Spring	Summer	Fall	Winter	Yearly	Spring	Summer	Fall	Winter	Total
				D. TOTAL CHLORIDE							
Wetfall											
Perinton Square	11	5.75	6.00	0.400	1.30	4.32	4.04	4.48	0.447	2.68	11.6
East Rochester	16	3.07	8.79	6.83	7.35	7.17	2.56	2.8	22.4	7.5	55.3
Mendon Ponds	20	.540	.116	.582	1.63	.472	.854	.368	1.30	3.66	6.18
Dustfall											
Perinton Square	7	2.55	8.25	1.00	-	5.58	0.794	5.13	0.156	-	6.08
East Rochester	10	28.0	10.0	3.80	4.70	1.2	8.72	6.23	1.77	.732	17.4
Mendon Ponds	16	.797	.323	.292	3.40	.981	.372	.302	.182	1.59	2.45
Bulk precipitation											
Pittsford	9	7.00	10.0	4.63	-	6.32	5.66	9.57	23.5	-	38.8

[1] Period of record: Perinton Square - July 29, 1980 through October 6, 1981; East Rochester - June 26, 1980 through October 6, 1981; Mendon Ponds - October 6, 1980 through September 22, 1981; Pittsford - July 1, 1980 through November 3, 1981

[2] $\text{Yields} = \frac{\text{seasonal concentration x seasonal precipitation}}{\text{(area represented by collector)}}$

SUMMARY

A 14-month data-collection program of streamflow, precipitation, and dustfall quantity and quality was conducted in the Irondequoit Creek basin from July 1980 through August 1981. Stream-discharge and water-quality data were collected at 17 sites representing rural to highly urbanized land uses. Precipitation data were collected at 16 sites, evaporation data at one site, and chemical quality of precipitation and dustfall at four sites.

These data were analyzed and compiled in accordance with strict quality-assurance and quality-control procedures and were rechecked for accuracy after being stored in the Survey's WATSTORE computer system. Initial computations of mean concentration and loads were made to determine the consistency and accuracy of the combined chemical concentration and load data for streams as well as the wetfall and dustfall (atmospheric) data.

These data are available from the Survey's WATSTORE system and can be used to determine chemical constituent contributions of urban and rural areas to local streams and by other municipalities to compare results of similar land-use studies.

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Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981.

[Locations are shown in fig. 1. TSS, Total Suspended Solids; P, Phosphorus; TKN, Total Kjeldahl Nitrogen; COD, Chemical Oxygen Demand; Cl, Chloride; Pb, Lead; Zn, Zinc; Cd, Cadmium. Dashes indicate missing data.]

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (Mg)	Total-P (kg)	TKN (kg)	COD (Mg)	Cl (Mg)	Pb (kg)	Zn (kg)	Cd (kg)
A. THORNELL ROAD (115 km^2, agricultural/rural subbasin)																		
Growing-season storms 08-05-80 to 10-28-80; 05-10-81 to 08-13-81																		
08-05-80	15.2	0.94	-	0.26	0.60	-	47	0.019	-	0.001	-	28.1	64.9	-	5.45	2.04	-	0.091
08-30-80	7.62	0.48	-	0.13	0.40	-	45	0.006	-	0.001	-	7.26	22.2	-	2.72	.318	-	.045
09-01-80	54.9	2.41	422	0.40	1.20	-	43	-	-	-	117.	111.	334.	-	11.8	-	-	-
09-14-80	26.2	1.30	203	0.21	0.50	-	43	-	-	-	30.9	31.3	74.9	-	6.35	-	-	-
10-25-80	74.7	5.54	317	0.36	0.60	-	41	-	0.05	-	202.	229.	382.	-	26.3	-	31.8	-
05-10-81	21.1	2.84	30	0.11	1.30	23	81	0.016	0.22	0.003	9.98	35.9	426.	7.26	26.3	5.27	72.2	.999
05-15-81	19.1	4.22	66	0.15	1.50	29	69	0.011	0.60	0.003	31.8	72.6	727.	13.6	33.6	5.31	29.0	1.45
06-21-81	25.4	1.80	99	0.11	1.00	23	56	0.011	0.16	0.006	20.9	22.7	208.	4.54	11.8	2.27	33.1	1.26
07-02-81	14.7	0.10	130	0.21	1.7	11	55	0.021	0.72	0.002	1.82	2.27	20.0	0.09	.908	.227	8.63	.045
07-20-81	41.4	1.73	78	0.18	1.2	29	52	0.009	0.86	0.004	15.4	35.9	239.	5.45	9.99	1.77	171.	.817
07-28-81	25.4	1.24	49	0.12	1.1	22	44	0.010	0.06	0.004	7.26	17.2	157.	2.72	6.35	1.41	8.63	.590
08-04-81	33.3	1.47	117	0.14	1.6	22	-	0.007	0.17	0.029	20.0	23.6	270.	3.63	-	1.18	28.6	4.90
08-10-81	37.1	2.62	129	0.12	1.3	36	53	0.013	3.6	0.007	38.1	35.9	388.	10.9	15.4	3.90	1080.	2.09
											495	653	3310	48.1	157	23.7	1460	12.3
Growing season base flow (Between storms) 08-05-80 to 10-28-80; 05-10-81 to 08-13-81		55.1	45	0.06	0.6	12	48	0.006	0.09	0.002	285.	380.	3800.	76.2	304.	38.0	570.	12.7
Winter runoff 10-28-80 to 01-24-81		54.9	50	0.06	0.7	-	53	-	-	-	315.	378.	4410.	-	334.	-	-	-
Snowmelt runoff 01-25-81 to 03-02-81		57.4	344	0.26	1.9	4	47	0.011	0.9	0.007	2270.	1700.	12600.	26.3	310.	72.6	5950.	46.3
Spring runoff 03-03-81 to 05-10-81		53.1	7	0.04	0.8	10	55	0.009	0.52	0.026	42.7	244.	4900.	60.8	335.	54.9	3170.	158.
Total sampled load 08-05-80 to 08-13-81		247.									3410.	3360.	29000.	211.	1440.	189.	11200.	229.
Estimated subbasin yield 1/, in (kg/km^2)/d											79.7	.078	.679	6.51	33.7	.006	.345	.007

