Data-Collection Methods and Quality-Assurance/ Quality-Control Procedures Used in the Study of Episodic Stream Acidification and its Effect on Fish and Aquatic Invertebrates in Four Catskill Mountain Streams, New York, 1988-90

By Anthony J. Ranalli, Barry P. Baldigo, Debra A. Horan-Ross, *and* Ronald V. Allen

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	by	To Obtain
	Length	
micrometer (µm)	0.00004	inch
centimeter (cm)	0.3937	inch
meter (m)	3.281	foot
kilometer (km)	0.621	mile
	Area	
square meter (m^2)	0.093	square foot
square kilometer (km^2)	0.3861	square mile
hectare	0.4047	acre
	Volume	
milliliter (mL)	0.0338	fluid ounce
liter (L)	0.2642	gallon
	Flow	
cubic meter per second (m^3/s)	35.31	cubic foot per second
	Temperature	
degree Celsius (°C)	(1.8 x °C) + 32)	degree Fahrenheit

Other Abbreviations

microsiemens per centimeter at 25 °C (µS/cm)

microequivalents per liter (µeq/L)

milligrams per liter (mg/L)

micrograms per liter (µg/L)

Water Year

The 365-day period from October 1 through September 30 of the following year

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Abstract

The U.S. Geological Survey, in cooperation with the U.S. Environmental Protection Agency, conducted a 20-month study during 1988-90 to evaluate the effects of episodic acidification on fish and aquatic invertebrates in pristine headwater streams in the Catskill Mountains of New York. The study was part of the Episodic Response Project, a regional survey of episodic acidification by the U.S. Environmental Protection Agency, and was carried out simultaneously with other studies in the Adirondack Mountains of New York by the Adirondack Lake Survey Corporation and in central Pennsylvania by Pennsylvania State University.

This report summarizes the methods used, describes the sampling sites, and presents the data collected from October 1, 1988 through May 30, 1990 at four headwater watersheds (Biscuit Brook, East Branch Neversink River, Black Brook, and High Falls Brook). The study entailed (1) monitoring the quantity and chemical quality of atmospheric deposition and the quality and discharge of streams, and (2) experiments to determine the effect of stream-water-quality changes on fish and invertebrate populations.

INTRODUCTION

The Acid Precipitation Act of 1980 prompted extensive research on acidic deposition and its effects on aquatic ecosystems in the United States. This research has included regional surveys to assess the current state of surface-water acidification and to predict the future susceptibility of surface waters to acid precipitation (Omernik and Powers, 1982; Linthurst and others, 1986; Lynch and Dise, 1986; Landers and others, 1987; Kaufmann and others, 1988; Bricker and Rice, 1989) as well as site-specific studies to define processes of acidification within individual watersheds (Chen and others, 1984; Galloway and others, 1983; Driscoll and Newton, 1985; David, 1986; Driscoll and others, 1986). Sampling for the regional surveys was done only once or twice at each lake or stream, usually under base-flow conditions, and furthermore, models that have been developed predict only the long-term trends and changes that could result if current rates of acidic deposition decrease (Chen and others, 1980; Cosby and others, 1985). Thus, most of the research to date has focused on defining the processes that control stream and lake acidification and the extent of gradual, chronic acidification rather than episodic acidification.

Recent research on individual watersheds in Europe and North America has shown that streams also can undergo significant temporary (hours to days) acidification in response to rainstorms or snowmelt (Lynch and others, 1986; Schaefer and others, 1990). These acidic episodes can contribute a major part of the annual hydrogen and aluminum loads of streams and can have detrimental effects on fish and other aquatic organisms.

Few research projects have been designed to simultaneously investigate both the physical and chemical factors that cause acidic episodes and their effects on fish because fish response to episodic chemical changes is difficult to measure in the field. As a result, most of the research that has been done on episodic acidification has focused on "biologically relevant" water-quality changes rather than on the fish themselves. The concentrations of "biologically relevant" constituents that cause fish mortality or morbidity in the field are undocumented, however, and whether fish can detect areas of less acidic waters (known as refugia) and move to them during these acidic episodes is unknown. Research that has focused directly on fish behavior is inconclusive. Kretzer (Adirondack Lake Survey Corporation, written commun., 1987) has shown that the sensitivity of fish to hydrogen-ion and aluminum concentrations in streams is dependent upon the species and life stage. Laboratory experiments and field bioassays by VanWinkle and others (1986) have shown that fish morbidity and mortality result from episodic as well as chronic lake and stream acidification, but field studies have also shown that the response of fish populations to acidification is variable (Gunn, 1986). Thus, the effects of episodic acidification on fish are poorly understood, and the available data pertain only to specific lakes and streams and do not reveal the regional extent of these effects.

To address concerns over the potential for episodic acidification of aquatic ecosystems in the United States, the U.S. Environmental Protection Agency (USEPA) in 1988 developed the Episodic Response Project (ERP), the objectives of which were to:

1. Define the magnitude, duration, and frequency of episodic chemical changes in streams during snowmelt periods and rainstorms,
2. Ascertain the extent to which episodic chemical changes in streams affect fish populations and note the frequency of episodes that cause these effects,
3. Obtain information on processes and factors that affect the severity of episodic chemical changes in streams, and
4. Develop and test episodic-chemistry models to make predictions of regional episodic acidification.

Although episodic acidification is a potential problem in many parts of the United States, the ERP was limited to three high-priority regions that are known to be affected by acidic deposition–the Catskill Mountains of southeastern New York, the Adirondack Mountains of northern New York, and the Northern Appalachians of west-central Pennsylvania (fig. 1). In each of the three regions, stream biology, stream chemistry, and watershed hydrology were investigated, and the three studies were done simultaneously. The project objectives, especially the development of regional chemical, models, required that the data be comparable among the three regions; therefore, the protocols for equipment, methods, sampling schedules, and Quality Assurance/Quality Control (QA/QC) procedures for all phases of the study were uniform among the three research groups.

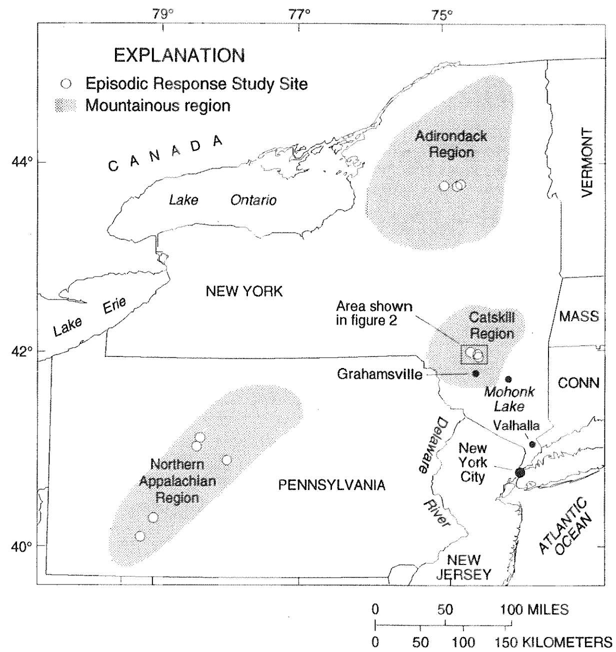


Figure 1. Location of study sites within the three regions of the Episodic Response Project in New York and Pennsylvania.

Purpose and Scope

This report summarizes results from the Catskill study area, the region investigated by the U.S. Geological Survey (USGS). The report describes the climate, geology, soils, vegetation, and land use in the region, describes the location and physical characteristics of the four watersheds studied, and discusses in detail the sampling techniques and the laboratory methods and QA/QC procedures used in the study. It also documents deviations from the ERP Integrated Quality Assurance Plan (Peck and others, 1988) and presents data collected for QA/QC experiments for various components of the study (such as comparison studies of different types of sample filters). Appendix tables give stream-discharge data and water-quality data for streams, snow cores, and snow lysimeters,

Acknowledgments

Thanks are extended to the Frost Valley YMCA, the Balsam Lake Anglers' Club, and the Tison family for allowing access to the streams observed during the study. Special thanks are extended to Dr. William Kelly III of Claryville (New York State Department of Environmental Conservation - retired), whose advice and services helped initiate the fish-monitoring effort.

SITE DESCRIPTION

Four headwater streams (each having drainage areas less than 24 km^2) in Ulster County, N.Y., were selected for the Episodic Response Project by the USGS. These streams are Biscuit Brook and High Falls Brook, both of which are tributary to the West Branch Neversink River, Black Brook, which is tributary to the Beaverkill, and the upper reaches of the East Branch Neversink River (fig. 2). The watersheds of these streams lie within the Catskill State Park, which consist of State-owned land (classified as New York State Forest Preserve Lands) and privately owned land.

The USGS has been investigating water quality within the Catskill region since the early 1980's, largely because this area contains six reservoirs that supply drinking water to New York City. Three of the four streams discussed in this report (fig. 2) flow into the Neversink Reservoir (fig. 3) and have been monitored monthly by the USGS since 1983 for discharge and stream chemistry as part of the USEPA Long Term Monitoring (LTM) study. The fourth stream, Black Brook, is a first-order tributary to the Beaverkill (fig. 3). Biscuit Brook (fig. 2) has been monitored continuously for discharge and weekly for water chemistry since 1983; it also was sampled during several storms in 1985 as part of an earlier USEPA-funded project. Both Biscuit Brook and High Falls Brook were included in the USEPA national stream survey as "special interest" sites. All four streams ultimately drain into the Delaware River (fig. 1).

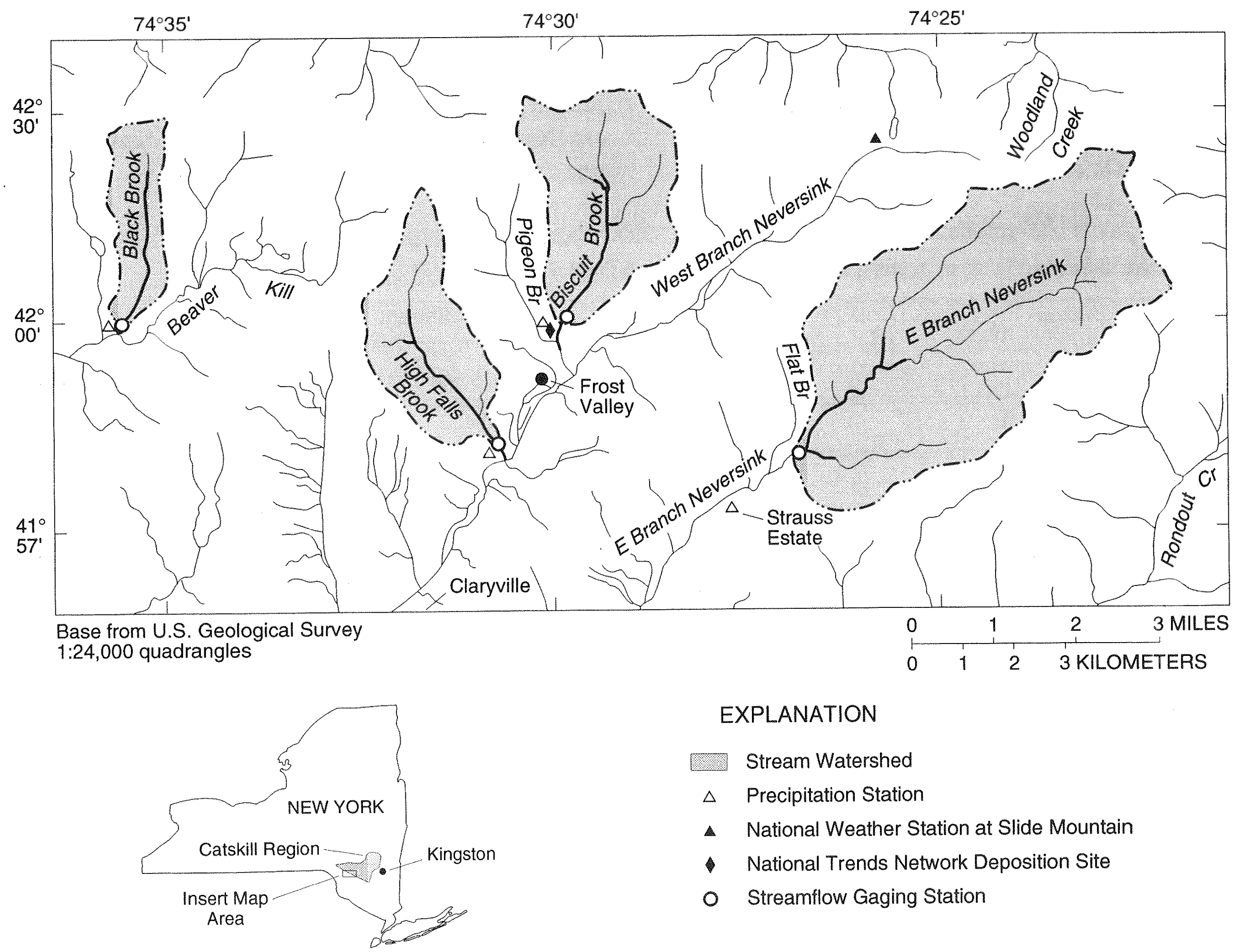


Figure 2. Locations of monitoring sites in the four Catskill Mountain watersheds studied, Ulster County, N.Y.

The four streams were selected to represent a range of chemical conditions and include:

- One stream that is acidic most of the year with an acid-neutralizing capacity (ANC) less than 0.
- Two control streams that did not become acidic at any time during the year (ANC always greater than 0), and
- At least one stream with positive ANC during low flows but negative ANC during high flows.

Black Brook and High Falls Brook are well-buffered trout streams that do not become acidic during high flows, although High Falls Brook has large declines in ANC during storms. Both streams were considered "control streams" because the ANC did not fall below 0 μeq/L during any storm observed in the study. Biscuit Brook experiences several acidic episodes each year but has ANC values greater than 0 and healthy populations of brook trout (*Salvelinus fontinalis*) and sculpin (*Cottus cognatus*) . The East Branch Neversink River is acidic most of the year but contains a brook trout population during the summer base-flow period. These four streams met the USEPA criteria for site selection and provided a suitable range of conditions for assessment of fish response to acidic episodes. Physical characteristics of these four watersheds are presented in table 1.

Climate

The climate of the region is classified as humid continental marked by extreme seasonal changes in temperature. The winters are cold, and the summers cool. Average annual air temperature, as determined from 24 years of data at the National Weather Service station at Slide Mountain (fig. 1), is 5°C (National Oceanic and Atmospheric Administration, 1950-85). The average January temperature is -9°C, and the average July temperature is 17°C. The area typically has 155 frost-free days (Tornes, 1979).

Although precipitation is evenly distributed throughout the year, the annual volume varies locally within the Catskill region and is greatest in the high, central elevations that contain the four study streams. Average annual precipitation, as determined from 32 years of data at the National Weather Service station at Slide Mountain, near the center of the study area, is 157 cm (National Oceanic and Atmospheric Administration, 1950-1985).

Table 1. Physical characteristics of the four study watersheds above stream gage.
[Locations are shown in fig. 2; m, meters; km, kilometers; km^2, square kilometers]

	Stream			
	Black Brook	High Falls Brook	Biscuit Brook	East Branch Neversink River
Quadrangle (7 1/2-minute)	Seager	Claryville	Claryville	Peekamoose
USGS station identifier	01417822	01434105	01434025	0143400680
Stream gage:				
Latitude (degrees, minutes, seconds)	42°00'42"	41°58'38"	41°59'43"	41°58'01"
Longitude	74°36'13"	71°31'21"	74°30'05"	74°26'54"
Elevation above sea level (m)	681	591	628	652
Stream:				
Order	1	2	2	2
Length (km)	3.73	4.88	4.54	8.42
Slope (m/km)	45	60	45	26
Watershed:				
Maximum elevation (m)	1140	1170	1120	1280
Minimum elevation (m)	681	591	628	652
Relief (m)	459	579	492	628
Area above gage (km^2)	3.65	7.15	9.84	23.1

Physiography and Bedrock Geology

The following discussion is paraphrased from Murdoch (1991). The Catskill Mountains form the northeastern end of the Appalachian Plateau and consist of flat-lying sedimentary rocks overlain by varying thicknesses of till and alluvium (Rich, 1934). Headwater watersheds in the Catskill Mountains generally have steep gradients with thin soils and extensive bedrock outcrops. The stream channels are commonly bedrock or large cobbles. The region ranges in elevation from about 427 m at its lowest part, at the Neversink Reservoir to 1,281 m at Slide Mountain (Tornes, 1979).

The Catskill Mountains consist of high ridges that are the erosional remnants of a massive Devonian delta; they were formed as streams cut down through the flat-lying rocks during the regional uplift (Rich, 1934). The geologic history of the area is described in detail by Rich (1934). The sedimentary rocks of the Catskills were derived from mountains that stood in what is now New England and southeastern New York. At the same time, a shallow sea covered western New York and Pennsylvania and extended into the Mississippi valley. Between those mountains and the sea, in what is now the Catskill region, was a massive delta upon which the rivers from the mountains to the east were depositing gravel, sand, and silt. These sediments were relatively coarse on the eastern side, near the mountains, and became finer, grading into sand and silt in a seaward (westward) direction, and accumulated to a thickness of several thousand feet as the land beneath subsided. Eventually, as the mountains to the east were eroded, sediment deposition on the delta gradually slowed. The Catskill delta has since been uplifted and now stands at an elevation higher than the region of New England from which its sediments were derived.

Geographically the region is divided by three northwest-southeast-trending parallel escarpments (fig. 3) that form divides between the major Catskill river basins (Rich, 1934). The northeastern and central scarps are cuestas formed by the outcrop of resistant rocks dipping southwestward (Rich, 1934), and the topography and drainage seem to be controlled more by the structure of the underlying bedrock than by its resistance to erosion. The southern scarp, which contains the study area, is irregular, and its topography seems to be controlled more by rock resistance than by structure, although the drainage in this area seems to be controlled by structure because the East and West Branches of the Neversink River, the upper reaches of Rondout Creek, and the upper reaches of the Beaverkill are all essentially parallel to the strike of the underlying bedrock (Rich, 1934). The bedrock of the Catskills affects the topography of the region through its nearly horizontal bedding planes and joints, which are exposed at or near land surface. In most places, the bedrock is fractured by three nearly perpendicular joint sets, one of which is parallel to the bedding plane (Parker and others, 1964). Joints at oblique angles are also common. The joint fractures are zones of weakness along which quarrying by glacial ice occurred. This resulted in a "staircase" topography of many flat surfaces adjacent to vertical cliffs.

The bedrock of the Catskill Mountains consists of interbedded Devonian sandstone, siltstone, shale, and conglomerate. Sandstone and interbedded conglomerates make up 60 percent of the bedrock; shale and silt-

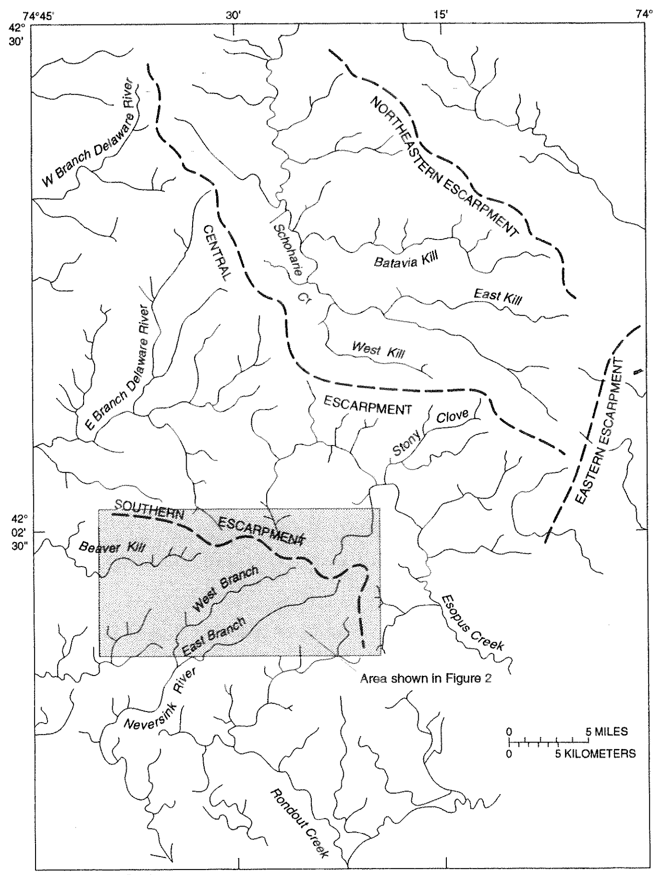


Figure 3. Principal physiographic and drainage features of the Catskill Region. (Location is shown in fig. 1.) Modified from Rich, 1935, fig. 1

stone account for the remaining 40 percent. Mineral composition in the Catskill region is fairly uniform. Quartz is the dominant mineral and represents about 39 percent of the bedrock material; other minerals found in appreciable amounts are muscovite and amphibole (Ethridge, 1977). Calcite and hematite, which are the primary interstitial cement materials, are also present, but only in small amounts (Way, 1972). Way (1972) reported pyrite and calcite in the shale south and northeast of the study area; thus, small amounts of both minerals could be present in the watersheds. The bedrock is considered relatively unreactive. Parker and others (1964) reported that the low specific conductance of streams of the study area (less than 30 µS/cm) during base-flow periods and the low dissolved-solids concentration in ground water from bedrock wells suggests slow chemical weathering of the bedrock.

Surficial Deposits

The surficial deposits in the Catskill Mountains are a combination of glacial deposits derived from repeated glaciations and recent alluvium. Rich (1934) mapped thick drift in the valleys and thinner ground moraine (till) on the high slopes in the upper Beaverkill and East Branch Neversink basins. Although he did not map the upper High Falls Brook or Biscuit Brook watersheds, he mapped pockets of thick drift in the lower reaches of both basins and noted morainic loops (unstratified drift deposited at the base of local and continental glaciers) midway up the Biscuit Brook basin. Ozsvath and Coates (1986) have described the glacial deposits in headwater watersheds throughout the Catskill region as a relatively thin layer (0.25 to 2.0 m thick) of a lodgment till (diamicton) derived from the basal layer of the Laurentide ice sheet. Ozsvath and Coates (1986) state that the till has undergone colluviation on most valley walls. Properties of the till are as follows: (1) it consists of locally derived sediments, (2) it rests directly on bedrock in headwater watersheds throughout the Catskill region, (3) it is dense and compacted, (4) its texture is relatively uniform, and (5) it lacks associated or interbedded sediments. Recent alluvial deposits on modern flood plains extend above the monitoring stations in the Black Brook and East Branch Neversink basins. The presence and position of morainic loops led Rich (1934) to conclude that the ice sheet flowed down the valleys of the Beaverkill and both branches of the Neversink.

Glacial deposits in the valleys of the upper East and West Branch Neversink Rivers, which include the watersheds above the gaging stations at Biscuit Brook, High Falls Brook, and the East Branch Neversink River, are reported by Rich (1934) to be from an alpine glacier emanating from the south side of the Slide Mountain group of peaks. Rich (1934) states that the moraines he mapped at Ladleton, in the valley of the East Branch Neversink River, and at Branch, in the valley of the West Branch Neversink River, mark the limits of the more recent glaciation and are much younger than the drift further down the valleys. His conclusions are based on the presence of wide postglacial flood plains downstream of both these moraines, which indicate the relative antiquity of glaciation in this part of the valley. He also notes the absence of significant moraines higher up those valleys and judges those lower down to be much older than the upper ones.

Soils

The U.S. Soil Conservation Service has mapped the soils of this region and classified them into seven general categories and many more detailed soil types (Tornes, 1979). The soils of the Catskill Mountains are classified in the Arnot-Oquaga-Lackawanna general category. These soils are thin to deep, excessively to moderately well drained, and predominantly very steep and medium textured on uplands (Tornes, 1979). Soils in most of the Catskills have developed on till. Because till is derived mainly from the underlying bedrock, the soils' chemical and physical properties generally reflect those of the bedrock in the study area (Tornes, 1979).

Soils in the watersheds studied are varied but are mainly shallow boulder soils on steep slopes and thus, are conducive to rapid runoff of precipitation . They also are moderately to extremely acidic. The Biscuit Brook and High Falls Brook watersheds contain mainly Arnot and Oquaga soils, the East Branch Neversink River watershed contains mainly Lackawanna soils, and the Black Brook watershed contains Wellsboro soils. Recent alluvial deposits are present in the flood plain of Black Brook and the East Branch Neversink River near the respective gaging stations. A brief description of the properties of the common soil types in these watersheds is given in table 2; the percentage of each watershed that is covered by each soil type is given in table 3. Soils maps of the four watersheds are presented in appendix 5.

Table 2. Properties of the soils within the four watersheds studied.

[Data from Tornes, 1979, p. 11-92 and 254-261. Soil distribution within each watershed is shown in appendix 5. [in/h, inches per hour]

Soil Type	Abbreviation	Soil Properties
Alluvium	AA	Consists of deep, unconsolidated alluvium that is commonly redeposited by stream overflow. Texture varies widely within a short distance, and the soil has little or no profile development. These areas are gravelly, very gravelly, cobbly, or stony.
Arnot-Oquaga-Rock outcrop complex: very steep	ARF	Consists of 40 percent Arnot very bouldery silt loam, 30 percent Oquaga very bouldery silt loam, 20 percent rock outcrop, and 10 percent other soils. The Arnot soils are shallow and somewhat excessively drained to moderately well drained. The Arnot subsoil extends to a depth of 14 inches, where it encounters dusty red fractured shale bedrock. The Oquaga soils are moderately deep and well drained to excessively drained. The Oquaga subsoil extends to a depth of 26 inches where it rests on olive-gray sandstone bedrock. Reaction is extremely acid to medium acid throughout both soils. Infiltration rate ranges from 0.6 to 2.0 in/h.
Lackawanna and Swartswood very bouldery soils: moderately steep	LCD	Both soils are deep and well drained. The Lackawanna subsoil extends to a depth of 80 inches. The Swartswood subsoil extends to a depth of 60 inches. Reaction is very strongly acid or strongly acid in the surface layer of the Lackawanna soils and extremely acid to strongly acid in the surface layer of the Swartswood soils. Maximum infiltration rate ranges from 0.6 to 2.0 in/h; slightly lower at depth.
Lackawanna and Swartswood very bouldery soils: very steep	LCF	Properties of this group are similar to those of the LCD group, except that this group is found on steeper slopes (ranging from 35 to 70 percent).
Lackawanna and Swartswood extremely bouldery soils: steep	LEE	Properties of this group are similar to those of the LCD group except that boulders and slope dominate this unit so much that the difference between the Lackawanna and Swartswood soils is relatively unimportant. Maximum infiltration rate ranges from 0.6 to 2.0 in/h and is slightly lower at depth.
Oquaga-Arnot-Rock outcrop complex: sloping	ORC	Consists of 35 percent Oquaga channery silt loam, 2.5 percent Arnot channery silt loam, 15 percent rock outcrop, and 25 percent other soils. The Oquaga soils are moderately deep and are well to excessively drained. These soils are mainly on the base of slopes and on benches, where the depth to red-shale bedrock is about 32 inches. The Arnot soils are shallow and are somewhat excessively drained to moderately well drained. These soils are intermingled with outcrops on slope breaks and on the front part of benches, where the depth to red-shale bedrock is about 17 inches. Reaction is extremely acid to medium acid throughout both soils. Infiltration rate ranges from 0.6 to 2.0 in/h.
Oquaga-Arnot-Rock outcrop complex: moderately steep	ORD	Consists of 35 percent Oquaga very bouldery silt loam, 30 percent Arnot very bouldery silt loam, 15 percent rock outcrop, and 20 percent other soils. Properties of this soil group are similar to those of the ORC group except that the Oquaga group overlies gray sandstone. Infiltration rate ranges from 0.6 to 2.0 in/h.

Table 2. Properties of soils within the four watersheds studied (continued).

Soil Type	Abbreviation	Soil Properties
Rock outcrop-Arnot complex: sloping	RXC	Consists of 45 percent rock outcrop, 30 percent Arnot channery silt loam or channery loam, and 25 percent other soils. This unit is mainly on the tops of the mountains. The Arnot soils are shallow, and somewhat excessively drained to moderately well drained. Thick-bedded gray sandstone and siltstone underlie the Arnot soil at a depth of about 17 inches. Reaction is extremely acid to medium acid throughout these soils. Infiltration rate ranges from 0.6 to 2.0 in/h.
Rock outcrop-Arnot complex: steep	RXE	Consists of 45 percent rock outcrop, 30 percent Arnot very bouldery loam or very bouldery silt loam, and 25 percent soils of minor extent. Properties of this soil group are similar to those of the RXC group except that depth to bedrock under the Arnot soil is about 14 inches.
Rock outcrop-Arnot complex: very steep	RXF	Consists of 55 percent rock outcrop, 30 percent Arnot extremely bouldery loam and extremely bouldery silt loam, and 15 percent other soils. Properties of this soil group are similar to those of the RXE group. Infiltration rate ranges from 0.6 to 2.0 in/h.
Scriba and Morris extremely bouldery soils: gently sloping	SGB	Consists of deep, somewhat poorly drained soils. Boulders dominate this unit so much that the difference between the Scriba and Morris soils is relatively unimportant. Depth to bedrock ranges from about 20 to about 80 inches. Reaction ranges from strongly acid to neutral. Maximum infiltration rate ranges from 0.6 to 2.0 in/h; lower at depth.
Wellsboro and Wurtsboro very bouldery soils: gently sloping	WLB	The Catskill Mountains contain the Wellsboro soil group, which is deep and moderately well drained on glaciated uplands. Depth to bedrock is about 50 inches. Reaction is strongly acid to medium acid. Maximum infiltration rate ranges from 0.6 to 2.0 in/h; lower at depth.
Wellsboro and Wurtsboro extremely bouldery soils: gently sloping	WOB	Properties of this group are similar to those of the WLB group except that these soils are found below rock ledges in glaciated uplands. Maximum infiltration rate ranges from 0.6 to 2.0 in/h; lower at depth.

Table 3. Soil distribution within each of the four watersheds studied.

[All values are in percent. Watershed locations are shown in fig. 2. Soil-type abbreviations are explained in table 2. <, less than. Dashes indicate group is absent]

Soil Type	Biscuit Brook	Black Brook	East Branch Neversink River	High Falls Brook
AA	< 1	1	7	< 1
ARF	30	35	24	24
LCD	2	17	—	10
LCF	< 1	—	7	—
LEE	—	—	24	—
ORC	< 1	4	< 1	4
ORD	12	22	9	17
RXC	2	—	< 1	2
RXE	8	—	1	2
RXF	42	—	23	15
SGB	—	—	2	—
WLB	2	21	—	6
WOB	—	—	1	—

Vegetation and Land Use

The four watersheds selected for this study are 100 percent forested and are considered pristine. The vegetation in the forests is almost entirely deciduous trees, interspersed with a few stands of conifers. The most common deciduous trees are beech and yellow birch; the most common conifer is hemlock. The percentages of deciduous trees and conifers in each of the four watersheds are given in table 3.

Table 4. Percentage of each watershed covered by deciduous, conifer, and mixed deciduous-conifer forest

[Locations are shown in fig. 2.]

Watershed	Deciduous	Conifer	Mixed
Biscuit Brook	95	1	4
Black Brook	93	2	5
East Branch Neversink River	34	24	42
High Falls Brook	80	3	17

Most of the land within the watersheds studied is owned by the New York State Department of Environmental Conservation, which limits land use to recreational activities such as hiking, camping, hunting, and fishing. Land use in the four watersheds has been classified as forest land by the New York State Land Use and Natural Resources Inventory of Cornell University (1969). This classification consists of land areas with natural stands where at least 50 percent of the trees are over 50 years old and over 9 m high.

The entire Black Brook watershed and the majority of the East Branch Neversink River watershed are on State-owned land. A small amount of land within the East Branch Neversink River watershed from just above the gage to just below it is privately owned (Strauss estate, fig. 2) but is still pristine. Most of the High Falls Brook and Biscuit Brook watersheds also are on State land, but the lower reaches, where the gages are located, are owned by the Frost Valley YMCA Camp. The YMCA uses this property for an environmental education center, a summer camp, and environmental research. Some logging was done in the watershed of High Falls Brook when the U.S. Forest Service, in conjunction with the Frost Valley YMCA, undertook an experiment to improve timber-stand quality during 1984-85. This involved reducing stand density to 60 percent in three stands on the eastern side of the watershed. An analysis of water-quality data from High Falls Brook as part of the Long-Term Monitoring Project has shown that this logging has not affected stream-water quality (P.S. Murdoch, U.S. Geological Survey, written commun., 1990). The only other possible adverse effect of land use on these watersheds is from road salt in the winter. Biscuit Brook and High Falls Brook are the only streams that could be affected by road salt, but the gages on both streams are far enough upstream from the road that they are not affected. Effects of human activity on water quality in these four watersheds are thus considered minimal.

FIELD METHODS

Streamflow-gaging stations were installed at Biscuit Brook in August 1983 and at Black Brook, East Branch Neversink River, and High Falls Brook from August through October 1988 for collection of water-quality and discharge data. The stream-gaging locations were selected mainly to maximize the accuracy of the stage-to-discharge relation. A detailed discussion of the stream-channel characteristics necessary for accurate measurement of stream stage and discharge is given in Rantz and others (1982).

The primary monitoring program for the ERP in the Catskill Mountains was as follows: Stream-water-quality monitoring included (1) manual base-flow sampling at weekly intervals, (2) automated sampling during changes in stream stage, and (3) continuous onsite monitoring of pH, specific conductance, and water temperature. Deposition monitoring included (1) weekly and storm-by-storm collection of wet-deposition samples, and (2) snowpack and snowmelt sampling during the winter. Hydrologic monitoring included (1) continuous measurement of stream stage, precipitation volume, and air temperature; (2) measurement of stream discharge over a range of flow conditions; and (3) measurement of snowpack volume during the winter. Biologic monitoring included (1) several estimates of fish populations by electrofishing methods, (2) periodic collection of invertebrate samples for qualitative species-diversity and abundance estimates, and (3) bioassay experiments in which fingerling brook trout were held in cages during a series of acidic flows (during storms or snowmelt) in the spring and fall. Field methods and QA/QC procedures for each of these activities are described in the following sections. A detailed discussion of how the data were collected in each phase of the study were evaluated and how they met the overall objectives of the ERP is given in Peck and others (1988, sec. 2.2).

Instrumentation

The instrumentation for measuring stream chemistry and stage consisted of USGS minimonitors, ISCO[1] automated samplers, and Druck pressure transducers. The minimonitors measured stream pH, specific conductance, and water temperature onsite; the automated samplers collected stream-water samples during rainstorms and snowmelt; and the pressure transducers measured stream stage. The primary source of stage data at Biscuit Brook, in addition to the transducer system, was a manometer coupled to digital and graphic recorders. These instruments were interfaced to a data logger, which was programmed to set sampling and measurement times according to changes in stream stage; it also stored the data collected. The instruments were housed in a heated 1.8- by 1.8- by 2.1-m shelter equipped with battery power and recharged by photovoltaic cells. The cables for the minimonitor's pH, conductance, and temperature probes, the automated sampler's sampling tube, and the pressure transducer were all enclosed in PVC pipe to prevent damage by animals or vandals and were bolted to the channel bed to prevent movement. The pipes containing the minimonitor probes and automated-sampler intake were fastened to bedrock in the stream channel at a point where the water was constantly flowing. At all streams, this was within 3 m of the stream bank. The pipe for the pressure transducer was fastened to bedrock at a point away from turbulent flow.

Hydrologic Data Collection

The following paragraphs describe the frequency and method of sampling and the QA/QC procedures used for the measurement of (1) stage and discharge, and (2) volume of precipitation, snowpack, and snowmelt.

Stage and Discharge Measurement

The measurement of stream stage and discharge and the development of stage-to-discharge rating curves for converting values of stage into discharge was done in accordance with procedures described in Rantz (1982). Stage was measured directly from a staff gage in a relatively stable pool during station visits, and between visits by a pressure transducer immersed in the stream. In addition, stage at Biscuit Brook was monitored by a manometer coupled with a digital graphic recorder. The transducer was interfaced to a datalogger and placed inside a 2-inch (5 cm) PVC pipe that was bolted to bedrock in the stream channel as close as possible to the staff gage. Stage values were converted to discharge from rating curves developed for each stream. (The curves consist of discharge measurements made over a wide range of stages and plotted against the stages at which they were measured). This involves making discharge measurements over a wide range of stage and plotting the discharge against the stage at which it was measured. The USGS ADAPS software was used to convert the transducer stage values to discharge values in accordance with the rating curve for each site.

The QA/QC procedures for this component of the study consisted of checking the accuracy of the pressure transducers on each site visit and making frequent discharge measurements. Checking the accuracy of the pressure transducers involved reading the staff gage and comparing the reading with that recorded by the data logger. If the two readings differed by more than 0.05 cm, the data-logger offset for the pressure transducer was readjusted. Frequent discharge measurements were made to ascertain whether the control was stable. The control configuration determines the depth of water in the pool in which the staff gage is placed. In streams as small as the ones used in this study, the control and, therefore, the stage-to-discharge relation, are subject to frequent shifts as a result of scouring or filling in with sediment after high flows, accumulation of leaves during the fall, and the buildup of ice. Therefore, the discharge of each stream was measured after every major high flow to verify the stage-to-discharge rating. If a change in the rating was noted, a series of discharge measurements was made until a new rating could be developed. Discharge was measured weekly at all sites during the fall and winter because ice buildup on the control can cause the stage-recording instruments to register high values that do not reflect increased streamflow. Discharge was measured at these times to determine the discharges at these high stages. No duplicate discharge measurements were made by a second observer as recommended by Peck and others (1988, sec. 6.3.2.2.2) because the frequent discharge measurements were judged to be of satisfactory quality and did not warrant duplication.

[1] Use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Wet-Deposition Sampling

Precipitation volume was measured weekly with Belfort weighing-bucket rain gages at Biscuit Brook, Black Brook, and at the Strauss Estate on the East Branch Neversink River (fig. 2). The weighing-bucket rain gage at Biscuit Brook has been operated since 1983 as part of the National Trends Network (NTN) program, and those in the Black Brook and East Branch Neversink River watersheds were installed in the fall of 1988. During the weekly site visits, the strip-chart recorders on the rain gages were replaced, the strip chart recorders for the previous week were read manually, and a daily precipitation value was recorded. Details on the processing of the volume data from the three weighing-bucket rain gages are given in Bigelow and Dossett (1988). Weighing-bucket gages were calibrated periodically with weights designed to represent specific rainfall amounts. QA/QC methods for the weighing- bucket rain gages are described in Peck and others (1988, sec. 6.3.3.1 and 6.3.3.2).

Snowpack Sampling

The snowpack was sampled biweekly during the period of accumulation and weekly during the spring snowmelt in the watersheds of Black Brook, Biscuit Brook, and the East Branch Neversink River. Samples were collected with an Adirondack snow tube from a snow-measuring course that consisted of five 10-m by 10-m plots. These plots were at equal elevations within each watershed and were roped off to prevent foot traffic. Each plot was cleaned of debris such as rocks and logs before snowpack accumulation. Snow depth was measured from the scale on the outside of the snow tube, and the measurements were averaged for a watershed value. One sample was collected from each plot during each sampling visit, then composited into one sample representing all stations along the snow course. The sample was then melted at room temperature and weighed to determine average water content. Minimal snowpack development during the winter of 1988-89 prevented snow-core-sample collection. A detailed description of the sampling technique and QA/QC methods used for snowpack sampling is given in Peck and others (1988, sec. 6.3.3.3).