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent.

Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (Mg)	Total-P (kg)	TKN (kg)	COD (Mg)	Cl (Mg)	Pb (kg)	Zn (kg)	Cd (kg)
B. THOMAS CREEK (71.7 km^2, rural headwaters, mixed land use subbasin)																		
Growing-season storms 08-05-80 to 10-28-80, 05-10-81 to 08-13-81																		
08-05-80	34.5	0.81	-	0.20	0.60	-	61	0.031	-	0.001	-	11.8	35.4	-	3.63	1.82	-	0.045
08-30-80	11.2	0.25	-	0.23	0.70	-	87	0.005	-	0.001	-	4.09	12.2	-	1.82	.091	-	>.001
09-01-80	70.6	1.98	75	0.26	0.70	-	44	0.011	-	0.001	10.9	36.8	99.0	-	6.35	1.54	-	>.001
09-14-80	20.8	0.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-25-80	76.7	3.76	140	0.50	1.00	-	42	0.041	0.10	0.001	38.1	135.	269.	-	10.9	11.0	26.8	.272
05-10-81	23.9	1.65	37	0.11	1.4	30	88	0.031	0.34	0.004	4.54	13.2	165.	3.63	9.98	3.68	40.0	.454
05-15-81	21.8	2.21	47	0.18	1.8	31	82	0.016	0.05	0.003	7.26	28.6	285.	4.54	12.7	2.54	7.72	.454
06-21-81	28.9	1.17	41	0.11	1.2	23	61	0.013	0.19	0.007	3.63	9.08	101.	1.82	5.45	1.09	15.9	.590
07-02-81	11.4	1.17	132	0.15	-	-	88	0.011	0.82	0.002	10.9	12.7	-	-	7.26	.908	69.0	.182
07-20-81	43.4	1.40	-	0.21	-	-	-	0.005	1.90	0.004	-	20.9	-	-	-	.499	189.	.409
07-28-81	25.1	1.02	27	0.16	1.3	20	65	0.017	0.10	0.008	1.82	11.8	94.0	1.82	4.54	1.22	7.26	.590
08-04-81	23.1	0.64	21	0.10	1.2	19	88	0.008	0.14	0.004	.908	4.54	55.4	.908	3.63	.363	6.36	.182
08-10-81	30.5	1.75	42	0.14	1.1	35	59	0.034	5.34	0.011	5.45	17.7	138.	4.54	7.26	4.27	669.	1.36
											82.5	306.	1250.	17.2	73.5	29.0	1030.	4.54
Growing season base flow (Between storms) 08-05-80 tp 10-28-80, 05-10-81 to 08-13-81	26.7		31	0.12	1.0	14	77	0.005	0.26	0.002	59.0	229.	1910.	26.3	147.	9.53	496.	3.81
Winter runoff 10-28-80 to 01-24-81		35.6	-	0.09	0.86	-	-	-	-	-	-	229.	2190.	-	-	-	-	-
Snowmelt runoff 01-25-81 to 03-02-81		62.5	30	0.13	1.45	4	97	0.011	1.3	0.003	134.	582.	6490.	18.2	434.	49.0	5820.	13.4
Spring runoff 03-03-81 to 05-10-81		33.3	4	0.08	1.2	21	91	0.022	0.94	0.041	9.98	191.	2870.	49.9	218.	52.6	2250.	98.0
Total sampled load 08-05-80 to 08-13-81	176.										285.	1540.	14700.	112.	872.	140.	9600.	120.
Estimated subbasin yield1/, in (kg/km^2)/d											14.1	.058	.551	5.54	43.1	.007	.475	.006

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent.

Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (Mg)	Total-P (kg)	TKN (kg)	COD (Mg)	Cl (Mg)	Pb (kg)	Zn (kg)	Cd (kg)
C. LINDEN AVENUE (249 km^2, urban subbasin)																		
Growing-season storms																		
08-05-80 to 10-28-80																		
05-10-81 to 08-13-81																		
08-05-80	33.3	1.45	-	-	-	-	38	-	-	-	-	-	-	-	13.6	-	-	-
08-30-80	13.2	0.53	-	0.09	0.40	-	91	0.005	-	>0.001	-	11.8	53.1	-	11.8	.681	-	> .001
09-01-80	62.5	3.71	236	0.37	0.80	-	49	0.037	-	0.001	218.	341.	737.	-	45.4	34.1	-	.908
09-14-80	23.6	1.35	243	0.27	1.20	-	65	0.025	-	0.001	80.8	89.9	399.	-	21.8	8.31	-	.318
10-25-80	73.2	7.01	-	0.23	0.60	-	77	-	0.05	-	-	401.	1050.	-	134.	-	87.2	-
05-10-81	21.8	2.90	40	0.11	1.50	30	80	0.012	0.20	0.003	29.0	79.9	1090.	21.8	58.1	8.72	145.	2.18
05-15-81	13.2	3.42	57	0.18	1.6	29	87	0.014	0.10	0.003	49.0	153.	1360.	24.5	74.4	11.9	85.4	2.54
06-21-81	26.9	1.78	122	0.09	1.7	28	88	0.015	0.15	0.004	53.6	39.5	750.	12.7	39.0	6.63	66.3	1.36
07-02-81	9.9	0.74	-	0.09	0.20	42	83	0.027	0.37	0.003	-	16.8	37.2	8.17	15.4	4.99	68.6	.545
07-20-81	43.9	1.75	285	0.25	2.00	48	59	0.028	0.17	0.005	123.	108.	870.	20.7	25.4	12.2	74.0	2.18
07-28-81	26.7	1.73	152	0.22	1.8	34	-	0.021	0.15	0.003	64.4	93.5	765.	14.5	-	8.95	63.6	1.27
08-04-81	23.9	1.35	216	0.26	1.8	40	79	0.009	0.78	0.010	72.6	86.7	602.	13.6	26.3	3.00	261.	3.36
08-10-81	41.4	2.44	471	0.16	2.5	48	37	0.033	2.98	0.005	285.	96.7	1510.	29.0	22.7	20.0	1800.	3.04
											975.	1520.	9220.	145.	488.	119.	2650.	17.7
Growing season base flow (Between storms)																		
08-05-80 to 10-28-80																		
05-10-81 to 08-13-81		42.7	51	0.12	1.1	18	101	0.009	0.39	0.002	542.	1280.	11700.	192.	1070.	95.7	4150.	21.2
Winter runoff																		
10-28-80 to 01-24-81		51.8	-	0.08	0.8	-	120	-	-	-	-	1030.	10300.	-	1550.	-	-	-
Snowmelt runoff																		
01-25-81 to 03-02-81		56.9	199	0.24	1.7	5	87	0.015	1.1	0.006	2810.	3390.	24000.	70.8	1230.	212.	15500.	84.8
Spring runoff																		
03-03-81 to 05-10-81		46.0	9	0.05	1.2	19	97	0.012	0.63	0.029	103.	570.	13700.	217.	1110.	137.	7180.	330.
Total sampled load																		
08-05-80 to 08-13-81		228.									4430.	7790.	68900.	625.	5450.	564.	29500.	454.
Estimated subbasin yield 1/, in (kg/km^2)/d											63.1	.084	.744	8.90	58.8	.008	.420	.006

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent.

Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (Mg)	Total-P (kg)	TKN (kg)	COD (Mg)	Cl (Mg)	Pb (kg)	Zn (kg)	Cd (kg)
D. ALLEN CREEK (66.6 km², mixed land-use subbasin)																		
Growing-season storms																		
08-05-80 to 10-28-80																		
05-10-81 to 08-13-81																		
08-05-80	35.6	2.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-30-80	7.11	0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09-01-80	43.9	4.90	199	-	-	-	-	-	-	-	65.4	-	-	-	-	-	-	-
09-14-80	23.9	1.83	60	-	-	-	-	-	-	-	7.26	-	-	-	-	-	-	-
10-25-80	82.6	17.1	-	0.2	0.7	-	74	0.018	-	0.001	-	227.	795.	-	84.4	20.5	-	1.14
05-10-81	22.9	3.43	67	0.13	2.0	32	136	0.023	0.21	0.003	15.4	29.5	456.	7.26	30.9	5.22	47.7	.681
05-15-81	24.1	4.29	139	0.17	2.2	34	106	0.035	0.26	0.003	39.9	48.6	628.	9.98	29.9	9.99	74.0	.863
06-21-81	32.2	3.66	111	0.23	2.1	-	69	0.087	0.31	0.054	27.2	55.8	510.	-	16.3	21.2	75.4	13.1
07-02-81	18.3	1.45	356	0.14	2.7	-	73	0.121	1.80	0.003	34.5	13.6	260.	-	7.26	11.7	173.	.272
07-20-81	52.6	6.60	225	0.29	1.9	-	53	0.070	0.18	0.001	99.0	128.	835.	-	23.6	30.8	79.0	.454
07-28-81	32.0	3.63	146	0.22	1.9	40	-	0.057	0.13	0.002	35.4	58.1	460.	9.98	-	13.8	31.3	.499
08-04-81	49.0	7.14	257	0.31	1.8	51	45	0.066	0.24	0.003	122.	147.	854.	24.5	21.8	31.3	114.	1.41
08-10-81	37.1	8.58	240	0.18	1.9	40	36	0.082	0.79	0.006	137.	103.	1050.	22.7	20.9	46.8	451.	3.45
											583.	811.	5850.	74.4	235.	191.	1050.	21.9
Growing season base flow (Between storms) 08-05-80 to 10-28-80 05-10-81 to 08-13-81		48.8	43	0.14	1.6	16	109	0.017	0.35	0.003	140.	455.	5200.	51.7	354.	55.3	1140.	9.76
Winter runoff 10-28-80 to 01-24-81		55.9	57	0.08	0.9	-	242	-	-	-	212.	297.	2970.	-	899.	-	-	-
Snowmelt runoff 01-25-81 to 03-02-81		108.	162	0.25	1.9	7	215	0.071	1.05	0.006	1160.	1800.	13700.	49.9	1540.	510.	7550.	43.1
Spring runoff 03-03-81 to 05-10-81		50.0	22	0.06	1.7	28	190	0.046	0.571	0.063	73.5	200.	5670.	93.5	634.	154.	1910.	210.
Total sampled load 08-05-80 to 08-13-81		329.									2170.	3560.	33400.	270.	3660.	911.	11600.	285.
Estimated subbasin yield1/, in (kg/km²)/d											89.2	.146	1.37	14.7	150.	.048	.618	.015

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent.

Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (Mg)	Total-P (kg)	TKN (kg)	COD (Mg)	Cl (Mg)	Pb (kg)	Zn (kg)	Cd (kg)
E. BLOSSOM ROAD (342 km^2, entire watershed upstream of wetlands)																		
Growing-season storms 05-10-81 to 08-13-81																		
05-10-81	46.0	7.59	82	0.14	1.8	25	100	0.020	0.12	0.003	213.	364.	4680.	65.4	260.	51.9	312.	7.81
06-21-81	28.2	2.82	82	0.50	3.1	41	81	0.047	0.15	0.003	270.	480.	3000.	39.0	78.1	45.1	144.	2.86
07-02-81	14.2	1.17	-	1.50	3.2	34	93	0.063	1.15	0.002	-	603.	1290.	13.7	37.2	25.3	462.	.817
07-20-81	44.7	4.39	-	0.23	2.5	55	58	0.054	0.28	0.004	-	345.	3750.	82.6	87.1	81.0	420.	5.99
07-28-81	29.5	2.31	179	0.26	2.2	36	65	0.035	0.13	0.002	142.	206.	1750.	29.0	51.7	27.8	104.	1.59
08-04-81	17.8	3.05	237	0.22	1.9	38	57	0.031	0.56	0.013	247.	230.	1980.	39.9	59.9	32.3	584.	13.6
08-10-81	42.2	4.14	382	0.23	1.9	47	80	0.065	1.70	0.006	541.	326.	2690.	66.3	113.	92.1	2410.	8.49
											1410.	2550.	19100.	336.	687.	356.	4440.	41.2
Growing season base flow (Between storms) 05-10-81 to 08-13-81		24.7	66	0.16	1.5	20	105	0.01	0.26	0.003	558.	1350.	12700.	169.	888.	84.6	2200.	25.4
Winter runoff 12-15-80 to 01-24-81		40.1	89	0.09	1.3	-	136	-	-	-	1220.	1230.	17800.	-	1870.	-	-	-
Snowmelt runoff 01-25-81 to 03-02-81		79.8	271	0.17	1.6	6	143	0.03	0.86	0.006	7400.	4640.	43700.	164.	3910.	819.	23500.	164.
Spring runoff 03-03-81 to 05-10-81		48.8	56	0.06	1.3	16	120	0.021	0.86	0.032	934.	1000.	21700.	267.	2000.	350.	14400.	534.
Total sampled load 12-15-80 to 08-13-81		219.									11500.	10810.	115000.	936.	9360.	1610.	44500.	765.
Estimated subbasin yield1/, in (kg/km2)/d											114.	.116	1.27	13.7	101.	.020	.476	.008

1/ The daily yields for the 1980 storms, the 1980 growing season baseflow, and the first 48 days of winter runoff were estimated using corresponding runoff periods in 1980 and 1981 to develop the estimated subbasin yield.

Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (kg)	Total-P (kg)	TKN (kg)	COD (kg)	Cl (kg)	Pb (kg)	Zn (kg)	Cd (kg)
F. CRANSTON ROAD (0.67 km^2, moderate-density residential site)																		
Growing-season storms 08-05-80 to 10-28-80 05-10-81 to 08-13-81																		
08-05-80	19.6	2.44	-	0.28	0.90	-	12	0.059	-	0.001	-	0.454	1.50	-	19.5	0.095	-	0.002
08-30-80	19.8	2.00	-	0.52	2.00	-	36	0.064	-	0.001	-	.681	2.68	-	48.6	.086	-	.001
09-01-80	70.4	12.1	101	0.50	0.80	-	27	0.017	-	0.002	825.	4.09	6.54	-	221.	.141	-	.016
09-14-80	19.8	2.83	43	0.12	0.60	-	17	0.013	-	0.001	81.7	.227	1.14	-	32.2	.023	-	.002
10-25-80	74.7	20.5	-	0.35	0.80	-	22	0.011	0.07	0.001	-	4.81	11.0	-	303.	.150	.953	>.001
05-10-81	23.1	5.74	319	0.22	1.70	60	40	0.066	0.47	0.003	1230.	.863	6.58	232.	154.	.254	1.82	.012
05-15-81	17.3	3.48	59	0.17	1.50	39	31	0.026	0.25	0.003	138.	.409	3.50	91.2	72.6	.059	.590	.007
06-21-81	25.1	4.62	67	0.14	1.30	26	35	0.022	0.23	0.009	208.	.454	4.04	80.8	109.	.068	.726	.028
07-02-81	14.8	1.47	173	0.49	2.10	24	14	0.040	0.73	0.003	172.	.499	2.09	23.6	14.1	.041	.726	.003
07-20-81	41.7	7.29	101	0.33	1.40	32	14	0.046	0.68	0.006	495.	1.63	6.86	157.	68.6	.227	3.31	.030
07-28-81	25.1	3.40	12	0.15	1.90	18	13	0.009	0.23	0.003	27.2	.363	4.36	41.3	29.5	.023	.545	.007
08-04-81	38.1	5.00	145	0.35	1.90	45	11	0.021	0.21	0.003	489.	1.18	6.40	152.	37.2	.073	.726	.010
08-10-81	36.8	6.48	169	0.23	2.20	20	-	0.038	0.61	0.003	736.	.999	9.58	87.2	-	.163	2.86	.013
											4400.	16.7	66.3	865.	1110.	1.40	12.2	.131
Growing season base flow (Between storms) 08-05-80 to 10-28-80 05-10-81 to 08-13-81		49.1	79	0.22	2.40	30	175	0.220	0.38	0.002	2610.	7.26	79.4	993.	5790.	7.26	12.6.	.066
Winter runoff 10-28-80 to 01-24-81		53.8	45	0.17	1.10	-	160	-	-	-	1630.	6.17	39.8	-	5790.	-	-	-
Snowmelt runoff 01-25-81 to 03-02-81		70.6	73	0.25	1.60	-	170	0.052	2.90	0.012	3470.	11.9.	76.0	-	8080.	2.47	138.	.570
Spring runoff 03-03-81 to 05-10-81		40.7	170	0.22	2.90	82	62	0.059	0.93	0.013	4650.	6.04	79.4	2240.	1700.	1.62	25.2	.356
Total sampled load 08-05-80 to 08-13-81		292.									16800.	48.1	341.	4100.	22470.	12.8	188.	1.12
Estimated site yield[1/], in (kg/km^2)/d											67.4	.188	1.37	24.9	90.28	.068	995.	.006

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent.