Snowmelt Sampling

Two snow lysimeters were installed near the gage house at Biscuit Brook to collect snowmelt water and were sampled continuously throughout the spring snowmelt period of 1990. The lysimeters were 0.9-m by 1.2-m trays made out of 1/4-in (0.6 cm)-thick plate PVC. The edge of each tray was 10.2 cm high. The lysimeters were placed flush on the ground such that a drain at one end of each tray directed meltwater to 19-L plastic carboys that were placed in pits below the lysimeters. A tipping-bucket rain gage was placed between the carboy and the lysimeters in one lysimeter pit to measure melting rates. As the snow melted, the water was channeled down to the drain end of the lysimeter and through the tipping-bucket rain gage to the carboy. The lysimeters were checked daily, and daily meltwater volumes were measured. Snow lysimeters were operated during the winter of 1989-90. QC procedures consisted of running a field blank through the lysimeters before and after the snow season.

Stream-Water and Deposition Sampling

The water-quality data represented pH, specific conductance, ANC, and concentrations of dissolved calcium, magnesium, potassium, sodium, chloride, nitrate, sulfate, silica, total aluminum, and organic carbon (DOC) in base-flow and stormflow samples. Additional samples were taken from selected streams during storms and analyzed for total monomeric aluminum, organic monomeric aluminum, and oxygen isotope concentrations. Selected "grab" samples were analyzed for dissolved inorganic carbon (DIC). The following paragraphs describe the frequency and method of sampling and the QA/QC procedures used for manual and automated collection of stream and atmospheric-deposition samples.

Manual Stream-Water Sampling

Stream-water samples were collected manually for routine chemical analysis once a week at each stream during the study. These "grab" samples were collected in 2-L Teflon bottles at midstream, just downstream from the minimonitor probes. Sample collection involved rinsing the bottle three times with stream water, then collecting a sample in well-mixed flow. The bottle was capped and brought to the field laboratory at Frost Valley for filtering. Because the stream channels are narrow and shallow, and the flow is turbulent, a sample taken at midstream was assumed to be representative of the average water chemistry at the cross section of the sampling site.

The QA/QC procedures for the "grab" samples consisted of bottle washing by specified procedures and the processing of field blanks and field natural audit samples as described below. Bottle-washing procedures consisted of rinsing the bottle three times with deionized water, dislodging particulate matter in the bottle with a clean bottle brush, then filling the bottle 1/4 full with deionized water and adding several drops of a low-ionic-strength soap. The bottle was then capped and shaken vigorously, rinsed until all soap was removed, and then rinsed three more times. Bottles were finally filled with deionized water, capped, and left for 48 hours, after which 10 percent of the bottles were checked for specific conductance. If specific conductance values exceeded 1.0 µS/cm, all bottles were again washed and rechecked after 48 hours. This process continued until the bottles were discarded or met the specific conductance criteria.

Field blanks were samples of deionized water that were taken into the field, poured into a sample bottle, and subsequently processed as though they were routine water samples. These samples were used to monitor and assess background contamination from sample collection, processing, and analysis. Field blanks were collected after about every 20 samples, and the transfer of deionized water to the field bottle was rotated among the four streams and among sampling devices (grab-sample containers and automated samplers).

Field natural audit samples were water samples from lakes that were chemically similar to the streams being studied and have been shown to remain stable over time (Peck and others, 1988, sec. 5.2.2). These natural audit samples have a known chemical concentration and were used to assess the precision and bias associated with sample collection, processing, and analysis. Samples from two Adirondack lakes in New York (labeled FN9 and FN10) were used during the project. Two 2-L amber-colored high-density polyethylene (HDPE) plastic bottles, each containing one of the natural audit samples, were sent to the field laboratory at Frost Valley every month by Lockheed Engineering and Science Company (hereafter referred to as Lockheed) in Las Vegas, Nev. They were processed in the same manner as the field blanks and were rotated among the four streams and among sampling devices (grab-sample containers and automated samplers).

Automated Streamwater Sampling

Stream stage and water chemistry were monitored continuously at each site throughout the study; stage was measured every 15 minutes, and stream pH, specific conductance, water temperature, and air temperature every hour. During high flows, pH, specific conductance, water temperature, and stage were measured every 15 minutes during the entire storm and every time an automated sampler was triggered. The data logger initiated sampling by the automated sampler and triggered frequent measurements by the minimonitor and pressure transducer during high flows, when the change in stage in a 15-minute interval exceeded a preset value. Subsequent samples were taken during rising and falling stages whenever the stage rose above or fell below a specified amount in a 15-minute interval. Backup procedures for the initial triggering of sampling and for collection of rising- and falling-stage samples were programmed into the data logger to ensure that samples were taken during every storm. The backup for the initial triggering of sampling was an absolute stage value that, when exceeded, caused the high-flow sampling to begin. The backup for the rising- and falling-stage sampling was a preset time-interval program that would be initiated only after the automated sampler was initially triggered by one of the two previously mentioned activation programs. The automated samplers were themselves programmable and, occasionally, especially during the spring snowmelt, were set to sample at a regular time interval such as hourly or every 2 hours. Each sampler contained 24 1-L plastic sample bottles. After each storm, the samples and the data recorded by the datalogger were retrieved from each site and were brought to the field laboratory at Frost Valley for processing. As many as 10 samples from each storm were chosen for complete laboratory analysis; fewer samples from small storms were processed. This selection was based on the stage and pH at the time of collection. Sample selection usually consisted of three or four rising-stage samples, three samples at or near the peak flow, and three falling-stage samples.

The QA/QC procedures for the automated sampler were similar to those for the grab samples—they consisted of specified bottle-washing techniques and the processing of field blanks and field natural audits. The procedure for bottle washing was the same as for the Teflon bottles used for grab samples–after cleaning, every 10th bottle was filled with deionized water, allowed to stand for 48 hours, and then measured for specific conductance. If the conductance values exceeded 1.0 µS/cm, all bottles were rerinsed with deionized water and remeasured for specific conductance. The procedures for the collection of field blanks and field natural audit samples through the automated samplers were as follows:

1. The automated sampling tube was removed from the stream bottom, and the outside of the sampling tube and strainer were rinsed with deionized water, followed by a rinse by either deionized water or field-natural audit water, depending on which solution was being used for the test.
2. The end of the sampling tube was inserted into the container of deionized water or field-natural audit water.
3. The automated sampler was manually activated to fill the collection tube with the sample and then purged to rinse the tube. This rinse water was not allowed to discharge back into the sample container.
4. The sampling tube was inserted back into the sample container, and enough sample was taken to fill one bottle.
5. After sample collection, the sampling tube was rinsed and purged with streamwater, returned to the stream bottom, and reset for programmed sampling.

In addition to the above methods, three other QA/QC methods were used for the automated samplers. These consisted of (1) checking the sampling tube and strainer weekly for damage and fouling by algal growth, and replacing the tube if a problem was observed, (2) collecting a grab sample at the same time that an automated sample was taken on several occasions throughout the study period to determine whether the collection of water through an automated sampler was causing significant chemical differences relative to a grab sample, and (3) running a holding-time experiment during which samples collected by the automated sampler were held for up to 2 days to determine whether their chemistry was changing through exposure to the atmosphere before processing. The sampling tube was replaced when algal growth became noticeable or when field blanks indicated contamination, and the strainer was cleaned periodically with a toothbrush. To obtain simultaneous collection of grab samples and automated samples, the automated sample was collected by overriding the sampling program and was processed at the same time as the grab sample. Results of this comparison, presented in table 4, indicate no significant difference between the two sampling methods. The holding-time experiment entailed collection of stream water in a bucket similar to those used in the wet-dry precipitation collectors, pouring the water into six automated sampler bottles, and leaving them uncapped in the gagehouse for 48 hours. This simulated the maximum delay between sample collection and retrieval. This experiment was carried out at High Falls Brook and the East Branch Neversink River on March 28, 1990. Results of this experiment (table 5) indicate that the holding times in the project had no significant effect on sample quality.

Onsite Monitoring

The QA/QC procedures for onsite monitoring of pH, specific conductance, and temperature consisted of monthly measurements of the field natural audit samples and approximately weekly checks on the calibration of the probes with calibration solutions. Field natural audit samples were measured as follows:

1. Two audit-sample containers were placed in the stream and allowed to reach stream temperature to minimize temperature effects in the pH and specific conductance measurements.
2. Specific conductance and temperature probes were removed from the stream, rinsed with deionized water, and then rinsed with a small amount of audit sample.
3. About 250 mL of the audit sample was poured into a 500-mL graduated cylinder. The probes were then immersed in the sample, and the temperature and conductance of the sample were recorded. The conductance probe was then removed from the cylinder, rinsed with deionized water, and placed back in the stream.
4. The pH probe was removed from the stream, rinsed as in step 2, and immersed in the graduated cylinder containing the audit sample. The pH and temperature of the sample were recorded. The probes were then removed from the cylinder, rinsed with deionized water, and placed back in the stream.
5. The second audit sample was measured as described in steps 2 through 4.

Calibration checks of the pH and conductance probes involved placing them in a solution of known concentration and plotting the minimonitor readings on quality-control charts. A low-ionic-strength solution of sulfuric acid with a theoretical pH of 4.01 was used as the check solution and to assess calibration of the pH

Table 5. Automated-sampler data and grab-sample data from three of the four streams studied, fall 1989.

[Values are in milligrams per liter unless otherwise noted. Stream locations are shown in fig. 2.]

	Stream and date of sampling						
	East Branch Neversink River	Biscuit Brook		High Falls Brook			
Constituent	Aug. 2	Aug. 3	Aug. 8	Aug. 3	Aug. 9	Sept. 23	Oct. 31
pH (standard units)							
Automated	4.95	6.10	6.31	6.89	6.88	6.42	6.57
Grab	4.96	6.31	6.48	6.88	6.81	6.28	6.53
Specific conductance (microsiemens per centimeter)							
Automated	21.9	26.3	26.7	33.5	38.4	27.5	31.6
Grab	21.5	26.4	26.6	36.2	38.4	27.5	31.9
Acid-neutralizing capacity (microequivalents per liter)							
Automated	2.8	40.7	31.9	146.0	144.6	53.3	166.7
Grab	8.4	37.9	35.4	145.6	157.6	63.1	90.2
Calcium							
Automated	1.24	2.78	2.69	4.84	5.14	3.43	4.04
Grab	1.24	2.71	2.84	5.05	5.10	4.41	3.92
Magnesium							
Automated	0.54	0.60	0.62	0.61	0.67	0.46	0.53
Grab	0.52	0.61	0.60	0.62	0.66	0.48	0.53
Potassium							
Automated	0.20	0.21	0.20	0.19	0.19	0.23	0.37
Grab	0.19	0.21	0.20	0.20	0.18	0.28	0.41
Sodium							
Automated	0.36	0.41	0.42	0.34	0.36	0.34	0.30
Grab	0.37	0.42	0.43	0.34	0.36	1.28	0.34
Aluminum							
Automated	0.12	0.02	0.02	0.01	0.02	0.06	0.02
Grab	0.15	0.02	0.02	0.02	0.01	0.40	0.02
Chloride							
Automated	0.54	0.66	0.67	0.54	0.57	0.54	0.74
Grab	0.52	0.68	0.67	0.54	0.57	0.55	0.71
Nitrate							
Automated	0.78	1.48	1.74	1.39	1.67	1.32	1.56
Grab	0.78	1.52	1.79	1.37	1.68	1.35	1.55
Sulfate							
Automated	5.93	6.47	6.48	6.47	6.65	5.98	6.15
Grab	5.66	6.45	6.53	6.48	6.68	5.97	6.08
Dissolved organic carbon							
Automated	2.28	2.90	1.57	2.11	1.47	3.76	2.97
Grab	2.01	1.37	1.47	1.80	1.51	3.81	--
Silica							
Automated	2.45	2.69	2.79	2.86	2.93	2.29	2.49
Grab	2.50	2.66	2.79	2.78	2.89	2.59	2.48

Table 6. Chemical data from automated-sampler holding-time experiment on samples from two streams studied, 1990.

[Values are in milligrams per liter unless otherwise noted. µS/cm, microsiemens per centimeter. µeq/L, microequivalents per liter]

	Stream and sample serial number*											
	High Falls Brook						East Branch Neversink River					
Constituent	#2994	#2995	#2996	#4013	#4014	#4015	#2997	#2998	#2999	#4016	#4017	#4018
pH (in standard units)	6.65	6.38	6.35	6.40	6.46	6.42	4.86	4.81	4.75	4.85	4.83	4.85
Specific conductance (µS/cm)	32.08	31.76	31.80	32.25	32.05	31.72	28.15	28.44	28.68	28.21	28.17	28.22
Acid-neutralizing capacity (µeq/L)	57.50	55.15	55.90	56.10	55.60	55.15	-9.75	-10.75	-11.40	-14.10	-10.10	-10.10
Calcium	3.94	4.04	4.01	4.00	3.92	3.98	1.68	1.56	1.43	1.45	1.45	1.49
Magnesium	0.53	0.52	0.54	0.56	0.56	0.56	0.66	0.67	0.69	0.71	0.71	0.72
Potassium	0.21	0.21	0.21	0.21	0.21	0.21	0.24	0.24	0.26	0.27	0.26	0.27
Sodium	0.35	0.35	0.34	0.56	0.30	0.30	0.36	0.38	0.33	0.33	0.33	0.34
Aluminum	0.017	0.020	0.018	0.015	0.016	0.017	0.186	0.215	0.233	0.254	0.255	0.259
Chloride	0.573	0.570	0.561	0.558	0.562	0.557	0.58	0.587	0.579	0.576	0.575	0.575
Nitrate	4.200	4.193	4.199	4.164	4.189	4.175	3.469	3.489	3.472	3.452	3.461	3.405
Sulfate	5.806	5.862	5.828	5.769	5.684	5.755	5.489	5.511	5.487	5.419	5.341	5.408
Dissolved organic carbon	1.31	1.23	1.18	1.33	1.45	1.38	1.69	1.76	1.80	2.03	2.00	1.90
Silica	1.97	1.98	1.98	2.00	1.97	2.00	2.14	2.08	2.12	2.12	2.10	2.14

* Samples with serial numbers 2994-2999 were brought to the field lab immediately after sampling for processing.
Samples with serial numbers 4013-4018 were left uncapped in the gagehouse for 48 hours.

probe. A solution of potassium chloride with a theoretical value of 44.4 µS/cm was used as the check solution for the specific-conductance probe. The temperature probe was checked through comparison with a thermometer accurate to 0.1 °C, and the difference was plotted on a quality-control chart. The quality-control charts used during the study are known as "x -type" control charts, for which three sets of values are established: (1) a central line that represents the best estimate of the true value of the check sample (0 in the case of temperature difference), (2) warning-limit lines that define a range in which 95 percent of the measurements should fall if statistical control is maintained, and (3) control-limit lines that define the range where almost all (99 percent) values should fall if statistical control is maintained. The central-line value and the warning limits and control limits used for the three minimonitor probes throughout the study were as follows:

Variable	Central Line	Warning Limits	Control Limits
pH	4.01	± 0.16 pH units	± 0.25 pH units
Specific conductance	44.4	± 4 µS/cm	± 7 µS/cm
Temperature difference	0	± 0.7 °C	± 1.0 °C

The procedure for checking the minimonitor probes was as follows:

1. The pH and specific conductance probes were removed from a 4-inch PVC housing, rinsed with deionized water, and then rinsed with their respective check solutions. The probes were then placed in the respective check solutions at streamside and allowed to equilibrate. The check solutions were held in special containers designed to allow the entire

probe to be submerged. The containers were then partially submerged in the stream to bring each solution to stream temperature. The temperature probe was removed from the PVC container and placed on the stream bottom adjacent to a thermometer.

2. The three probes were allowed to equilibrate for a few minutes, then values for each were recorded.
3. If the check values met the control criteria, the pH and conductance probes were removed from the containers, rinsed with deionized water, and placed back in the PVC housing.

The guidelines that were used in evaluating the quality of the minimonitor data through these calibration checks are as follows:

1. If the measured value of the check sample was within the warning limits, all data collected since the last acceptable check-sample measurement were accepted.
2. If the measured value of the check sample was outside the control limits, the minimonitor was assumed to be no longer in a state of statistical control. The minimonitor was recalibrated, and all data collected since the last acceptable check-sample measurement were considered suspect and were flagged as such in the data base.
3. If the measured value of the check sample was outside the warning limit but within the control limits, a second check solution was analyzed. If the second check-sample measurement was within the warning limits, the minimonitor was assumed to be in a state of statistical control, and all data collected since the last acceptable check-sample measurement were accepted. If the second check-sample measurement was outside the warning limits, the minimonitor was assumed to be no longer in a state of statistical control and was recalibrated, and all data collected since the last acceptable check-sample measurement were considered suspect and were flagged as such in the data base.

Wet-Deposition Sampling

Wet-only deposition samples were collected for water-quality analysis both weekly and on a storm-by-storm basis at Biscuit Brook. Samples were collected in acid-rinsed buckets in two Aerochem Metrics model 301 automated wet-dry precipitation collectors. The weekly collector has been in operation since 1983 as part of the National Trends Network (NTN) program; the other was installed adjacent to the NTN collector in August 1988 for sampling precipitation volume and chemistry of individual storms as part of the Multi-State Atmospheric Power Production Pollution Study (MAP3S) (R. Barchet, Battelle Northwest Laboratories, written commun., 1991). Weekly samples from the NTN collector were weighed for precipitation volume and measured for pH and specific conductance, then shipped in the collection bucket to the Illinois Water Survey Laboratory in Champaign, Ill., for analysis. Storm-by-storm samples from the MAP3S collector were weighed and transferred to a bottle, then refrigerated prior to monthly shipment to the Pacific Northwest Laboratory in Richland, Wash., for analysis. Both types of deposition samples were analyzed for the same constituents as stream-water samples, except that analysis for all forms of aluminum were omitted. These data are not presented herein, but are given in Barchet (1991) and National Atmospheric Deposition Program (1989, 1990).

Snowpack and Snowmelt Sampling

All snowpack and snowmelt samples were analyzed for the same constituents as stream samples. Snowpack samples were weighed to determine water-equivalent volume and were melted prior to filtration through the same type of filters as those used for each respective aliquot in the stream-sampling programs (see "Filtration" section, p. 20.) Snowmelt samples were treated in the same fashion but were generally unfrozen at the time of collection.

Fish and Aquatic Macroinvertebrate Sampling

Effects of chronic and (or) episodic stream acidification on aquatic ecosystems have been widely reported in the literature. Several studies have detailed direct effects of acidification on game fish and associated prey populations (Beamish and Harvey, 1972, Shindler and others, 1985, Rosseland, 1986, Hall and Ede, 1987, Schofield and Driscoll, 1987, Bergman and others, 1988, Christensen and others, 1988). Less well studied and, consequently, less understood, are (1) geochemical interactions that affect biota, (2) the degree to which differing magnitudes and frequencies of episodic acidification affect biota, (3) the biological mechanisms that cause the observed effects, and (4) the means by which an individual organism or population can minimize or avoid toxic effects. Biological experiments and chemical monitoring plans for the ERP were designed to identify and characterize factors that could help define several of these interactions.

Declines in game-fish populations through stream acidification can result from indirect as well as direct stresses. Some example of indirect stresses are the reduction or elimination of prey-fish and invertebrate populations through acidification. Because brook trout in the Neversink River prey upon sculpin and macroinver-tebrates, assessments of brook trout, sculpin, and invertebrate populations and toxicity tests are expected to provide data on the potential changes that acidification and the attendant declines in sculpin and macroinvertebrate populations have on native brook trout populations. Fish-population declines also can result from other causes, for example (a) chronic aluminum toxicity, which can result in decreased or failed reproduction and thus can cause decreases in the population without immediate adult fish mortality; and (b) population declines, which can occur when fish emigrate to reaches that are less toxic (such as reservoirs, tributaries, and lower order stream sections) during chronic acidification. Several years of repeated indirect fish losses could culminate in decreased or absent populations without causing mortality in the extant populations. Brook trout use of refugia was assessed in this study through surveys of fish communities along the length of the study streams and radiotracking of individual trout during acidic episodes.

Measures of direct stress, such as acute toxicity, are more easily assessed. Toxic effects may be seen at the cell, organ, or individual organism level, and fish in reaches that have extremely acidic episodes can survive only if they can avoid those toxic conditions, such as by fleeing to temporary, less acidic refugia. The toxicity tests (bioassays) done in this study were designed to quantify fish mortality during acidic episodes. Specific mechanisms for fish mortality during acidification were not addressed in this study but were evaluated by Wigington and others (1990).

Fish-Population Surveys

Fish communities in the four study reaches were surveyed initially to characterize community disruptions associated with present stream-acidification conditions. Population surveys indicate only the present density, which could reflect past chronic and (or) episodic acidification. Because detailed historical data were lacking, fish were transferred to the affected stream reaches to increase the populations to near pre-acidification densities (approximately equal to the fish-population densities in the control stream) so that the effects of acidic episodes could be monitored from changes in the transferred populations during the 2-year study.

Fish communities within each of the four study streams were first inventoried from October 12 through November 15, 1988, and several quantitative surveys and qualitative checks were conducted within each stream during the next 2 years. Quantitative surveys were conducted in the four streams in the spring and fall of 1989 and the spring of 1990; qualitative surveys were conducted in Biscuit Brook in the winter of 1988 and the summer of 1989, in Black Brook in the summer and fall of 1989, and in High Falls Brook and East Branch Neversink in August 1989 (table 7). Qualitative population checks were similar to quantitative surveys except that only two passes were completed, and fish weights and lengths generally were not recorded.

Table 7.—Dates of 1989-90 fish-population surveys at the four study streams.

Quantitative Survey		Qualitative Survey	
Date	Stream	Date	Stream
May 1 to June 20, 1989	All	December 7, 1988	Biscuit Brook
October 13-29, 1989	All	August 22, 1989	Biscuit Brook, High Falls Brook
May 4 to June 6, 1990	All	August 23, 1989	East Branch Neversink River
--	--	August 28, 1989	Black Brook
--	--	November 27, 1989	Black Brook

All fish-population surveys were conducted within a seine-blocked, 200-m stream reach adjacent to each gage house. For each survey, fish were collected from the reach on three successive passes with a Coffelt AC/DC backpack electroshocker. One or two technicians collected fish with scap nets while another carried the shocker upstream. Generally, individual brook trout lengths and weights were recorded along with sculpin length ranges and pooled weights. During several surveys, individual sculpin lengths and weights (from all or some of the specimens collected) were recorded to provide definition of sculpin-population age structure and length-to-weight ratios. All fish were returned to the reach after fish surveys were completed. The numbers of each species collected from each pass were used to calculate population estimates and 95-percent confidence intervals by the Moran-Zippin method (Zippin, 1958). These calculations were done with Microfish 3.0 software. A detailed description of sampling methods is given in Murdoch and others (1990).

Quality-assurance procedures for population assessments and most other fish-handling operations were less straightforward than chemical procedures. The balance used to weigh fish was checked against a known weight after every 10 measurements. Occasional departures from the known value indicated a need for recalibration of the balance. When this occurred, the readings were noted, and the balance was recalibrated before additional weight measurements were obtained. Fish weighed between the last valid measure and the erroneous measure were reweighed after the balanced was recalibrated. Fish-species identifications were verified once by an independent fisheries biologist. Additional verifications were unnecessary because only three species (brook trout, brown trout, and sculpin) were encountered during the study. Efficiency of the collection method and electroshocker was tested on June 6 and October 30, 1989 as follows: 40 brook trout were uniquely marked and released into a 50-m blocked section of stream. On a second date, 25 adult sculpin were also released. A set of three electroshocker passes was used to collect as many marked fish as possible. The sampling efficiency for trout was 97 percent in June and 66 percent in October. In October, about two-thirds of the fish collected from the blocked section were unmarked resident fish. Almost all of the individual fish in the blocked reach were marked during the first efficiency test. The number of marked fish in the reach during the second efficiency test (recapture effort) was a fraction of the total number of fish in the test reach because only about one-third of the population was initially marked. Because greater effort was needed to collect marked individuals during the second test, efficiency declined; sculpin recovery in October was only 44 percent. Estimates of marked-fish population (Moran-Zippin method) during the checks yielded an efficiency of 97 percent for June and 70 percent for October brook trout collections.

Fish Transfers

Brook trout and sculpin were collected by electroshocker from the West Branch Neversink and its tributaries from May 10 through June 9, 1989 and transferred into the East Branch Neversink River, Biscuit Brook, and High Falls Brook. The transfer was such that total trout biomass in each stream ranged from 30 to 80 percent of the Black Brook trout biomass (about 3 g/m^2). Sculpin were not transferred to High Falls Brook because the populations there were already high. Black Brook fish were not supplemented or replaced with additional West Branch Neversink fish. The number of trout and sculpin transferred to the streams, and their mass and density, are summarized in table 8. The numbers and weights of fish in the four study reaches after transfers were estimated as follows: the number and weight of transferred fish were added to the number and weight of fish collected during the most recent survey to estimate an approximate total number and mass of fish in respective study reaches. Calculations of fish densities and biomass were based on the surface areas of study reaches in Biscuit Brook, Black Brook, High Falls and the East Branch Neversink River (1,384 m^2 , 713 m^2, 600 m^2 and 2,420 m^2, respectively).

Table 8. Number and mass of fish transferred to study reaches and estimated totals after transfer.
[Mass values are in grams. Locations are shown in fig. 2.]

	Number and mass added				Estimated reach population after transfer			
	Trout		Sculpin		Trout		Sculpin	
Stream	No.	Mass	No.	Mass	No.	Mass	No.	Mass
Biscuit Brook	42	680	29	180	163	2,723	122	625
Black Brook	0	0	0	0	90	1,072	241	857
East Branch Neversink River	50	770	50	280	118	1,725	50	280
High Falls Brook	43	718	0	0	92	1,556	97	345

Fish Telemetry

A fish population is not necessarily adversely affected by toxic conditions if its individuals, either actively or by chance, avoid living in and(or) reproducing in the toxic areas. Several adult brook trout were radiotagged and tracked within three streams to assess the ability of individual fish to locate and utilize refugia during episodic stream acidification. This project also attempted to evaluate the extent of refugia in each stream by a longitudinal assessment of stream chemistry and fish populations in each watershed.

Radiotelemetry studies were conducted during April 13-27, 1989 in the East Branch of the Neversink. Additional studies were conducted there from October 17 through November 25, 1989 and in Biscuit Brook from March 26 through May 22, 1990. Similar control groups were monitored in High Falls Brook during the same three periods (table 7). During the first study, nine brook trout had transmitters installed in their gut and were released into each stream. In each group, four fish were obtained from the West Branch Neversink River, and five were collected from the stream being studied. The signals from each fish were tracked until the end of the study period or until the transmitters were regurgitated or stopped functioning, or until the fish was found dead. The second experiment used 13 fish in each of two streams. About half of the transmitters were placed into the gut, as done previously; the others were surgically implanted. In addition to the imported West Branch trout, 5 to 10 of the fish used in High Falls Brook and the East Branch of the Neversink River, respectively, were native residents. The last experiment, in the spring of 1990, used 10 or 11 West Branch trout in each stream, and all transmitters were placed in fish stomachs.

Longitudinal Profiles

A longitudinal study to characterize fish populations and associated water quality at various points within each watershed was begun in July 1989 to determine whether selected study reaches were representative of each of the streams being investigated. Fish communities in the main channels of the East Branch Neversink, Biscuit Brook, and High Falls Brook, as well as several tributaries upstream from the study reaches, were assessed. Similar checks were conducted along the main channel in Black Brook during July 1990. From two to six main-stem sites and several tributaries to each of these streams were surveyed. Fish communities were assessed by seine blocking stream sections from 25 to 70 m long and collecting fish with three passes of the electroshocker.

Bioassays

Of the several mechanisms that are known to cause declines in or losses of fish populations, only acute fish mortality during periods of episodic acidification could be assessed directly within the scope of this investigation. Confined brook trout and sculpin were exposed to waters of each study stream four times for periods of about 30 days from the fall of 1988 through the spring of 1990. Fingerling trout and adult sculpin were the subjects of all toxicity tests.

A total of 14 tests were conducted in two to four streams during the four test periods—November 3-30, 1988, April 4 through May 19, 1989, October 4 through November 8, 1989, and March 9 through April 6, 1990. Test fish for most bioassays were obtained from the West Branch Neversink River and several of its tributaries. Several bioassays were designed to compare resident-fish and nonresident-fish tolerance to episodic acidification. In these tests, fish collected from the stream being studied were tested alongside the imported West Branch Neversink fish. All bioassays on each stream were conducted in the study reach adjacent to the gage house. In each test, 20 or 21 brook trout and sculpin were segregated into three to five plastic screen-sided jugs and placed in holding cages. Their condition was checked and recorded, generally on a daily basis, during the test periods.

Aquatic Macroinvertebrate Communities

Macroinvertebrate communities within each study stream were inventoried to identify effects of differing levels of acidification. Differences in community structure and (or) function would suggest that toxic conditions, either acute or chronic, had occurred during part of the year and also provide a measure of the food resource available to fish. Macroinvertebrate communities within each of the four stream reaches were sampled three times during the period of study–May 21-22, 1989, August 30 through September 8, 1989, and May 4-8, 1990. Five samples were collected within each stream with a standard Surber sampler. Water velocities and substrates were generally similar among the sampling sites. Debris and invertebrates were preserved with 80-percent ethanol. Macroinvertebrates were sorted from the sample debris until no further specimens could be located during a 2-minute scan. A time limit was specified to standardize the level of effort used to sort each sample. Ten percent of the samples were resorted by another technician for quality assurance, and if organisms were found, the sample was resorted. Specimens were usually identified to the family level; the majority were identified to the genus level. Taxa were differentiated by keys provided in Merrit and Cummins (1984), Wiggins (1977), Pennak (1978), and Edmunds and others (1976).

LABORATORY METHODS

All samples were processed at the field laboratory at Frost Valley, then placed in coolers and packed in ice and shipped to the respective laboratories. Analyses for pH, specific conductance, ANC, and anions (SO_4, NO_3, Cl) were done at the USGS laboratory in Albany, N.Y. Analysis for cations (Ca, Mg, Na, K) and DOC were done at the New York City Department of Environmental Protection (NYCDEP) laboratories in Grahamsville, N.Y., and the analysis for silica and total dissolved aluminum (Al) were done at the NYCDEP laboratory in Valhalla, N.Y. During the second year of the study, both the cation and (Si) analyses were done at the USGS laboratory in Albany, N.Y. Sample aliquots for organic monomeric and total monomeric aluminum were express-mailed after filtration to the laboratory of Dr. Brian Dempsey at Pennsylvania State University, University Park, Pa., for analysis, and analyses for oxygen-isotope ratios were done at the USGS isotope laboratory in Reston, Va.

Filtration

The protocol for filtering samples was as follows: sample aliquots to be analyzed for pH, specific conductance, ANC, and oxygen-isotope ratios were not filtered. At the beginning of the project, DOC samples were filtered through 0.45-µ silver filters; aluminum samples were filtered through 0.1-µ Nucleopore polycarbonate membrane filters; and the cations, anions, and silica samples were filtered through 0.40-µ Nucleopore polycarbonate membrane filters. The filters for DOC were exchanged for 0.4-µ Nucleopore membrane filters in January 1989 to avoid the expense of silver filters. A comparison study of the two filter types was done to detect differences in their effect on measured concentrations. Results (table 8) indicate no significant difference. In August 1989, the USEPA requested that sample aliquots to be analyzed for cations, anions, silica, DOC, and DIC be filtered through 0.45-µ Nucleopore Membra-Fil membrane filters to produce consistent filtration methods across the three regions of the

Table 9. Dissolved organic carbon concentrations obtained with 0.45-micrometer silver filter and 0.40-micrometer Nucleopore polycarbonate membrane filter, 1989.

[Locations are shown in fig. 2. Values are in milligrams per liter.]

Stream*	Date (1989)	Silver filter	Nucleopore polycarbonate membrane filter
East Branch Neversink River at Strauss Estate	Jan. 24	0.95	0.95
† East Branch Neversink River at Strauss Estate	Jan. 24	0.97	0.98
Hollow Tree Brook	Jan. 25	0.70	0.79
† Hollow Tree Brook	Jan. 25	0.68	0.75
Woodland Creek	Jan. 25	0.77	0.72
Beaverkill	Jan. 25	0.86	0.78
Rondout Creek	Jan. 28	0.97	0.71
Hollow Tree Brook	Feb. 28	1.01	1.03
East Branch Neversink River at Strauss Estate	Feb. 14	1.21	0.89
Woodland Creek	Feb. 13	0.95	1.07
Hollow Tree Brook	Feb. 14	3.22	3.19
Beaverkill	Feb. 14	2.60	2.46
† Beaverkill	Feb. 14	2.10	2.50
Hollow Tree Brook	Mar. 17	0.80	1.00
Woodland Creek	Mar. 17	0.86	1.11
East Branch Neversink River at Strauss Estate	Mar. 18	7.84	7.05
Rondout Creek	Mar. 24	0.72	0.88
† Rondout Creek	Mar. 24	0.83	0.84
Beaverkill	Apr. 27	1.39	1.44
† Beaverkill	Apr. 27	1.37	1.37
East Branch Neversink River at Strauss Estate	Apr. 28	1.53	1.53

* Streams from which these samples were taken were a part of the the Long Term Monitoring project, a concurrent USEPA-funded project.

† Duplicate sample

study. Samples for aluminum analysis were filtered through 0.22-μ Nucleopore Membra-Fil membrane filters, which consist of mixed esters of cellulose nitrate and cellulose acetate. All samples except those for cation and aluminum analysis were stored at 4°C until they were analyzed. The cation samples and dissolved-aluminum samples were preserved with concentrated nitric acid to a pH less than 2. An experiment was done in August 1989 to determine whether the increase in pore size of the filter from 0.1 μ to 0.22 μ had a significant effect on the aluminum analysis; results are presented in table 9. The filter-comparison experiments with Catskill stream waters did not indicate an introduction of bias by the change in filter type, but similar experiments on stream waters in Pennsylvania indicated that the change introduced a positive bias in aluminum concentrations (David DeWalle, Pennsylvania State University, oral commun., 1991.)

Table 10. Dissolved aluminum concentrations obtained with 0.1-micrometer Nucleopore polycarbonate membrane filter and 0.22-micrometer Nucleopore Membra-Fil membrane filter, August 2-3, 1989

[Locations are shown in fig. 2. Values are in milligrams per liter.]

Stream*	Date (1989)	Polycarbonate filter	Membra-fil filter
East Branch Neversink River	Aug. 2	0.157	0.123
Black Brook	Aug. 2	.011	0.011
Biscuit Brook	Aug. 3	0.023	0.018
High Falls Brook	Aug. 3	0.011	0.015
East Branch Neversink River	Aug. 2	0.145	0.084
Biscuit Brook	Aug. 3	0.017	0.017
High Fall sBrook	Aug. 3	0.018	0.013
*Biscuit Brook	Aug. 3	< .005	<.005
East Branch Neversink River	Aug. 2	0.122	0.095
Biscuit Brook	Aug. 3	0.021	0.020
*Biscuit Brook	Aug. 3	0.017	0.020
High Falls Brook	Aug. 3	0.014	0.014
† High Falls Brook	Aug. 3	0.017	0.014

* Duplicate sample
† Laboratory split

Quality-Control/Quality-Assurance Procedures

Laboratory QA/QC procedures were done in accordance with those outlined in Peck and others (1988, chap. 7) and were virtually uniform among the chemical constituents analyzed. High- and low-value quality-control check samples (QCCS solutions) and blanks were analyzed during each sample run to determine whether the measurement process was in statistical control. The QCCS solutions were synthetic samples provided to the three research groups by Lockheed. Concentrations of these solutions bracketed the expected concentration range of each constituent in the ERP streams. The solutions were analyzed (1) at the beginning of each sampling run, (2) after every 10th sample thereafter, and (3) after the last sample. Values of the QCCS solutions were plotted on quality-control charts with warning and control limits established by the USEPA. The data were then accepted or rejected according to criteria described in Peck and others (1988, sec. 7.5.1). The values of these QCCS solutions and their warning and control limits for every constituent except pH, conductance, and ANC that was used since August 1989 are given in table 10. Laboratory blanks are samples of deionized water that were analyzed at the end of each sampling run. Other QA/QC methods included analyzing (1) the Long Range Transport of Airborne Pollutants (LRTAP) audit samples, (2) natural and synthetic audit samples provided by Lockheed, (3) natural audit samples (precipitation/snowmelt) provided by the USGS Standard Reference Water Sample Project, and (4) laboratory splits. Audit samples have a known concentration, and laboratory splits were duplicate samples poured out of the same sample bottle. The LRTAP samples were analyzed three times a year; the natural and synthetic audits from Lockheed were analyzed monthly except in the months when LRTAP samples were being analyzed; the USGS standard reference waters were analyzed twice a year; and laboratory splits were run every 20 samples. Analytical results were tested by computing cation-anion balances and constructing temporal plots of the concentration of each constituent. Samples with cation-anion balances that exceeded 10 percent or showed anomalous concentrations in relation to temporal plots were reanalyzed.

Analytical Procedures

The following paragraphs cite the analytical method used for those constituents for which the analysis was done in strict accordance with a standard method. A detailed description of the analytical method is given for those constituents whose analysis either did not follow or deviated significantly from a standard method.

pH

pH was measured on unstirred samples in an open beaker with an Altex pH I-71 pH meter and an Orion-Ross combination electrode. Calibration standards of pH 4.00 and 7.00 provided by the USGS Water-Quality Service Unit in Ocala, Fla., were used to calibrate the meter each day. As required by the study (Peck and others, 1988), two QCCS solutions (a high-pH solution and a low-pH solution) were measured immediately after calibration, after every 10 samples, and at the end of each run. The QCCS solutions were provided by Lockheed. The low-pH QCCS solution had a target value of 4.40 and was prepared from a 0.1N sulfuric acid solution. This solution was also used as the low-QCCS solution for ANC and specific conductance. The original high-pH QCCS solution had a target value of 7.19 and was prepared from a mixture of 0.1N solutions of $NaHCO_3$ and KCl. After October 16, 1989, a new high-pH QCCS solution with a target value of 6.86 was prepared from a National Bureau of Standards phosphate buffer solution. Both of these high-pH QCCS solutions were used as the high QCCS solutions for ANC and specific conductance.

The procedure used by the USGS laboratory in Albany, N.Y. to determine pH was as follows:

1. At room temperature, calibrate the meter to pH 7.00 and adjust the slope of the pH-to-millivolt relation with pH 4.00 calibration standards, then check

Table 11. Concentrations of the high- and low-range quality-control check samples and their warning and control limits.

[All measurements were made before April. 9, 1990 except as noted. All values are in milligrams per liter, except pH, in standard units; acid-neutralizing capacity, in microequivalents per liter; and specific conductance, in microsiemens per centimeter.]

	High-Range Samples			Low-Range Samples		
Constituent	Concen-tration	Warning Limits	Control Limits	Concen-tration	Warning Limits	Control limits
Calcium	4.0	± 0.27	± 0.4	0.4	± 0.03	± 0.04
Magnesium	0.4	± 0.03	± 0.04	0.04	± 0.01	± 0.01
Potassium	2.0	± 0.134	± 0.2	0.2	± 0.01	± 0.03
Sodium	0.75	± 0.05	± 0.08	0.075	± 0.01	± 0.01
Aluminum, total	0.100	± 0.012	± 0.018	0.025	± 0.0003	± 0.005
Aluminum, total monomeric	0.500	± 0.0335	± 0.050	0.050	± 0.003	± 0.005
Chloride	3.0	± 0.201	± 0.300	0.3	± 0.020	± 0.030
Nitrate	3.0	± 0.201	± 0.300	0.3	± 0.020	± 0.030
Sulfate	8.0	± 0.536	± 0.800	0.8	± 0.054	± 0.080
Silica	8.0	± 0.536	± 0.800	0.8	± 0.054	± 0.080
Dissolved organic carbon	5	± 0.5	± 0.75	1	± 0.2	± 0.3
*pH	4.45	± 0.06	± 0.1	7.19 6.88	± 0.06 ± 0.06	± 0.1 ± 0.1
*Acid-neutralizing capacity	70.0 125.0	± 5.0 ± 12.5	± 7.5 ± 15.0	-39.9	± 5.0	± 7.5
*Specific conductance	32.4 39.0	± 2.0 ± 2.3	± 3.0 ± 3.9	17.0	± 2.0	± 3.0

* Measured after April 9, 1990

calibration with the low-pH QCCS solution. (Calibration was repeated on two aliquots of the check solution.)

2. Note pH reading of the check solution, wait 2 minutes, and press the "pH" soft key again. When the stability symbol appears on the meter, note the pH value.
3. If the difference between the first and second pH readings is 0.002 pH units or less, and the reading is within ±0.05 pH units of the target QC value, record the pH reading in the pH notebook and on the QC form.
4. If the difference between the first and second pH readings is 0.002 pH units or less, but the reading is not within ±0.05 pH units of the target value, press the "pH" soft key again. If the results are not satisfactory, pour another aliquot of low-pH QCCS solution and repeat steps 2 through 8. If the results are still not satisfactory, recalibrate the meter and try again. If the QCCS solution is still not within 0.05 pH units of the target value, remedial action should be taken with the probe, meter, calibration solutions, or QCCS solutions.
5. If the difference between the first and second pH reading is greater than 0.002 pH units, wait 2 minutes and press the "pH" soft key again. Repeat this process until the difference between subsequent pH reading is less than 0.002 pH units.
6. Repeat steps 2 through 5 for the high-pH QCCS solution.
7. Follow steps 2 through 5 (omitting step 4) for 10 samples at room temperature.
8. Measure the pH of the low- and high-pH QCCS solutions. Accept or reject data according to guidelines of Peck and others (1988, sec. 7.5.2.3).

Specific Conductance

Specific conductance was measured with an Altex model RC-20 conductivity bridge equipped with a Beckman conductivity cell and a Beckman temperature-compensation probe. Quality-assurance standards were obtained from the USGS Hydrologic Instrumentation Facility (HIF). Calibration concentrations were 10 to 20 μS/cm for the low range and 40 to 60 μS/cm for the high range. The low- and high-range QCCS solutions were provided by Lockheed (see pH section). The low-range QC target value was 17.0 μS/cm; the high-range QC target value was 32.4 μS/cm until October 25, 1989, after which a new solution with a target value of 39.0 μS/cm was used. Analysis of the QCCS solutions followed the guidelines of Peck and others (1988, sec. 7.5.2.3).

Acid-Neutralizing Capacity (ANC)

ANC was measured with a Radiometer Titralab System by titration with a commercial preparation of 0.02N H_2SO_4 (±0.0005N). A Gran plot was then produced, and the results were reported as ANC, in μeq/L (Gran, 1952).

The high- and low-ANC QCCS solutions were provided by Lockheed. The low-ANC QCCS target value was -39.90 μeq/L for the duration of the project. The high-ANC target value was 140.00 μeq/L until October 11, 1989, after which a new solution with a target value of 125.00 μeq/L was used. The procedure for measuring ANC was as follows:

1. Calibrate the pH electrode with pH 7 and pH 4 buffers as described above. Record the pH, millivolts, and temperature of the buffers in the ANC laboratory notebook.
2. Measure 40 mL of the low-ANC QCCS solution with a graduated cylinder and pour into a sample cup. Record the millivolts, temperature, and starting pH in the ANC laboratory notebook.
3. Titrate the solution. (The Radiometer system automatically titrates the sample by adding 0.1-mL increments of 0.02N H_2SO_4.) The autotitrator was programmed for a minimum delay of at least 30 seconds before adding more acid and was further programmed to make the next addition only if the pH changed by less than 0.01 pH unit in the 30 seconds. This stability criterion must be met before any addition of acid occurs.
4. Record values. The sample pH was automatically recorded after stability and (or) the minimum delay was reached with each acid addition. The addition of titrant continued until a pH of 3.5 was reached. The final pH was 3.5 or less.
5. Select values for Gran titration. A total of five pH values (points) ranging from 3.999 to 3.500 were chosen for the Gran calculation. If only four pH values were in this range, the pH value below 3.500 was chosen as the fifth point.
6. Refer to guidelines in Peck and others (1988, sec. 7.5.2.3) for acceptance or rejection of the value obtained for the low-range QCCS solution.
7. Repeat steps 2 through 6 for the high-range QCCS solution.

8. Use a 40-mL aliquot measured in a graduated cylinder for each of the 10 samples, and follow steps 4 through 10 above. Then follow steps 3 through 11 for the low- and high-ANC QCCS solutions.

Cations

Calcium, magnesium, sodium, and potassium were measured by atomic absorption spectroscopy (Perkin-Elmer model 3030) at the NYCDEP laboratory in Grahamsville, N.Y., from October 1988 through April 1989. In the last 2 months of the project, all cation analyses were done by atomic-absorption spectroscopy (Perkin Elmer model 1100B) at the USGS laboratory in Albany, N.Y. Potassium, sodium, and magnesium analysis were done with an air-acetylene flame; the calcium analyses were done with a nitrous oxide-acetylene flame in Grahamsville, N.Y. and with an air-acetylene flame in Albany, N.Y.

The operating procedure for the cation analyses was to calibrate the instrument with a blank and five multi-element standards before each sampling run. The calibration standards were prepared by diluting a 1,000-mg/L atomic-absorption standard solution. The concentrations of the standards ranged from 1.00 mg/L to 8.00 mg/L for calcium and from 0.10 mg/L to 2.00 mg/L for sodium, potassium, and magnesium. A solution of 0.5-percent concentrated nitric acid was added to make up 0.5 percent (by volume) of the blank and the standards to mimic the approximate volume of acid added to the cation samples. Aliquots of the blank, standards, and samples were poured into test tubes supplied by Perkin-Elmer to a final volume of 13 mL, to which 0.25 mL of a 5-percent solution of lanthanum as lanthanum chloride had been previously added. Lanthanum was added to suppress chemical interferences with calcium and magnesium and to suppress the ionization of sodium and potassium. Each sample aliquot was used for the analysis of all four elements. QA/QC procedures were done in accordance with those outlined in Peck and others (1988, chap. 7).

Anions

Chloride, nitrate, and sulfate were measured by ion chromatography. A Dionex 2000i system was used with an Auto-ion 100 control unit, analytical pump, autosampler, and a model 4270 integrator. The separator column used was a Dionex AS4A, with an AG4A guard column and a micromembrane suppressor. The general procedure for analyzing anions by ion chromatography follows the method outlined by the USEPA (1987, sec. 11).

Aluminum

Total dissolved aluminum was measured by graphite-furnace atomic absorption spectroscopy at the NYCDEP laboratory in Valhalla, N.Y. The analysis was based on method 3500-A1B (American Public Health Association, 1989). Organic monomeric aluminum and total monomeric aluminum analyses were done in the laboratory of Dr. Brian Dempsey at Pennsylvania State University. The method used is described in Pagano (1990).

Silica

Dissolved silica was measured colorimetrically by an ammonium molybdate method. Samples taken from October 1988 through December 1989 were run at the NYCDEP laboratory in Valhalla, N.Y. The analysis was based on method 4500-SiD (American Public Health Association, 1989).

Dissolved silica was measured at the USGS laboratory in Albany, N.Y., from January 1, 1990 to the project end in June 1990 with an automated segmented-flow method based on molybdate colorimetry. The procedure used is outlined in Fishman and Friedman (1985).Concentrations of samples run by the Valhalla and Albany laboratories are given in table 11 and indicate no bias.

Table 12.—Dissolved silica concentrations in samples run by laboratories in Valhalla and Albany, N.Y., 1990.

[Values are in milligrams per liter. Stream locations are shown in fig. 2.]

Stream	Valhalla	Albany
Biscuit Brook	2.10	2.01
Beaverkill	2.04	1.95
Black Brook	1.95	1.95
High Falls Brook	1.96	1.92
High Falls Brook	1.93	1.90
Biscuit Brook	1.89	1.85
Biscuit Brook	1.85	1.80
High Falls Brook (field blank)	0.06	0.01
Biscuit Brook	1.79	1.80

Dissolved Organic and Inorganic Carbon

DOC and DIC were measured by a Dohrmann Carbon Analyzer at the NYCDEP laboratory in Grahamsville, N.Y. The analysis was based on the method described in USEPA, 1987, (sec. 14).

Oxygen-Isotope Ratios

Oxygen-isotope analyses were done at the USGS laboratory in Reston, Va. The method used was that of Epstein and Mayeda (1953). Isotope samples taken manually were collected in a glass bottle and sealed in the field; isotope samples taken by the automated sampler were decanted from the automated sampler bottles immediately after collection.

DATA MANAGEMENT

The data-management task entailed handling a broad variety of information and data built from more than 20,800 data-entry records and stored in 64 computer data sets. QA/QC procedures included review of entered data by the data-entry technician and the data manager, and review of temporal plots of each constituent to catch entry mistakes. Data were entered into a custom-designed PC-SAS software package designed by Slagle (1988). The menu-driven system included data-entry templates, edit-mode capabilities, standardized retrieval options, and a variety of QA/QC programmed retrieval options that facilitated data verification. The package incorporated 64 coding sheets designed for compilation of information associated with the study's chemistry, biology, hydrology, and atmospheric-deposition data, as well as for data tracking, site characterization, and QA/QC.

Procedures

Management of the chemistry data began with the receipt of a field log sheet that documented where, when, and why a group of samples was collected. The sample serial number, which is the primary identifier, was written on the sheet and on each sample bottle, as were the stream-identification number and the date and time of collection. This log information was coded and entered into the data base (A01 file). The opening of this file initiated space in a second file (A02 file), where analytical results for up to 18 constituents per sample were entered. Results from the five laboratories used in the study were entered into this file directly from laboratory bench sheets.

Before entry, data were reviewed for completeness and legibility. Laboratory standards and associated analytical-blank results were coded on quality-control check-sample (QCCS) forms for entry into quality-control files. At the completion of a data-entry session (typically 15 to 45 minutes), the entry person visually examined each entry against the input document. Periodically, the data-base manager checked about 3 percent of the data.

Menu-selected retrievals were used to verify, summarize, and analyze the data. They identified data-handling errors and potential sample contamination or analytical errors. Anomalies were then segregated for further investigation.

Information from the biological activities and hydrologic measurements was compiled on coding sheets by field personnel. Those documents were collated and reviewed before entry into the data base.

Data Verification

All biology field records were checked for accuracy and completeness by the senior biologist after field activities. Unreadable or inaccurate information was corrected, and field records were entered into the data base. Frequency checks of field-data variables and graphs of logical relations were used to isolate and correct inconsistent or erroneous entries, where possible.

Many related files supported and embellished the primary files (including QA/QC files and comments files). Standard retrievals provided an output matrix of sample documentation information (A01) or analytical results (A02) by sample serial number. Retrievals could be selected by either a range of serial numbers or a range of dates collected. These reports were the primary references needed for data verification.

Programmed retrievals that summarized variables, and analyzed QA/QC properties were available for data management. Brief descriptions of the most actively used programmed retrievals are listed below. Discrepancies identified by periodic use of the retrievals were resolved through further investigation.

- Summary programs computed frequency distributions of variables and provided cross tabulations. Included were calculated maximum, minimum, mean, and standard deviation.

- Sample-holding times were monitored by a program that compared the "date collected" field with each constituent's "date analyzed" field. The program flagged constituents whose holding times exceeded project limits.
- A third program isolated analytical results of field blanks and flagged values that exceeded either warning limits or control limits for each constituent.
- Analytical results of field duplicates were compared to analyses of the original sample by a program that flagged constituent differences that exceeded project limits.
- Several programs calculated cation-anion balances. Results were flagged when ion differences exceeded 10 percent.
- Similar programs were also used to monitor the analyses of QCCS samples. Values that exceeded acceptable limits were flagged.

The cation-anion balance equation most frequently used to verify Catskill samples did not include aluminum or DOC in the computation. Samples that deviated by more than 10 percent from unity were then checked for high concentrations of aluminum or DOC. If concentrations of these constituents were high, the cation-anion balance equation was recomputed. If the sample still did not meet the balance criteria above, it was flagged for reanalysis.

REFERENCES CITED

American Public Health Association, 1989, Standard Methods for the Examination of Water and Wastewater [17th ed.]: Washington, D.C.American Public Health Association.

Beamish, R.J., and Harvey, H.H., 1972, Acidification of the La Cloche Mountain lakes, Ontario, and resulting fish mortalities: Journal of Fisheries, Research Board of Canada, v. 29, p. 1131-1143.

Bergman, H.L., Mattice, J.S., and Brown, D.J.A., 1988, Lake acidification and fisheries project - adult brook trout (*Salvelinus fontinalis*): Canadian Journal of Fisheries and Aquatic Sciences, v. 45, p. 1561-1562.

Bigelow, D.S. and Dossett, S.R., 1988, Instruction Manual NADP/NTN SITE Operation: Fort Collins, Colorado State University, 104 p.

Barchet, W.R., 1991, Episodic Response Project - Wet deposition in watersheds in three regions of the United States: Richland, Wa., Pacific Northwest Laboratories Report PNL-7876, 79 p.

Bricker, O.P. and Rice, K.C., 1989, Acidic deposition to streams: Environmental Science and Technology, v. 23, No. 4. p. 379-385

Chen, C.W., Gherini, S.A., and Goldstein, Robert, 1980, Modeling of lake acidification process: Palo Alto, Calif., Electric Power Research Institute, 58 p.

Chen, C.W., Gherini, S.A., Peters, N.E., Murdoch, P.S., Newton, R.A., and Goldstein, R.A., 1984, Hydrologic analysis of acidic and alkaline lakes: Water Resources Research, v. 20, p. 1875-1882.

Christensen, S.W., Breck, J.E., and Van Winkle, W., 1988, Predicting acidification effects on fish populations using laboratory data and field information: Environmental Toxicology and Chemistry, v. 7, p. 735-747.

Cosby, B.J., Hornberger, G.M., Galloway, J.N., and Wright, R.F., 1985, Modeling the effects of acidic deposition—Assessment of a lumped parameter model of soil water and stream water chemistry: Water Resources Research, v. 21, p. 51-63.

David, M.B., 1986, Chemistry differences in two streams entering an acidic lake in the Adirondack Mountains, New York (USA): Water, Air, and Soil Pollution, v. 29, p. 415-424.

Driscoll, C.T., and Newton, R.M., 1985, Chemical characteristics of Adirondack lakes: Environmental Science and Technology, v. 19, No. 11, p. 1018-1024.

Driscoll, C.T., Wyskowski, B.J., Cosentini, C.C., Smith, M.E., 1986, Processes regulating temporal and longitudinal variations in the chemistry of a low-order woodland stream in the Adirondack region of New York: Biogeochemistry, v. 3, p.225-241.

Edmunds, G.F., Jr., Jensen, S.L., and Berner L., 1976, The Mayflies of North and Central America: Minneapolis, University of Minnesota Press, 330 p.

Epstein, S. and Mayeda, T.K., 1953, Variation of 180 content of waters from natural sources: Geochemica Cosmochemka Acta, v. 4, p. 213-224.

Ethridge, F.G., 1977, Petrology, transport, and environment in isochronous Upper Devonian sandstone and siltstone units, New York: Journal of Sedimentary Petrology, v. 47, no. 1, p. 53-65.

Fishman, M.J. and Friedman, L.C., 1985, Methods for Determination of Inorganic Substances in Water and Fluvial Sediments: U.S. Geological Survey Open-File Report 85-495, 709 p.

Galloway, J.N., Schofield, C.L., Hendrey, G.R., Peters, N.E., and Johannes, A.H., 1980, Sources of acidity in three lakes acidified during snowmelt, *in* Drablos, D., and Tollan, A. (eds.), Ecological impact of acid precipitation - proceedings of an international conference, Sandefjord, Norway, March 11-14, 1980: Oslo, Norway, SNSF Project, p. 264-265.

Galloway, J.N., Schofield, C.L., Peters, N.E., Hendrey, G.R., Altwicker, E.R.A., 1983, Effects of atmospheric sulfur on the composition of the Adirondack lakes:

Canadian Journal of Fisheries and Aquatic Sciences, v. 40, p. 799-806.

Gran, G., 1952, Determination of the equivalence point in potentiometric titrations: International Congress of Analytical Chemistry, v. 77, p. 661-671.

Gunn, J.M., 1986, The role of episodic acidification in the extinction of Lake Charr (*Salvelinus namaycush*) populations: Guelph, Ontario, University of Guelph, unpublished Ph.D. thesis, 100 p.

Hall, R.J., and Ide, F.P., 1987, Evidence of acidification effects on stream insect communities in central Ontario between 1937 and 1985: Canadian Journal of Fisheries and Aquatic Sciences, v. 44, p. 1652-1657.

Kaufmann, P.R., and others, 1988, Chemical characteristics of streams in the mid-Atlantic and southeastern United States, v. I, population descriptions and physico-chemical relationships: U.S. Environmental Protection Agency, EPA/600/3-88/021a, 397 p.

Landers, D.H., Eilers, J.M., Brakke, D.F., Overton, and others, 1987, Characteristics of lakes in the western United States, v. I, population descriptions and physio-chemical relationships: U.S. Environmental Protection Agency, EPA-600/3-86-054a, 176 p.

Linthurst, R.A., Landers, D.H., Eilers, J.M., Brakke, D.F., and others, 1986, Characteristics of lakes in the eastern United States, v. I, population descriptions and physico-chemical relationships: U.S. Environmental Protection Agency, EPA-600/4- 86/007a, 136 p.

Lynch, D.D., and Dise, N.B., 1986, Sensitivity of stream basins in Shenandoah National Park to acidic deposition: U.S. Geological Survey Water Resources Investigations Report 85-115, 61 p.

Lynch, J.A., Hanna, C.M., and Corbett, E.S., 1986, Predicting pH, alkalinity, and total acidity in stream water during episodic events: Water Resources Research, v. 22, p. 905-912.

Merritt, R.W., and Cummins, K.W., 1984, An Introduction to the aquatic insects of North America: 2nd edition, Dubuque, Kendall/Hunt Publishing Company, 722 p.

Murdoch, P.S., Bonitz, C.E., Eakin, K.W., Ranalli, A.J., and others, 1990, Episodic acidification and associated fish and aquatic invertebrate response in four Catskill Mountain streams–an interim report of the episodic response project: U.S. Geological Survey Open-File Report 90-566, 50 p.

National Atmospheric Deposition Program, 1989, NADP/NTN annual data summary–precipitation chemistry in the United States, 1988: Fort Collins, Colo., Natural Resource Ecology Laboratory, 380 p.

_____ 1990, NADP/NTN annual data summary–precipitation chemistry in the United States, 1989: Fort Collins, Colo., Natural Resource Ecology Laboratory, 380 p.

National Oceanic and Atmospheric Administration, 1950-85. Climatological data annual summary: Asheville, N.C., National Climatic Data Center, p. 62-94.

Omernick, J.M. and Powers, C.F., 1982, Total alkalinity of surface waters–a National map. U.S. Environmental Protection Agency, Corvallis, Ore., Corvallis Environmental Research Laboratory, 1:24,000.

Ozsvath, D.L., and Coates, D.R., 1986, Woodfordian stratigraphy in the western Catskill Mountains, *in* Cadwell, D.H. (ed.), The Wisconsinan stage of the First Geological District, eastern New York: New York State Museum Bulletin 455, p. 109-120.

Pagano, T.A., 1990, Evaluation of a method to fractionate aluminum in surface waters and interpretation of the speciation of aluminum in streams during episodes of acidic runoff: University Park, Pa., Penn State University M.S. thesis, 65 p.

Parker, G.G., Hely, A.G., Keighton, W.B., Olmstead, F.H., and others, 1964, Water resources of the Delaware River basin: U.S. Geological Survey Professional Paper 381, 200 p.

Peck, D.V., Engels, J.E., Howe, K.M. and Pollard, J.E., 1988. Aquatic Effects Research Program, Episodic Response Project integrated Quality Assurance Plan. Revision 1. USEPA600/x-88/274: Las Vegas, Nev.,U.S. Environmental Protection Agency.

Pennak, R.W., 1978, Fresh-water Invertebrates of the United States [2d ed.: New York, John Wiley, 803 p.

Rantz, S.E., and others, 1982. Measurement and computation of streamflow, v. 1. measurement of stage and discharge. U.S. Geological Survey Water Supply Paper 2175, 284 p.

Rich, J.L., 1934, Glacial geology of the Catskills: New York State Museum Bulletin 299, 180 p.

Rosseland, B.O., Skogheim, O.K., and Sevaldrud, I.H., 1986, Acid deposition and effects in Nordic Europe–damage to fish populations: Water, Air, and Soil Pollution, v. 30, p. 65-74.

Schaefer, D.A., Driscoll, C.T., van Dreason, R., and Yatsko, C.P., 1990, The episodic acidification of Adirondack lakes during snowmelt: Water Resources Research, v. 26, no. 7, p. 1639-1647.

Schindler, D.W., Mills, K.H., Malley, D.F., Findlay, D.L., Shearer, and others, 1985, Long-term ecosystem stress - the effects of years of experimental acidification of a small lake: Science, v. 228, p. 1395-1401.

Schofield, C.L., and Driscoll, C.T., 1987, Fish species distribution in relation to water quality gradients in the north branch of the Moose River Basin: Biogeochemistry, v. 3, p. 63-85.

Slagle, R.L., 1988, Draft Report, ERP Entry/Verification System Users Guide, U.S. Environmental Protection Agency, Contract No. 69-03-3249, 15 p.

Swanson, R.A., 1969, The land use and natural resource inventory of New York State: New York State Office of Planning Coordination, Albany, N.Y., 20 p.

Tornes, L.A., 1979, Soil survey of Ulster County, New York: U.S. Department of Agriculture, Soil Conservation Service, 273 p.

U.S. Environmental Protection Agency, 1987, Handbook of Methods for Acid Deposition Studies: Laboratory Analyses for Surface Water Chemistry: Washington, D.C, U.S. Environmental Protection Agency, Office of Research and Development, EPA/600/4-87/026.

VanWinkle, W., Christensen, S.W., Breck, J.E., 1986. Linking laboratory and field responses of fish populations to acidification. Water, Air and Soil Pollution, v. 30, p. 639-648.

Way, J.H., 1972, A more detailed discussion of the depositional environmental analysis—middle and upper Devonian sedimentary rocks, Catskill Mountain area, New York: Troy, N.Y., Rensselaer Polytechnic Institute, unpublished Ph.D. dissertation, 145 p.

Wigington, P.J., Davies, T.D., Tranter, M., Eshleman, K., 1990, Episodic acidification of surface waters due to acidic deposition: National Acid Precipitation Assessment Program, State-of-Science/Technology Report 12, 200 p.

Wiggins, G.B., 1977, Larvae of the North American caddisfly genera (Trichoptera): Buffalo, N.Y.,University of Toronto Press, 401 p.

Zippin, C., 1958, The removal method of population estimation: Journal of Wildlife. Management, v. 22, p. 82-90.

APPENDIXES

Tables 13-15

Figres 4-5

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990.
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

[µS/cm, microsiemens per centimeter at 25 degrees celsius; mg/l, ,milligrams per liter; µg/L, micrograms per liter; dashes indicate no measurement]

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/11/88	9:45	2.8	28.4	6.43	-	-	-	-	50.0	6.63	0.77	2.66	0.08	-	33	-	-	1.67	1.05
10/18/88	11:15	1.9	27.9	6.25	2.94	0.70	0.47	0.21	55.0	6.50	0.76	2.63	0.19	-	49	-	-	1.51	1.16
10/22/88	16:00	17	27.0	6.50	2.41	0.58	0.32	0.32	40.0	6.66	0.95	2.39	0.90	-	78	-	-	3.92	1.18
10/25/88	11:00	7.2	28.6	6.22	3.06	0.68	0.36	0.24	25.0	6.85	0.72	2.25	1.12	-	68	-	-	2.44	0.71
11/1/88	10:15	3.4	27.0	6.63	2.92	0.68	0.40	0.17	50.0	6.72	0.65	2.45	1.07	-	49	-	-	1.63	0.82
11/5/88	16:25	24	26.1	6.01	2.55	0.61	0.35	0.27	1.3	5.92	0.68	2.18	0.94	-	-	-	-	4.97	0.76
11/5/88	17:24	19	25.7	6.06	2.69	0.61	0.36	0.25	25.0	6.27	0.66	2.15	0.87	-	-	-	-	4.67	0.95
11/5/88	19:29	81	25.6	6.01	2.52	0.60	0.34	0.35	20.0	5.18	0.61	2.14	0.78	-	134	-	-	5.49	0.72
11/5/88	19:46	98	25.1	5.93	2.61	0.59	0.33	0.34	15.0	5.86	0.69	2.04	1.51	-	-	-	-	5.78	0.76
11/5/88	20:01	108	25.8	5.89	2.53	0.56	0.28	0.36	25.0	5.92	0.68	1.98	0.94	-	-	-	-	6.15	0.88
11/5/88	20:15	114	25.1	5.95	-	-	-	-	25.0	5.84	0.68	1.93	1.03	-	104	-	-	6.29	0.72
11/6/88	9:20	54	27.0	5.50	2.56	0.58	0.29	0.25	0.0	6.25	0.70	1.99	2.00	-	190	-	-	4.17	0.51
11/7/88	16:30	18	25.9	6.17	2.73	0.61	0.32	0.19	15.0	6.37	0.66	2.33	1.55	-	106	-	-	2.55	0.55
11/7/88	16:35	18	25.6	6.05	2.73	0.61	0.30	0.19	12.5	6.23	0.64	2.36	1.50	-	97	-	-	2.53	0.51
11/8/88	9:15	14	26.0	5.57	2.77	0.63	0.31	0.17	65.0	6.44	0.73	2.39	1.52	-	82	-	-	2.23	0.57
11/14/88	12:23	14	27.2	5.72	2.73	0.61	0.14	0.33	15.0	6.62	0.70	2.39	1.18	-	61	-	-	2.18	0.56
11/20/88	9:00	17	25.8	6.21	2.74	0.56	0.30	0.14	30.0	6.22	0.62	2.31	1.30	-	70	-	-	2.52	0.58
11/28/88	9:45	17	25.7	6.13	6.05	0.56	0.28	0.17	27.5	6.43	0.63	2.77	1.38	-	74	-	-	2.27	0.56
12/6/88	10:50	7.7	23.8	5.98	6.31	0.62	0.31	0.17	20.0	6.43	0.61	2.58	1.45	-	46	-	-	1.43	0.61
12/12/88	15:23	6.7	31.6	6.01	3.07	0.70	0.36	0.25	20.0	7.14	0.72	3.24	1.72	-	41	-	-	1.28	0.78
12/20/88	10:22	4.0	26.8	5.67	2.93	0.59	0.40	0.15	30.0	6.60	0.66	2.29	1.72	-	29	-	-	1.07	0.81
12/27/88	10:00	4.2	28.1	5.18	1.70	0.41	0.25	0.12	30.0	6.75	0.69	2.51	2.04	-	32	-	-	1.34	0.77
1/2/89	10:35	4.0	27.7	6.04	3.15	0.67	0.37	0.26	35.0	6.59	0.72	2.34	1.84	-	28	-	-	1.10	0.76
1/10/89	9:40	3.1	28.5	5.97	2.82	0.63	0.39	0.18	37.5	6.71	0.72	2.65	2.07	-	26	-	-	1.08	0.85
1/18/89	13:42	3.1	28.2	6.01	2.54	0.55	0.35	0.21	32.5	6.69	0.69	2.46	1.88	-	22	-	-	-	-
1/30/89	12:00	2.8	29.5	6.14	2.88	0.63	0.43	0.20	42.5	6.74	0.72	2.56	2.04	-	32	-	-	1.04	0.81
2/6/89	14:12	3.0	29.1	5.88	2.70	0.59	0.43	0.18	32.5	6.93	0.73	2.45	2.32	-	37	-	-	1.26	0.74
2/21/89	11:15	16	27.9	5.89	2.82	0.66	0.40	0.25	77.5	6.15	0.67	1.88	2.82	-	41	-	-	2.24	0.82
2/22/89	14:00	29	26.7	5.77	2.47	0.49	0.30	0.22	22.5	5.85	0.64	1.70	3.29	-	75	-	-	2.17	0.48
2/28/89	14:30	5.6	29.3	6.01	3.09	0.66	0.36	0.20	40.0	6.38	0.66	2.27	2.29	-	28	-	-	1.05	0.71
3/8/89	11:20	5.7	30.7	5.90	3.33	0.68	0.38	0.21	50.0	6.80	0.72	2.41	2.45	-	-	-	-	1.02	0.78
3/14/89	9:40	1.5	29.7	6.14	3.24	0.65	0.37	0.18	50.0	6.52	0.70	2.28	2.19	-	22	-	-	1.02	0.83
3/18/89	16:00	49	27.0	5.64	2.71	0.56	0.30	0.54	17.5	5.25	0.63	1.27	2.90	-	150	-	-	5.46	0.72
3/22/89	10:20	13	27.4	5.79	2.88	0.64	0.32	0.25	30.0	6.23	0.68	2.29	2.71	-	13	-	-	1.38	0.56
3/25/89	11:55	12	25.7	5.97	2.87	0.58	0.30	0.26	22.5	5.91	0.64	1.79	2.50	-	71	-	-	-	0.60
3/29/89	10:00	77	25.4	5.37	2.17	0.43	0.21	0.42	12.5	5.32	0.62	1.32	2.86	-	164	-	-	4.80	0.60
3/29/89	10:15	76	25.2	5.51	2.45	0.48	0.23	0.49	5.0	5.31	0.59	1.24	2.89	-	141	143	55	-	0.39
3/29/89	17:00	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3/30/89	4:00	37	26.4	5.38	2.44	0.48	0.34	0.46	15.0	5.48	0.70	1.48	3.11	-	104	-	-	3.71	0.76
3/30/89	9:20	46	26.3	5.93	2.73	0.52	0.25	0.40	7.5	5.67	0.63	1.59	3.09	-	103	-	-	-	0.41
3/30/89	12:00	57	25.7	5.39	2.36	0.51	0.87	0.83	12.5	5.62	0.64	1.56	3.24	-	109	-	-	4.17	0.78
3/30/89	15:50	57	26.9	5.46	2.66	0.55	0.25	0.41	10.0	5.70	0.64	1.48	3.42	-	127	133	52	3.66	0.43
3/31/89	9:35	37	27.6	5.78	2.77	0.55	0.26	0.36	12.5	5.88	0.68	1.58	3.57	-	83	102	38	2.83	0.43
3/31/89	16:00	33	27.7	5.92	2.78	0.58	0.25	0.35	15.0	5.79	0.66	1.64	3.48	-	97	-	-	3.36	0.79
3/31/89	20:00	43	27.0	5.63	2.56	0.51	0.25	0.33	12.5	5.78	0.69	1.61	3.47	-	105	-	-	3.59	0.92