Table 9.—Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (kg)	Total-P (kg)	TKN (kg)	COD (kg)	Cl (kg)	Pb (kg)	Zn (kg)	Cd (kg)
G. SOUTHGATE ROAD (0.73 km², commercial/residential site)																		
Growing-season storms																		
08-05-80 to 10-28-80																		
05-10-81 to 08-13-81																		
08-05-80	36.3	6.70	-	-	1.3	-	45	0.151	-	0.005	-	-	6.31	-	219.	.735	-	0.024
08-30-80	14.5	2.06	82	0.26	1.1	-	68	0.032	-	0.001	123.	.409	1.63	-	102.	.050	-	.001
09-01-80	71.1	14.0	695	0.24	0.5	-	36	0.043	-	0.001	7060.	2.45	5.08	-	365.	.436	-	.010
09-14-80	19.1	3.40	107	0.16	0.6	-	48	0.036	-	0.001	263.	.409	1.50	-	118.	.091	-	>.001
10-25-80	78.2	19.5	96	0.32	0.7	32	27	0.036	0.07	0.001	1360.	4.54	9.90	53.	382.	.508	.990	.014
05-10-81	22.9	5.92	61	0.15	1.7	46	115	0.050	0.36	0.002	262.	.636	7.31	98.	494.	.213	1.55	.009
05-15-81	16.8	6.99	118	0.26	2.1	66	80	0.039	0.19	0.003	597.	1.32	10.6	34.	405.	.195	.965	.015
06-21-81	30.5	5.51	142	0.21	1.5	50	61	0.031	0.22	0.011	566.	.817	6.00	99.	243.	.122	.881	.044
07-02-81	8.8	1.45	110	0.23	1.9	46	58	0.057	1.79	0.003	115.	.227	2.00	48.	60.8	.059	1.89	.003
07-20-81	42.9	7.87	100	0.23	1.3	24	43	0.035	2.16	0.005	571.	1.32	7.44	37.	246.	.200	10.2	.029
07-28-81	24.9	5.16	43	0.17	1.1	26	50	0.020	0.39	0.003	161.	.636	4.09	97.	187.	.073	1.45	.011
08-04-81	26.4	5.23	160	0.21	1.2	35	42	0.036	0.27	0.003	606.	.817	4.54	32.	159.	.136	1.04	.011
08-10-81	40.6	8.08	89	0.14	1.1	32	15	0.052	6.18	0.005	521.	.817	6.45	88.	87.6	.305	36.2	.029
											12200.	14.4	72.8	1790.	3070.	3.12	55.1	.200
Growing season base flow (Between storms) 08-05-80 to 10-28-80 05-10-81 to 08-13-81		54.4	107	0.19	1.5	36	190	0.054	0.26	0.002	4210.	7.49	59.0	1420.	7500.	2.12	10.2	.078
Winter runoff 10-28-80 to 01-24-81		51.8	99	0.12	1.1	-	307	-	-	-	3720.	4.49	41.4	-	11500.	-	-	-
Snowmelt runoff 01-25-81 to 03-02-81		103.	94	0.20	1.4	25	298	0.05	0.64	0.003	7050.	15.0	105.	9400.	22300.	3.75	48.4	.225
Spring runoff 03-03-81 to 05-10-81		79.2	270	0.26	2.3	71	160	0.092	0.98	0.052	5500.	14.9	132.	4080.	9200.	5.28	56.2	2.99
Total sampled load 08-05-80 to 08-13-81		380.									42700.	56.3	410.	16700.	53600.	14.3	170.	3.49
Estimated site yield 1/, in (kg/km²)/d											157.	.207	1.51	61.5	197.	.069	.862	.017

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent.

Table 9.--Constituent concentrations and runoff loads in Irondequoit Creek basin, August 1980 through August 1981 (continued).

Date	Rainfall (mm)	Runoff (mm)	Mean concentrations (milligrams per liter) TSS	Total P	TKN	COD	Cl	Pb	Zn	Cd	Runoff load TSS (kg)	Total-P (kg)	TKN (kg)	COD (kg)	Cl (kg)	Pb (kg)	Zn (kg)	Cd (kg)
G. EAST ROCHESTER (1.40 km^2, high density residential site)																		
Growing-season storms																		
10-25-80																		
05-10-81 to 08-13-81																		
10-25-80	77.7	13.7	-	0.24	0.6	-	15	0.06	0.07	0.002	-	4.58	11.5	-	288.	1.15	1.36	0.038
05-10-81	22.1	9.09	28	0.23	1.3	69	58	0.04	0.40	0.002	356.	2.90	16.5	878.	738.	.508	5.08	.025
05-15-81	20.8	5.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06-21-81	26.7	6.63	228	0.35	3.1	67	16	0.22	0.38	0.005	2120.	3.27	28.7	622.	148.	2.04	3.54	.046
07-02-81	15.2	1.75	270	0.76	4.4	129	18	0.34	1.33	0.004	664.	1.86	10.8	317.	44.5	.835	3.27	.010
07-20-81	41.4	9.40	276	0.42	1.6	58	9	0.13	0.20	0.002	3630.	5.54	21.1	763.	118.	1.71	2.63	.026
07-28-81	29.7	3.33	191	0.73	1.7	68	12	0.13	0.23	0.003	886.	3.40	7.9	316.	55.8	.604	1.04	.014
08-04-81	20.1	3.84	260	0.35	3.8	110	10	0.19	0.26	0.002	1400.	1.86	20.4	591.	53.6	1.02	1.41	.011
08-10-81	28.7	4.84	470	0.46	5.6	97	-	0.32	0.78	0.013	3180.	3.09	37.9	656.	-	2.16	5.27	.020
											12200.	26.5.	155.	4140.	1450.	10.	23.6	.190
Estimated site yield1/, in (kg/km^2)/d											512.	1.11	6.52	174.	61.2	.420	.994	.008

1/ Sampling periods for which no data were recorded for a particular constituent were excluded in the calculation of estimated yield for that constituent. Estimated yields for the East Rochester site are based solely on sampled loads from storm events. Data were not available for other parts of the study period.