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
4/1/89	8:00	28	27.3	5.57	2.70	0.55	0.25	0.32	10.0	5.88	0.62	1.64	3.54	-	101	-	-	3.45	0.80
4/5/89	12:00	22	28.5	6.02	2.85	0.58	0.28	0.29	22.5	6.09	0.64	1.86	3.12	-	70	-	-	2.04	0.40
4/5/89	12:30	22	27.8	5.54	3.06	0.62	0.31	0.30	27.5	6.18	0.65	1.82	2.86	-	52	-	-	1.96	0.59
4/6/89	2:09	43	27.6	5.51	2.79	0.57	0.32	0.34	32.5	6.07	0.73	1.77	3.21	-	89	-	-	2.51	-
4/6/89	8:30	35	29.2	6.06	2.96	0.58	0.29	0.31	30.0	6.10	0.66	1.74	3.48	-	99	-	-	2.51	0.47
4/13/89	13:10	9.0	27.5	5.84	2.84	0.63	0.34	0.24	22.5	6.48	-	1.86	2.48	-	49	-	-	1.47	0.49
4/17/89	13:40	13	27.8	5.70	2.82	0.64	0.32	0.24	18.5	6.35	0.66	1.73	2.87	-	56	40	-	1.75	0.45
4/18/89	15:05	13	27.1	6.44	2.79	0.64	0.32	0.26	21.0	-	-	1.73	.	-	55	-	-	1.68	0.39
4/27/89	9:10	6.5	26.7	6.28	3.04	0.65	0.36	0.23	28.0	6.53	0.68	1.83	2.07	-	72	-	-	1.33	0.64
4/30/89	8:40	6.9	27.9	6.36	2.88	0.66	0.36	0.24	27.5	6.65	0.67	-	2.09	-	74	-	-	1.47	0.60
5/1/89	17:30	7.2	27.3	6.32	2.22	0.50	0.30	0.19	28.5	6.65	0.66	1.69	1.86	-	29	25	19	1.54	0.61
5/2/89	0:45	35	26.8	5.93	2.84	0.59	0.36	0.28	25.5	6.25	0.64	1.69	2.30	-	82	60	46	3.72	-
5/2/89	3:42	48	28.8	5.78	3.12	0.63	0.35	0.30	17.0	6.22	0.65	1.84	3.41	-	116	82	50	4.28	-
5/2/89	7:55	59	28.8	5.64	3.06	0.62	0.35	0.32	16.5	5.90	0.67	1.80	3.92	-	206	112	53	3.70	-
5/2/89	8:00	59	29.4	5.85	2.92	0.66	0.33	0.30	16.9	5.92	0.65	1.84	3.70	-	100	94		3.36	0.46
5/2/89	9:31	89	28.9	5.62	3.04	0.59	0.32	0.33	16.5	5.83	0.66	1.77	4.03	-	207	109	57	3.79	-
5/2/89	10:07	100	29.4	5.54	2.98	0.59	0.33	0.35	12.5	5.83	0.68	1.79	4.24	-	166	126	62	4.22	-
5/2/89	11:42	104	30.6	5.43	2.86	0.61	0.33	0.37	10.5	5.87	0.65	1.82	4.79	-	211	149	70	4.69	-
5/2/89	13:15	89	31.4	5.44	2.89	0.67	0.32	0.39	8.5	5.83	0.66	2.05	4.81	-	188	166	-	4.00	0.37
5/2/89	13:36	86	31.3	5.16	2.86	0.63	0.31	0.38	9.9	5.82	0.71	2.00	4.81	-	196	160	67	3.98	-
5/2/89	15:25	75	-	-	-	-	-	-	-	-	-	-	.	-	-	-	-	-	-
5/2/89	16:59	63	31.2	5.16	2.91	0.66	0.32	0.37	8.7	5.91	0.67	.	4.86	-	-	-	-	3.51	-
5/2/89	17:00	63	31.3	5.43	2.94	0.67	0.32	0.36	8.0	5.82	0.74	2.06	4.78	-	180	140	-	3.52	0.38
5/2/89	18:59	56	31.3	5.24	2.88	0.64	0.31	0.34	7.5	5.90	0.67	2.06	4.78	-	176	140	48	3.08	-
5/3/89	6:59	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/3/89	8:59	26	29.4	5.42	2.82	0.63	0.36	0.28	11.2	6.03	0.69	2.11	4.16	-	101	82	35	2.60	-
5/5/89	17:00	21	29.0	5.49	2.80	0.61	0.34	0.32	26.5	6.12	0.69	1.82	2.79	-	83	-	-	2.43	-
5/5/89	20:00	46	26.6	5.60	2.66	0.59	0.30	0.28	15.0	5.86	0.62	1.76	2.72	-	96	-	-	3.18	-
5/5/89	23:00	69	26.5	5.38	2.60	0.58	0.30	0.30	12.0	5.66	0.58	1.72	2.91	-	139	117	67	3.54	-
5/6/89	2:00	171	27.5	5.18	2.60	0.55	0.26	0.45	9.0	5.19	0.56	1.56	3.53	-	195	180	95	4.66	-
5/6/89	5:00	239	27.1	5.07	2.54	0.55	0.28	0.55	9.0	5.13	0.54	1.49	3.88	-	234	211	-	4.72	-
5/6/89	8:00	248	29.9	4.97	2.31	0.51	0.26	0.51	1.5	5.18	0.54	1.49	4.20	-	264	283	96	4.64	.
5/6/89	9:06	192	29.1	5.02	2.31	0.50	0.25	0.46	-2.5	5.30	0.55	1.51	4.34	-	266	-	-	3.83	0.30
5/6/89	11:00	143	30.1	5.02	2.47	0.54	0.26	0.47	0.5	5.39	0.52	1.56	4.19	-	233	-	-	4.29	-
5/6/89	14:00	108	30.0	5.02	2.46	0.57	0.28	0.40	-1.5	5.53	0.55	1.66	4.22	-	203	205	67	3.95	-
5/6/89	19:00	76	29.2	5.09	2.54	0.57	0.27	0.35	2.5	5.64	0.56	1.77	4.09	-	184	-	-	3.59	-
5/6/89	23:00	69	29.5	5.12	2.51	0.57	0.27	0.36	3.5	5.73	0.58	1.79	4.11	-	168	-	-	3.33	-
5/7/89	1:00	78	29.6	5.18	2.65	0.59	0.28	0.35	2.5	5.76	0.59	1.72	4.06	-	174	145	49	3.73	-
5/7/89	9:00	57	28.6	5.22	2.50	0.59	0.30	0.33	5.0	5.78	0.58	1.85	3.81	-	158	147	50	3.21	-
5/7/89	15:00	49	27.9	5.67	2.67	0.58	0.30	0.33	5.5	5.84	0.65	1.81	3.71	-	146	-	-	2.22	0.36
5/8/89	15:00	31	26.6	5.42	2.79	0.61	0.30	0.29	10.5	6.03	0.63	1.85	3.36	-	132	-	-	1.91	0.33
5/10/89	20:00	58	25.8	5.52	2.41	0.53	0.27	0.27	13.0	5.80	0.62	1.76	2.53	-	104	-	-	2.97	.
5/10/89	22:00	62	24.9	5.24	2.33	0.54	0.27	0.27	10.5	5.74	0.59	1.74	2.58	-	137	116	53	3.73	-
5/11/89	4:00	108	25.9	5.18	2.29	0.51	0.28	0.32	8.0	5.55	0.54	1.58	2.73	-	203	363	120	4.15	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
5/11/89	6:00	108	26.3	5.26	2.25	0.49	0.26	0.31	4.0	5.58	0.54	1.64	2.81	-	136	-	-	3.78	-
5/11/89	10:00	89	25.9	5.19	2.33	0.50	0.27	0.31	4.5	5.66	0.55	1.58	2.85	-	197	151	71	4.06	-
5/11/89	13:40	75	1.1	5.78	2.57	0.52	0.28	0.24	14.0	6.06	0.64	.	2.78	-	76	-	-	2.39	0.40
5/11/89	14:40	71	26.5	5.00	2.41	0.53	0.30	0.31	4.0	5.80	0.55	1.67	2.91	-	182	-	-	2.93	0.31
5/11/89	20:00	57	26.8	5.87	2.29	0.52	0.26	0.27	8.5	5.91	0.52	1.77	2.87	-	112	-	-	3.30	-
5/12/89	10:45	42	26.3	5.54	2.43	0.55	0.28	0.28	7.5	5.98	0.63	1.79	2.88	-	92	-	-	2.61	0.34
5/14/89	9:28	22	26.3	5.92	2.49	0.57	0.30	0.26	8.0	6.19	0.61	1.57	2.60	-	75	-	-	0.37	-
5/15/89	11:45	19	25.8	5.84	2.63	0.61	0.32	0.27	10.5	6.26	0.63	1.65	2.46	-	63	-	-	0.34	-
5/16/89	16:37	58	23.9	5.34	2.44	0.58	0.29	0.28	14.0	5.68	0.61	1.81	2.00	-	110	-	-	0.48	-
5/16/89	16:39	59	24.1	6.24	2.38	0.52	0.29	0.28	18.5	5.67	0.61	1.51	1.91	-	72	-	-	3.36	-
5/16/89	20:39	191	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/16/89	20:39	191	23.2	5.60	2.16	0.49	0.24	0.34	21.0	4.69	0.50	1.42	1.95	-	238	190	91	5.40	-
5/17/89	0:39	298	24.0	5.01	2.11	0.38	0.19	0.30	4.0	4.99	0.47	1.32	2.34	-	208	-	-	4.74	-
5/17/89	4:39	134	25.2	5.21	2.05	0.46	0.23	0.37	2.5	5.35	0.51	1.43	2.58	-	166	271	89	4.88	-
5/17/89	8:39	94	25.2	5.35	2.16	0.48	0.24	0.34	3.0	5.14	0.47	1.58	2.28	-	171	-	-	4.32	-
5/17/89	12:39	74	25.7	5.24	1.96	0.47	0.23	0.30	2.5	5.65	0.52	1.64	2.47	-	135	-	-	4.44	-
5/17/89	15:10	65	25.1	5.34	2.28	0.55	0.25	0.33	2.5	5.65	0.52	-	2.45	-	149	-	-	0.43	-
5/27/89	17:05	10	25.1	5.94	2.50	0.57	0.30	0.27	20.5	6.44	0.61	1.99	1.57	-	45	-	-	2.04	-
6/1/89	16:55	6.5	25.3	5.96	2.26	0.53	0.31	0.25	26.5	6.44	0.61	2.25	1.42	-	44	-	-	1.81	0.50
6/6/89	15:05	12	24.5	6.41	2.35	0.50	0.28	0.23	28.0	6.34	0.55	2.13	1.41	-	55	-	-	2.40	0.57
6/9/89	16:35	5.9	25.2	6.25	2.65	0.58	0.34	0.26	29.0	6.49	0.59	2.24	1.42	-	40	-	-	1.71	0.53
6/10/89	2:00	10	25.1	5.80	2.61	0.54	0.32	0.27	31.0	6.15	0.55	2.18	1.37	-	56	-	-	3.44	-
6/10/89	9:02	8.4	25.0	5.98	2.59	0.61	0.32	0.23	26.5	6.24	0.55	2.00	1.26	-	42	-	-	1.98	0.56
6/15/89	21:00	18	24.5	5.91	2.49	0.54	0.28	0.24	39.5	6.32	0.47	1.97	1.33	-	61	-	-	2.56	0.55
6/16/89	3:05	30	24.6	5.86	2.15	0.44	0.31	0.22	21.0	6.08	0.45	1.94	1.24	-	66	-	-	3.84	-
6/16/89	6:05	25	24.2	5.87	2.42	0.53	0.28	0.22	21.0	6.27	0.45	2.06	1.29	-	101	-	-	3.79	-
6/16/89	14:05	21	24.1	5.71	2.46	0.52	0.27	0.20	19.0	6.29	0.46	1.97	1.29	-	94	-	-	2.88	0.43
6/23/89	14:45	16	24.3	6.11	2.38	0.52	0.29	0.20	33.0	6.14	0.54	2.21	1.32	-	54	-	-	2.11	0.60
7/1/89	12:20	5.3	25.4	6.36	2.52	0.57	0.32	0.18	29.0	6.50	0.58	2.45	1.18	-	-	-	-	1.52	0.55
7/5/89	10:15	24	25.0	6.30	2.65	0.57	0.34	0.23	33.0	5.34	0.49	-	1.33	-	41	-	-	2.83	0.68
7/13/89	12:30	3.1	26.0	6.08	2.66	0.58	0.37	0.20	34.5	6.45	0.61	-	1.35	-	25	-	-	1.70	0.60
7/20/89	11:40	3.3	26.4	6.40	2.70	0.60	0.38	0.21	26.6	6.35	0.63	-	1.36	-	19	-	-	1.65	0.79
7/20/89	14:03	4.7	25.6	6.33	2.56	0.55	0.38	0.20	29.8	6.26	0.62	-	1.33	-	15	-	-	2.82	-
7/20/89	16:03	6.4	25.3	6.21	2.71	0.57	0.36	0.22	29.8	6.20	0.60	-	1.35	-	17	-	-	2.71	-
7/20/89	18:03	7.1	25.8	6.22	2.70	0.58	0.38	0.20	32.8	6.34	0.63	-	1.47	-	18	-	-	2.89	-
7/20/89	20:03	6.9	26.0	6.22	2.75	0.59	0.38	0.20	29.7	6.26	0.61	-	1.41	-	18	-	-	2.72	-
7/20/89	22:03	5.2	26.2	6.16	2.85	0.60	0.38	0.22	30.5	6.29	0.61	-	1.44	-	15	-	-	2.93	-
7/21/89	9:30	3.4	26.2	6.28	2.84	0.60	0.38	0.18	24.4	6.37	0.60	-	1.53	-	16	-	-	1.58	0.65
7/27/89	15:35	1.9	26.3	6.26	2.72	0.61	0.41	0.21	35.8	6.52	0.66	-	1.57	-	19	-	-	1.38	0.64
8/2/89	15:30	1.5	21.9	4.95	1.24	0.54	0.36	0.20	2.8	5.93	0.54	2.45	0.78	-	122	-	-	2.28	-
8/3/89	11:05	1.9	26.0	6.10	2.75	0.62	0.42	0.19	29.8	6.50	0.69	2.69	1.55	-	23	-	-	1.36	0.64
8/3/89	11:15	1.9	26.4	6.31	2.71	0.61	0.42	0.21	37.9	6.45	0.68	2.66	1.52	-	17	-	-	1.37	-
8/8/89	15:40	1.2	26.6	6.38	2.73	0.61	0.43	0.20	29.2	6.48	0.66	2.80	1.77	-	21	-	-	1.53	-
8/8/89	15:41	1.2	26.7	6.31	2.69	0.62	0.42	0.20	31.9	6.48	0.67	2.79	1.74	-	22	-	-	1.57	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
8/16/89	11:20	1.6	26.0	6.50	2.69	0.60	0.39	0.20	31.6	6.17	0.58	2.71	1.54	-	26	-	-	1.71	0.62
8/22/89	14:35	1.2	26.8	6.48	2.53	0.59	0.39	0.19	29.0	6.29	0.67	2.76	1.64	-	19	-	-	1.29	0.63
8/29/89	19:58	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8/29/89	20:58	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8/30/89	3:58	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/14/89	13:00	2.9	27.2	6.40	2.63	0.62	0.48	0.36	36.7	5.99	0.74	2.47	1.69	-	22	-	-	1.94	0.72
9/14/89	13:25	3.1	27.1	6.36	2.69	0.64	0.48	0.36	32.6	5.82	0.72	2.48	1.61	-	21	-	-	4.20	-
9/14/89	14:07	4.0	27.3	6.24	2.66	0.63	0.43	0.37	29.7	5.78	0.72	2.52	1.65	-	28	-	-	3.04	-
9/14/89	19:12	3.0	29.0	6.15	2.79	0.66	0.48	0.26	26.8	5.73	0.74	2.78	1.98	-	24	-	-	2.77	-
9/16/89	15:40	1.2	26.3	6.34	2.63	0.60	0.49	0.33	29.8	5.94	0.74	2.50	1.56	-	39	-	-	2.39	-
9/16/89	17:30	2.8	27.6	6.36	2.68	0.62	0.52	0.27	44.7	5.97	0.74	2.57	1.60	-	41	-	-	2.51	-
9/16/89	17:55	3.6	26.0	6.35	2.68	0.60	0.48	0.27	37.7	5.90	0.72	2.55	1.62	-	47	-	-	2.48	-
9/16/89	21:09	3.4	26.4	6.32	2.86	0.66	0.50	0.26	37.0	6.23	0.76	2.86	1.81	-	42	-	-	2.72	-
9/17/89	6:06	4.7	27.5	6.32	2.89	0.65	0.50	0.23	44.8	6.11	0.74	2.58	1.80	-	36	-	-	2.69	-
9/17/89	10:10	3.6	28.1	6.34	2.90	0.65	0.51	0.23	53.2	6.09	0.73	2.71	1.71	-	33	-	-	2.58	-
9/19/89	16:02	1.9	25.5	6.39	2.52	0.60	0.43	0.23	39.4	5.99	0.68	2.94	1.40	-	23	33	18	1.85	-
9/19/89	16:35	2.0	25.6	6.41	2.80	0.62	0.69	0.25	32.9	6.01	0.69	2.55	1.40	-	247	187	17	1.77	0.71
9/19/89	18:35	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	19:36	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	20:38	6.2	24.9	6.30	2.34	0.58	0.39	0.29	30.0	5.45	0.63	2.87	1.33	-	34	34	-	2.58	-
9/19/89	20:48	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	21:21	9.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	22:02	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	22:12	15	25.2	6.27	2.50	0.59	0.38	0.31	33.7	5.34	0.62	2.93	1.63	-	50	44	42	3.35	-
9/20/89	9:01	107	24.7	5.17	2.66	0.49	0.39	0.33	-1.7	4.75	0.35	1.98	2.30	-	283	15	.	6.98	0.41
9/20/89	11:20	126	24.6	5.22	2.40	0.44	0.32	0.33	6.0	5.34	0.45	2.28	2.31	-	332	-	-	7.51	-
9/20/89	17:25	64	24.5	5.24	2.86	0.48	0.79	0.29	2.2	5.41	0.39	2.01	2.04	-	257	167	114	6.06	0.48
9/21/89	11:42	18	23.7	5.58	2.88	0.53	0.87	0.24	26.4	5.87	0.40	2.23	1.41	-	392	78	62	4.18	0.43
9/22/89	11:00	9.2	23.4	5.87	2.32	0.54	0.32	0.22	17.6	6.10	0.42	2.28	1.22	-	65	43	39	3.43	0.49
9/22/89	16:00	11	23.8	5.93	2.40	0.53	0.39	0.27	18.4	6.01	0.51	2.26	1.17	-	66	38	36	3.39	0.58
9/22/89	21:50	75	23.1	5.53	2.31	0.49	0.29	0.29	12.7	5.41	0.58	1.96	1.09	-	171	157	128	5.77	0.47
9/22/89	23:30	75	23.4	5.58	2.32	0.49	0.28	0.26	10.5	5.56	0.56	1.97	1.09	-	177	165	126	6.13	0.38
9/23/89	4:20	53	23.4	5.48	2.34	0.48	0.35	0.24	3.7	5.82	0.66	2.05	1.01	-	149	124	101	4.79	0.45
9/23/89	8:30	44	23.2	5.42	2.24	0.48	0.36	0.22	12.1	5.89	0.54	2.08	0.97	-	129	100	79	4.53	0.41
9/23/89	14:50	36	23.2	5.43	2.32	0.48	0.31	0.21	16.8	5.96	0.52	2.12	0.92	-	121	103	75	4.59	0.33
9/24/89	11:20	18	23.6	5.97	2.65	0.52	0.51	0.20	11.2	6.18	0.54	1.99	0.97	-	183	-	-	3.41	0.45
9/26/89	9:10	20	24.1	6.16	2.66	0.56	0.51	0.25	21.7	5.99	0.57	1.97	1.10	-	430	-	-	2.89	-
10/2/89	9:20	9.1	25.7	6.28	2.52	0.58	0.35	0.30	35.8	6.32	0.65	2.65	1.08	-	45	-	-	2.12	-
10/2/89	13:29	19	25.1	6.12	2.49	0.56	0.34	0.30	40.6	6.06	0.66	2.58	1.00	-	59	-	-	3.12	-
10/2/89	16:00	17	25.0	6.09	2.43	0.57	0.33	0.26	34.3	6.17	0.67	2.64	0.99	-	76	-	-	3.04	-
10/12/89	13:50	5.8	25.5	6.32	2.55	0.58	0.40	0.23	33.4	6.50	0.69	2.33	0.70	-	51	-	-	1.92	0.68
10/15/89	2:24	9.6	26.7	6.09	2.60	0.61	0.37	0.49	26.2	6.35	0.63	2.04	1.24	-	37	-	-	3.00	-
10/15/89	3:46	16	28.0	6.14	2.76	0.65	0.37	0.60	39.5	6.39	0.73	2.09	1.44	-	51	-	-	4.03	-
10/15/89	11:40	9.7	27.8	6.00	2.86	0.64	0.34	0.33	33.4	6.59	0.80	2.21	1.41	-	54	-	-	2.80	0.66

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/17/89	10:05	8.2	26.5	6.21	2.78	0.65	0.36	0.34	40.9	6.36	0.69	2.12	0.75	-	37	-	-	2.56	0.88
10/17/89	12:03	11	25.9	6.02	2.72	0.59	0.36	0.36	52.6	6.35	0.70	2.38	0.69	-	40	-	-	2.60	-
10/17/89	15:50	20	26.9	6.26	2.76	0.63	0.36	0.44	35.8	6.34	0.75	2.09	0.85	-	61	-	-	3.14	0.77
10/17/89	16:30	20	26.8	6.12	2.76	0.60	0.36	0.44	40.6	6.41	0.76	2.43	0.82	-	49	-	-	3.30	-
10/17/89	22:10	14	26.9	6.07	2.82	0.63	0.41	0.43	43.2	6.49	0.77	2.43	1.00	-	74	-	-	3.59	-
10/18/89	9:50	11	26.7	6.26	2.79	0.62	0.35	0.30	18.0	6.46	0.75	2.10	1.06	-	57	-	-	2.95	0.61
10/20/89	9:24	50	25.6	5.72	2.63	0.58	0.31	0.45	26.3	5.91	0.70	2.33	1.59	-	77	-	-	3.50	-
10/20/89	11:30	83	25.8	5.14	2.55	0.54	0.30	0.52	23.4	5.73	0.72	1.71	1.83	-	159	105	91	4.65	0.49
10/20/89	12:37	116	26.3	5.38	2.39	0.54	0.27	0.61	23.1	5.51	0.68	2.23	2.00	-	127	139	84	5.22	-
10/20/89	14:12	206	26.9	5.27	2.99	0.44	0.23	0.59	19.5	5.36	0.62	2.12	3.18	-	140	161	141	5.48	-
10/20/89	18:33	189	28.8	5.04	2.35	0.51	0.26	0.62	6.8	5.24	0.65	2.10	3.28	-	200	-	-	6.20	-
10/21/89	11:42	47	26.8	5.64	2.50	0.55	0.28	0.34	7.1	5.65	0.63	1.97	2.60	-	108	-	-	3.83	0.33
10/31/89	12:40	7.3	25.8	6.33	2.68	0.58	0.34	0.25	25.9	6.45	0.65	2.52	1.41	-	31	-	-	1.92	0.49
10/31/89	15:06	9.3	25.3	6.22	2.60	0.56	0.32	0.28	32.0	6.15	0.65	2.52	1.38	-	32	-	-	2.30	-
10/31/89	15:55	12	25.2	6.16	2.62	0.56	0.32	0.28	30.9	6.16	0.67	2.51	1.36	-	36	35	28	2.65	-
10/31/89	16:41	15	25.6	6.10	2.63	0.58	0.32	0.29	27.5	6.06	0.65	2.52	1.47	-	38	-	-	2.70	-
10/31/89	22:53	19	25.9	6.02	2.68	0.58	0.31	0.27	32.2	6.01	0.67	2.52	1.55	-	54	58	40	3.27	-
11/1/89	11:10	15	25.8	6.06	2.58	0.60	0.33	0.24	26.1	6.24	0.69	2.44	1.62	-	60	63	-	2.57	0.43
11/2/89	13:00	10	25.8	6.34	2.66	0.58	0.31	0.22	28.8	6.39	0.66	2.47	1.53	-	41	-	-	2.07	0.55
11/3/89	11:00	9.5	25.5	5.68	2.70	0.58	0.33	0.22	-	6.44	0.66	2.77	1.63	-	29	-	-	1.93	0.48
11/4/89	17:30	8.7	25.7	6.15	2.74	0.62	0.33	0.21	27.4	6.35	0.65	2.45	1.53	-	33	-	-	3.05	-
11/9/89	8:40	8.4	26.6	5.84	2.74	0.62	0.33	0.22	26.3	6.56	0.63	2.51	1.72	-	28	-	-	1.64	0.62
11/9/89	10:43	11	25.8	5.96	2.64	0.60	0.35	0.25	30.4	6.19	0.62	2.45	1.36	-	25	-	-	4.76	-
11/9/89	11:48	12	-	5.95	2.62	0.60	0.33	0.26	28.5	6.31	0.61	2.41	1.59	-	27	-	-	4.07	-
11/9/89	12:39	15	25.9	5.34	2.65	0.59	0.33	0.26	23.6	6.28	0.62	2.41	1.54	-	27	-	-	3.57	-
11/9/89	13:34	19	26.3	5.44	2.70	0.58	0.32	0.26	25.9	6.37	0.63	2.37	1.70	-	36	-	-	2.64	-
11/9/89	20:42	15	26.7	5.47	2.77	0.59	0.32	0.25	25.5	6.39	0.64	2.41	1.92	-	41	-	-	3.09	-
11/16/89	9:25	15	26.6	6.12	2.71	0.60	0.35	0.28	19.5	6.36	0.69	2.29	1.99	-	52	-	-	2.18	0.55
11/16/89	10:00	18	26.0	6.06	2.72	0.60	0.36	0.29	27.6	6.11	0.67	2.32	1.91	-	89	-	-	2.48	-
11/16/89	10:28	22	26.3	5.91	2.58	0.59	0.33	0.28	21.0	6.13	0.67	2.28	1.96	-	32	38	41	3.06	-
11/16/89	11:25	34	26.0	6.03	2.78	0.59	0.34	0.32	22.1	5.99	0.67	2.30	2.04	-	101	-	-	2.76	-
11/16/89	11:47	41	26.5	5.85	2.64	0.60	0.34	0.32	18.8	6.00	0.68	2.26	2.15	-	55	70	-	3.66	-
11/16/89	12:30	54	26.2	5.75	2.58	0.58	0.33	0.34	15.8	5.83	0.69	2.19	2.29	-	72	-	-	4.10	-
11/16/89	13:05	66	27.0	5.79	2.78	0.59	0.32	0.41	18.2	5.71	0.69	2.24	2.61	-	204	-	-	3.37	-
11/16/89	13:35	74	27.6	5.58	2.73	0.61	0.33	0.40	14.2	5.70	0.71	2.25	2.87	-	121	-	-	5.36	-
11/16/89	15:30	67	28.9	5.52	2.81	0.60	0.31	0.38	8.4	5.77	0.72	2.28	3.71	-	206	166	-	4.77	0.35
11/16/89	15:33	67	29.0	5.44	2.68	0.59	0.33	0.36	13.6	5.44	0.68	2.32	2.96	-	142	-	-	7.44	-
11/16/89	19:27	47	29.4	5.38	2.80	0.63	0.32	0.32	7.8	5.10	0.62	2.30	3.48	-	134	-	-	4.37	-
11/16/89	21:27	41	29.3	5.52	2.97	0.63	0.31	0.31	6.1	5.81	0.69	2.43	4.07	-	224	-	-	3.50	-
11/17/89	1:27	33	29.4	5.36	2.84	0.63	0.31	0.27	8.7	5.88	0.69	2.34	3.95	-	104	-	-	3.59	-
11/17/89	11:25	23	28.1	5.62	2.74	0.60	0.31	0.25	10.8	6.10	0.70	2.42	3.58	-	99	91	57	2.53	0.42
11/28/89	5:40	13	26.1	5.75	2.57	0.57	0.35	0.23	18.5	6.08	0.59	-	2.17	-	86	-	-	3.53	-
11/28/89	6:40	16	26.9	5.94	2.70	0.61	0.35	0.22	18.9	6.22	0.61	-	2.39	-	105	-	-	2.24	-
11/28/89	9:45	18	27.4	6.16	2.85	0.61	0.38	0.23	18.2	6.25	0.64	2.24	2.51	-	49	49	-	1.98	0.65

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (μS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (μeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (μg/L as Al)	Alum-inum, total mono-meric (μg/L as Al)	Alum-inum, organic mono-meric (μg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
11/28/89	14:05	18	27.1	6.12	2.86	0.63	0.32	0.21	17.2	6.25	0.61	2.30	2.62	-	75	-	-	1.92	-
11/29/89	3:45	12	27.6	5.84	2.69	0.60	0.40	0.22	19.2	6.22	0.62	2.37	2.75	-	207	-	-	3.01	-
11/29/89	9:25	11	27.6	6.09	2.88	0.62	0.32	0.19	20.4	6.28	0.70	2.37	2.82	-	69	-	-	1.72	-
12/14/89	9:15	3.4	29.2	6.29	2.86	0.65	0.40	0.20	30.7	6.65	0.68	2.54	2.47	-	24	-	-	1.20	1.02
12/19/89	12:30	3.1	28.0	6.18	2.94	0.67	0.40	0.20	30.4	6.43	0.67	2.41	2.45	-	46	-	-	1.24	0.90
12/28/89	12:25	2.4	28.7	6.32	2.94	0.68	0.42	0.20	30.0	6.42	0.67	2.54	2.56	-	21	-	-	1.30	0.80
12/31/89	12:45	3.7	29.6	6.21	3.05	0.69	0.42	0.26	26.4	6.62	0.72	2.52	3.08	-	21	-	-	1.21	0.84
12/31/89	17:05	19	30.5	6.07	3.08	0.70	0.39	0.33	23.7	6.56	0.70	2.27	3.76	-	30	-	-	1.08	0.86
1/1/90	9:20	22	30.0	6.02	3.06	0.70	0.37	0.24	21.5	6.23	0.64	2.21	4.29	-		-	-	1.25	0.69
1/2/90	12:26	3.8	29.4	6.00	3.05	0.71	0.39	0.20	22.7	6.25	0.66	2.54	3.80	-	28	-	-	1.29	-
1/11/90	13:50	2.8	28.4	6.23	2.99	0.70	0.42	0.21	24.0	6.45	0.68	2.45	2.97	-	22	-	-	1.05	0.78
1/17/90	13:00	3.8	28.9	6.28	3.02	0.64	0.40	0.18	27.3	6.32	-	2.40	2.92	-	22	-	-	1.17	0.66
1/18/90	8:55	12	29.1	6.19	3.09	0.67	0.39	0.19	24.5	6.04	0.63	2.26	3.67	-	32	-	-	1.40	0.63
1/18/90	15:45	34	31.1	5.99	3.20	0.68	0.37	0.24	17.5	5.59	0.60	2.17	5.42	-	62	-	-	1.88	0.56
1/19/90	13:15	12	34.0	-	3.54	0.76	0.39	0.22	12.5	5.80	0.62	2.32	6.77	-	56	-	-	1.65	0.52
1/25/90	10:40	5.1	30.0	6.14	3.10	0.69	0.38	0.20	25.0	6.15	0.64	1.00	4.01	-	26	-	-	1.47	0.76
1/25/90	15:45	8.9	30.0	6.16	3.14	0.72	0.38	0.22	21.3	6.23	0.62	1.94	4.05	-	26	-	-	1.54	0.70
1/25/90	17:00	10	29.8	6.00	3.05	0.68	0.36	0.22	23.6	6.22	0.62	2.24	4.20	-	59	-	-	-	-
1/25/90	18:59	14	30.7	5.90	3.06	0.70	0.39	0.23	22.3	6.14	0.59	2.10	4.43	-	31	-	-	2.32	-
1/25/90	21:59	39	29.6	5.81	2.96	0.67	0.34	0.26	16.2	5.55	0.53	1.83	4.36	-	42	37	-	2.43	-
1/26/90	0:59	90	30.6	5.62	2.99	0.67	0.33	0.31	11.1	5.17	0.51	1.67	5.76	-	93	92	51	3.19	-
1/26/90	3:59	136	33.1	5.23	2.96	0.63	0.33	0.41	5.0	4.87	0.47	1.55	6.66	-	127	175	75	3.65	-
1/26/90	8:55	99	34.8	5.09	3.04	0.67	0.29	0.38	0.0	5.18	0.47	1.74	6.94	-	240	-	-	-	-
1/26/90	9:59	90	35.2	5.06	3.02	0.68	0.37	0.37	0.8	4.99	0.48	1.67	7.09	-	146	191	62	3.62	-
1/26/90	11:21	81	35.4	5.11	3.06	0.69	0.32	0.35	0.0	5.23	0.47	1.73	6.94	-	188	-	-	3.14	-
1/26/90	11:25	80	35.0	5.11	3.13	0.71	0.30	0.35	0.3	5.22	0.48	1.67	7.99	-	169	-	-	3.00	0.48
1/27/90	9:27	24	33.0	5.44	3.17	0.72	0.37	0.26	4.9	5.38	0.54	1.92	6.59	-	95	88	-	2.57	0.67
1/30/90	10:25	41	29.8	5.43	2.81	0.64	0.32	0.23	5.6	5.22	0.48	1.82	5.96	-	115	-	-	2.13	0.44
2/2/90	16:35	23	29.3	5.95	2.86	0.63	0.32	0.23	12.1	5.77	0.52	1.98	4.86	-	-	-	-	1.58	0.54
2/10/90	9:36	62	29.3	5.67	2.74	0.64	0.32	0.25	9.6	5.59	0.49	1.93	5.14	-	2	-	-	2.42	0.43
2/11/90	9:35	20	30.4	5.71	2.94	0.70	0.36	0.23	5.5	5.70	0.55	2.10	5.36	-	80	-	-	1.71	0.46
2/16/90	11:05	27	29.2	5.79	3.05	0.68	0.35	0.23	11.2	5.77	0.59	1.89	4.68	-	89	-	-	1.59	0.39
2/16/90	17:30	39	29.0	5.67	2.88	0.63	0.35	0.24	10.6	5.59	0.56	1.85	4.77	-	116	-	-	1.76	0.41
2/17/90	9:25	41	29.9	5.40	2.90	0.64	0.31	0.25	2.2	5.51	0.51	1.79	5.38	-	148	-	-	1.92	0.40
2/22/90	17:00	14	28.0	5.75	2.78	0.63	0.35	0.23	13.2	5.66	0.60	1.99	4.14	-	144	-	-	1.39	0.47
2/22/90	21:30	24	27.9	5.73	2.51	0.69	0.34	0.24	13.3	5.56	0.60	-	4.11	-	62	-	-	1.88	-
2/23/90	0:30	43	27.6	5.63	3.08	0.66	0.36	0.27	11.0	5.36	0.58	-	4.17	-	82	-	-	2.33	0.87
2/23/90	3:30	56	28.0	5.48	2.64	0.62	0.31	0.24	12.0	5.33	0.56	-	4.66	-	-	-	-	2.39	-
2/23/90	8:00	59	29.5	5.38	2.64	0.61	0.32	0.24	5.2	5.29	0.55	-	5.02	-	244	-	-	2.46	-
2/23/90	10:00	63	28.9	5.35	2.59	0.59	0.30	0.29	4.8	5.24	0.53	1.69	5.07	-	188	-	-	2.21	0.34
2/23/90	13:45	66	30.0	5.28	2.52	0.61	0.30	0.26	3.2	5.22	0.52	-	5.15	-	191	-	-	2.27	0.29
2/23/90	16:45	69	29.2	5.23	2.55	0.60	0.31	0.27	6.3	5.27	0.52	-	5.26	-	211	-	-	2.36	0.39
2/24/90	9:25	40	29.0	5.38	2.72	0.61	0.30	0.23	4.5	5.35	0.52	-	5.25	-	183	-	-	1.95	0.34
3/2/90	12:40	14	28.3	5.85	3.24	0.71	0.35	0.23	13.9	5.77	0.58	-	4.30	-	53	-	-	1.36	0.49

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
3/8/90	10:40	8.3	29.4	6.07	2.92	0.70	0.36	0.22	15.5	6.10	0.62	2.10	4.30	-	41	-	-	1.64	0.58
3/10/90	15:20	8.1	27.2	6.03	2.72	0.63	0.35	0.22	15.4	5.64	0.59	-	3.76	-	31	-	-	1.38	0.53
3/11/90	10:57	8.6	27.7	6.05	2.69	0.67	0.36	0.21	15.3	5.66	0.59	-	3.90	-	36	-	-	1.34	-
3/11/90	22:00	15	27.1	5.98	2.65	0.62	0.35	0.24	13.2	5.46	0.54	1.88	4.01	-	134	-	-	2.11	-
3/12/90	2:00	17	27.2	5.71	2.77	0.64	0.34	0.26	15.3	5.46	0.55	1.77	4.13	-	-	60	32	2.16	-
3/12/90	6:00	28	27.9	5.61	2.58	0.67	0.34	0.25	9.9	5.53	0.54	1.70	4.44	-	76	77	37	2.47	-
3/12/90	7:55	46	28.9	5.70	2.71	0.63	0.34	0.29	10.4	5.59	0.55	-	4.94	-	86	-	-	2.33	-
3/12/90	10:00	52	29.5	5.47	2.80	0.64	0.31	0.28	7.8	5.57	0.51	1.64	5.19	-	112	-	-	2.90	-
3/12/90	13:10	45	29.7	6.44	3.02	0.67	0.32	0.25	5.5	5.51	0.53	1.66	5.41	-	129	140	47	2.58	-
3/12/90	18:00	56	29.5	5.39	2.66	0.62	0.29	0.31	4.9	5.39	0.51	1.66	5.45	-	129	-	-	2.74	-
3/13/90	2:00	44	29.4	5.37	2.68	0.63	0.31	0.31	1.8	5.32	0.51	1.64	5.49	-	153	-	-	2.89	-
3/13/90	6:00	40	28.5	5.38	2.66	0.57	0.49	0.26	6.1	5.20	0.51	1.70	5.26	-	93	120	52	2.79	-
3/13/90	8:45	43	29.2	5.35	2.69	0.62	0.29	0.30	7.4	5.32	0.50	1.66	5.40	-	141	-	-	2.31	-
3/13/90	10:00	46	28.9	5.34	2.82	0.59	0.34	0.26	5.9	5.22	0.52	1.64	5.40	-	-	158	57	3.74	-
3/13/90	14:00	60	28.3	5.35	2.97	0.57	0.31	0.26	2.9	5.12	0.49	1.62	5.32	-	133	150	62	3.11	-
3/13/90	14:40	64	28.0	5.37	2.90	0.58	0.28	0.29	2.9	5.04	0.48	1.73	5.33	-	160	185	68	2.27	-
3/13/90	18:00	57	28.3	5.30	2.79	0.55	0.31	0.27	5.0	5.09	0.47	1.60	5.34	-	172	125	60	3.32	-
3/13/90	22:00	47	28.5	5.36	3.10	0.56	0.35	0.27	5.0	5.14	0.50	1.63	5.41	-	105	-	-	3.97	-
3/14/90	10:05	32	28.0	5.44	3.24	0.59	0.28	0.26	5.3	5.27	0.50	1.87	5.13	-	182	130	50	2.12	-
3/14/90	18:00	30	27.9	5.39	3.51	0.60	0.35	0.26	7.0	5.21	0.49	1.71	4.68	-	-	-	-	2.35	-
3/15/90	13:30	21	27.6	6.00	2.85	0.61	0.31	0.26	7.6	5.52	0.52	1.76	4.44	-	69	-	-	2.36	0.42
3/15/90	15:15	21	30.7	4.71	1.68	0.39	0.27	0.17	-2.1	5.44	0.62	1.85	4.21	-	368	-	-	3.27	-
3/15/90	15:45	21	23.8	4.81	1.35	0.39	0.31	0.16	2.2	5.47	0.53	2.22	0.62	-	275	-	-	-	-
3/17/90	11:55	20	28.4	5.99	2.86	0.63	0.32	0.28	12.7	5.65	0.57	1.85	4.30	-	59	65	44	1.90	-
3/17/90	15:04	30	27.8	5.82	3.61	0.63	0.32	0.30	8.3	5.54	0.61	1.80	4.22	-	102	-	-	2.39	-
3/17/90	15:41	36	27.5	5.72	2.59	0.62	0.33	0.31	-	5.46	0.56	1.80	4.17	-	88	-	-	2.62	-
3/17/90	19:00	44	28.2	5.82	2.98	0.61	0.31	0.31	10.6	5.45	0.57	1.81	4.40	-	95	108	61	2.62	0.35
3/18/90	1:43	39	28.9	5.63	3.96	0.61	0.31	0.32	10.6	5.59	0.58	1.81	4.94	-	103	-	-	2.94	-
3/18/90	10:50	31	28.8	5.59	2.88	0.62	0.31	0.28	7.6	5.52	0.57	1.90	4.76	-	100	119	53	2.23	0.31
3/20/90	10:20	28	28.0	5.77	3.84	0.63	0.31	0.27	10.1	5.62	0.59	1.90	4.51	-	46	-	-	2.03	0.36
3/24/90	13:38	16	28.4	5.93	2.80	0.67	0.32	0.24	10.4	5.69	0.60	-	4.45	-	48	-	-	1.71	0.43
3/30/90	17:00	9.2	27.9	5.98	2.87	0.68	0.33	0.21	15.0	5.69	0.60	1.95	3.90	-	28	-	-	1.36	0.47
4/2/90	11:00	9.5	29.0	5.96	2.86	0.64	0.34	0.21	16.2	5.81	0.60	1.95	3.98	-	36	-	-	1.56	0.41
4/3/90	9:15	21	-	-	2.88	0.66	0.36	0.23	-	-	-	-	-	-	49	-	-	1.86	0.47
4/3/90	18:30	26	27.5	5.85	2.74	0.62	0.33	0.22	10.7	5.55	0.56	1.88	3.90	-	62	-	-	2.05	0.43
4/4/90	2:00	21	-	-	2.76	0.62	0.32	0.22	-	-	-	-	-	-	80	-	-	2.49	-
4/4/90	9:00	18	-	-	2.73	0.63	0.32	0.20	-	-	-	-	-	-	65	-	-	1.95	0.44
4/9/90	14:40	9.2	27.7	5.75	2.77	0.66	0.33	0.21	15.0	5.86	0.59	1.91	3.86	0.02	43	-	-	1.31	-
4/10/90	17:50	29	27.7	5.78	2.80	0.64	0.33	0.23	15.0	5.75	0.57	1.75	3.80	0.02	64	57	31	1.41	-
4/10/90	19:00	34	27.8	5.86	3.02	0.65	0.34	0.24	13.6	5.63	0.55	1.68	3.72	-	58	-	-	2.07	-
4/10/90	21:00	55	27.8	5.47	2.68	0.64	0.33	0.24	14.7	5.71	0.55	1.71	4.10	-	76	78	41	2.46	-
4/10/90	23:00	106	27.9	5.46	2.70	0.63	0.31	0.27	12.1	5.58	0.53	1.64	4.27	-	124	95	56	3.14	-
4/10/90	24:00	112	28.1	5.56	3.08	0.61	0.31	0.29	10.3	5.41	0.51	1.59	4.20	-	125	-	-	3.22	-
4/11/90	1:00	112	28.8	5.31	2.70	0.60	0.29	0.34	4.5	5.53	0.51	1.60	4.88	0.03	182	-	87	3.94	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)
A. Station 01434025 Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dis-solved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
4/11/90	3:00	127	30.0	5.15	2.66	0.60	0.28	0.38	4.3	5.32	0.49	1.57	5.38	-	239	220	83	3.84	-
4/11/90	5:00	105	30.0	5.11	2.60	0.58	0.27	0.39	2.8	5.20	0.47	1.51	5.42	0.01	232	-	89	3.94	-
4/11/90	7:00	92	31.0	5.03	2.69	0.60	0.29	0.39	0.0	5.39	0.48	1.55	5.65	0.02	250	-	91	3.72	-
4/11/90	9:45	72	30.3	5.11	2.48	0.57	0.28	0.34	-6.3	5.28	0.49	1.61	5.56	-	247	242	83	3.29	0.32
4/11/90	13:00	57	29.4	5.14	2.78	0.65	0.29	0.34	-0.5	5.41	0.49	1.69	5.48	0.03	212	217	71	2.63	-
4/11/90	13:00	57	29.0	5.46	3.36	0.77	0.37	0.31	4.7	5.48	0.54	1.87	5.02	-	115	-	-	2.08	-
4/12/90	16:00	23	28.7	5.45	2.64	0.66	0.30	0.24	7.1	5.72	0.53	1.87	5.07	-	112	106	43	2.00	0.45
4/30/90	3:30	11	26.2	6.08	2.90	0.63	0.37	0.27	20.8	5.87	0.62	1.79	2.85	-	37	-	-	2.16	-
4/30/90	4:15	14	26.2	6.10	2.95	0.60	0.36	0.26	20.8	5.76	0.62	1.73	2.82	-	61	-	-	2.49	-
4/30/90	9:30	20	25.8	5.78	2.66	0.61	0.33	0.28	14.5	5.75	0.60	1.78	2.82	-	66	-	-	2.09	0.44
4/30/90	10:57	20	26.1	5.95	2.87	0.60	0.32	0.27	15.7	5.74	0.60	1.79	2.81	-	68	57	-	3.01	-
5/1/90	9:10	9.8	26.7	6.04	2.86	0.64	0.33	0.26	18.2	5.99	0.62	1.98	2.98	-	46	-	-	1.60	0.48
5/3/90	14:07	7.8	26.7	6.03	-	-	-	-	17.5	5.89	0.58	1.95	2.74	-	33	-	-	1.54	0.39
5/4/90	22:00	13	27.1	6.07	-	-	-	-	22.6	5.87	0.59	1.86	2.81	-	33	-	-	2.13	-
5/5/90	2:00	22	26.5	6.00	-	-	-	-	22.6	5.65	0.56	1.80	2.73	-	42	-	-	2.39	-
5/5/90	9:05	16	26.3	6.06	-	-	-	-	18.1	5.81	0.56	1.90	2.84	-	53	-	-	2.07	0.50
5/6/90	10:40	11	26.8	6.02	-	-	-	-	18.6	5.89	0.58	1.98	2.83	-	40	-	-	1.72	0.38
5/10/90	9:19	16	26.3	6.11	2.97	0.62	0.34	0.24	22.3	5.83	0.57	1.74	2.73	-	-	27	-	1.65	-
5/10/90	11:00	25	25.0	6.05	2.53	0.59	0.32	0.24	24.2	5.44	0.53	1.62	2.50	-	-	-	-	2.71	-
5/10/90	12:00	38	25.2	6.04	2.55	0.58	0.32	0.25	18.4	5.37	0.53	1.62	2.48	-	-	-	-	2.83	-
5/10/90	14:10	64	24.9	5.86	3.26	0.54	0.29	0.27	15.3	5.33	0.51	1.66	2.69	-	-	131	-	-	-
5/10/90	16:35	130	25.8	5.50	2.38	0.55	0.27	0.38	10.1	4.99	0.45	1.69	3.56	-	-	117	108	4.49	0.35
5/10/90	19:00	125	27.4	5.19	2.34	0.54	0.26	0.38	2.9	4.94	0.44	1.67	4.28	-	-	-	-	4.37	-
5/10/90	20:00	141	27.5	5.30	3.49	0.52	0.27	0.38	5.4	4.73	0.44	1.60	4.24	-	-	128	-	4.68	-
5/10/90	24:00	130	28.5	5.04	2.50	0.52	0.26	0.37	2.8	4.79	0.43	1.61	4.37	-	-	151	107	4.26	-
5/11/90	3:00	110	28.9	5.08	2.47	0.54	0.27	0.35	4.0	4.93	0.46	1.68	4.63	-	-	-	-	3.97	-
5/11/90	8:30	77	28.2	5.13	2.37	0.56	0.27	0.32	3.7	5.27	0.46	1.80	4.44	-	-	135	-	2.97	-
5/11/90	14:00	56	27.7	5.26	2.33	0.57	0.27	0.30	2.9	5.50	0.50	1.86	4.34	-	-	-	-	2.72	0.28
5/12/90	8:50	29	27.2	5.67	2.47	0.61	0.28	0.25	8.4	5.55	0.50	1.90	3.90	-	-	-	-	2.32	0.39
5/13/90	13:35	54	26.3	5.50	2.47	0.55	0.27	0.26	7.5	5.35	0.49	1.80	3.43	-	-	-	-	2.59	-
5/13/90	17:00	117	26.1	5.38	2.34	0.51	0.25	0.31	5.8	5.32	0.47	1.67	3.69	-	184	-	-	3.19	-
5/13/90	18:00	123	26.4	5.12	2.34	0.50	0.24	0.32	2.0	5.22	0.44	1.64	3.73	-	-	100	78	4.01	-
5/14/90	2:00	122	26.8	5.17	2.20	0.49	0.24	0.32	0.6	5.25	0.43	1.64	3.79	-	-	95	71	3.69	-
5/14/90	9:15	79	26.6	5.27	2.32	0.52	0.26	0.28	0.0	5.60	0.46	1.73	3.87	-	-	-	-	2.77	-
5/16/90	19:59	49	25.6	5.72	2.49	0.57	0.28	0.29	12.5	5.51	0.49	1.84	3.11	-	176	-	-	-	-
5/16/90	22:59	38	25.7	5.69	2.55	0.56	0.29	0.26	10.0	5.56	0.48	1.89	3.22	-	108	-	-	-	-
5/17/90	1:59	34	25.8	5.67	2.59	0.57	0.29	0.26	9.9	5.65	0.49	1.90	3.27	-	110	-	-	-	-
5/17/90	17:00	28	25.9	5.63	2.51	0.59	0.28	0.28	10.9	5.74	0.50	2.00	3.27	-	94	-	-	-	-
5/17/90	20:00	29	26.1	5.91	2.47	0.56	0.29	0.25	11.9	5.73	0.50	1.96	3.24	-	90	-	-	-	-
5/18/90	5:00	25	26.1	5.71	2.49	0.58	0.29	0.26	13.7	5.77	0.51	2.05	3.30	-	91	-	-	-	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