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981

A. NITRATES

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (± mg/L)	Percent ≤1 Std. deviation	Percent ≤2 Std. deviation
01/81-08/81	198	2.0	1.96	0.044	70	98
01/81-08/81	192	0.8	0.814	.026	72	94
01/81-08/81	136	.2	.186	.014	71	94
09/81-12/81	39	2.0	1.96	.044	51	90
09/81-12/81	74	.8	.814	.026	55	92
09/81-12/81	38	.2	.186	.014	74	97
06/81-11/81	50	.100	.099	.004	52	86
06/81-11/81	45	.050	.054	.004	69	93
06/81-11/81	46	.010	.015	.004	67	93

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
01/81-08/81	43	100	81	51
09/81-12/81	17	88	70	47

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.003 mg/L	≥0.005 mg/L
01/81-08/81	106	25	18
09/81-12/81	27	41	30

B. TOTAL KJELDAHL NITROGEN

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (± mg/L)	Percent ≤1 Std. deviation	Percent ≤2 Std. deviation
01/81-02/81	81	3.00	2.97	0.076	53	79
12/80-03/81	88	1.00	1.07	.101	88	98
03/81-10/81	381	3.00	3.03	.081	67	95
04/81-10/81	202	1.00	.965	.070	94	88

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
12/80-08/81	86	79	34	17

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.003 mg/L	≥0.005 mg/L
01/81-08/81	41	41	51

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981 (continued)

C. TOTAL PHOSPHORUS

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent ≤1 Std. deviation	Percent ≤2 Std. deviation
04/80-11/80	45	0.500	0.502	0.006	49	85
02/80-04/80	57	.100	.100	.004	64	100
02/80-09/80	86	.050	.048	.004	87	95
12/80-07/81	98	.500	.502	.006	64	96
10/80-05/81	62	.050	.048	.004	100	-
08/81-12/81	29	.500	.502	.006	76	96
06/81-12/81	43	.100	.100	.004	93	100
06/81-12/81	47	.050	.048	.004	98	100

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
07/80-02/81	79	100	80	48
03/81-12/81	153	94	69	44

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.003 mg/L	≥0.005 mg/L
08/80-02/81	90	32	23

D. AMMONIA (NH_3)

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent ≤1 Std. deviation	Percent ≤2 Std. deviation
01/81-08/81	211	1.00	0.985	0.039	95	99
01/81-08/81	174	.50	.517	.025	91	99
01/81-08/81	142	.10	.090	.028	94	99
09/81-12/81	96	1.00	.985	.039	88	99
09/81-12/81	88	.50	.517	.035	88	99
09/81-12/81	73	.10	.090	.028	88	99

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
01/81-08/81	42	95	71	48
09/81-12/81	14	100	79	50

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.003 mg/L	≥0.005 mg/L
01/81-08/81	94	3	1
09/81-12/81	41	20	7

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981 (continued)

E. SPECIFIC CONDUCTANCE

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (± mg/L)	Percent ≤1 Std. deviation	Percent ≤2 Std. deviation
03/81-10/81	103	0.01M-KCL (solution)	1413.50	23.8	70	92
09/80-02/81	38	.005M-KCL (solution)	760.0*	5.6	66	95

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥30 µmho/cm	≥50 µmho/cm
10/80-07/81	72	44	31
08/81-11/81	25	32	72

* This value does not have µmho/cm units but is obtained by dividing the resistance reading of the standard solution by its corresponding f-factor The assumed conductivity of the KCl standard (primary standard) was 1413.

F. ALKALINITY

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (± mg/L)	Percent ≤1 Std. deviation	Percent ≤2 Std. deviation
10/80-04/81	73	47.20	47.18	0.270	45	78
05/81-12/81	74	47.20	47.18	.270	35	73

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
01/81-08/81	34	94	68	56

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.30 mg/L	≥0.050 mg/L
01/81-08/81	48	57	21
09/80-12/80	24	29	19

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981 (continued)

G. CADMIUM

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent <1 Std. deviation	Percent <2 Std. deviation
09/81-03/82	34	20	19.62	0.761	79	94
09/81-03/82	67	10	10.05	.971	84	96
09/81-03/82	71	5	5.11	.451	54	85

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
10/81-03/82	34	79	53	26

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by >0.030 mg/L	>0.050 mg/L
09/81-03/82	59	59	49

H. LEAD

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent <1 Std. deviation	Percent <2 Std. deviation
09/81-03/82	42	75	74.7	3.43	81	93
09/81-03/82	40	25	25.3	2.05	63	93
09/81-03/82	43	10	10.2	1.23	47	79

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
10/81-03/82	32	88	34	16

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicate analysis differing by >0.030 mg/L	>0.050 mg/L
09/81-03/82	61	74	38

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981 (continued)

I. ZINC

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent <1 Std. deviation	Percent <2 Std. deviation
09/81-03/82	7	5000	4890	54.4	57	100
09/81-03/82	7	2500	2600	50.0	57	100
09/81-03/82	23	1000	995	33.5	70	74
09/81-03/82	16	400	406	11.6	69	94
09/81-03/82	13	100	104	8.60	54	85

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
10/81-03/82	35	100	43	29

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.030 mg/L	≥0.050 mg/L
10/81-03/82	72	57	30

J. CHLORIDE

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent <1 Std. deviation	Percent <2 Std. deviation
02/81-05/81	40	500	494	12.1	86	100
02/81-08/81	95	400	401	6.91	73	94
02/81-09/81	123	300	302	9.86	86	100
02/81-09/81	119	100	98.0	4.27	75	98
08/80-03/81	47	50	49.8	0.278	55	89

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
08/80-02/81	41	100	100	94
03/81-09/81	58	100	83	53

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.030 mg/L	≥0.050 mg/L
08/80-05/81	52	60	15
06/81-12/81	56	23	7

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981 (continued)

K. ORTHO PHOSPHORUS

STANDARDS ANALYSIS

Period of analysis	Sample size (n)	Laboratory standard concentration (mg/L)	Average measured concentration (mg/L)	Measured standard deviation (+ mg/L)	Percent <1 Std. deviation	Percent <2 Std. deviation
05/80-12/80	131	0.500	0.505	0.006	49	88
02/80-09/80	108	.100	.099	.003	81	95
05/80-12/80	139	.050	.044	.002	76	95
01/81-08/81	142	.500	.505	.006	45	86
10/80-05/81	147	.100	.099	.003	88	99
01/81-08/81	150	.050	.044	.002	83	100

RECOVERY FROM SPIKED SAMPLES

Period of analysis	Sample size n	Percentage of samples exhibiting spike recovery of 100± (20%)	(10%)	(5%)
07/80-02/81	72	99	71	38
03/81-09/81	137	98	77	49

DUPLICATE ANALYSIS

Period of analysis	Sample size n	Percentage of duplicates differing by ≥0.003 mg/L	≥0.005 mg/L
10/81-12/81	21	24	5

L. SUSPENDED SOLIDS

DATE	Analysis #1 (mg/L)	Analysis #2 (mg/L)	Sample volume (mls)	Percent difference between analyses
09-19-80	19	17	200	11
11-26-80	20.5	17	200	19
01-27-81	<25	<25	100	0
02-13-81	84	79	100	6
02-13-81	64	64	100	0
02-17-81	81	84	150	4
02-19-81	34	32	200	6
02-20-81	43	42	200	2
03-17-81	< 5	< 4	500	20
03-17-81	357	359	100	1
04-02-81	240	244	100	2
04-16-81	54	56	200	4
04-16-81	146	153	200	5
04-17-81	24	26	250	8
04-20-81	57	65	250	15
04-29-81	40	36	500	10
05-26-81	182	187	200	9
06-14-81	100	110	200	3
06-21-81	150	140	200	7
08-03-81	25	27	150	7
10-30-81	107	83	500	25
10-31-81	107	83	490	25
11-02-81	4890	4490	140	8
11-05-81	25	25	140	0
11-05-81	39	41	140	5
11-15-81	22	22	250	0
11-17-81	29	29	880	0
11-17-81	748	660	50	12
11-24-81	302	298	230	1

Total Analyses: 29 Average Percent Difference: 7

Table 10.--Monroe County Environmental Health Laboratory quality-control data for water-quality constituents measured by the laboratory between December 1980 and September 1981 (continued)

M. VOLATILE SUSPENDED SOLIDS

DATE	Analysis #1 (mg/L)	Analysis #2 (mg/L)	Sample volume (mls)	Percent difference between analyses
03-23-81	< 5	< 5	500	0
03-17-81	67	67	100	0
04-02-81	71	76	100	7
04-16-81	<12	<12	200	0
04-16-81	40	38	200	5
04-17-81	14	14	250	0
04-20-81	<10	12	250	17
04-29-81	8	8	500	0
05-26-81	28	26	200	7
06-14-81	42	42	200	0
06-22-81	32	30	200	6
10-30-81	17	15	490	12
10-30-81	17	15	500	12
10-30-81	<10	<11	240	9
11-02-81	206	176	140	16
11-05-81	<18	<19	300	5
11-05-81	<18	<18	500	0
11-17-81	180	160	50	12
11-17-81	4	5	900	22
11-24-81	43	41	235	5

Total Analyses: 20 Average Percent Difference: 7