B. Station 01417822 Black Brook at Quaker Clearing near Turnwood, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/13/88	12:30	-	40.5	6.71	5.90	0.80	0.28	0.28	172.5	6.59	0.51	2.88	1.61	-	23	-	-	0.83	2.55
10/20/88	11:30	0.72	41.0	6.79	5.34	0.74	0.26	0.21	172.5	6.86	0.57	3.04	1.58	-	23	-	-	1.05	2.88
10/27/88	16:00	1.2	40.5	6.50	5.44	0.74	0.27	0.21	130.0	2.20	0.72	2.83	0.21	-	32	-	-	1.21	1.98
10/31/88	14:23	1.3	38.4	6.73	5.24	0.73	0.30	0.29	50.0	7.01	0.66	2.85	2.13	-	25	-	-	1.18	2.16
11/5/88	18:16	18	29.3	5.92	3.44	0.50	0.22	0.42	20.0	6.13	0.71	1.95	2.54	-	228	-	-	-	-
11/5/88	18:58	24	34.4	5.81	3.35	0.51	0.22	0.59	-	6.26	0.74	2.00	2.31	-	-	-	-	8.01	0.84
11/5/88	19:25	32	29.8	5.76	3.35	0.49	0.22	0.76	35.0	5.78	0.67	1.85	1.83	-	436	-	-	-	-
11/5/88	20:01	40	29.9	5.94	3.47	0.50	0.22	0.73	50.0	5.86	0.69	-	1.49	-	-	-	-	-	-
11/5/88	21:01	43	29.5	5.98	3.56	0.50	0.23	0.70	50.0	5.86	0.69	1.93	1.45	-	184	-	-	-	-
11/5/88	21:35	41	29.7	5.99	3.58	0.51	0.22	0.66	55.0	5.91	0.68	1.97	1.57	-	172	-	-	-	-
11/5/88	23:59	31	29.5	6.02	3.70	0.52	0.22	0.60	10.0	5.89	0.67	1.96	0.91	-	158	-	-	-	-
11/6/88	3:00	26	32.0	6.12	4.12	0.56	0.24	0.48	80.0	6.11	0.70	1.99	1.40	-	98	-	-	-	-
11/6/88	16:32	13	31.1	5.75	3.87	0.54	0.25	0.30	55.0	6.42	0.69	2.17	2.73	-	126	-	-	2.91	1.02
11/13/88	14:23	12	33.1	6.15	4.66	0.57	0.24	0.17	90.0	6.91	0.68	2.62	2.13	-	38	-	-	2.62	1.47
11/13/88	15:23	14	33.6	6.08	4.70	0.63	0.26	0.20	92.6	6.87	0.62	2.69	2.48	-	28	-	-	2.30	1.61
11/14/88	16:55	-	33.6	6.75	4.70	0.63	0.26	0.20	85.0	6.78	0.66	2.48	1.97	-	54	-	-	1.67	1.38
11/17/88	16:25	-	29.9	6.68	3.74	0.49	0.25	0.15	75.0	6.78	0.66	2.51	1.79	-	54	-	-	-	-
11/21/88	11:30	-	29.6	6.27	3.73	0.50	0.23	0.15	47.6	6.52	0.63	2.37	1.81	-	80	-	-	2.25	1.02
11/29/88	14:30	-	34.4	6.40	5.04	0.63	0.25	0.22	97.5	6.74	0.65	2.77	2.20	-	33	-	-	1.16	1.49
12/6/88	13:30	2.8	34.7	6.53	4.84	0.67	0.28	0.22	87.5	4.57	0.17	2.51	0.64	-	23	-	-	1.12	1.51
12/13/88	16:00	12	38.3	6.33	5.20	0.69	0.24	0.22	120.0	6.99	0.61	3.07	2.35	-	26	-	-	0.85	2.05
12/20/88	12:41	1.9	37.0	6.33	5.27	0.67	0.24	0.20	125.0	6.81	0.56	1.97	2.38	-	17	-	-	0.72	1.89
1/2/89	11:50	1.8	35.8	6.78	4.86	0.62	0.23	0.22	112.5	6.83	0.65	2.41	2.23	-	15	-	-	0.80	1.77
1/10/89	14:15	1.6	37.6	6.29	4.33	0.62	0.26	0.20	95.0	2.10	0.19	1.74	0.59	-	15	-	-	0.96	1.85
1/17/89	12:20	-	36.0	6.03	4.83	0.68	0.27	0.19	125.0	6.92	0.62	2.46	2.15	-	100	-	-	0.88	1.71
1/25/89	10:12	1.1	39.9	6.35	4.72	0.66	0.26	0.20	145.0	6.97	0.64	2.31	2.24	-	16	-	-	0.75	2.02
1/31/89	10:45	1.4	39.1	6.42	4.58	0.64	0.26	0.20	140.0	6.98	0.61	1.88	2.28	-	20	-	-	0.82	1.88
2/7/89	13:40	-	37.8	6.36	4.26	0.61	0.27	0.18	135.0	7.04	0.60	2.44	2.36	-	12	-	-	0.79	1.89
2/14/89	13:10	-	41.9	6.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2/21/89	15:33	18	38.5	6.63	4.56	0.59	0.22	0.20	137.5	6.74	0.60	2.29	2.41	-	8	-	-	2.57	2.06
2/28/89	13:25	5.3	37.3	6.32	5.02	0.62	0.24	0.20	130.0	6.59	0.62	2.36	2.75	-	19	-	-	0.72	1.64
3/7/89	13:40	2.1	38.8	6.07	5.13	0.61	0.25	0.20	135.0	6.72	0.64	2.41	2.55	-	2	-	-	0.98	1.81
3/15/89	13:13	5.0	32.9	6.22	4.68	0.54	0.22	0.37	117.5	5.93	0.64	1.91	2.30	-	-	-	-	2.29	1.86
3/21/89	14:15	2.6	35.7	6.36	4.76	0.60	0.23	0.23	117.5	6.51	0.63	1.88	2.80	-	18	-	-	1.21	1.57
3/25/89	15:15	15	27.4	6.22	3.66	0.43	0.21	0.34	55.0	5.43	0.53	1.38	4.01	-	73	-	-	-	1.04
3/30/89	8:00	11	33.2	6.74	4.55	0.51	0.60	0.64	70.0	6.21	0.66	1.74	3.54	-	52	-	-	2.19	1.26
4/3/89	15:00	7.4	33.4	5.77	4.44	0.56	0.23	0.28	77.5	6.50	0.65	1.78	3.14	-	36	-	-	1.45	1.21
4/6/89	2:46	11	33.6	5.80	4.37	0.55	0.25	0.32	65.0	6.15	0.64	1.92	3.33	-	68	-	-	2.92	-
4/11/89	10:50	4.7	33.4	6.52	4.52	0.62	0.26	0.24	90.0	6.60	0.65	1.92	2.80	-	32	-	-	1.07	1.31
4/19/89	13:30	-	35.1	6.57	4.57	0.58	0.25	0.24	89.5	6.50	0.71	1.82	2.66	-	34	-	-	1.26	1.30
4/21/89	16:00	3.2	35.4	6.31	-	-	-	-	96.0	-	-	-	-	-	34	-	-	-	-
4/27/89	11:05	1.9	37.5	6.83	4.65	0.64	0.27	0.23	112.0	6.87	0.65	2.17	2.58	-	23	-	-	1.03	1.60
5/2/89	1:58	12	34.9	6.27	4.24	0.59	0.27	0.27	63.5	6.42	0.70	2.09	4.45	-	86	-	-	2.00	-
5/2/89	18:39	9.7	33.6	6.06	3.86	0.55	0.26	0.29	53.5	6.30	0.69	2.19	4.33	-	92	-	-	2.70	-
5/2/89	18:40	9.7	34.3	6.29	4.14	0.54	0.27	0.29	59.5	6.37	0.71	2.05	4.48	-	91	-	-	2.62	1.12

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

B. Station 01417822 Black Brook at Quaker Clearing near Turnwood, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
5/2/89	19:58	9.2	34.1	6.19	4.17	0.57	0.26	0.30	55.0	6.34	0.70	2.07	4.39	-	136	-	-	2.47	-
5/2/89	21:58	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/3/89	3:58	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/3/89	7:58	6.9	-	-	3.86	0.53	0.26	0.23	.	6.31	0.72	2.09	4.23	-	71	-	-	2.18	-
5/3/89	9:58	6.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/3/89	11:58	6.6	34.1	6.19	4.47	0.61	0.27	0.27	69.5	6.38	0.72	2.01	4.12	-	57	-	-	2.04	-
5/5/89	15:35	5.5	36.2	6.44	4.71	0.61	0.25	0.25	93.5	6.53	0.77	1.98	3.43	-	37	-	-	1.25	1.40
5/5/89	17:00	6.3	35.8	6.57	4.72	0.59	0.27	0.23	82.5	6.52	0.72	2.06	3.72	-	38	-	-	1.45	-
5/5/89	20:00	9.9	33.1	6.29	4.35	0.56	0.25	0.26	75.5	5.93	0.64	1.94	2.97	-	66	-	-	1.47	-
5/5/89	23:00	16	30.5	6.27	3.96	0.53	0.24	0.29	54.0	5.89	0.62	1.88	3.06	-	90	-	-	2.91	-
5/6/89	2:00	41	29.6	6.05	3.57	0.49	0.24	0.45	34.0	5.51	0.51	1.78	3.84	-	148	-	-	4.34	-
5/6/89	5:00	52	30.0	5.81	3.50	0.44	0.21	0.61	25.5	4.80	0.50	1.50	3.77	-	160	142	85	-	-
5/6/89	8:00	51	31.6	5.68	3.60	0.47	0.22	0.57	18.5	5.23	0.54	1.70	4.55	-	169	149	85	4.02	-
5/6/89	11:00	41	32.1	5.88	3.73	0.51	0.24	0.46	23.5	5.70	0.59	1.69	5.42	-	130	-	-	3.95	-
5/6/89	14:00	35	33.1	5.90	4.02	0.52	0.25	0.46	29.0	5.89	0.63	1.95	5.45	-	95	-	-	3.43	-
5/6/89	17:00	28	33.2	5.96	3.99	0.52	0.25	0.44	29.0	6.02	0.64	1.92	5.40	-	87	-	-	2.89	-
5/6/89	21:00	22	33.7	6.11	4.19	0.54	0.26	0.42	37.5	6.03	0.65	2.11	5.25	-	79	-	-	2.44	0.76
5/7/89	5:00	20	33.8	6.16	4.17	0.55	0.25	0.36	40.0	6.16	0.66	2.00	5.05	-	66	-	-	2.87	-
5/8/89	11:40	13	34.7	6.31	4.46	0.58	0.26	0.32	64.5	6.29	0.67	2.28	4.24	-	35	-	-	2.09	1.13
5/10/89	14:10	11	33.3	6.29	4.11	0.55	0.24	0.28	66.5	6.26	0.65	2.19	3.41	-	47	-	-	1.58	1.11
5/10/89	20:59	15	32.1	6.15	3.87	0.58	0.24	0.29	63.0	6.22	0.69	2.08	3.36	-	77	-	-	2.17	-
5/11/89	2:59	16	31.6	6.19	3.34	0.46	0.24	0.25	55.0	6.16	0.65	2.01	3.40	-	71	-	-	2.26	-
5/11/89	5:59	17	31.8	6.26	3.89	0.53	0.24	0.29	56.0	6.22	0.62	2.00	3.47	-	72	-	-	2.06	-
5/11/89	8:59	16	31.8	5.88	3.22	0.45	0.22	0.24	52.0	6.35	0.61	0.00	3.53	-	69	-	-	2.06	-
5/11/89	11:59	15	31.8	6.28	-	-	-	-	55.5	-	-	-	-	-	-	-	-	-	-
5/11/89	17:59	13	31.6	6.35	3.43	0.48	0.23	0.25	57.0	6.21	0.63	1.95	3.47	-	53	-	-	2.21	-
5/12/89	11:59	11	33.9	6.30	4.26	0.62	0.25	0.27	68.5	6.43	0.67	2.09	3.70	-	26	-	-	1.62	-
5/13/89	13:40	7.6	33.1	6.27	4.36	0.59	0.27	0.28	74.0	6.56	0.68	2.06	3.57	-	34	-	-	1.18	-
5/17/89	13:20	17	30.4	6.03	3.64	0.49	0.23	0.28	50.0	6.32	0.56	2.06	3.15	-	80	-	-	-	-
5/25/89	15:40	-	34.7	6.67	4.41	0.61	0.26	0.26	99.0	6.69	0.63	2.35	2.33	-	22	-	-	1.64	-
6/5/89	14:45	2.0	37.4	6.74	4.89	0.65	0.24	0.25	125.5	6.84	0.82	1.97	2.50	-	18	-	-	1.31	1.77
6/12/89	15:30	-	37.0	6.67	4.99	0.63	0.25	0.24	123.5	6.81	0.60	2.56	2.64	-	16	-	-	1.23	1.69
6/17/89	17:55	-	34.7	6.44	4.22	0.55	0.22	0.21	94.5	6.70	0.56	2.43	2.47	-	29	-	-	1.74	1.46
7/1/89	12:45	2.4	37.4	6.85	4.90	0.63	0.24	0.19	118.0	6.77	0.59	2.73	2.44	-	-	-	-	1.14	1.76
7/5/89	14:20	6.1	32.7	6.58	4.39	0.55	0.25	0.21	100.5	5.99	0.52	-	1.83	-	306	-	-	3.05	1.47
7/14/89	11:45	0.68	38.8	6.84	5.00	0.64	0.26	0.20	137.4	6.70	0.59	-	2.29	-	10	-	-	1.09	1.88
7/18/89	16:20	0.78	39.9	6.80	5.32	0.68	0.26	0.20	147.0	6.72	0.59	-	2.32	-	6	-	-	1.01	2.01
7/20/89	11:40	1.5	39.3	6.66	5.13	0.70	0.25	0.23	138.9	6.46	0.58	-	2.43	-	6	-	-	1.27	2.13
7/20/89	14:00	2.2	37.8	6.73	5.15	0.67	0.25	0.24	129.9	6.29	0.57	-	2.23	-	10	-	-	2.26	-
7/20/89	16:00	2.4	37.8	6.74	5.03	0.66	0.24	0.23	129.8	6.32	0.57	-	2.20	-	10	-	-	2.33	-
7/20/89	20:00	1.8	38.6	6.74	5.84	0.68	0.13	0.23	137.1	6.46	0.58	-	2.23	-	8	-	-	2.21	-
7/21/89	8:00	1.2	39.4	6.80	5.54	0.70	0.26	0.19	134.7	6.59	0.58	-	2.35	-	9	-	-	1.86	-
7/27/89	13:45	0.78	39.8	6.82	5.48	0.69	0.27	0.21	156.2	6.80	0.58	-	2.41	-	8	-	-	1.00	2.15
8/2/89	12:30	-	40.3	6.77	5.45	0.75	0.28	0.21	150.3	6.76	0.58	2.90	2.47	-	11	-	-	0.95	2.24

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

B. Station 01417822 Black Brook at Quaker Clearing near Turnwood, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
8/9/89	16:43	-	41.0	6.78	5.37	0.73	0.26	0.20	155.5	6.79	0.57	3.00	2.49	-	12	-	-	1.15	2.21
8/17/89	10:30	-	41.5	6.92	5.38	0.72	0.25	0.20	163.7	6.70	0.57	2.89	2.47	-	10	-	-	1.05	2.29
8/24/89	12:50	0.39	36.7	7.04	5.35	0.72	0.26	0.21	164.4	6.56	0.56	2.95	2.54	-	12	-	-	1.01	2.28
8/28/89	13:55	0.39	41.0	6.89	5.49	0.75	0.28	0.21	155.4	6.72	0.57	2.79	2.48	-	35	-	-	0.82	2.23
8/29/89	18:02	0.80	27.9	6.35	2.79	0.63	0.45	0.28	28.8	6.55	0.71	2.52	1.75	-	24	-	-	1.46	0.69
9/8/89	11:30	0.49	42.2	7.00	5.77	0.77	0.28	0.20	175.6	6.73	0.57	2.77	2.53	-	8	-	-	0.97	2.34
9/14/89	13:02	1.7	38.3	6.72	4.63	0.66	0.24	0.57	160.3	5.08	0.60	2.37	1.94	-	14	-	-	2.67	-
9/14/89	13:30	2.4	40.5	6.76	4.90	0.69	0.26	0.63	157.9	5.47	0.79	2.50	1.88	-	18	-	-	2.83	-
9/14/89	17:22	1.5	40.7	6.83	5.26	0.73	0.28	0.37	150.3	6.17	0.66	2.93	2.25	-	36	-	-	2.91	-
9/15/89	11:00	0.55	42.1	6.84	5.43	0.76	0.28	0.24	171.4	6.22	0.58	2.98	2.19	-	10	-	-	1.28	2.30
9/18/89	10:30	0.55	41.7	6.99	5.74	0.75	0.29	0.23	166.2	6.72	0.59	3.19	2.24	-	20	-	-	1.47	2.25
9/19/89	17:22	1.7	38.3	6.78	5.08	0.67	0.36	0.31	.	6.07	0.62	2.72	1.89	-	20	-	-	3.17	2.16
9/19/89	20:35	3.7	35.3	6.85	4.80	0.60	0.50	0.41	131.9	5.87	0.60	2.82	1.74	-	137	-	-	3.78	-
9/20/89	0:42	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/20/89	1:14	12	31.0	6.27	4.31	0.52	0.36	0.50	87.6	-	-	2.55	-	-	198	-	-	6.84	-
9/20/89	3:44	21	28.4	6.30	4.22	0.47	0.89	0.46	68.4	5.36	0.40	2.33	1.82	-	225	121	112	8.07	-
9/20/89	8:23	32	26.0	6.18	3.86	0.44	0.75	0.42	35.5	5.11	0.35	2.06	2.50	-	212	117	108	6.79	-
9/20/89	8:50	37	26.6	6.08	3.43	0.40	0.58	0.42	37.7	5.07	0.37	2.03	2.47	-	204	130	114	7.01	-
9/21/89	12:00	7	31.5	6.39	4.29	0.54	0.36	0.25	81.4	6.18	0.43	2.49	2.64	-	167	47	36	3.62	1.37
9/22/89	18:53	12	29.9	6.46	4.24	0.51	0.76	0.41	67.7	5.76	0.56	2.06	2.07	-	539	-	-	4.70	-
9/22/89	18:54	12	30.3	6.35	4.00	0.51	0.52	0.36	76.0	5.64	0.56	2.50	2.04	-	158	-	-	4.38	1.42
9/25/89	14:55	5.5	34.2	6.56	4.77	0.58	0.58	0.24	91.4	6.56	0.52	2.46	2.82	-	158	-	-	1.87	1.49
10/5/89	13:25	2.9	36.6	6.74	4.77	0.64	0.53	0.26	111.5	6.73	0.58	2.27	2.22	-	206	-	-	1.57	1.72
10/10/89	15:10	1.7	38.9	6.38	5.03	0.67	0.28	0.48	140.0	6.84	0.63	2.67	2.01	-	61	-	-	1.83	1.99
10/15/89	2:03	1.7	38.3	6.76	4.92	0.68	0.30	0.46	128.3	6.66	0.61	2.20	2.57	-	18	-	-	2.43	-
10/15/89	3:40	3.9	38.9	6.72	4.73	0.68	0.31	0.75	120.6	6.71	0.76	2.23	2.62	-	47	-	-	3.77	-
10/15/89	10:17	3.2	36.7	6.70	4.59	0.65	0.30	0.42	116.6	6.72	0.75	2.29	1.83	-	40	-	-	3.49	-
10/15/89	16:05	3.0	36.2	6.78	4.37	0.60	0.26	0.34	112.2	6.76	0.72	2.36	1.67	-	30	-	-	2.43	1.67
10/17/89	10:13	2.6	36.5	6.39	4.70	0.63	0.28	0.39	122.0	6.48	0.64	2.47	1.73	-	17	-	-	2.30	-
10/17/89	13:20	3.9	34.2	6.50	4.43	0.58	0.29	0.44	111.2	6.38	0.67	2.37	1.47	-	24	-	-	2.74	-
10/17/89	15:15	5.0	34.5	6.57	3.95	0.53	0.30	0.41	105.3	6.49	0.70	2.43	1.43	-	40	-	-	3.22	-
10/18/89	7:40	4.0	34.9	6.56	4.24	0.56	0.28	0.31	96.4	6.58	0.68	2.48	1.70	-	25	-	-	3.03	-
10/18/89	10:10	3.8	33.8	6.31	4.53	0.59	0.27	0.30	98.8	6.62	0.68	2.12	1.72	-	48	-	-	2.14	1.65
10/19/89	12:45	6.0	32.8	6.39	4.04	0.57	0.23	0.36	97.1	6.32	0.65	2.32	1.61	-	42	-	-	2.67	-
10/20/89	7:59	13	29.7	6.34	3.58	0.51	0.22	0.39	67.1	6.14	0.66	2.12	1.80	-	82	-	-	3.58	-
10/20/89	10:22	23	28.1	6.27	3.32	0.46	0.21	0.59	51.2	5.83	0.65	1.97	1.74	-	118	-	-	4.46	-
10/20/89	11:04	27	30.1	5.97	3.48	0.48	0.26	0.44	41.5	6.19	0.59	2.31	3.11	-	57	-	-	3.12	-
10/20/89	11:33	31	26.9	6.13	3.15	0.41	0.30	0.76	52.0	5.56	0.63	1.85	1.78	-	140	-	-	5.19	-
10/20/89	12:00	37	26.7	6.08	2.96	0.43	0.19	0.78	33.2	5.46	0.62	1.78	1.78	-	157	-	-	5.82	-
10/20/89	12:27	44	26.4	5.95	2.84	0.41	0.19	0.87	42.1	5.35	0.61	1.67	1.87	-	192	-	-	6.15	-
10/20/89	12:56	52	26.6	5.84	2.80	0.41	0.22	0.95	28.4	5.32	0.60	1.65	1.97	-	183	-	-	6.01	-
10/20/89	13:11	54	26.7	5.74	2.74	0.39	0.18	0.97	34.4	5.27	0.59	1.62	2.01	-	208	-	-	6.19	-
10/20/89	13:46	57	26.3	5.67	2.73	0.38	0.17	1.05	31.7	5.08	0.56	1.52	2.16	-	167	-	-	7.40	-
10/20/89	19:32	50	28.3	5.44	2.98	0.40	0.20	0.70	17.1	5.55	0.55	1.62	3.37	-	129	-	-	5.31	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

B. Station 01417822 Black Brook at Quaker Clearing near Turnwood, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/20/89	20:33	50	28.1	5.52	2.99	0.41	0.21	0.70	22.4	5.56	0.52	1.99	3.35	-	108	179	107	4.88	-
10/20/89	23:16	42	28.7	5.77	3.09	0.43	0.23	0.62	28.1	5.83	0.57	2.08	3.39	-	95	-	-	4.45	-
10/21/89	3:49	32	28.9	-	3.29	0.45	0.22	0.53	-	6.03	0.57	2.19	3.32	-	74	-	-	3.77	-
10/25/89	15:37	5.9	34.2	6.64	4.58	0.59	0.24	0.29	99.3	6.61	0.56	2.70	2.61	-	18	-	-	1.58	1.35
11/1/89	2:37	7.7	32.1	6.59	4.18	0.53	0.24	0.30	81.4	6.47	0.64	2.69	2.07	-	36	-	-	2.56	-
11/1/89	2:45	7.9	32.8	6.62	4.21	0.56	0.25	0.31	82.4	6.49	0.64	2.69	2.08	-	37	-	-	2.67	-
11/2/89	12:30	4.2	33.9	6.86	4.48	0.60	0.25	0.25	99.1	6.67	0.62	2.62	2.09	-	22	-	-	1.34	-
11/3/89	14:50	4.2	34.3	6.63	4.50	0.59	0.25	0.25	97.1	6.78	0.60	2.69	2.21	-	11	-	-	1.73	1.41
11/9/89	10:53	4.6	34.8	6.46	4.52	0.59	0.23	0.28	102.1	6.70	0.59	2.35	2.24	-	13	-	-	7.86	-
11/9/89	11:43	5.5	33.8	6.50	4.43	0.56	0.24	0.30	94.3	6.60	0.58	2.33	2.17	-	18	-	-	2.38	-
11/9/89	12:15	6.6	33.3	6.36	4.33	0.55	0.24	0.29	91.2	6.57	0.58	2.35	2.07	-	17	-	-	3.06	1.53
11/9/89	12:54	7.5	33.1	6.55	4.27	0.54	0.24	0.30	91.2	6.62	0.59	2.35	2.09	-	33	-	-	2.22	-
11/9/89	23:59	5.2	33.7	6.59	4.35	0.57	0.24	0.25	85.9	6.73	0.60	2.49	2.35	-	30	-	-	2.18	-
11/10/89	8:43	4.0	33.7	6.23	4.30	0.55	0.26	0.23	92.9	6.49	0.58	2.45	1.88	-	16	-	-	3.56	-
11/16/89	8:33	5.3	34.1	6.60	4.47	0.59	0.32	0.32	102.3	6.35	0.64	1.97	2.27	-	16	-	-	2.26	-
11/16/89	9:19	6.6	33.9	6.64	4.21	0.54	0.31	0.36	96.8	6.15	0.64	2.05	1.65	-	18	-	-	4.01	-
11/16/89	10:49	11	32.7	6.59	3.99	0.53	0.27	0.35	83.3	6.17	0.64	2.10	1.73	-	64	28	-	4.94	-
11/16/89	11:42	17	30.2	6.47	3.70	0.49	0.27	0.40	67.5	5.78	0.62	2.01	1.46	-	97	-	-	5.37	-
11/16/89	12:12	21	29.7	6.41	3.61	0.48	0.27	0.43	62.3	5.68	0.62	2.03	1.43	-	141	96	46	6.12	-
11/16/89	13:01	28	29.1	6.37	3.59	0.47	0.31	0.48	53.2	5.60	0.61	2.06	1.36	-	152	-	-	7.72	-
11/16/89	16:43	23	30.2	6.22	3.60	0.47	0.23	0.37	35.5	5.92	0.61	2.10	3.13	-	139	116	92	4.25	-
11/16/89	20:05	17	30.4	6.30	3.72	0.47	0.24	0.34	43.8	5.98	0.60	2.17	3.18	-	112	-	-	3.49	-
11/17/89	0:32	12	30.9	6.32	3.72	0.49	0.23	0.30	49.8	6.04	0.60	2.25	3.17	-	92	-	-	3.04	-
11/17/89	13:35	8.5	31.0	6.43	3.93	0.53	0.24	0.27	59.3	6.55	0.59	2.32	2.99	-	58	48	31	2.14	1.01
11/27/89	14:10	3.1	34.5	6.96	4.48	0.59	0.26	0.23	95.3	6.81	0.62	2.20	2.30	-	28	-	-	1.28	1.52
11/28/89	4:43	3.9	34.7	6.66	4.37	0.59	0.26	0.27	96.5	6.48	0.58	1.98	2.66	-	16	-	-	1.78	-
11/28/89	5:44	5.2	35.0	6.65	4.47	0.60	0.24	0.24	96.5	6.60	0.57	2.02	2.68	-	21	-	-	1.56	-
11/28/89	7:35	6.8	34.4	6.69	4.35	0.57	0.25	0.24	86.8	6.64	0.57	2.11	2.73	-	43	-	-	1.89	-
11/29/89	0:25	7.0	33.8	6.53	4.26	0.57	0.24	0.22	81.8	6.53	0.56	2.18	2.78	-	38	-	-	1.76	-
11/29/89	12:50	5.2	32.8	6.79	4.12	0.57	0.25	0.21	78.9	6.60	0.59	2.26	2.41	-	31	-	-	5.76	2.64
12/7/89	13:35	3.7	25.7	6.88	4.66	0.63	0.25	0.21	103.0	6.84	0.61	2.39	2.51	-	15	-	-	1.25	1.50
12/14/89	13:30	5.0	37.3	6.95	4.81	0.64	0.29	0.23	111.5	6.91	0.62	2.54	2.55	-	11	-	-	1.00	1.94
12/20/89	11:50	2.3	38.4	6.75	5.14	0.70	0.27	0.22	125.0	6.79	0.59	2.60	2.82	-	10	-	-	1.31	1.98
12/29/89	13:10	1.9	39.2	6.85	5.31	0.71	0.28	0.23	132.5	6.74	0.58	2.76	2.84	-	8	-	-	0.89	2.15
1/6/90	13:30	1.7	36.6	6.79	4.80	0.65	0.27	0.22	110.1	6.71	0.60	2.74	2.87	-	11	-	-	0.84	1.82
1/11/90	10:45	1.3	38.5	6.82	5.19	0.68	0.27	0.20	122.5	6.64	0.59	2.63	3.12	-	9	-	-	0.74	1.96
1/18/90	11:05	4.0	34.8	6.66	4.48	0.57	0.27	0.22	79.8	6.48	0.57	2.48	3.58	-	33	-	-	1.51	1.34
1/18/90	14:10	5.9	34.2	6.63	4.41	0.55	0.26	0.23	71.6	6.30	0.56	2.39	3.73	-	44	-	-	1.78	1.28
1/25/90	14:45	3.1	37.7	6.84	4.85	0.64	0.26	0.23	99.8	6.63	0.58	-	4.04	-	11	-	-	-	-
1/26/90	7:00	29	34.4	6.08	4.12	0.56	0.26	0.28	26.5	5.65	0.49	-	6.69	-	93	-	-	-	-
1/26/90	8:20	27	33.6	5.94	3.76	0.56	0.25	0.32	21.1	5.52	0.47	1.80	6.59	-	122	-	-	-	-
1/30/90	14:00	11	34.7	6.48	4.23	0.59	0.37	0.30	58.0	6.12	0.53	2.15	5.41	-	29	-	-	1.47	1.06
2/7/90	7:55	3.5	37.7	6.68	4.64	0.63	0.26	0.21	85.0	6.38	0.57	2.38	4.40	-	-	-	-	1.07	-
2/11/90	13:32	6.5	33.6	6.46	4.15	0.56	0.29	0.23	52.8	6.07	0.52	2.19	4.71	-	66	-	-	1.17	0.96

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

B. Station 01417822 Black Brook at Quaker Clearing near Turnwood, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
2/15/90	9:00	3.6	36.8	6.67	4.32	0.65	0.27	0.21	87.7	6.35	0.57	2.30	4.46	-	-	-	-	1.15	-
2/16/90	6:50	6.5	36.0	6.63	4.20	0.61	0.27	0.22	71.1	6.25	0.59	2.13	4.70	-	-	-	-	1.24	-
2/21/90	13:00	9.7	35.2	6.82	4.28	0.60	0.26	0.22	77.2	6.17	0.55	-	4.25	-	19	-	-	0.96	1.19
3/2/90	17:20	5.2	36.3	6.57	4.39	0.63	0.27	0.23	89.5	6.45	0.56	2.27	4.23	-	24	-	-	0.82	-
3/7/90	14:28	5.1	35.1	6.62	-	0.63	0.26	0.22	88.6	6.31	0.56	-	3.90	-	15	-	-	1.36	1.58
3/12/90	16:40	12	32.5	6.36	3.91	0.55	0.25	0.25	50.8	5.75	0.52	1.86	5.00	-	81	-	-	1.88	-
3/13/90	17:17	14	32.7	6.26	3.63	0.53	0.26	0.26	44.2	5.59	0.49	1.89	5.23	-	83	-	-	1.65	-
3/14/90	17:35	9.1	34.3	6.13	4.06	0.58	0.26	0.26	63.2	5.84	0.51	2.02	5.20	-	45	-	-	-	-
3/18/90	9:30	9.1	33.6	6.48	4.06	0.56	0.26	0.26	53.4	5.90	0.54	2.10	5.17	-	52	-	-	1.67	-
3/18/90	17:30	8.5	34.5	6.62	4.16	0.58	0.26	0.27	62.1	6.03	0.54	2.12	5.10	-	42	-	-	1.48	-
3/21/90	11:05	6.8	34.2	6.74	3.92	0.58	0.26	0.24	63.9	6.18	0.57	2.22	4.85	-	37	-	-	1.19	1.07
3/27/90	15:50	4.9	35.6	6.67	4.11	0.60	0.27	0.24	78.3	6.31	0.57	2.30	4.41	-	22	-	-	1.33	1.26
4/3/90	7:43	8.1	33.6	6.56	4.14	0.57	0.26	0.21	57.9	5.94	0.54	2.09	4.55	-	42	-	-	1.40	1.11
4/3/90	8:13	8.2	33.5	6.54	4.24	0.58	0.25	0.22	66.2	6.01	0.53	2.12	4.00	-	38	-	-	1.68	1.19
4/3/90	17:35	9.6	32.3	6.50	4.14	0.58	0.29	0.26	55.0	5.87	0.53	2.05	4.09	-	64	-	-	1.86	1.00
4/10/90	17:10	5.8	34.3	6.43	4.26	0.60	0.25	0.24	81.5	6.18	0.54	2.07	4.06	-	35	-	-	1.44	1.35
4/11/90	7:55	20	31.0	6.10	3.55	0.52	0.24	0.30	25.0	5.71	0.49	1.77	5.21	-	152	-	-	2.45	0.81
4/20/90	13:00	3.8	35.8	6.77	4.45	0.61	0.25	0.24	84.9	6.28	0.56	2.30	4.16	-	31	-	-	1.13	1.26
4/30/90	17:10	8.2	31.3	6.54	4.78	0.54	0.24	0.27	65.5	6.13	0.58	2.10	3.12	-	64	-	-	1.89	1.16
5/4/90	15:45	4.0	36.8	6.80	-	-	-	-	95.5	6.24	0.54	2.29	3.69	-	17	-	-	1.31	1.52
5/10/90	7:30	4.7	35.7	6.57	5.07	0.63	0.25	0.25	96.0	6.16	0.53	2.11	3.54	-	-	-	-	1.31	1.66
5/10/90	16:15	45	27.1	5.95	2.96	0.44	0.20	0.39	28.3	5.85	0.43	1.64	3.41	-	-	-	-	4.93	0.84
5/11/90	7:45	32	30.2	5.95	3.81	0.47	0.23	0.33	23.4	5.48	0.45	1.81	4.92	-	-	-	-	2.71	0.68
5/12/90	7:50	12	33.4	6.35	3.79	0.54	0.25	0.26	56.5	5.85	0.51	2.10	4.75	-	-	-	-	1.55	1.07
5/17/90	7:35	10.427	33.5	6.41	3.99	0.56	0.23	0.25	66.9	6.09	0.50	2.23	4.19	-	40	-	-	1.67	1.30

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

C. Station 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/13/88	14:50	-	20.8	5.25	1.24	0.61	0.46	0.15	-7.5	5.25	0.46	2.64	0.27	-	174	-	-	1.28	0.33
10/19/88	12:15	7.3	21.4	5.08	1.24	0.61	0.41	0.17	-10.0	5.77	0.53	2.66	0.32	-	150	-	-	1.38	0.42
10/22/88	18:00	134	21.7	4.49	1.28	0.62	0.28	0.46	-35.0	5.36	0.72	2.12	1.84	-	430	-	-	6.92	0.93
10/28/88	9:50	12	24.3	4.92	1.30	0.66	0.34	0.17	-12.5	6.06	0.56	2.50	0.97	-	248	-	-	1.91	0.33
10/31/88	16:23	12	27.5	4.88	1.34	0.66	0.58	0.77	5.0	5.88	1.01	2.71	0.95	-	204	-	-	2.86	0.34
11/13/88	17:20	-	28.9	4.83	1.35	0.63	0.32	0.20	-5.0	5.87	0.61	2.41	1.21	-	280	-	-	3.53	0.46
11/16/88	9:20	-	24.9	5.05	1.31	0.61	0.31	0.17	-7.5	6.02	0.58	2.55	1.19	-	212	-	-	2.18	0.41
11/17/88	8:45	-	25.2	4.96	1.30	0.61	0.31	0.19	12.5	5.92	0.57	2.34	1.21	-	264	-	-	3.27	0.39
11/20/88	11:55	-	25.3	4.70	1.14	0.60	0.30	0.16	-20.0	5.68	0.53	2.28	1.12	-	248	-	-	3.46	0.33
11/21/88	9:15	-	28.4	4.59	1.23	0.54	0.27	0.22	-20.0	5.82	0.57	2.17	1.16	-	370	-	-	4.91	0.45
11/28/88	15:40	-	26.2	4.84	1.40	0.62	0.29	0.24	-12.5	5.84	0.67	2.74	1.36	-	350	-	-	2.59	0.39
12/5/88	11:00	-	22.9	5.07	1.48	0.65	0.32	0.18	-10.0	5.98	0.52	2.84	1.42	-	308	-	-	1.71	0.39
12/12/88	16:20	-	24.5	5.08	1.79	0.73	0.39	0.25	-5.0	6.29	0.61	2.94	1.71	-	280	-	-	1.41	0.52
12/20/88	16:14	-	22.8	5.43	1.41	0.67	0.35	0.19	-5.0	5.72	0.52	2.64	1.63	-	165	-	-	1.24	0.52
12/27/88	12:10	-	24.7	5.26	1.43	0.68	0.40	0.21	-5.0	5.61	0.55	2.47	1.90	-	168	-	-	1.27	-
1/1/89	14:05	-	25.3	4.94	1.70	0.69	0.35	0.28	-10.0	5.79	0.57	2.68	1.91	-	150	-	-	1.18	0.39
1/9/89	14:10	13	24.7	4.96	1.34	0.57	0.33	0.43	-5.0	5.71	0.56	2.68	1.94	-	162	-	-	1.31	0.48
1/16/89	12:30	7.5	24.3	5.17	1.43	0.60	0.36	0.21	-2.5	5.77	0.59	2.65	1.93	-	162	-	-	1.54	0.39
1/31/89	15:15	-	24.6	5.08	1.43	0.60	0.42	0.21	-5.5	5.82	0.57	2.69	2.18	-	110	-	-	1.12	0.39
2/6/89	15:15	4.9	24.1	5.35	1.42	0.51	0.39	0.19	-5.0	5.80	0.59	2.72	2.15	-	170	-	-	1.28	0.45
2/20/89	13:50	12	25.3	5.05	1.47	0.49	0.39	0.20	-2.5	5.76	0.64	2.67	2.45	-	158	-	-	1.01	0.57
2/21/89	17:30	1322	24.6	4.77	1.17	0.36	0.26	0.41	-7.5	4.54	0.45	1.20	2.65	-	252	-	-	3.17	0.45
2/22/89	9:30	807	28.9	4.72	1.23	0.39	0.27	0.26	-15.0	5.39	0.55	1.58	3.23	-	282	-	-	2.70	0.46
2/27/89	13:50	83	26.0	5.09	1.58	0.71	0.36	0.22	10.0	5.66	0.62	2.49	2.47	-	210	-	-	1.06	0.53
3/6/89	16:40	19	26.6	5.00	1.57	0.68	0.37	0.25	2.5	5.69	0.61	2.54	2.56	-	156	-	-	1.15	0.41
3/13/89	13:45	14	25.2	5.13	1.58	0.67	0.37	0.21	-5.0	5.65	0.60	2.59	2.20	-	118	-	-	0.97	0.62
3/18/89	12:50	594	24.4	4.67	1.30	0.61	0.31	0.46	-2.5	4.88	0.60	1.61	2.47	-	232	223	37	3.70	0.48
3/26/89	18:00	394	23.0	5.40	1.25	0.54	0.24	0.32	-5.0	4.57	0.48	1.60	2.16	-	200	189	-	3.46	0.67
3/27/89	16:00	734	20.9	5.07	1.13	0.52	0.23	0.34	-2.5	4.12	0.58	-	2.15	-	182	163	35	3.36	0.54
3/28/89	10:00	887	21.5	4.86	1.03	0.40	0.19	0.35	5.0	4.04	0.39	1.14	2.07	-	240	226	43	3.71	0.59
3/28/89	14:00	1438	19.9	4.68	0.79	0.34	0.16	0.43	-7.5	3.28	0.36	0.87	1.66	-	222	213	53	4.92	0.79
3/29/89	0:00	1112	22.3	4.90	0.88	0.39	0.17	0.52	12.5	3.69	0.41	1.08	1.81	-	248	-	-	5.53	0.58
3/30/89	20:00	243	29.2	4.58	1.37	0.62	0.27	0.58	-15.0	5.20	0.60	1.73	2.94	-	304	314	64	4.88	0.63
3/31/89	22:00	87	29.6	4.77	1.25	0.52	0.26	0.53	-22.5	5.18	0.59	1.36	3.05	-	380	367	66	5.94	0.50
4/1/89	4:00	69	30.6	4.73	1.30	0.51	0.28	0.51	-15.0	5.52	0.61	1.38	3.41	-	388	-	-	5.57	0.43
4/3/89	13:00	32	28.8	4.79	1.50	0.59	0.27	0.43	0.0	5.64	0.60	1.86	2.88	-	131	-	-	2.52	0.44
4/5/89	17:00	98	31.2	4.59	1.40	0.62	0.28	0.45	-17.5	5.60	0.58	1.70	2.96	-	304	-	-	3.73	-
4/6/89	1:00	180	31.8	4.63	1.38	0.62	0.28	0.48	-15.0	5.49	0.60	1.60	2.93	-	308	-	-	4.26	-
4/6/89	5:00	217	33.2	4.56	1.35	0.60	0.26	0.54	-20.0	5.55	0.82	1.35	3.09	-	380	-	-	5.31	-
4/6/89	13:00	134	32.7	4.65	1.39	0.62	0.29	0.49	-15.0	5.57	0.61	1.43	3.14	-	300	-	-	4.73	-
4/7/89	17:00	67	29.8	4.96	1.47	0.68	0.28	0.44	-5.0	5.70	0.67	1.87	3.11	-	244	-	-	2.79	0.36
4/7/89	17:35	67	27.6	4.79	-	-	-	-	-5.0	-	-	-	-	-	228	-	-	-	-
4/10/89	12:10	29	28.3	4.86	1.60	0.69	0.31	0.37	0.0	5.72	0.61	2.23	2.75	-	240	-	-	2.02	0.47

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
4/16/89	10:10	103	30.3	4.72	1.60	0.69	0.31	0.36	-17.5	5.74	0.62	1.92	3.14	-	304	324	40	2.62	0.41
4/28/89	13:45	18	25.6	4.97	1.49	0.67	0.33	0.29	-1.5	5.82	0.58	2.16	2.01	-	206	-	-	-	-
4/30/89	12:30	26	26.3	4.89	1.39	0.64	0.33	0.28	-8.0	5.94	0.63	1.94	2.19	-	214	-	-	1.72	0.38
5/1/89	19:00	29	27.4	4.85	1.53	0.70	0.38	0.32	0.0	5.92	0.60	1.95	2.23	-	262	207	30	1.72	-
5/1/89	23:26	126	28.6	4.80	1.20	0.47	0.29	0.24	-7.5	5.87	0.61	1.88	2.40	-	234	186	38	4.44	-
5/1/89	23:43	167	28.7	4.84	1.03	0.46	0.26	0.25	-7.0	5.83	0.61	1.87	2.47	-	256	234	38	-	-
5/2/89	0:08	225	29.4	4.74	0.99	0.41	0.21	0.22	-9.5	5.84	0.61	1.88	2.54	-	268	252	39	3.41	-
5/2/89	0:35	287	30.8	4.68	0.94	0.42	0.23	0.23	-12.0	5.91	0.63	1.85	2.74	-	354	270	50	3.70	-
5/2/89	3:43	391	38.4	4.49	1.30	0.56	0.28	0.49	-29.0	5.97	0.71	1.76	3.90	-	592	264	16	6.70	-
5/2/89	6:32	355	38.5	4.47	0.48	0.18	0.12	0.17	-28.0	5.97	0.69	1.66	4.13	-	543	502	92	3.88	-
5/2/89	7:54	314	39.9	4.49	0.87	0.35	0.19	0.32	-28.0	5.96	0.68	1.74	4.20	-	580	525	91	6.47	-
5/2/89	10:12	84	37.5	4.51	1.31	0.52	0.32	0.51	-25.0	5.70	0.67	1.64	4.16	-	562	479	99	6.26	-
5/2/89	10:15	26	37.6	4.47	1.46	0.65	0.30	0.56	-28.0	5.69	0.66	1.56	4.15	-	608	495	94	5.90	0.40
5/2/89	12:05	403	38.6	4.45	1.43	0.62	0.33	0.61	-31.5	5.67	0.66	1.49	4.38	-	658	519	113	-	-
5/2/89	15:00	372	37.6	4.44	1.18	0.60	0.29	0.52	-28.0	5.46	0.67	1.61	4.20	-	526	-	-	7.27	-
5/2/89	17:00	319	37.1	4.45	1.26	0.62	0.29	0.50	-26.0	5.48	0.67	1.63	4.17	-	523	-	-	7.25	-
5/2/89	19:00	270	36.5	4.50	1.29	0.59	0.27	0.44	-26.2	5.66	0.65	1.59	4.21	-	496	453	76	5.09	-
5/2/89	23:00	185	35.5	4.39	1.30	0.63	0.28	0.45	-20.5	5.58	0.69	1.71	4.17	-	495	-	-	5.38	-
5/3/89	3:00	145	35.1	4.54	1.36	0.67	0.30	0.42	-17.5	5.64	0.66	.	4.08	-	444	437	63	3.70	-
5/3/89	7:00	122	34.1	4.55	1.28	0.67	0.29	0.40	-14.0	5.62	0.71	1.85	4.03	-	429	-	-	4.36	-
5/3/89	11:00	100	33.5	4.57	1.34	0.66	0.29	0.39	-15.5	5.62	0.71	1.90	3.91	-	442	-	-	3.91	-
5/3/89	13:00	92	33.3	4.62	1.31	0.62	0.29	0.36	-13.4	5.77	0.65	-	3.90	-	420	373	51	3.51	-
5/5/89	14:00	37	29.5	4.78	1.52	0.64	0.31	0.30	-11.0	5.73	0.68	2.00	3.06	-	260	-	-	2.49	0.48
5/6/89	16:00	371	34.2	4.47	1.31	0.49	0.24	0.50	-29.0	6.28	0.63	1.36	3.52	-	476	441	87	7.43	-
5/6/89	18:00	300	34.3	4.43	1.20	0.52	0.24	0.49	-27.0	5.42	0.55	1.39	5.16	-	456	434	85	4.73	-
5/6/89	22:00	222	34.1	4.52	1.13	0.54	0.25	0.46	-24.0	5.05	0.53	1.59	3.84	-	441	-	-	5.22	-
5/6/89	24:00	213	34.0	4.51	1.13	0.55	0.25	0.46	-23.0	5.13	0.54	1.56	3.88	-	442	-	-	5.05	-
5/7/89	2:00	202	34.0	4.51	1.12	0.57	0.26	0.45	-25.0	5.12	0.54	1.63	3.84	-	434	-	-	4.36	-
5/7/89	8:00	124	33.2	4.51	1.15	0.57	0.26	0.43	-20.0	5.23	0.55	-	3.73	-	443	-	-	4.06	-
5/7/89	11:15	122	32.1	4.56	1.34	0.60	0.29	0.45	-17.5	5.26	0.58	1.61	3.81	-	437	-	-	3.70	0.35
5/7/89	18:00	103	32.0	4.57	1.42	0.57	0.26	0.41	-17.5	4.90	0.53	1.66	3.84	-	366	387	63	4.52	-
5/10/89	0:00	43	30.0	4.45	1.09	0.48	0.23	0.39	-31.0	5.15	0.45	1.28	3.01	-	249	-	-	4.98	-
5/10/89	15:40	155	29.0	4.59	1.36	0.60	0.28	0.36	-15.0	5.50	0.58	1.80	2.96	-	335	-	-	2.95	0.32
5/10/89	20:00	527	31.4	4.47	1.08	0.47	0.23	0.41	-27.5	5.04	0.47	1.37	2.99	-	464	638	133	5.94	-
5/11/89	2:00	746	30.3	4.50	1.17	0.49	0.24	0.40	-25.0	5.12	0.49	1.38	2.98	-	476	508	124	5.05	-
5/11/89	6:00	612	27.6	4.50	1.17	0.52	0.25	0.39	-28.0	-	-	1.44	-	-	386	-	-	4.99	-
5/11/89	8:00	538	30.1	4.52	1.16	0.52	0.25	0.39	21.0	5.14	0.52	1.46	2.93	-	453	278	208	4.42	-
5/11/89	12:00	428	30.3	4.52	1.12	0.46	0.22	0.33	-23.0	5.32	0.51	1.51	3.03	-	364	v	-	4.67	-
5/11/89	12:45	402	31.0	4.46	1.14	0.48	0.23	0.41	-26.0	5.11	0.48	1.33	3.05	-	479	484	77	4.65	0.33
5/11/89	18:00	272	30.1	4.52	1.21	0.55	0.26	0.38	-25.0	5.38	0.58	1.52	3.01	-	361	-	-	3.42	-
5/12/89	2:00	174	29.2	4.59	1.22	0.55	0.26	0.38	-19.5	5.36	0.52	1.76	2.81	-	325	-	-	3.62	-
5/12/89	15:00	130	30.6	4.57	1.19	0.52	0.25	0.36	-17.5	5.39	0.54	1.61	2.94	-	404	-	-	3.36	0.39
5/13/89	13:00	78	28.6	4.65	1.35	0.60	0.28	0.37	-23.0	5.56	0.54	1.71	2.90	-	296	-	-	0.30	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
5/14/89	11:55	57	29.0	4.66	1.22	0.61	0.25	0.34	-12.0	5.67	0.56	1.96	2.69	-	312	-	-	0.33	-
5/15/89	13:15	57	29.4	4.65	1.33	0.64	0.27	0.36	-9.0	5.78	0.57	1.88	2.68	-	306	-	-	0.31	-
5/16/89	11:45	50	28.9	4.69	1.25	0.58	0.26	0.34	-12.5	5.60	0.54	1.90	2.38	-	269	-	-	2.45	-
5/16/89	12:00	51	28.9	4.68	1.23	0.58	0.26	0.33	-13.0	5.60	0.64	1.94	2.37	-	362	-	-	3.79	-
5/16/89	18:00	424	31.0	4.52	1.06	0.48	0.22	0.34	-23.0	4.92	0.45	1.56	2.18	-	493	746	107	6.15	-
5/16/89	24:00	315	29.1	4.49	1.00	0.42	0.17	0.40	-21.0	4.39	0.36	1.15	2.23	-	498	530	137	8.36	-
5/17/89	6:00	208	29.7	4.47	0.95	0.40	0.18	0.41	-25.5	-	-	1.19	-	-	496	560	130	8.46	-
5/17/89	9:15	185	30.9	4.48	1.02	0.48	0.21	0.39	-26.0	4.90	0.37	1.24	2.49	-	235	-	-	5.28	-
5/17/89	10:00	391	31.3	4.50	1.01	0.44	0.19	0.38	-26.5	4.91	0.36	1.28	2.42	-	438	-	-	6.24	-
5/17/89	13:00	300	30.5	4.50	1.02	0.47	0.19	0.38	-24.0	4.99	0.40	1.37	2.43	-	418	-	-	5.43	-
5/17/89	16:00	256	30.6	4.52	1.01	0.47	0.20	0.37	-25.0	5.03	0.39	1.43	2.39	-	420	-	-	5.46	-
5/17/89	19:00	234	30.4	4.52	1.07	0.48	0.21	0.38	-21.0	5.13	0.41	1.48	2.42	-	395	-	-	5.23	-
5/18/89	10:15	122	29.2	4.62	1.14	0.50	0.22	0.35	-16.0	5.30	0.46	1.68	2.45	-	355	-	-	-	-
5/24/89	10:18	52	27.2	4.69	1.25	0.60	0.27	0.35	-11.0	5.64	0.53	1.92	1.83	-	242	-	-	2.87	-
5/25/89	11:21	47	27.9	4.61	1.25	0.60	0.27	0.35	-12.0	5.68	0.52	2.04	1.81	-	274	-	-	3.18	-
5/27/89	11:15	32	26.6	4.72	1.31	0.61	0.28	0.33	-13.0	5.73	0.53	2.05	1.76	-	240	-	-	2.63	-
5/30/89	12:05	25	26.1	4.92	1.31	0.59	0.29	0.31	-5.5	5.55	0.53	2.31	1.61	-	141	-	-	2.22	0.38
6/7/89	14:50	-	25.1	4.92	1.33	0.60	0.31	0.30	-6.5	5.55	0.51	2.26	1.42	-	217	-	-	2.05	-
6/10/89	2:00	-	30.9	4.50	1.10	0.47	0.24	0.29	16.0	5.65	0.45	2.00	1.91	-	489	-	-	-	-
6/10/89	11:50	-	30.1	4.51	1.12	0.51	0.27	0.27	-18.5	5.63	0.44	2.06	1.75	-	357	-	-	5.22	0.31
6/15/89	14:45	-	28.7	4.58	1.12	0.50	0.26	0.26	-16.0	5.70	0.41	-	1.38	-	396	-	-	4.64	0.36
6/15/89	21:00	-	28.6	4.61	1.05	0.44	0.23	0.21	-16.0	5.66	0.42	1.95	1.35	-	95	-	-	4.96	-
6/16/89	3:00	-	28.4	4.58	1.13	0.53	0.26	0.24	-15.0	4.80	0.36	1.98	1.14	-	387	-	-	4.92	-
6/16/89	9:00	-	28.5	4.57	0.75	0.36	0.21	0.19	-17.5	5.71	0.40	1.89	1.30	-	404	-	-	5.01	-
6/23/89	10:46	22	24.2	4.78	1.14	0.52	0.29	0.20	-7.0	5.70	0.50	2.29	1.19	-	239	-	-	2.12	-
7/5/89	13:30	1.9	24.1	4.82	1.27	0.56	0.33	0.24	-7.5	5.33	0.48	-	1.08	-	205	-	-	2.41	0.38
7/13/89	15:30	1.4	23.4	4.91	1.20	0.54	0.34	0.20	-5.0	5.70	0.53	-	0.90	-	174	-	-	2.00	0.34
7/20/89	12:00	1.4	22.6	5.05	1.22	0.56	0.34	0.21	-8.7	5.60	0.52	-	0.89	-	133	-	-	1.85	0.62
7/20/89	14:00	1.5	21.2	4.95	1.17	0.55	0.33	0.22	-8.4	5.40	0.50	-	0.85	-	104	-	-	3.00	-
7/20/89	18:00	1.6	23.4	4.98	1.40	0.56	0.34	0.21	-10.7	5.33	0.49	-	0.88	-	129	-	-	2.85	-
7/20/89	20:00	1.6	23.2	4.90	1.95	0.58	0.37	0.21	-11.1	5.54	0.51	-	0.94	-	146	-	-	2.67	-
7/20/89	22:00	1.6	23.1	4.90	1.67	0.56	0.34	0.20	-11.9	5.56	0.51	-	0.96	-	140	-	-	2.86	-
7/21/89	9:45	1.5	22.9	4.96	1.17	0.57	0.34	0.19	-12.0	5.56	0.51	-	0.94	-	149	-	-	1.75	0.37
7/27/89	16:40	1.3	21.9	4.91	1.23	0.58	0.37	0.18	1.7	5.72	0.52	-	0.79	-	128	-	-	1.60	0.39
8/2/89	15:30	1.3	21.5	4.92	1.24	0.52	0.37	0.19	8.4	5.66	0.52	2.50	0.78	-	145	-	-	2.01	-
8/2/89	15:42	1.3	22.5	4.90	1.18	0.55	0.37	0.19	-11.0	5.66	0.52	2.55	0.87	-	157	-	-	2.03	0.40
8/3/89	11:15	1.3	26.3	6.10	2.78	0.60	0.41	0.21	40.7	6.47	0.66	2.69	1.48	-	21	-	-	2.90	-
8/8/89	17:30	1.2	22.4	4.86	1.20	0.56	0.36	0.18	-10.6	5.60	0.52	2.54	0.87	-	124	-	-	1.70	0.36
8/8/89	17:35	1.2	22.5	4.87	1.24	0.56	0.36	0.18	-8.4	5.57	0.52	2.52	0.89	-	126	-	-	1.74	-
8/8/89	17:35	1.2	22.6	4.89	2.39	0.57	0.38	0.19	-9.7	5.57	0.52	2.60	0.88	-	133	-	-	2.22	-
8/17/89	10:15	1.3	21.5	5.03	1.20	0.55	0.36	0.18	-8.5	5.52	0.50	2.58	0.88	-	138	-	-	1.66	0.38
8/23/89	10:27	1.2	21.2	5.02	1.21	0.55	0.36	0.18	-10.2	5.46	0.51	2.76	0.83	-	101	-	-	1.46	0.37
8/29/89	18:35	1.2	22.1	4.91	1.24	0.56	0.39	0.26	-6.1	5.62	0.53	2.49	0.89	-	-	-	-	1.65	0.51

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
8/29/89	19:30	1.3	22.9	4.98	1.23	0.57	0.39	0.26	0.0	5.58	0.52	2.57	0.89	-	120	-	-	2.30	-
8/29/89	20:30	1.3	23.1	4.92	1.40	0.54	0.38	0.26	-7.2	5.66	0.54	-	0.90	-	121	-	-	2.30	-
8/30/89	11:10	1.2	21.4	4.96	1.25	0.57	0.40	0.17	-6.2	5.54	0.53	2.63	0.87	-	110	-	-	1.37	0.39
9/14/89	13:13	1.4	21.8	5.02	1.13	0.52	0.36	0.32	-6.9	4.89	0.51	2.52	0.84	-	109	-	-	2.52	-
9/14/89	15:05	1.4	22.9	5.03	1.25	0.56	0.37	0.31	-5.3	5.07	0.51	2.57	0.93	-	152	-	-	2.91	-
9/14/89	15:20	1.5	22.6	4.93	1.23	0.57	0.39	0.30	-7.9	5.44	0.54	2.63	0.99	-	146	-	-	2.07	0.38
9/14/89	19:22	1.4	23.2	5.03	1.27	0.60	0.39	0.27	-5.3	4.68	0.46	2.70	0.94	-	105	-	-	2.40	-
9/17/89	0:02	1.4	21.4	5.13	1.21	0.55	0.50	0.25	5.2	5.44	0.54	2.70	0.92	-	104	-	-	2.42	-
9/17/89	2:58	1.4	21.1	4.98	1.24	0.54	0.67	0.25	-3.6	5.28	0.53	2.74	0.92	-	237	-	-	2.23	-
9/17/89	3:52	1.5	21.4	5.03	1.29	0.56	0.58	0.26	-5.3	5.41	0.53	2.73	0.94	-	251	-	-	2.33	-
9/17/89	13:26	1.4	21.4	5.16	1.29	0.58	0.51	0.22	-9.2	5.38	0.54	2.81	0.94	-	278	-	-	2.14	-
9/19/89	14:00	1.3	21.1	5.08	1.54	0.56	0.86	0.23	-7.9	5.32	0.52	2.71	0.82	-	371	-	-	2.45	0.36
9/19/89	18:30	1.4	20.6	4.99	1.09	0.50	0.35	0.21	-5.3	4.95	0.50	2.79	0.72	-	101	147	111	2.24	-
9/19/89	18:53	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	20:20	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	21:05	1.7	19.7	5.07	1.11	0.53	0.34	0.27	-5.3	4.94	0.49	2.84	0.81	-	116	-	-	2.37	-
9/19/89	21:13	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	22:01	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	22:27	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	22:32	2.2	22.0	4.99	1.11	0.51	0.31	0.36	2.7	4.93	0.48	2.81	0.99	-	192	187	90	4.00	.
9/20/89	14:30	3.2	33.4	4.36	1.12	0.50	0.22	0.26	-25.4	5.21	0.42	2.30	1.32	-	737	465	218	9.39	0.55
9/20/89	15:40	3.1	32.9	4.35	1.04	0.45	0.31	0.25	-38.8	5.24	0.42	2.16	1.28	-	462	473	310	9.26	0.69
9/20/89	17:00	3.0	31.9	4.40	1.23	0.45	0.33	0.26	-30.7	6.88	0.64	2.42	1.79	-	470	-	-	8.47	-
9/20/89	20:22	2.7	31.2	4.42	1.19	0.49	0.32	0.25	-22.9	5.40	0.40	2.71	1.13	-	430	-	-	7.50	-
9/20/89	22:56	2.5	29.3	4.45	0.88	0.50	0.35	0.24	-28.5	5.40	0.43	2.26	1.06	-	421	392	221	7.45	0.53
9/21/89	3:32	2.4	29.3	4.53	1.17	0.52	0.33	0.26	-13.3	5.46	0.43	2.74	1.02	-	371	-	-	6.28	-
9/21/89	17:10	2.1	26.7	4.66	1.07	0.53	0.36	0.22	-18.2	5.61	0.43	2.39	0.89	-	307	277	130	4.79	0.62
9/22/89	15:15	1.8	25.0	4.71	1.57	0.55	0.74	0.26	-11.5	5.52	0.43	2.84	0.86	-	690	294	81	4.01	-
9/22/89	20:00	2.1	25.1	4.74	1.43	0.51	0.85	0.30	-10.7	5.40	0.52	2.43	0.74	-	596	236	103	7.10	-
9/23/89	2:00	2.6	28.5	4.59	1.56	0.51	0.97	0.28	-20.1	5.50	0.53	2.38	0.67	-	589	355	156	5.74	-
9/23/89	14:00	2.3	28.1	4.58	1.87	0.52	1.34	0.26	-15.8	5.69	0.51	2.42	0.63	-	480	336	117	5.45	-
9/23/89	20:00	2.3	29.5	4.62	2.49	0.53	2.00	0.28	-14.1	5.68	0.51	2.37	0.65	-	686	322	132	4.89	-
9/24/89	0:01	2.3	27.9	4.61	2.44	0.54	1.87	0.26	-14.9	5.86	0.50	2.38	0.66	-	546	318	177	5.26	-
9/24/89	6:00	2.2	27.0	4.61	2.13	0.54	1.56	0.24	-10.5	5.71	0.48	2.34	0.66	-	428	316	124	4.97	-
9/24/89	14:00	1.8	26.6	4.68	1.58	0.54	1.00	0.22	-11.9	5.81	0.52	2.55	0.69	-	598	291	124	4.57	0.40
9/24/89	14:00	1.8	26.8	4.67	1.46	0.53	0.85	0.21	-10.5	5.78	0.54	2.35	0.68	-	415	365	102	4.41	.
9/26/89	13:30	2.2	25.3	4.68	1.27	0.55	0.61	0.22	-15.0	5.63	0.51	2.29	0.90	-	364	-	-	3.94	0.33
10/2/89	10:24	24	24.4	4.79	1.39	0.60	0.62	0.24	-8.5	5.80	0.51	2.22	0.95	-	475	-	-	3.01	-
10/2/89	13:13	46	23.8	4.81	-	-	-	-	-4.1	5.58	0.58	2.64	0.97	-	234	-	-	2.92	0.53
10/2/89	14:27	76	24.8	4.82	1.38	0.58	0.56	0.34	-2.6	5.53	0.58	1.99	0.97	-	420	-	-	3.97	-
10/3/89	6:26	50	25.4	4.81	1.38	0.59	0.58	0.37	5.1	5.55	0.59	2.02	1.01	-	433	-	-	4.37	-
10/11/89	15:05	19	23.6	5.91	1.32	0.62	0.46	0.27	-5.7	5.82	0.60	2.36	0.92	-	203	-	-	2.40	0.35
10/15/89	14:10	21	23.7	4.93	1.35	0.64	0.37	0.26	-5.4	5.84	0.61	2.29	1.06	-	156	-	-	2.40	0.34

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/17/89	10:20	16	23.7	4.81	1.31	0.59	0.35	0.27	-5.6	5.65	0.57	2.18	0.98	-	155	-	-	2.35	0.56
10/17/89	10:25	16	23.4	4.95	1.28	0.58	0.35	0.27	-2.1	5.66	0.56	2.42	0.98	-	94	-	-	2.77	-
10/17/89	14:00	25	22.9	4.98	1.28	0.58	0.37	0.32	-5.6	5.62	0.57	2.47	0.92	-	115	-	-	2.59	-
10/17/89	16:00	37	24.2	4.97	1.31	0.61	0.37	0.38	-8.9	5.71	0.59	2.48	1.01	-	154	-	-	3.12	-
10/17/89	20:00	44	25.6	4.92	1.33	0.63	0.37	0.38	-9.2	5.78	0.63	2.55	1.24	-	163	-	-	3.54	-
10/18/89	2:00	39	25.9	4.80	1.33	0.62	0.37	0.33	-6.6	5.87	0.65	2.48	1.20	-	176	-	-	4.28	-
10/18/89	17:55	26	26.1	4.82	1.33	0.62	0.37	0.28	-6.4	5.92	0.66	2.53	1.10	-	197	-	-	3.33	-
10/19/89	12:30	27	24.6	5.12	1.31	0.58	0.34	0.29	-5.3	5.68	0.62	2.07	1.06	-	215	-	-	3.13	0.40
10/19/89	14:40	40	25.5	4.85	1.30	0.63	0.35	0.30	-9.9	5.74	0.63	2.05	1.09	-	246	-	-	3.32	0.43
10/20/89	13:30	614	37.2	4.38	1.08	0.47	0.24	0.63	-45.3	4.89	0.65	1.55	2.34	-	545	481	244	10.12	0.56
10/20/89	14:00	664	36.5	4.31	1.13	0.46	0.24	0.65	-33.1	4.76	0.61	1.75	2.33	-	334	-	-	11.67	-
10/20/89	16:00	728	37.9	4.31	1.07	0.46	0.24	0.64	-34.9	4.67	0.60	1.80	2.65	-	416	-	-	11.20	-
10/20/89	18:00	652	37.7	4.27	1.10	0.47	0.26	0.55	-35.7	4.63	0.58	1.77	2.69	-	437	-	-	10.55	-
10/20/89	23:59	339	36.2	4.31	1.10	0.49	0.24	0.43	-38.3	4.88	0.57	1.87	2.60	-	357	-	-	7.61	-
10/21/89	6:00	194	34.4	4.38	1.15	0.54	0.25	0.38	-25.8	5.21	0.60	1.97	2.41	-	402	-	-	5.95	-
10/21/89	12:00	139	32.5	4.42	1.19	0.55	0.27	0.35	-16.6	5.23	0.57	2.03	2.29	-	353	-	-	5.02	-
10/21/89	15:05	125	31.9	4.52	1.23	0.55	0.25	0.33	-24.1	5.31	0.58	2.02	2.27	-	274	-	-	5.05	0.38
10/22/89	17:50	59	29.1	4.63	1.30	0.59	0.28	0.29	-19.2	5.49	0.56	2.07	1.99	-	236	-	-	3.62	0.37
10/31/89	0:00	24	30.8	4.49	1.23	0.55	0.28	0.31	-24.5	5.41	0.61	-	1.82	-	231	397	220	6.79	-
10/31/89	16:40	46	25.6	4.76	1.25	0.59	0.34	0.34	1.1	5.51	0.56	2.61	1.50	-	156	-	-	-	-
10/31/89	18:00	65	26.1	4.66	1.32	0.58	0.31	0.30	-12.2	5.65	0.59	2.59	1.56	-	150	-	-	3.24	-
10/31/89	20:00	79	26.9	4.68	1.36	0.59	0.33	0.30	-12.2	5.58	0.59	2.57	1.68	-	170	247	79	3.78	-
10/31/89	22:00	128	27.4	4.62	1.27	0.58	0.29	0.30	-15.2	5.46	0.59	2.46	1.74	-	157	-	-	4.10	-
11/1/89	2:00	175	33.7	4.40	1.24	0.52	0.28	0.30	-31.6	5.41	0.63	2.46	2.00	-	260	-	-	8.39	-
11/1/89	6:00	116	33.9	4.41	1.19	0.53	0.27	0.28	-32.0	5.46	0.63	2.56	2.04	-	270	-	-	8.01	-
11/1/89	10:00	77	32.4	4.47	1.23	0.55	0.28	0.27	-26.2	5.50	0.63	2.59	1.99	-	266	-	-	6.99	-
11/1/89	16:00	59	30.5	4.55	1.24	0.56	0.31	0.26	-21.8	5.60	0.62	2.51	1.84	-	231	395	152	5.32	-
11/1/89	16:01	59	29.6	4.59	1.26	0.56	0.28	0.26	-11.7	5.59	0.62	2.42	1.84	-	320	-	-	5.28	0.32
11/2/89	2:00	43	28.8	4.64	1.25	0.58	0.29	0.25	-16.8	5.67	0.61	2.54	1.80	-	212	-	-	4.28	-
11/2/89	15:00	38	27.4	4.70	1.28	0.60	0.30	0.25	-13.3	5.75	0.60	2.54	1.70	-	190	-	-	3.18	0.39
11/3/89	14:45	34	26.6	4.67	1.31	0.61	0.31	0.24	-13.9	5.81	0.59	2.82	1.69	-	170	-	-	2.59	0.30
11/6/89	11:41	27	26.4	4.75	1.39	0.63	0.31	0.24	-15.0	5.94	0.59	2.72	1.80	-	150	-	-	2.34	0.36
11/9/89	10:20	36	25.5	4.86	1.30	0.59	0.32	0.27	-10.4	5.78	0.56	2.59	1.58	-	161	-	-	3.36	1.80
11/10/89	10:20	50	30.9	4.56	1.28	0.59	0.29	0.25	-19.6	5.76	0.57	2.53	2.21	-	296	-	-	4.71	0.50
11/16/89	12:30	66	28.0	4.72	1.36	0.57	0.32	0.32	-14.8	5.66	0.62	2.47	2.00	-	207	256	81	3.46	-
11/16/89	14:00	98	28.4	4.66	1.50	0.62	0.32	0.33	-16.1	5.72	0.64	2.40	2.19	-	245	242	-	3.40	0.36
11/16/89	14:30	119	29.4	4.69	1.34	0.61	0.32	0.33	-17.7	5.68	0.65	2.39	2.22	-	253	-	-	3.70	-
11/16/89	15:15	145	29.7	4.61	-	-	-	-	-20.1	5.69	0.66	2.37	2.35	-	280	312	110	3.93	0.33
11/16/89	16:30	145	31.6	4.63	1.31	0.58	0.30	0.32	-24.9	5.73	0.62	2.34	2.33	-	387	-	-	4.59	-
11/16/89	18:30	118	33.3	4.56	1.44	0.57	0.30	0.31	-31.7	5.82	0.64	2.36	2.46	-	441	-	-	5.54	-
11/16/89	22:30	80	33.5	4.52	1.29	0.58	0.29	0.28	-29.5	5.87	0.63	2.39	2.50	-	467	-	-	5.10	-
11/17/89	2:30	62	32.6	4.53	1.30	0.60	0.29	0.28	-24.4	5.93	0.63	2.43	2.46	-	436	-	-	4.86	-
11/17/89	9:15	51	30.4	4.64	1.32	0.60	0.31	0.26	-20.9	5.91	0.64		2.39	-	321	366	-	3.63	0.38

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
11/24/89	11:00	22	26.4	4.88	1.37	0.66	0.32	0.21	-5.3	5.84	0.61	2.62	2.09	-	239	261	46	1.88	0.46
11/27/89	18:00	21	26.1	4.87	1.41	0.67	0.33	0.22	-6.6	5.79	0.55	2.62	2.04	-	290	-	-	1.89	-
11/28/89	4:00	21	26.3	4.88	1.43	0.66	0.33	0.24	-8.9	5.77	0.58	2.58	2.13	-	293	-	-	1.99	-
11/28/89	6:00	26	26.5	4.87	1.43	0.66	0.33	0.26	-8.2	5.82	0.61	2.55	2.16	-	299	-	-	1.94	-
11/28/89	8:00	30	26.7	4.86	1.49	0.65	0.33	0.25	-5.9	5.80	0.55	2.58	2.21	-	328	-	-	2.03	-
11/28/89	10:00	32	27.1	4.90	1.51	0.66	0.36	0.25	-9.6	5.89	0.59	-	2.28	-	264	232	-	2.14	0.56
11/28/89	14:00	37	27.0	4.85	1.46	0.67	0.32	0.24	-8.8	5.79	0.58	2.54	2.29	-	350	-	-	2.37	-
11/28/89	15:10	37	26.8	4.85	1.48	0.67	0.32	0.24	-12.7	5.84	0.56	2.56	2.32	-	301	-	-	1.83	-
11/28/89	16:00	36	27.3	4.84	1.45	0.67	0.33	0.24	-9.2	5.83	0.56	2.56	2.32	-	368	-	-	2.10	-
11/28/89	22:00	32	27.2	4.85	1.43	0.67	0.33	0.24	-10.9	5.80	0.57	2.54	2.35	-	336	-	-	2.15	-
11/29/89	2:00	30	27.0	4.87	1.44	0.68	0.32	0.23	-5.4	5.78	0.56	2.58	2.34	-	342	-	-	2.17	-
11/29/89	6:00	27	27.0	4.86	1.46	0.66	0.32	0.24	-8.6	5.79	0.56	2.58	2.34	-	340	-	-	2.13	-
11/29/89	10:00	24	26.9	4.86	1.49	0.67	0.33	0.24	-11.3	5.89	0.60	2.64	2.34	-	350	-	-	1.88	-
12/8/89	12:20	30	25.8	4.94	1.43	0.69	0.36	0.21	-3.3	5.80	0.57	2.74	2.23	-	191	-	-	1.61	0.48
12/17/89	12:05	13	24.5	4.99	1.40	0.68	0.36	0.23	-4.9	5.68	0.57	2.82	2.24	-	172	-	-	1.60	0.69
12/20/89	14:15	15	25.5	4.97	1.49	0.70	0.38	0.23	-5.1	5.64	0.56	2.69	2.24	-	148	-	-	1.66	0.49
12/30/89	11:45	11	24.9	5.04	1.53	0.68	0.40	0.23	-1.9	5.54	0.56	2.69	2.31	-	148	-	-	1.32	0.68
12/31/89	16:15	22	28.1	4.92	1.55	0.71	0.36	0.37	-5.4	5.92	0.60	2.41	3.12	-	179	-	-	1.58	0.64
1/1/90	10:25	28	28.0	4.90	1.56	0.74	0.35	0.28	-5.4	5.72	0.57	2.45	3.45	-	189	-	-	1.46	0.50
1/11/90	11:00	8.9	25.2	4.99	1.50	0.72	0.39	0.23	-4.1	5.67	0.60	2.69	2.70	-	166	-	-	-	-
1/17/90	11:30	8.9	25.3	5.01	1.50	0.69	0.38	0.21	-5.4	5.58	0.58	2.65	2.57	-	153	-	-	1.11	0.46
1/18/90	9:00	15	26.3	4.94	1.54	0.71	0.38	0.22	-7.8	5.61	0.58	2.64	2.91	-	167	-	-	1.22	0.46
1/18/90	16:25	25	28.0	4.96	1.53	0.69	0.36	0.24	-5.3	5.50	0.56	2.48	3.22	-	193	-	-	1.54	0.43
1/19/90	7:30	15	29.2	4.85	1.60	0.73	0.36	0.23	-6.9	5.65	0.58	2.53	3.91	-	251	-	-	1.74	0.44
1/25/90	12:25	11	27.4	4.92	1.59	0.70	0.38	0.24	-5.1	5.66	0.56	2.42	3.25	-	156	-	-	1.61	0.57
1/25/90	16:30	17	28.5	4.87	1.57	0.75	0.38	0.28	-6.6	5.80	0.57	2.30	3.30	-	-	-	-	1.78	0.50
1/25/90	18:59	24	28.8	4.89	1.56	0.74	0.38	0.28	-6.6	5.69	0.55	2.24	3.42	-	152	218	39	3.55	-
1/25/90	21:59	49	29.8	4.77	1.52	0.72	0.36	0.34	-8.6	5.63	0.52	2.05	3.88	-	-	-	-	2.82	-
1/26/90	0:59	197	33.5	4.63	1.53	0.71	0.30	0.38	-15.0	5.24	0.49	1.78	4.41	-	276	-	62	3.75	-
1/26/90	3:59	295	39.4	4.45	1.42	0.66	0.28	0.45	-29.4	5.21	0.54	1.48	5.85	-	440	520	97	4.89	-
1/26/90	7:10	263	41.2	4.38	1.38	0.63	0.31	0.47	-34.3	5.26	0.53	1.44	6.57	-	461	-	-	4.61	0.51
1/26/90	9:59	175	41.2	4.43	1.43	0.65	0.28	0.42	-31.3	5.19	0.54	1.48	6.57	-	392	515	107	5.24	-
1/26/90	11:00	154	39.7	4.43	1.38	0.70	0.29	0.37	-28.6	5.37	0.48	1.68	6.35	-	588	-	-	-	-
1/26/90	13:15	118	39.3	4.49	-	-	-	-	-31.3	-	-	-	-	-	-	-	-	-	-
1/27/90	3:59	45	36.5	4.59	1.59	0.77	0.31	0.31	-19.5	5.26	0.50	1.87	6.07	-	-	388	57	5.13	-
1/30/90	12:20	48	31.6	4.68	1.48	0.70	0.33	0.28	-12.8	5.20	0.50	1.92	5.13	-	266	-	-	2.68	0.41
2/10/90	7:25	80	29.3	4.75	1.48	0.70	0.34	0.33	-14.4	5.46	0.50	2.08	3.63	-	329	-	-	2.35	0.45
2/10/90	13:50	122	34.3	4.55	1.38	0.66	0.30	0.30	-23.0	5.55	0.49	1.91	4.68	-	532	-	-	2.83	0.37
2/11/90	7:53	44	33.0	4.61	1.53	0.74	0.32	0.28	-17.5	5.57	0.51	2.10	4.58	-	397	-	-	2.21	0.37
2/16/90	9:45	68	31.8	4.68	1.51	0.72	0.34	0.28	-13.2	5.57	0.57	2.04	4.05	-	337	-	-	1.83	0.53
2/16/90	14:45	80	32.7	4.65	1.43	0.69	0.34	0.27	-15.8	5.65	0.58	1.98	4.23	-	367	-	-	2.06	0.46
2/17/90	7:28	95	33.8	4.59	1.30	0.66	0.30	0.28	-23.9	5.47	0.53	1.79	4.53	-	383	-	-	2.72	0.44
2/22/90	16:10	46	28.1	4.80	1.41	0.70	0.34	0.26	-11.1	5.38	0.57	-	3.40	-	258	-	-	1.57	0.34

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
2/22/90	21:30	58	28.9	4.75	1.36	0.68	0.47	0.28	-8.2	5.29	0.57	1.92	3.43	-	280	-	-	2.39	-
2/23/90	0:30	92	28.8	4.70	1.50	0.65	0.33	0.29	-14.9	5.20	0.58	-	3.55	-	433	-	-	2.62	-
2/23/90	1:59	126	29.7	4.69	1.37	0.65	0.31	0.30	-16.1	5.15	0.56	1.77	3.57	-	-	-	-	2.88	0.42
2/23/90	5:00	154	31.2	4.61	1.25	0.61	0.31	0.29	-25.0	5.15	0.57	-	3.92	-	373	-	-	3.46	0.66
2/23/90	8:50	154	32.2	4.53	1.18	0.59	0.28	0.28	-23.0	5.11	0.55	1.70	4.13	-	383	-	-	2.94	0.36
2/23/90	11:00	163	32.8	4.56	1.25	0.60	0.28	0.28	-21.8	5.12	0.55	1.57	4.14	-	415	-	-	3.38	-
2/23/90	17:16	156	32.4	4.54	1.35	0.60	0.29	0.30	-23.7	5.11	0.54	-	4.23	-	395	-	-	3.08	0.37
2/24/90	7:42	91	32.3	4.58	1.32	0.63	0.29	0.30	-20.9	5.17	0.52	-	4.29	-	438	-	-	2.93	0.41
2/28/90	15:27	181	28.7	4.78	1.59	0.68	0.33	0.28	-10.5	5.41	0.55	-	3.59	-	342	-	-	1.78	0.41
3/8/90	12:20	60	28.0	4.84	1.38	0.71	0.35	0.25	15.5	5.57	0.56	2.22	3.33	-	226	-	-	1.83	0.42
3/10/90	18:00	22	27.1	4.81	1.88	0.65	0.40	0.26	-10.6	5.38	0.55	-	3.10	-	188	-	-	2.13	-
3/11/90	14:45	28	26.3	4.86	1.89	0.70	0.35	0.23	-8.9	5.30	0.54	-	3.07	-	195	-	-	1.71	-
3/11/90	22:00	33	27.4	4.78	1.36	0.68	0.31	0.30	-6.2	5.29	0.53	2.10	3.28	-	233	-	-	2.39	-
3/12/90	2:00	35	27.7	4.75	1.37	0.67	0.34	0.33	-9.1	5.26	0.54	2.00	3.30	-	300	-	-	0.29	-
3/12/90	6:00	46	29.0	4.76	1.37	0.68	0.36	0.34	-11.7	5.26	0.55	1.92	3.54	-	318	292	63	2.68	-
3/12/90	7:50	70	30.0	4.72	1.41	0.67	0.31	0.32	-15.6	5.44	0.55	-	3.77	-	409	-	-	2.47	-
3/12/90	10:45	109	31.0	4.63	1.36	0.67	0.31	0.36	-15.8	5.39	0.54	1.79	4.01	-	368	382	78	3.22	-
3/12/90	18:43	104	33.7	4.55	1.78	0.73	0.44	0.34	-20.0	5.36	0.55	1.68	4.55	-	-	478	73	5.68	-
3/13/90	7:28	82	33.0	4.60	1.57	0.64	0.39	0.29	-18.5	5.40	0.54	1.70	4.38	-	353	462	69	3.49	-
3/13/90	12:00	110	32.3	4.55	1.56	0.63	0.48	0.29	-19.4	5.21	0.54	1.67	4.20	-	352	440	63	3.63	-
3/13/90	16:00	154	32.5	4.57	1.48	0.58	0.35	0.30	-21.8	5.06	0.53	1.55	4.29	-	-	453	71	4.05	-
3/13/90	20:00	141	32.4	4.54	1.47	0.57	0.55	0.31	-23.6	5.09	0.52	1.54	4.17	-	333	485	85	3.70	-
3/14/90	7:22	91	31.3	4.56	1.79	0.58	0.29	0.28	-19.4	5.23	0.52	1.63	4.38	-	430	455	75	2.94	-
3/14/90	16:00	87	31.3	4.63	1.74	0.71	0.43	0.34	-18.5	5.15	0.52	1.66	3.93	-	320	381	62	3.59	-
3/15/90	7:15	70	30.7	4.62	1.72	0.61	0.35	0.29	-16.1	5.15	0.53	1.73	3.90	-	323	404	70	2.60	0.41
3/17/90	13:30	88	30.7	4.61	1.30	0.62	0.30	0.31	-19.4	5.38	0.56	1.74	3.64	-	257	398	75	2.71	0.34
3/17/90	15:51	126	31.1	4.61	1.85	0.60	0.29	0.33	-21.3	5.25	0.56	1.77	3.56	-	283	-	-	3.42	-
3/17/90	17:50	182	32.3	4.55	1.44	0.59	0.29	0.33	-21.9	5.32	0.57	1.69	3.66	-	583	420	91	3.18	-
3/18/90	4:21	158	34.8	4.51	1.81	0.58	0.28	0.35	-28.2	5.29	0.59	1.68	4.31	-	376	-	-	4.38	-
3/18/90	8:11	131	33.9	4.56	1.14	0.62	0.29	0.34	-26.6	5.27	0.59	1.77	4.31	-	364	-	-	4.04	-
3/18/90	12:25	109	33.4	4.55	1.32	0.61	0.28	0.33	-23.8	5.38	0.59	1.79	4.31	-	308	477	81	3.20	-
3/20/90	8:08	119	31.5	4.65	1.99	0.65	0.29	0.33	-17.7	5.34	0.57	1.88	4.01	-	274	-	-	2.74	0.34
3/28/90	10:50	37	28.6	4.84	1.58	0.81	0.40	0.32	-9.1	5.54	0.59	2.14	3.55	-	255	-	-	1.87	-
3/28/90	13:35	34	28.2	4.86	1.68	0.66	0.36	0.24	-9.8	5.49	0.58	2.14	3.47	-	186	-	-	1.69	-
3/28/90	13:35	34	28.4	4.81	1.56	0.67	0.38	0.24	-10.8	5.51	0.59	2.08	3.49	-	215	-	-	1.76	-
3/28/90	13:35	34	28.7	4.75	1.43	0.69	0.33	0.26	-11.4	5.49	0.58	2.12	3.47	-	233	-	-	1.80	-
3/28/90	13:35	34	28.2	4.85	1.45	0.71	0.33	0.27	-14.1	5.42	0.58	2.12	3.45	-	254	-	-	2.03	-
3/28/90	13:35	34	28.2	4.83	1.45	0.71	0.33	0.26	-10.1	5.34	0.58	2.10	3.46	-	255	-	-	2.00	-
3/28/90	13:35	34	28.2	4.85	1.49	0.72	0.34	0.27	-10.1	5.41	0.58	2.14	3.41	-	259	-	-	1.90	-
3/30/90	15:00	31	27.0	4.91	1.45	0.70	0.32	0.25	-9.1	5.32	0.56	2.06	3.23	-	192	-	-	1.67	0.30
4/2/90	14:00	29	27.9	5.13	1.94	0.97	0.38	0.31	-1.2	5.93	0.59	1.58	3.61	-	50	-	-	1.80	0.36
4/3/90	11:25	59	-	-	1.46	0.67	0.32	0.27	-	-	-	-	-	-	221	-	-	2.28	0.32
4/3/90	16:50	64	29.0	4.79	1.44	0.67	0.34	0.27	-15.8	5.32	0.55	2.00	3.41	-	246	-	-	2.35	0.37

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

Station C. 0143400680 East Branch Neversink River Northeast of Denning, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
4/4/90	9:05	50	-	-	1.40	0.66	0.31	0.25	-	-	-	-	-	-	301	-	-	2.40	0.33
4/9/90	14:45	27	27.6	4.85	1.47	0.71	0.33	0.25	-10.0	5.53	0.56	2.06	3.16	0.02	251	-	-	1.47	-
4/10/90	17:35	36	27.7	4.82	1.39	0.69	0.31	0.25	-8.4	5.46	0.56	1.97	3.19	0.02	260	303	43	1.79	-
4/10/90	21:00	52	28.7	4.78	1.45	0.68	0.31	0.27	-10.0	5.46	0.55	1.94	3.37	-	191	305	123	2.28	-
4/10/90	22:00	61	28.9	4.73	1.61	0.69	0.34	0.27	-12.5	5.36	0.54	1.89	3.20	-	277	-	-	-	-
4/10/90	23:00	80	29.5	4.70	1.45	0.67	0.31	0.28	-16.8	5.57	0.57	1.81	3.45	-	179	335	63	2.59	-
4/10/90	24:00	143	29.9	4.65	1.54	0.64	0.30	0.30	-19.7	5.35	0.53	1.79	3.26	-	328	-	-	2.83	-
4/11/90	1:00	350	31.7	4.61	1.30	0.62	0.30	0.34	-22.4	5.31	0.53	1.68	3.51	0.02	403	-	85	3.57	-
4/11/90	4:00	520	36.7	4.42	1.27	0.53	0.26	0.47	-32.1	5.26	0.49	1.32	4.60	-	380	557	138	5.21	-
4/11/90	5:00	646	37.2	4.40	1.17	0.54	0.25	0.47	-34.5	5.04	0.48	1.28	4.49	0.07	469	-	136	5.27	-
4/11/90	7:00	525	37.6	4.36	1.16	0.54	0.25	0.47	-37.1	5.09	0.48	1.26	4.86	0.04	568	-	137	5.21	-
4/11/90	9:00	374	36.8	4.43	1.19	0.55	0.24	0.42	-32.1	5.06	0.48	1.32	4.71	-	509	598	133	4.43	0.36
4/11/90	9:00	374	37.3	4.41	1.23	0.52	0.26	0.44	-34.7	5.17	0.50	1.33	4.89	-	473	-	-	5.08	-
4/11/90	16:00	171	34.8	4.52	1.27	0.67	0.41	0.40	-27.7	5.15	0.50	1.51	4.64	0.01	470	548	95	3.25	-
4/12/90	9:55	74	32.1	4.61	1.37	0.67	0.28	0.30	-17.9	5.34	0.52	1.80	4.35	-	386	445	77	2.59	0.38
4/30/90	4:43	39	27.2	4.76	1.42	0.63	0.34	0.28	-20.1	5.32	0.58	1.88	2.50	-	231	132	150	2.32	-
4/30/90	8:30	54	27.4	4.75	1.45	0.62	0.31	0.30	-12.6	5.47	0.59	1.90	2.51	-	250	-	-	2.00	-
4/30/90	9:33	62	27.2	4.77	1.41	0.62	0.34	0.26	-13.8	5.35	0.58	1.90	2.50	-	245	-	-	2.61	-
4/30/90	11:39	81	28.0	4.71	1.48	0.60	0.30	0.31	-14.8	5.47	0.59	1.88	2.50	-	270	200	147	2.97	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990.

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/11/88	11:05	-	41.1	6.92	-	-	-	-	187.5	6.30	0.60	2.37	0.19	-	32	-	-	1.67	2.68
10/18/88	15:00	-	42.5	6.63	5.71	0.77	0.43	0.46	190.0	6.82	0.67	2.80	0.50	-	35	-	-	2.15	3.02
10/22/88	17:15	-	33.0	6.61	9.68	0.74	0.34	0.45	125.0	7.24	1.03	2.12	0.43	-	83	-	-	-	-
10/26/88	15:20	-	37.2	6.48	5.04	0.67	0.38	0.23	137.5	6.85	0.69	2.79	0.97	-	44	-	-	1.88	1.87
11/1/88	16:00	-	35.1	6.27	4.92	0.65	0.36	0.24	135.0	6.56	0.65	2.29	1.29	-	34	-	-	1.76	1.90
11/5/88	18:22	46	30.2	6.34	3.79	0.54	0.32	0.43	65.0	6.13	0.73	2.31	0.93	-	133	-	-	5.90	1.23
11/5/88	19:08	62	27.2	6.18	3.74	0.54	0.30	0.50	65.0	5.88	0.82	2.14	0.92	-	159	-	-	7.25	1.25
11/5/88	19:21	66	29.0	6.22	3.73	0.55	0.30	0.53	135.0	5.95	0.73	2.18	0.91	-	228	-	-	7.76	1.31
11/5/88	19:34	70	29.0	6.13	3.93	0.51	0.27	0.53	55.0	5.77	0.76	2.06	0.85	-	186	-	-	-	-
11/5/88	19:52	76	27.9	6.19	3.57	0.52	0.28	0.55	45.0	5.69	0.74	2.01	0.89	-	178	-	-	-	-
11/6/88	10:00	39	29.6	6.21	3.49	0.52	0.26	0.28	40.0	6.19	0.68	2.06	2.15	-	130	-	-	3.97	0.80
11/7/88	16:56	13	29.7	6.14	3.95	0.56	0.31	0.23	60.0	6.31	0.63	2.23	1.91	-	64	-	-	2.60	1.01
11/13/88	10:00	7.5	31.1	5.98	4.23	0.55	0.31	0.17	95.0	6.56	0.63	2.55	1.57	-	26	-	-	2.27	1.36
11/13/88	18:00	23	-	-	3.86	0.53	0.33	0.18	-	6.43	0.69	2.44	1.36	-	57	-	-	3.26	1.23
11/14/88	11:45	7.5	32.1	6.36	3.91	0.55	0.32	0.16	80.0	6.61	0.66	2.54	1.93	-	57	-	-	2.27	1.13
11/20/88	10:34	30	29.3	6.34	3.42	0.48	0.28	0.18	10.0	5.92	0.61	2.28	1.22	-	71	-	-	4.02	0.94
11/20/88	16:30	44	25.6	5.94	3.14	0.45	0.27	0.19	35.0	5.95	0.63	2.10	1.22	-	118	-	-	4.28	0.69
11/21/88	8:00	26	26.2	5.93	3.59	0.45	0.27	0.24	30.0	6.15	0.61	2.14	1.51	-	97	-	-	3.47	0.67
11/28/88	11:30	8.5	25.6	5.94	4.35	0.47	0.26	0.20	70.0	6.48	0.60	2.61	1.38	-	54	-	-	2.44	1.17
12/5/88	13:20	-	26.9	6.38	3.97	0.54	0.29	0.15	87.5	6.57	0.62	2.77	1.55	-	28	-	-	1.33	1.45
12/12/88	11:20	-	36.1	6.24	4.97	0.65	0.35	0.24	110.0	7.35	0.63	3.20	1.86	-	25	-	-	1.28	1.69
12/20/88	14:40	8.3	32.9	6.12	4.69	0.54	0.38	0.17	105.0	6.63	0.58	2.19	1.69	-	15	-	-	1.02	1.74
12/26/88	13:25	4.4	35.9	6.14	4.12	0.51	0.33	0.21	92.5	6.65	0.62	2.35	1.77	-	22	-	-	-	-
1/1/89	15:45	4.1	34.4	6.39	4.80	0.60	0.32	0.26	117.5	6.75	0.61	2.59	1.78	-	25	-	-	1.08	1.69
1/10/89	11:00	3.3	36.0	6.21	4.22	0.58	0.34	0.21	125.0	6.83	0.61	2.83	2.03	-	11	-	-	1.00	1.82
1/16/89	13:23	4.6	34.1	6.73	3.78	0.48	0.18	0.48	112.5	6.71	0.26	2.70	1.83	-	13	-	-	1.05	1.62
1/31/89	11:50	3.2	36.5	6.13	4.43	0.59	0.37	0.23	122.5	6.87	0.64	2.76	1.95	-	12	-	-	1.12	1.77
2/21/89	14:10	78	22.7	6.94	2.39	0.31	0.22	0.36	50.0	4.38	0.43	1.28	1.84	-	58	-	-	3.66	0.76
2/22/89	14:45	26	30.0	6.36	3.47	0.44	0.29	0.23	75.0	5.88	0.57	1.99	2.66	-	29	-	-	2.59	1.05
2/28/89	8:30	12	32.2	6.41	5.00	0.61	0.34	0.23	137.5	6.54	0.64	2.46	2.38	-	12	-	-	0.89	1.72
3/8/89	10:45	3.3	39.3	6.33	5.28	0.64	0.36	0.23	142.5	6.96	0.72	2.57	2.31	-	22	-	-	0.95	1.83
3/13/89	13:40	3.8	37.3	6.26	5.04	0.56	0.34	0.22	135.0	6.59	0.63	2.41	2.03	-	11	-	-	1.09	1.72
3/18/89	16:55	25	28.8	5.80	3.61	0.51	0.25	0.48	55.0	5.31	0.63	1.50	2.50	-	72	-	-	4.81	0.99
3/23/89	12:35	7.0	31.9	6.19	4.52	0.53	0.28	0.23	90.0	6.42	0.72	1.93	2.18	-	29	-	-	-	1.39
3/25/89	19:00	14	27.8	5.69	3.61	0.49	0.24	0.31	67.5	5.25	0.55	1.64	2.10	-	56	-	-	3.06	1.38
3/29/89	9:05	28	28.1	6.50	4.00	0.51	0.26	0.42	37.5	5.54	0.65	1.51	3.77	-	111	-	-	-	0.67
3/30/89	8:28	24	29.7	6.38	3.96	0.49	0.25	0.34	50.0	5.90	0.64	1.61	2.91	-	47	-	-	-	0.85
3/31/89	11:00	22	29.7	6.07	3.75	0.49	0.25	0.32	55.0	6.02	0.65	1.83	3.32	-	53	-	-	2.50	0.78
4/5/89	11:10	14	31.7	6.14	3.84	0.49	0.27	0.27	65.0	6.23	0.65	1.95	2.73	-	40	-	-	1.84	0.88
4/6/89	9:00	19	31.8	6.23	3.89	0.49	0.27	0.28	60.0	6.26	0.71	1.98	2.91	-	57	-	-	2.23	0.85
4/6/89	11:00	18	31.2	5.91	3.76	0.53	0.29	0.32	52.5	6.23	0.71	1.82	2.73	-	58	-	-	3.30	-
4/13/89	10:45	8.2	32.1	5.86	4.09	0.56	0.32	0.24	87.5	6.49	0.71	1.87	2.17	-	29	-	-	1.58	1.14

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Dis-charge, in cubic feet per second	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Calcium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
4/16/89	11:00	12	31.7	6.20	3.98	0.53	0.31	0.25	62.5	6.46	0.65	1.74	2.47	-	49	-	-	2.62	-
4/17/89	10:50	8.5	31.6	6.23	3.97	0.56	0.31	0.23	68.5	6.40	0.65	1.78	2.33	-	36	-	-	1.55	1.05
4/21/89	11:18	7.5	31.6	6.28	-	-	-	-	80.0	-	-	-	-	-	40	-	-	-	-
4/26/89	10:25	5.7	32.7	6.77	4.09	0.57	0.32	0.22	83.5	6.55	0.63	1.66	1.81	-	22	-	-	1.45	1.26
4/30/89	11:20	6.5	32.4	6.40	4.41	0.51	0.32	0.20	60.5	6.75	0.67	1.67	1.79	-	24	-	-	1.58	1.31
5/1/89	18:30	7.5	34.2	6.85	4.85	0.60	0.34	0.26	133.5	6.63	0.63	1.49	1.67	-	18	-	-	1.62	1.49
5/2/89	0:44	24	31.0	6.31	3.69	0.53	0.31	0.30	74.2	6.24	0.59	1.59	1.72	-	54	-	-	4.10	-
5/2/89	8:02	31	29.6	6.09	2.63	0.39	0.27	0.23	53.3	6.21	0.61	1.80	2.20	-	91	-	-	4.07	-
5/2/89	8:06	31	29.8	6.39	3.65	0.53	0.30	0.28	56.0	5.97	0.63	1.78	2.15	-	84	-	-	3.62	0.83
5/2/89	9:19	42	27.5	6.16	3.54	0.52	0.31	0.30	48.3	5.64	0.58	1.78	2.22	-	83	-	-	4.29	-
5/2/89	11:56	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/2/89	13:30	33	30.1	6.17	3.50	0.54	0.31	0.31	41.6	5.98	0.64	1.95	3.16	-	186	-	-	3.67	0.65
5/2/89	14:17	31	29.6	6.18	3.16	0.46	0.28	0.27	41.5	5.91	0.66	1.82	3.15	-	98	-	-	3.41	-
5/2/89	17:48	25	30.7	6.16	3.40	0.50	0.28	0.27	47.5	6.02	0.67	1.94	3.37	-	83	-	-	3.03	0.71
5/2/89	17:59	25	29.6	6.25	3.41	0.48	0.29	0.26	45.0	5.90	0.69	1.84	3.31	-	168	-	-	2.91	-
5/3/89	13:59	15	31.1	6.28	3.75	0.55	0.33	0.25	55.0	6.11	0.68	1.84	3.12	-	43	-	-	1.87	-
5/5/89	17:00	19	30.1	6.31	3.28	0.45	0.26	0.22	66.0	6.13	0.61	1.64	2.33	-	39	-	-	3.16	-
5/5/89	20:00	38	28.7	6.31	2.46	0.35	0.21	0.19	52.5	5.84	0.60	1.69	2.22	-	52	-	-	3.17	-
5/5/89	23:00	48	27.4	6.26	3.26	0.45	0.27	0.28	42.0	5.59	0.57	1.68	2.37	-	90	-	-	3.50	-
5/6/89	2:00	63	26.9	5.70	3.14	0.47	0.33	0.43	28.0	5.33	0.56	1.64	3.03	-	138	111	81	4.72	-
5/6/89	5:00	76	27.3	5.40	3.05	0.47	0.38	0.52	21.5	5.04	0.51	1.47	3.62	-	160	140	90	4.87	-
5/6/89	8:00	70	28.8	5.42	2.56	0.39	0.27	0.47	11.5	5.23	0.53	1.52	4.37	-	178	172	90	4.60	-
5/6/89	8:35	67	28.9	5.49	2.78	0.41	0.23	0.46	12.0	5.23	0.54	1.56	4.49	-	194	-	-	4.11	0.37
5/6/89	11:00	59	29.1	5.53	2.92	0.47	0.25	0.44	15.0	5.39	0.59	1.66	4.48	-	161	121	60	4.14	-
5/6/89	14:00	54	29.1	5.60	3.27	0.46	0.27	0.43	14.5	5.54	0.54	1.71	4.41	-	139	128	57	3.59	-
5/6/89	18:00	46	29.0	6.02	3.27	0.47	0.26	0.40	18.5	5.61	0.59	1.71	4.29	-	86	-	-	3.21	-
5/6/89	22:00	41	29.3	6.02	3.29	0.48	0.27	0.37	22.0	5.70	0.59	1.74	4.13	-	104	-	-	2.98	-
5/6/89	24:00	47	29.1	5.71	3.39	0.49	0.27	0.35	23.5	5.75	0.59	1.82	4.08	-	109	-	-	3.25	-
5/7/89	4:00	41	29.2	5.66	3.28	0.48	0.27	0.33	24.3	5.77	0.62	1.84	3.98	-	109	-	-	3.31	-
5/7/89	12:00	32	29.4	5.70	3.38	0.48	0.27	0.39	18.5	5.61	0.56	1.77	4.34	-	126	-	-	3.98	-
5/8/89	13:45	24	29.7	6.08	3.54	0.50	0.28	0.27	39.0	6.03	0.66	1.92	3.30	-	46	-	-	2.03	0.71
5/9/89	16:20	19	30.1	6.24	3.09	0.42	0.25	0.22	48.5	6.14	0.66	1.94	2.92	-	37	-	-	1.78	0.79
5/10/89	0:00	17	28.3	6.11	3.37	0.47	0.28	0.27	42.5	5.93	0.59	1.84	2.67	-	71	-	-	3.33	-
5/10/89	12:10	24	28.0	6.29	3.56	0.51	0.29	0.16	49.5	6.01	0.64	1.87	2.69	-	81	-	-	2.09	0.70
5/10/89	20:00	31	28.5	6.04	3.47	0.46	0.28	0.28	42.5	5.95	0.59	1.97	2.58	-	68	-	-	3.39	-
5/11/89	4:00	31	26.5	6.07	3.34	0.45	0.27	0.26	40.0	5.93	0.59	1.82	2.69	-	68	-	-	2.95	-
5/11/89	8:00	28	27.1	5.89	3.33	0.47	0.28	0.26	34.5	5.90	0.59	1.84	2.72	-	63	-	-	-	1.07
5/11/89	15:40	24	27.8	6.30	3.21	0.50	0.30	0.26	41.5	6.03	0.63	-	2.74	-	59	-	-	2.32	0.68
5/11/89	22:00	23	29.5	6.02	3.42	0.49	0.29	0.27	48.0	6.02	0.61	1.92	2.74	-	47	-	-	2.49	-
5/12/89	11:40	21	28.3	6.21	3.57	0.50	0.30	0.26	49.5	6.15	0.64	1.89	2.80	-	44	-	-	3.53	0.73
5/14/89	12:20	15	29.7	6.46	3.75	0.55	0.30	0.25	58.0	6.33	0.65	1.93	2.33	-	26	-	-	2.10	-
5/15/89	10:22	15	30.0	6.50	3.85	0.56	0.30	0.25	59.0	6.33	0.69	1.87	2.52	-	27	-	-	1.89	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
5/16/89	15:56	27	27.9	6.36	3.45	0.50	0.28	0.25	58.0	5.01	0.58	1.93	1.68	-	39	-	-	2.74	-
5/16/89	16:15	27	27.6	6.17	3.17	0.48	0.26	0.24	58.0	5.93	0.64	1.76	1.99	-	48	-	-	2.58	0.88
5/16/89	21:56	52	25.2	6.33	1.91	0.28	0.19	0.18	41.5	5.37	0.59	1.74	1.77	-	93	-	-	4.34	-
5/17/89	1:56	53	25.0	5.66	2.97	0.44	0.25	0.30	29.0	5.21	0.63	1.62	2.06	-	128	-	-	-	-
5/17/89	5:56	42	25.9	5.80	2.70	0.43	0.25	0.27	32.0	5.70	0.60	1.80	2.32	-	84	-	-	4.28	-
5/17/89	9:56	34	25.7	5.66	2.77	0.43	0.25	0.27	34.0	5.85	0.59	1.93	2.32	-	62	-	-	3.50	-
5/17/89	14:10	29	26.6	5.98	3.13	0.48	0.27	0.28	33.5	5.97	0.60	1.63	2.34	-	79	-	-	2.76	0.63
5/19/89	11:05	17	28.1	6.02	3.46	0.50	0.27	0.25	53.0	6.18	0.61	1.71	2.18	-	34	-	-	2.29	-
5/27/89	12:05	9.0	30.9	6.44	3.79	0.51	0.28	0.24	80.5	6.35	0.60	2.01	1.81	-	23	-	-	2.39	-
6/1/89	10:50	7.1	31.9	6.61	4.07	0.54	0.30	0.22	91.5	6.43	0.60	2.25	1.73	-	33	-	-	1.61	1.32
6/6/89	15:46	10	31.2	6.78	4.07	0.55	0.29	0.24	90.0	6.40	0.54	2.28	1.46	-	40	-	-	2.79	1.25
6/9/89	15:40	7.8	32.7	6.72	4.34	0.56	0.30	0.24	99.0	6.47	0.57	2.40	1.69	-	21	-	-	1.78	1.35
6/10/89	2:00	6.5	30.3	6.53	4.09	0.53	0.29	0.25	94.5	6.13	0.53	2.45	1.43	-	31	-	-	3.03	-
6/10/89	10:32	7.6	31.1	6.73	4.04	0.55	0.30	0.21	91.5	6.01	0.51	2.28	1.34	-	34	-	-	2.40	1.24
6/15/89	16:20	12	30.2	6.49	3.85	0.51	0.27	0.22	82.5	6.28	0.49	2.27	1.46	-	45	-	-	2.73	1.16
6/16/89	18:00	14	30.1	6.38	2.76	0.39	0.25	0.14	73.5	6.23	0.49	2.42	1.56	-	24	-	-	0.28	-
6/17/89	6:00	9.0	30.4	6.48	3.08	0.43	0.27	0.18	73.0	6.28	0.52	2.19	1.73	-	12	-	-	2.55	-
6/23/89	11:30	3.5	32.6	6.64	3.67	0.48	0.26	0.16	99.5	6.33	0.56	2.39	1.58	-	23	-	-	1.47	1.36
7/1/89	9:45	4.1	33.9	6.91	4.07	0.51	0.27	0.13	116.0	6.47	0.57	2.62	1.59	-	-	-	-	1.35	1.55
7/5/89	12:25	12	29.4	6.45	4.06	0.54	0.30	0.23	86.0	5.42	0.47	-	1.27	-	49	-	-	3.70	1.15
7/13/89	13:15	3.2	34.8	6.79	4.03	0.52	0.29	0.15	122.4	6.37	0.56	-	1.46	-	13	-	-	1.60	1.59
7/20/89	11:02	3.5	36.6	6.54	4.68	0.63	0.32	0.21	138.7	6.21	0.55	-	1.54	-	7	-	-	2.69	-
7/20/89	12:50	4.6	35.3	6.63	4.67	0.61	0.32	0.22	131.9	6.27	0.55	-	1.46	-	9	-	-	2.57	-
7/20/89	14:17	5.1	34.6	6.72	4.56	0.59	0.31	0.23	124.9	6.02	0.53	-	1.37	-	13	-	-	2.83	-
7/21/89	15:05	3.8	34.8	6.81	4.70	0.57	0.33	0.16	116.7	6.50	0.54	-	1.48	-	9	-	-	1.77	1.71
7/27/89	16:46	2.1	37.0	6.74	4.78	0.63	0.35	0.18	125.5	7.00	0.57	-	3.76	-	12	-	-	1.38	1.97
8/3/89	11:04	2.5	36.4	6.87	4.88	0.61	0.33	0.20	138.9	6.50	0.55	2.81	1.39	-	11	-	-	1.81	1.94
8/3/89	11:04	2.5	36.2	6.88	5.05	0.62	0.34	0.20	145.6	6.48	0.54	2.78	1.37	-	18	-	-	1.80	1.98
8/3/89	11:04	2.5	33.5	6.89	4.84	0.61	0.34	0.19	146.0	6.47	0.54	2.86	1.39	-	14	-	-	2.11	-
8/9/89	8:30	1.7	37.7	6.86	4.96	0.68	0.37	0.19	147.0	6.68	0.57	2.89	1.68	-	15	-	-	1.45	-
8/9/89	8:31	1.7	38.4	6.88	5.14	0.67	0.36	0.19	144.5	6.65	0.57	2.93	1.67	-	16	-	-	1.47	-
8/9/89	8:35	1.7	38.4	6.81	5.10	0.66	0.36	0.18	157.6	6.68	0.57	2.89	1.68	-	12	-	-	1.51	2.07
8/17/89	13:50	1.5	37.0	7.07	4.97	0.61	0.37	0.20	95.2	6.43	0.55	2.86	1.54	-	6	-	-	1.71	1.96
8/24/89	12:30	1.4	39.2	7.03	4.32	0.60	0.33	0.19	150.4	6.35	0.58	2.97	1.71	-	15	-	-	1.53	2.05
8/30/89	12:45	37	43.4	7.12	6.04	0.65	0.44	0.22	189.8	6.72	0.61	3.03	1.82	-	30	-	-	1.15	2.62
8/30/89	14:55	4.5	39.2	7.08	5.22	0.65	0.40	0.21	162.3	6.73	0.59	2.98	1.59	-	17	-	-	1.55	2.15
8/30/89	16:55	1.8	39.6	7.06	5.27	0.69	0.41	0.22	171.8	6.67	0.60	2.95	1.56	-	25	-	-	1.61	2.15
8/31/89	9:00	1.7	40.9	6.98	5.40	0.69	0.41	0.23	171.4	6.69	0.60		1.60	-	-	-	-	-	-
9/14/89	12:23	2.5	39.0	6.83	4.93	0.67	0.40	0.46	163.2	6.06	0.61	2.71	1.70	-	14	-	-	2.70	-
9/14/89	12:51	4.0	39.1	6.81	4.99	0.71	0.40	0.45	160.5	5.17	0.53	2.63	1.50	-	17	-	-	1.64	-
9/14/89	13:00	4.8	39.7	6.66	5.00	0.70	0.40	0.51	166.6	6.21	0.74	2.75	1.94	-	23	-	-	3.48	2.20
9/14/89	17:09	3.5	40.8	6.82	5.45	0.73	0.41	0.37	158.8	6.10	0.64	2.96	1.89	-	23	-	-	2.78	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
9/16/89	15:37	1.8	37.9	6.70	4.68	0.64	0.41	0.35	149.1	6.15	0.64	2.73	1.50	-	57	-	-	2.09	-
9/16/89	16:23	2.7	37.0	6.87	4.91	0.64	0.42	0.35	155.2	5.90	0.58	2.73	1.39	-	31	-	-	2.39	-
9/16/89	16:39	3.8	37.3	6.92	4.98	0.65	0.40	0.34	147.5	6.08	0.60	2.78	1.55	-	27	-	-	2.66	-
9/16/89	21:33	3.0	38.5	6.91	5.17	0.66	0.40	0.31	151.6	6.27	0.60	2.96	1.56	-	34	-	-	3.66	-
9/17/89	3:55	4.8	37.8	6.93	5.13	0.64	0.38	0.30	150.1	6.23	0.58	2.99	1.39	-	38	-	-	3.57	-
9/17/89	7:00	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/17/89	9:47	2.9	37.6	6.91	5.06	0.63	0.41	0.27	144.8	6.34	0.56	3.08	1.29	-	49	-	-	3.67	-
9/19/89	13:30	2.0	38.8	7.05	5.55	0.68	0.75	0.33	162.5	6.24	0.58	2.96	1.38	-	27	-	-	2.22	2.27
9/19/89	19:29	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/19/89	22:32	20	31.7	6.56	4.25	0.57	0.29	0.38	124.4	5.29	0.48	3.11	1.29	-	63	-	-	6.18	-
9/19/89	23:03	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/20/89	2:09	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/20/89	4:42	55	24.7	6.34	3.22	0.44	0.21	0.33	53.7	4.75	0.36	2.59	1.46	-	151	-	-	7.66	-
9/20/89	6:20	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9/20/89	6:57	51	25.5	6.23	3.24	0.44	0.19	0.35	40.8	4.76	0.40	-	1.89	-	234	-	-	7.72	-
9/20/89	11:30	61	24.6	6.06	3.34	0.41	0.48	0.34	35.9	5.33	0.34	1.98	1.99	-	202	-	-	7.96	0.55
9/20/89	11:57	60	24.5	6.04	3.14	0.39	0.24	0.32	29.4	4.53	0.33	2.28	1.79	-	552	-	-	7.35	-
9/20/89	12:55	55	24.8	6.03	3.74	0.42	0.99	0.33	41.4	4.77	0.31	2.33	1.87	-	712	-	-	6.78	-
9/22/89	13:45	6.5	30.0	6.57	3.93	0.52	0.47	0.23	78.3	6.09	0.44	2.64	1.74	-	168	-	-	3.09	1.13
9/22/89	19:58	29	28.3	6.43	4.54	0.49	1.42	0.34	72.4	5.48	0.61	2.64	1.23	-	773	-	-	6.27	-
9/23/89	3:58	23	27.3	6.31	3.79	0.48	0.78	0.26	63.3	5.88	0.57	2.62	1.26	-	476	-	-	4.84	-
9/23/89	9:58	16	27.4	6.36	4.02	0.49	1.09	0.25	64.4	5.95	0.55	2.60	1.31	-	309	-	-	4.11	-
9/23/89	10:50	16	27.5	6.28	4.41	0.48	1.28	0.28	63.1	5.97	0.55	2.59	1.35	-	396	-	-	3.81	-
9/23/89	12:13	14	27.5	6.42	3.43	0.46	0.34	0.23	53.3	5.98	0.54	2.29	1.32	-	64	36	34	3.76	0.92
9/23/89	21:58	10	27.8	6.39	3.78	0.47	0.57	0.21	63.1	6.08	0.51	2.64	1.39	-	226	-	-	3.40	-
9/26/89	9:55	15	29.6	6.68	3.92	0.50	0.58	0.26	75.7	5.97	0.56	2.19	1.27	-	243	-	-	3.76	1.30
10/2/89	11:55	14	32.5	6.76	4.07	0.53	0.32	0.38	104.4	6.10	0.68	2.65	1.29	-	32	-	-	2.72	-
10/2/89	12:51	18	32.1	6.47	4.22	0.53	0.64	0.42	103.9	5.95	0.68	2.14	1.18	-	248	-	-	4.02	-
10/2/89	16:20	15	30.7	6.78	3.66	0.51	0.31	0.31	87.6	6.16	0.67	2.67	1.16	-	66	-	-	3.53	-
10/2/89	16:32	14	30.9	6.46	4.07	0.52	0.64	0.35	90.7	6.11	0.66	2.14	1.09	-	216	-	-	4.30	-
10/3/89	13:30	7.2	30.6	6.51	4.28	0.54	0.71	0.25	98.0	6.35	0.61	2.22	1.21	-	258	-	-	2.30	1.29
10/12/89	11:10	5.6	34.3	6.80	4.19	0.55	0.32	0.24	120.9	6.51	0.64	2.42	1.13	-	25	-	-	1.97	1.71
10/15/89	3:07	11	36.6	6.78	4.53	0.63	0.37	0.56	124.9	6.53	0.67	2.20	1.73	-	24	-	-	2.88	-
10/15/89	7:02	8.5	36.6	6.70	4.53	0.62	0.37	0.52	109.9	6.64	0.78	2.28	1.74	-	49	-	-	3.84	-
10/15/89	13:00	7.0	34.6	6.86	4.44	0.60	0.35	0.36	105.6	6.61	0.76	2.38	1.28	-	30	-	-	2.89	1.53
10/17/89	11:30	7.8	35.6	6.95	4.70	0.62	0.33	0.42	122.1	6.37	0.69	2.25	1.03	-	23	-	-	3.27	1.78
10/17/89	13:43	9.5	34.5	6.54	4.49	0.57	0.35	0.46	118.6	6.31	0.72	2.43	0.99	-	25	-	-	3.02	-
10/17/89	15:20	12	34.0	6.65	4.44	0.59	0.32	0.49	87.6	6.40	0.78	2.15	1.02	-	43	-	-	3.80	1.56
10/17/89	15:22	12	34.3	6.54	4.23	0.55	0.34	0.48	113.2	6.33	0.75	2.58	1.00	-	31	-	-	3.53	-
10/17/89	19:31	10	33.5	6.52	4.27	0.57	0.36	0.45	105.9	6.46	0.79	2.57	1.03	-	52	-	-	3.87	-
10/18/89	7:10	7.3	33.6	6.73	4.37	0.57	0.32	0.33	97.0	6.52	0.72	2.26	1.13	-	35	-	-	3.04	1.46
10/19/89	12:08	8.8	31.5	6.47	4.04	0.55	0.30	0.38	99.5	6.19	0.65	2.28	1.11	-	29	-	-	2.69	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
10/19/89	16:00	16	30.6	6.71	3.90	0.53	0.30	0.40	80.4	6.17	0.73	2.07	1.09	-	72	-	-	4.63	1.20
10/20/89	8:14	20	29.3	6.47	3.54	0.50	0.27	0.37	67.0	5.98	0.70	2.13	1.36	-	50	-	-	3.42	-
10/20/89	10:21	41	27.8	6.38	3.27	0.48	0.26	0.51	57.8	5.70	0.83	2.02	1.34	-	94	-	-	4.89	-
10/20/89	11:40	49	26.7	5.47	3.12	0.45	0.27	0.55	41.6	5.51	0.71	1.73	1.46	-	139	-	-	5.50	0.70
10/20/89	12:31	62	26.3	6.07	2.96	0.45	0.23	0.66	47.4	5.24	0.69	1.85	1.58	-	141	-	-	6.22	-
10/20/89	13:35	71	26.3	5.89	2.91	0.44	0.23	0.78	34.4	5.04	0.68	1.75	1.96	-	176	-	-	7.24	-
10/20/89	14:17	78	26.5	5.82	2.94	0.43	0.22	0.85	34.4	4.93	0.67	1.67	2.26	-	204	-	-	7.46	-
10/20/89	14:23	78	26.8	5.79	2.83	0.43	0.21	0.87	32.2	4.92	0.65	1.65	2.24	-	198	-	-	7.32	-
10/20/89	14:37	79	26.7	5.74	2.89	0.43	0.25	0.90	30.5	4.94	0.65	1.58	2.36	-	222	-	-	7.75	-
10/20/89	15:53	77	27.3	5.66	2.82	0.43	0.20	0.86	24.0	4.98	0.63	1.67	2.83	-	224	-	-	7.68	-
10/20/89	17:48	77	27.4	5.58	2.85	0.43	0.23	0.75	21.2	5.08	0.62	2.02	3.05	-	158	-	-	6.87	-
10/20/89	18:09	77	27.2	5.78	2.87	0.42	0.21	0.73	27.0	5.06	0.61	2.02	3.04	-	167	-	-	6.53	-
10/20/89	22:01	63	27.9	5.62	2.47	0.54	0.26	0.73	23.0	5.28	0.69	2.15	2.59	-	185	203	182	6.07	-
10/21/89	11:47	38	26.9	5.77	3.09	0.46	0.24	0.38	25.1	5.76	0.62	2.27	2.64	-	82	-	-	3.64	-
10/22/89	12:05	25	27.7	6.14	3.33	0.46	0.26	0.28	38.0	5.99	0.59	2.03	2.15	-	53	-	-	2.76	-
10/31/89	15:55	19	31.9	6.53	3.92	0.53	0.34	0.41	90.2	6.08	0.71	2.49	1.55	-	21	-	-	-	-
10/31/89	16:02	20	31.6	6.57	4.04	0.53	0.30	0.37	166.7	6.15	0.74	2.49	1.56	-	24	-	-	2.97	-
10/31/89	20:28	16	30.3	6.62	3.97	0.53	0.29	0.32	77.2	6.18	0.71	2.64	1.54	-	75	-	-	3.24	-
10/31/89	23:59	19	29.9	6.67	3.84	0.51	0.29	0.31	69.8	6.09	0.70	2.51	1.50	-	78	-	-	3.24	-
11/1/89	5:39	16	29.2	6.61	3.77	0.51	0.28	0.27	60.0	6.16	0.67	2.51	1.54	-	79	-	-	3.17	-
11/1/89	9:55	13	29.5	6.53	3.70	0.50	0.29	0.25	68.2	6.29	0.65	2.46	1.55	-	44	-	-	2.66	0.94
11/2/89	14:25	9.0	30.9	6.63	3.87	0.51	0.29	0.23	85.0	6.42	0.62	2.49	1.57	-	24	-	-	1.81	1.19
11/3/89	13:20	9.0	30.9	6.33	3.95	0.53	0.30	0.24	79.2	6.46	0.61	2.82	1.67	-	13	-	-	1.76	1.12
11/9/89	9:30	9.0	32.7	6.48	4.17	0.55	0.30	0.27	90.5	6.56	0.61	2.49	1.83	-	14	-	-	1.58	1.37
11/9/89	11:33	14	31.1	6.54	4.05	0.52	0.29	0.29	86.0	6.29	-	2.47	1.55	-	20	-	-	4.07	-
11/9/89	12:12	19	31.1	6.54	3.96	0.52	0.29	0.29	76.3	6.25	0.59	2.43	1.49	-	18	-	-	2.94	-
11/9/89	17:10	16	30.2	6.51	3.81	0.51	0.29	0.27	63.6	6.33	0.60	2.53	1.60	-	50	-	-	4.47	-
11/9/89	21:21	12	30.9	6.52	3.88	0.51	0.29	0.26	67.8	6.39	0.62	2.57	1.60	-	38	-	-	2.53	-
11/16/89	8:20	10	32.4	6.24	4.01	0.51	0.31	0.31	86.1	6.39	0.63	2.39	1.96	-	17	15	20	2.37	-
11/16/89	9:25	14	32.0	6.17	4.05	0.53	0.33	0.32	84.8	6.36	0.67	2.50	1.91	-	29	-	-	2.21	1.25
11/16/89	10:25	24	30.6	6.33	3.78	0.53	0.34	0.33	73.7	6.10	0.67	2.32	1.86	-	29	-	-	3.19	-
11/16/89	11:12	33	30.1	6.50	3.82	0.51	0.31	0.35	64.3	5.95	0.66	2.37	1.78	-	82	-	-	3.41	-
11/16/89	12:16	38	28.4	6.16	3.43	0.48	0.28	0.37	49.5	5.74	0.69	2.17	1.80	-	55	71	67	4.77	-
11/16/89	12:43	49	27.8	6.11	3.30	0.47	0.30	0.38	47.4	5.63	0.68	2.21	1.83	-	61	73	79	5.11	-
11/16/89	14:27	48	27.9	6.00	3.30	0.48	0.27	0.40	35.1	5.65	0.67	2.25	2.22	-	119	122	132	6.23	-
11/16/89	15:53	39	28.0	6.13	3.36	0.46	0.31	0.39	33.0	5.80	0.69	2.28	2.68	-	157	.	.	5.16	0.56
11/16/89	17:52	31	28.7	6.10	3.44	0.50	0.28	0.32	34.2	5.85	0.66	2.34	2.90	-	94	101	103	4.78	-
11/17/89	4:33	16	29.6	6.46	3.78	0.53	0.32	0.28	54.0	6.05	0.65	2.49	2.78	-	90	-	-	2.62	-
11/17/89	9:00	15	29.8	6.25	3.66	0.51	0.33	0.27	52.5	6.21	0.65	2.44	2.78	-	57	-	-	2.45	0.85
11/25/89	11:45	7.0	32.2	6.73	4.05	0.53	0.33	0.20	79.0	6.45	0.65	2.46	2.15	-	53	-	-	1.46	1.25
11/28/89	5:20	10	32.5	6.46	4.07	0.54	0.43	0.29	76.9	6.37	0.60	2.33	2.19	-	32	-	-	2.03	-
11/28/89	9:15	12	32.0	6.66	3.93	0.53	0.29	0.23	68.5	6.30	0.61	2.37	2.23	-	64	-	-	2.38	1.23

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
11/28/89	15:10	12	30.9	6.68	3.84	0.50	0.30	0.22	63.7	6.37	0.61	2.37	2.16	-	101	-	-	2.22	1.20
11/29/89	2:05	8.3	31.9	6.51	4.01	0.52	0.42	0.26	71.1	6.36	0.61	2.37	2.30	-	43	-	-	2.06	-
12/19/89	15:35	4.1	34.9	6.99	4.53	0.61	0.37	0.24	105.4	6.58	0.61	2.62	2.28	-	12	-	-	1.15	1.76
12/28/89	13:30	2.9	36.3	6.83	4.71	0.63	0.38	0.24	117.5	6.56	0.59	2.47	2.35	-	10	-	-	1.11	1.88
12/31/89	13:50	4.9	38.2	6.77	4.97	0.63	0.36	0.34	99.5	6.93	0.65	2.52	3.57	-	14	-	-	1.39	1.75
12/31/89	17:40	14	36.3	6.62	4.54	0.60	0.34	0.39	80.0	6.64	0.63	2.28	3.87	-	20	-	-	1.79	1.45
1/1/90	8:15	7.0	33.7	6.69	4.12	0.55	0.32	0.26	69.7	6.37	0.59	2.38	3.47	-	30	-	-	1.62	1.26
1/2/90	15:55	3.2	34.8	6.78	4.50	0.63	0.36	0.22	95.1	6.51	0.62	2.65	2.84	-	20	-	-	1.26	-
1/11/90	13:10	3.0	35.9	6.85	4.64	0.64	0.36	0.23	110.4	6.65	0.61	2.58	2.56	-	11	-	-	-	-
1/17/90	15:45	3.5	34.6	6.80	4.74	0.59	0.35	0.21	105.2	6.37	0.60	2.56	2.56	-	14	-	-	1.20	1.66
1/18/90	9:50	5.7	34.9	6.77	4.59	0.58	0.33	0.22	91.4	6.29	0.60	2.53	3.10	-	30	-	-	1.61	1.37
1/18/90	15:40	8.3	33.2	6.70	4.26	0.55	0.32	0.24	72.7	6.10	0.58	2.51	3.34	-	34	-	-	2.15	1.19
1/19/90	13:55	4.3	34.4	6.71	4.44	0.57	0.33	0.21	78.2	6.24	0.59	2.55	3.56	-	21	-	-	1.51	1.29
1/25/90	13:10	4.7	35.8	6.66	4.70	0.60	0.34	0.24	102.1	6.39	0.60	0.96	3.28	-	26	-	-	1.58	1.66
1/25/90	16:20	5.7	36.2	6.69	4.65	0.63	0.33	0.26	95.5	6.48	0.58	1.92	3.38	-	17	-	-	1.69	1.61
1/25/90	17:50	6.5	35.5	6.66	4.64	0.61	0.32	0.27	95.0	6.40	0.57	2.36	3.51	-	-	-	-	-	-
1/25/90	18:59	7.0	35.8	6.36	4.25	0.57	0.41	0.28	88.4	6.10	0.56	2.24	3.41	-	15	10	-	2.27	-
1/25/90	21:59	23	32.1	6.11	3.97	0.56	0.33	0.30	67.5	5.92	0.51	1.99	3.81	-	27	-	-	2.77	-
1/26/90	0:59	33	30.5	6.04	3.62	0.52	0.30	0.32	44.4	5.53	0.48	1.87	4.08	-	42	39	-	3.23	-
1/26/90	4:00	43	30.4	5.88	3.50	0.50	0.27	0.33	30.0	5.22	0.46	1.76	5.16	-	66	55	56	3.32	-
1/26/90	9:10	35	32.7	6.23	3.80	0.56	0.28	0.33	25.0	5.23	0.46	1.58	6.58	-	78	-	-	2.82	0.64
1/26/90	9:14	35	33.3	5.87	3.67	0.55	0.29	0.31	25.8	5.23	0.46	1.85	6.37	-	70	-	-	3.30	-
1/26/90	14:55	23	33.8	6.17	3.96	0.58	0.30	0.29	27.7	5.33	0.48	1.94	6.56	-	56	53	31	2.34	0.75
1/26/90	19:00	16	34.7	5.95	4.05	0.60	0.30	0.29	32.5	5.42	0.50	1.99	6.56	-	42	53	-	2.29	-
1/27/90	11:10	8.8	34.4	6.40	4.15	0.61	0.32	0.24	40.4	5.64	0.52	2.12	6.07	-	30	23	-	1.83	0.93
1/30/90	10:15	22	30.6	6.12	3.57	0.52	0.29	0.23	32.5	5.25	0.47	1.87	5.67	-	48	-	-	2.28	0.73
1/30/90	14:27	16	31.3	6.18	3.69	0.53	0.30	0.25	35.9	5.41	0.49	1.92	5.67	-	45	-	-	2.22	0.73
2/10/90	9:00	31	30.1	6.36	3.45	0.51	0.29	0.26	41.8	5.65	0.48	2.04	3.97	-	79	-	-	2.50	0.77
2/11/90	9:00	11	32.0	6.32	3.60	0.57	0.31	0.22	50.1	5.77	0.52	2.19	4.64	-	40	-	-	1.64	0.96
2/16/90	10:30	13	31.5	6.40	3.84	0.54	0.33	0.24	44.7	5.94	0.58	1.95	4.26	-	40	-	-	1.94	0.82
2/16/90	18:20	17	31.1	6.44	3.83	0.53	0.32	0.25	45.5	5.68	0.55	1.96	4.19	-	47	-	-	1.57	0.79
2/17/90	8:30	19	30.9	6.40	3.79	0.54	0.32	0.24	33.3	5.56	0.52	1.93	4.79	-	67	-	-	1.83	0.70
2/22/90	17:50	12	32.4	6.47	4.34	0.55	0.32	0.25	63.2	5.70	0.61	2.00	3.95	-	25	-	-	1.62	1.01
2/22/90	22:54	20	30.7	6.34	3.72	0.54	0.42	0.25	49.3	5.61	0.58	-	3.87	-	43	-	-	1.98	-
2/23/90	3:24	25	30.2	6.05	3.99	0.57	0.35	0.28	39.5	5.54	0.56	-	4.09	-	63	-	-	2.52	1.48
2/23/90	7:54	25	30.2	6.07	3.33	0.51	0.31	0.23	37.7	5.51	0.55	1.85	4.42	-	-	-	-	2.38	1.21
2/23/90	9:40	28	29.4	6.33	3.34	0.50	0.29	0.24	31.9	5.43	0.54	1.90	4.43	-	78	-	-	2.29	0.60
2/23/90	16:19	32	29.6	6.37	3.69	0.52	0.29	0.27	29.2	5.35	0.52	-	4.64	-	393	-	-	2.36	0.68
2/24/90	7:45	25	30.8	6.30	3.61	0.54	0.29	0.25	27.3	5.39	0.51	-	5.24	-	75	-	-	1.91	0.65
3/2/90	10:55	13	32.4	6.47	4.26	0.64	0.37	0.25	57.9	5.92	0.57	-	4.23	-	26	-	-	1.22	1.04
3/8/90	13:05	15	32.8	6.63	3.81	0.57	0.31	0.22	70.5	5.97	0.57	-	3.84	-	19	-	-	1.32	1.15
3/10/90	15:55	8.8	32.3	6.65	3.83	0.53	0.35	0.24	71.0	5.84	0.56	-	3.52	-	22	-	-	1.60	1.24

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
3/10/90	17:00	8.5	32.5	6.61	3.89	0.56	0.32	0.23	73.7	5.85	0.56	1.99	3.41	-	26	-	-	1.21	-
3/11/90	9:30	8.5	33.4	6.66	3.76	0.58	0.33	0.21	75.8	5.95	0.56	-	3.75	-	20	-	-	1.60	-
3/11/90	22:00	12	31.4	6.43	3.66	0.53	0.31	0.26	64.1	5.60	0.53	1.96	3.62	-	38	-	-	2.16	-
3/12/90	2:00	13	31.6	6.39	3.76	0.55	0.31	0.26	58.5	5.70	0.53	1.88	3.74	-	-	-	-	2.43	-
3/12/90	6:00	16	31.2	6.32	3.63	0.54	0.29	0.29	50.3	5.76	0.53	1.88	3.97	-	-	-	-	2.57	-
3/12/90	8:35	18	30.9	6.42	3.69	0.54	0.29	0.26	47.5	5.77	0.57	1.78	4.13	-	69	68	60	2.22	-
3/12/90	10:00	17	30.9	6.28	3.45	0.55	0.30	0.26	44.4	5.73	0.54	1.81	4.16	-	57	52	30	2.72	-
3/12/90	13:00	16	29.9	6.37	3.72	0.53	0.29	0.26	43.8	5.71	0.53	1.82	4.33	-	56	-	-	2.38	-
3/12/90	18:00	19	30.8	6.21	3.45	0.54	0.28	0.30	40.3	5.41	0.51	1.84	4.46	-	52	-	-	2.78	-
3/13/90	6:00	17	31.1	6.26	3.77	0.52	0.31	0.25	41.3	5.41	0.52	1.80	5.28	-	188	-	-	2.57	-
3/13/90	9:45	23	30.6	6.37	3.53	0.53	0.28	0.26	37.7	5.39	0.50	1.78	5.10	-	53	-	-	2.21	-
3/13/90	14:00	32	29.9	6.05	3.53	0.47	0.39	0.27	28.3	5.15	0.47	1.70	5.26	-	58	57	52	2.99	-
3/13/90	18:00	32	30.3	5.95	3.39	0.48	0.37	0.28	30.8	5.01	0.47	1.64	5.47	-	62	-	-	3.80	-
3/13/90	22:00	26	30.8	5.95	3.69	0.51	0.32	0.28	32.6	5.00	0.46	1.68	5.53	-	52	-	-	3.28	-
3/14/90	10:10	22	30.4	6.41	4.34	0.50	0.27	0.25	34.4	5.35	0.48	1.76	5.39	-	43	-	-	1.81	-
3/14/90	14:00	24	30.8	6.14	3.86	0.51	0.37	0.26	34.1	5.28	0.48	1.72	4.98	-	49	-	-	2.35	-
3/15/90	10:27	16	31.1	6.46	4.40	0.52	0.34	0.24	46.0	5.46	0.50	1.80	4.86	-	37	-	-	1.80	0.77
3/17/90	12:40	16	32.1	6.59	3.76	0.55	0.31	0.28	50.8	5.64	0.55	1.92	4.56	-	31	-	-	1.89	-
3/17/90	15:03	26	31.1	6.50	4.17	0.52	0.29	0.30	44.8	5.49	0.54	1.85	4.26	-	57	-	-	2.61	-
3/17/90	19:35	27	30.7	6.49	3.48	0.51	0.29	0.31	41.8	5.52	0.54	1.89	4.43	-	52	85	60	2.73	-
3/18/90	11:35	19	31.2	6.52	3.62	0.53	0.30	0.27	41.8	5.52	0.54	2.01	4.78	-	39	-	-	2.01	-
3/20/90	9:20	24	30.3	6.45	5.37	0.53	0.29	0.28	42.6	5.69	0.56	1.92	4.49	-	1	-	-	2.26	-
3/24/90	14:13	12	32.0	6.58	3.81	0.57	0.31	0.24	52.1	5.89	0.57	2.00	4.43	-	22	-	-	1.62	0.93
3/28/90	11:15	12	32.1	6.65	3.94	0.53	0.35	0.21	57.5	5.81	0.57	1.97	4.20	-	19	-	-	1.31	-
3/28/90	11:15	12	31.8	6.38	4.04	0.52	0.35	0.21	55.2	5.86	0.57	1.98	4.19	-	20	-	-	1.23	-
3/28/90	11:15	12	31.8	6.35	4.01	0.54	0.34	0.21	55.9	5.83	0.56	1.98	4.20	-	18	-	-	1.18	-
3/28/90	11:15	12	32.3	6.40	4.00	0.56	0.56	0.21	56.1	5.77	0.56	2.00	4.19	-	15	-	-	1.33	1.31
3/28/90	11:15	12	32.1	6.46	3.92	0.56	0.30	0.21	55.6	5.68	0.56	1.97	4.19	-	16	-	-	1.45	1.27
3/28/90	11:15	12	31.7	6.42	3.98	0.56	0.30	0.21	55.2	5.76	0.56	2.00	4.18	-	17	-	-	1.38	1.29
3/30/90	11:45	8.5	32.6	6.65	4.13	0.58	0.31	0.23	62.5	5.82	0.56	1.94	4.04	-	16	-	-	1.35	1.08
4/3/90	8:09	13	-	-	3.76	0.54	0.30	0.22	-	-	-	-	-	-	26	-	-	2.16	-
4/3/90	19:10	14	30.6	6.54	3.71	0.53	0.30	0.24	52.4	5.57	0.54	2.00	3.49	-	37	-	-	2.09	0.90
4/4/90	2:00	9.6	-	-	3.84	0.55	0.37	0.30	-	-	-	-	-	-	38	-	-	2.33	-
4/4/90	10:00	9.0	-	-	3.83	0.55	0.31	0.21	-	5.75	0.55	2.03	3.77	-	31	-	-	1.81	0.87
4/9/90	15:35	6.2	32.0	6.64	3.74	0.53	0.31	0.21	60.9	5.99	0.56	1.90	3.63	0.01	29	-	-	1.28	-
4/10/90	5:00	6.0	28.7	5.93	3.21	0.51	0.26	0.34	25.6	5.35	0.50	1.73	4.22	-	131	-	-	4.00	-
4/10/90	18:15	12	32.3	6.60	3.81	0.56	0.30	0.25	65.0	5.92	0.54	1.82	3.62	0.02	30	23	23	1.66	-
4/10/90	22:00	21	30.4	6.08	3.62	0.54	0.31	0.27	51.8	5.77	0.55	1.79	3.75	-	54	-	-	2.74	-
4/10/90	24:00	37	29.3	6.08	3.41	0.52	0.28	0.30	40.0	5.72	0.53	1.77	3.64	-	82	-	-	3.64	-
4/11/90	2:00	39	29.1	6.04	3.31	0.51	0.27	0.32	31.4	5.69	0.53	1.70	3.92	0.01	126	-	67	4.07	-
4/11/90	4:00	44	28.5	6.02	3.28	0.50	0.27	0.32	28.3	5.46	0.50	1.62	4.18	0.02	113	89	57	3.64	-
4/11/90	6:00	39	28.3	5.87	3.25	0.50	0.26	0.32	27.7	5.42	0.51	1.68	4.47	0.02	140	107	78	3.70	-

Table 13.—Water-quality data on the four study streams, October 1988 through May 1990. (continued)

D. Station 01434105 High Falls Brook at Frost Valley, N.Y.

Date	Time	Discharge, in cubic feet per second	Specific conductance (µS/cm)	pH (standard units)	Calcium dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity wat wh gran titration (µeq/L)	Sulfate dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, nitrate dissolved (mg/L as NO_3)	Ammonium dissolved (mg/L as NH_4)	Aluminum, dissolved (µg/L as Al)	Aluminum, total monomeric (µg/L as Al)	Aluminum, organic monomeric (µg/L as Al)	Carbon dissolved organic (mg/L as C)	Carbon dissolved inorganic (mg/L as C)
4/11/90	8:20	33	29.4	6.18	3.25	0.51	0.27	0.28	28.9	5.40	0.50	1.76	4.57	-	101	103	83	2.80	0.62
4/11/90	13:20	25	29.9	6.37	3.43	0.53	0.28	0.27	28.2	5.56	0.51	1.79	4.62	0.01	68	75	45	2.23	-
4/12/90	15:00	14	31.0	6.35	3.66	0.54	0.29	0.24	41.6	5.78	0.53	1.95	4.65	-	40	-	-	0.44	0.73
4/30/90	3:21	11	33.2	6.74	4.40	0.57	0.34	0.26	82.8	5.82	0.56	1.79	3.06	-	21	-	-	2.32	-
4/30/90	3:48	15	32.2	6.72	4.53	0.56	0.33	0.28	84.2	5.66	0.56	1.73	2.93	-	24	-	-	2.61	-
4/30/90	4:14	20	31.8	6.61	4.30	0.55	0.32	0.27	76.2	5.56	0.54	1.69	2.84	-	61	-	-	2.82	-
4/30/90	9:21	20	28.5	6.38	3.78	0.51	0.28	0.28	57.9	5.57	0.57	1.86	2.62	-	74	-	-	3.17	0.86

Table 14. Water-quality data from snowcores and snowmelt, water years 1989-90

Table 14A.—Snow-core water-quality data from Biscuit Brook, Black Brook and East Branch Neversink River, N.Y., water years 1989-90

[μS/cm, microsiemens per centimeter at 25 degrees celsius; mg/l, ,milligrams per liter; μg/L, micrograms per liter; Locations are shown in fig. 2. Dashes indicate no measurement]

Site	Date	Time	Water equiv-alent (cm)	Specifi c conduc - tance (μS/cm)	pH (stan-dard units)	Cal-cium dis-solved (mg/L as Ca)	Mag-nesium, dis-solved (mg/L as mg)	Sodium , dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (μeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Alum-inum, organic mono-meric (μg/L as Al)	Carbon dis-solved organic (mg/L as C)
Biscuit Brook	12/18/89	11:25	1.8	27.55	4.33	0.3	0.06	0.1	0.19	-48.4	0.967	0.291	-	3.621	-	-
Biscuit Brook	1/8/90	15:00	3.6	24.91	4.35	0.18	0.07	0.1	0.14	-46.95	0.83	0.307	0	3.18	3.1	1.49
Biscuit Brook	1/17/90	16:15	3.3	24.9	4.35	0.22	0.05	0.08	0.12	-44.75	1.065	0.309	-	3.133	-	-
Biscuit Brook	2/10/90	10:00	8.9	10.96	4.71	0.08	0.02	0.06	0.16	-17.25	0.514	0.136	-	1.125	-	-
Biscuit Brook	3/3/90	13:00	6.1	9.06	4.72	0.11	0.04	0.03	0.11	-16.05	-	0.116	-	1.133	-	-
Biscuit Brook	3/8/90	11:00	7.7	10.78	4.74	0.16	0.05	0.04	0.19	-17.25	0.5	0.15	0	1.398	-	-
Biscuit Brook	1/16/91	10:00	-	-	-	0.07	0.02	0.01	0.02	-15.05	-	0.085	0	0.478	-	-
Biscuit Brook	1/30/91	13:00	-	-	-	0.28	0.09	0.09	0.22	-	1.079	0.274	0	1.942	-	-
Biscuit Brook	2/15/91	8:35	-	-	-	0.34	0.14	0.05	0.11	-	0.582	0.215	0	1.246	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black Brook	12/20/89	15:00	1.7	29.22	4.29	0.23	0.05	0.07	0.16	-55.9	0.956	0.31	-	4.001	-	-
Black Brook	1/6/90	15:15	3.0	20.66	4.41	0.17	0.07	0.09	0.17	-40.1	0.704	0.32	0.02	2.933	2.7	1.27
Black Brook	1/18/90	14:15	2.4	14.16	4.57	0.09	0.02	0.05	0.07	-27.3	0.417	0.218	-	1.769	-	-
Black Brook	2/1/90	14:00	4.4	8.15	4.86	0.06	0.02	0.03	0.06	-12.35	0.457	0.097	-	0.775	-	-
Black Brook	2/11/90	14:00	4.2	7.12	4.87	0.07	0.02	0.05	0.05	-10.1	-	0.099	-	0.653	-	-
Black Brook	3/7/90	14:00	2.8	14.91	4.53	0.27	0.07	0.05	0.16	-26.9	0.443	0.173	0	2.378	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East Branch	12/18/89	14:00	1.1	26.9	4.33	0.19	0.06	0.06	0.42	-47	0.901	0.261	-	3.662	-	-
East Branch	1/8/90	11:00	3.2	24.47	4.34	0.19	0.08	0.15	0.26	-45.15	0.82	0.325	0	3.339	5.6	1.31
East Branch	1/17/90	14:00	3.0	25.49	4.36	-	-	-	-	-42.1	1.256	0.313	-	3.381	-	-
East Branch	2/10/90	8:00	7.4	8.49	4.82	0.09	0.05	0.07	0.09	-11.6	-	0.129	-	0.981	-	.
East Branch	3/3/90	10:00	8.0	9.31	4.71	0.1	0.05	0.04	0.12	-16.05	0.417	0.132	0	1.208	-	-
East Branch	3/8/90	12:30	8.2	11.82	4.7	0.16	0.03	0.05	0.11	-21	0.431	0.168	-	1.576	-	-

Table 14B.—Snow-lysimeter water-quality data,October 1989 through May 1990. at station 01434025 , Biscuit Brook above Pigeon Brook at Frost Valley, N.Y.

Site	Date	Time	Sample volume (ml)	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Cal-cium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)
Lysimeter A	1/1/90	10:30		83.73	3.86	1.42	0.22	0.21	0.98	-145.25	5.343	0.709	0	9.49	-	0.0401	-	-	5.84
Lysimeter A	1/17/90	14:57	5,250	73.6	3.92	1.46	0.18	0.34	0.47	-121.3	5.618	0.706	0	7.646	-	0.1746	-	-	-
Lysimeter A	1/18/90	9:05	680	82.3	3.89	1.86	0.21	0.32	0.51	136.35	5.897	0.69	-	10.624	-	-	-	-	-
Lysimeter A	1/18/90	16:05	700	55.48	4.04	1.21	0.13	0.21	0.38	-94.75	3.624	0.531	-	7.12	-	-	-	-	-
Lysimeter A	1/24/90	16:10	2,000	44.56	4.13	0.92	0.08	0.17	0.23	-75	3.023	0.421	-	5.952	-	-	-	-	-
Lysimeter A	1/25/90	11:15	2,750	109.18	3.73	1.59	0.23	0.25	0.77	-209.1	9.258	0.682	-	7.729	-	-	-	-	-
Lysimeter A	1/25/90	16:56	9,009	66.15	3.92	1.05	0.15	0.19	0.52	-126.15	5.839	0.386	0	5.343	-	-	-	-	4.44
Lysimeter A	1/26/90	9:05	>17,000	33.53	4.19	0.4	0.06	0.08	0.26	-64.7	2.481	0.201	0	2.868	-	-	-	-	2.71
Lysimeter A	1/27/90	12:10	770	35.68	4.19	0.45	0.06	0.1	0.28	-65.25	2.728	0.224	-	3.68	-	0.0674	-	-	-
Lysimeter A	1/30/90	11:00	9,100	14.5	4.58	0.13	0.03	0.06	0.13	-26.85	1.073	0.174	-	1.156	-	0.0157	-	-	-
Lysimeter A	2/2/90	10:10	750	29.91	4.31	0.28	0.04	0.08	0.18	-55.85	2.227	0.244	-	3.17	-	-	-	-	-
Lysimeter A	2/2/90	16:28	4,250	50.54	4.03	0.56	0.1	0.07	0.37	-99.5	3.987	0.317	-	3.694	-	0.0147	-	-	-
Lysimeter A	2/3/90	9:44	2,000	38.03	4.17	0.46	0.07	0.06	0.33	-75.6	3.228	0.204	-	2.352	-	0.0324	-	-	-
Lysimeter A	2/4/90	10:02	950	62.07	3.92	0.5	0.07	0.08	0.25	-130.65	5.01	0.223	-	4.46	-	0.071	-	-	-
Lysimeter A	2/7/90	10:15	1,000	56.18	3.98	0.42	0.06	0.07	0.18	-113.8	4.654	0.23	-	4.123	-	0.1429	-	-	-
Lysimeter A	2/8/90	16:15	550	-	-	-	-	-	-	-	5.479	0.274	-	4.226	-	-	-	-	-
Lysimeter A	2/9/90	17:11	1,000	50.22	4.09	0.7	0.1	0.12	0.33	-97.5	4.573	0.275	-	4.471	-	-	-	-	-
Lysimeter A	2/10/90	9:45	8,000	49.66	3.97	0.76	0.12	0.1	0.45	-119.25	4.554	0.273	-	5.143	-	0.0251	-	-	-
Lysimeter A	2/11/90	16:26	2,750	36.66	4.21	0.43	0.07	0.11	0.28	-76.2	2.814	0.191	-	3.357	-	-	-	-	-
Lysimeter A	2/16/90	11:30	1,000	34.1	4.3	0.73	0.11	0.12	0.28	-55.7	3.322	0.271	-	3.597	-	-	-	-	-
Lysimeter A	2/17/90	16:45	700	34.46	4.26	-	-	-	-	-60.4	2.799	0.279	1.93	3.417	-	-	-	-	-
Lysimeter A	2/23/90	9:15	17,000	37.77	4.21	0.58	0.11	0.31	0.34	-87.45	2.756	0.641	1.6	3.126	-	-	-	-	4.35
Lysimeter A	2/23/90	16:40	-	15.58	4.51	0.22	0.03	0.12	0.11	-29.2	1.039	0.198	0	1.472	-	-	-	-	-
Lysimeter A	2/24/90	9:40	-	35.6	4.17	0.37	0.07	0.2	0.26	-70	2.404	0.265	0	3.09	-	-	-	-	-
Lysimeter A	3/4/90	10:20	1,500	65.47	3.96	0.66	0.1	0.27	0.38	-137.2	3.889	0.478	-	6.429	-	-	-	-	4.77
Lysimeter A	3/11/90	11:12	1,200	42.44	4.06	0.38	0.07	0.14	0.2	-84.85	1.959	0.273	0	5.478	-	0.0219	-	-	-
Lysimeter A	3/11/90	17:25	13,400	16.78	4.46	0.19	0.06	0.07	0.06	-34.5	0.816	0.154	0	1.963	-	-	-	-	-
Lysimeter A	3/12/90	7:35	16,500	64.47	3.92	0.73	0.13	0.29	0.39	-128.95	4.912	0.542	0	6.204	-	0.0153	-	-	4.63
Lysimeter A	3/12/90	13:20	4,800	86.45	3.79	0.79	0.17	0.64	0.38	-170.95	7.019	0.853	-	6.967	-	-	-	-	-
Lysimeter A	3/12/90	16:25	5,500	22.14	4.37	0.15	0.03	0.19	0.12	-41.65	1.469	0.229	0	2.043	-	0.0038	-	-	1.43
Lysimeter A	3/13/90	7:30	12,500	10.15	4.66	0.06	0.01	0.09	0.06	-16.55	0.508	0.128	0	1.03	-	0.0023	-	-	-
Lysimeter A	3/13/90	14:30	>17,000	7.33	4.79	0.05	0.01	0.07	0.05	-11.4	-	0.156	0	0.914	-	0.0044	-	-	-
Lysimeter A	3/14/90	10:29	16,000	9.84	4.76	0.18	0.02	0.06	0.08	-	0.442	0.204	0	1.174	-	-	-	-	-
Lysimeter B	1/1/90	10:00	-	36.87	4.22	0.76	0.05	0.08	0.28	-64.4	2.704	0.261	0.02	3.648	-	0.0128	-	-	2.02
Lysimeter B	1/17/90	14:50	5,250	42.31	4.28	2.22	0.1	0.2	0.17	-54.6	3.983	0.464	0	6.636	-	0.0187	-	-	-
Lysimeter B	1/17/90	16:30	737	47.83	4.2	1.59	0.13	0.17	0.15	-62.5	3.808	0.442	0	6.876	-	0.0265	-	-	-
Lysimeter B	1/18/90	9:08	900	29.22	4.42	1.11	0.07	0.12	0.13	-41.45	2.369	0.302	-	4.27	-	-	-	-	-
Lysimeter B	1/18/90	16:08	700	17.53	5.86	1.35	0.03	0.08	0.14	-10.55	1.534	0.288	-	3.566	-	-	-	-	-
Lysimeter B	1/25/90	17:08	8,000	59.98	3.94	0.71	0.04	0.11	0.16	-119.35	4.333	0.277	0.03	5.742	-	-	-	-	1.62
Lysimeter B	1/26/90	9:20	>17,000	27.77	4.27	0.21	0.02	0.06	0.08	-54.55	1.969	0.141	0	2.54	-	0.0087	-	-	0.88
Lysimeter B	2/9/90	17:05	750	25.72	4.35	-	-	-	-	-50.5	2.253	0.139	-	1.858	-	-	-	-	-
Lysimeter B	2/10/90	9:24	13,000	35.19	4.22	0.3	0.05	0.08	0.45	-67.65	2.534	0.145	-	3.055	-	-	-	-	-
Lysimeter B	2/16/90	11:35	1,000	31	4.32	0.71	0.09	0.1	0.3	-55.25	2.97	0.211	-	2.862	-	-	-	-	-
Lysimeter B	2/17/90	17:00	3,000	19.44	4.48	0.18	0.03	0.07	0.18	-36.75	1.424	0.178	-	1.558	-	-	-	-	-

Table 14B.—Snow-lysimeter water-quality data,October 1989 through May 1990. at station 01434025 , Biscuit Brook above Pigeon Brook at Frost Valley, N.Y. (continued)

Site	Date	Time	Sample volume (ml)	Specific conduc-tance (µS/cm)	pH (stan-dard units)	Cal-cium dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as mg)	Sodium, dis-solved (mg/L as Na)	Potas-sium, dis-solved (mg/L as K)	Alka-linity wat wh gran titration (µeq/L)	Sulfate dis-solved (mg/L as SO_4)	Chlo-ride, dis-solved (mg/L as Cl)	Silica, dis-solved (mg/L as SiO_2)	Nitro-gen, nitrate dis-solved (mg/L as NO_3)	Ammo-nium dis-solved (mg/L as NH_4)	Alum-inum, dis-solved (µg/L as Al)	Alum-inum, total mono-meric (µg/L as Al)	Alum-inum, organic mono-meric (µg/L as Al)	Carbon dissolved organic (mg/L as C)
Lysimeter B	2/23/90	9:30	17,000	24.81	4.36	0.3	0.07	0.28	0.26	-46.5	1.929	0.498	-	2.04	-	-	-	-	2.4
Lysimeter B	2/23/90	16:30	3,500	14.16	4.57	0.21	0.03	0.06	0.14	-25.1	0.987	0.148	-	1.298	-	-	-	-	-
Lysimeter B	2/24/90	9:50	-	28.47	4.26	0.23	0.04	0.06	0.22	-54.05	1.871	0.195	-	2.561	-	-	-	-	-
Lysimeter B	3/11/90	17:35	8,000	30.77	4.21	0.36	0.05	0.09	0.14	-58.2	1.364	0.211	0	4.197	-	0.0263	-	-	1.11
Lysimeter B	3/12/90	7:45	16,800	53.38	4	0.34	0.09	0.2	0.41	-97.4	4.187	0.398	1.8	4.829	-	-	-	-	-
Lysimeter B	3/12/90	13:25	4,200	71.86	3.87	0.32	0.09	0.45	0.35	-134.85	5.668	0.677	0	6.207	-	0.0116	-	-	-
Lysimeter B	3/12/90	16:40	5,900	13.37	4.55	0.07	0.02	0.08	0.05	-26	0.883	0.165	0	1.187	-	0.0058	-	-	-
Lysimeter B	3/13/90	8:30	9,900	6.9	4.81	0.04	0.01	0.05	0.05	-11.25	-	0.098	0	0.678	-	0.0033	-	-	-
Lysimeter B	3/14/90	10:00	6,000	11.65	4.74	0.28	0.04	0.07	0.12	-15.6	0.948	0.184	0	1.325	-	-	-	-	-

Table 15. Daily mean discharges at the four study sites, water years 1989-90

Table 15A.--Mean discharge of Biscuit Brook, October 1988 Through September 1989
[Values are in cubic meters persecondl(iters per second); CAL Yr, calendar year, WTR YR, water year; E, estimated; dashes indicate missing values]

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	5.3	10	e3.4	e3.3	4.1	26	8.1	5.4	4.8	1.5	89
2	2.3	8.7	9.0	e3.4	e3.6	e4.0	17	68	5.6	4.4	1.6	.5
3	2.3	5.9	8.5	e3.2	e3.0	e3.9	17	28	4.7	3.9	1.9	.89
4	1.7	6.1	8.0	e3.0	e2.5	e4.0	22	18	4.6	3.9	1.4	.74
5	1.7	34	7.7	e2.9	e2.2	6.9	23	28	3.5	11	2.3	.70
6	1.7	55	e7.4	e2.8	e2.2	5.7	34	162	7.9	6.5	1.5	.70
7	1.7	21	e6.8	e2.7	e2.3	e4.0	24	56	6.2	5.3	1.3	.70
8	2.4	14	e6.2	e2.6	e2.2	e3.7	18	31	5.3	4.5	1.2	.69
9	2.2	12	e5.8	e3.0	e2.2	e3.5	16	25	5.4	3.8	1.1	.66
10	2.2	11	e5.6	e2.8	e2.1	e3.7	13	34	8.5	3.9	1.1	.65
11	2.8	9.7	e5.4	e2.7	e2.1	4.0	12	78	5.7	3.7	1.2	.62
12	2.3	8.3	e5.2	e2.6	e2.3	3.7	11	37	4.7	3.3	4.1	.62
13	2.0	16	e5.0	e2.6	e2.3	3.6	10	27	8.8	3.0	11	.62
14	1.9	14	e5.2	e2.8	e3.0	5.4	10	22	10	2.7	3.6	1.9
15	1.9	11	e4.8	e2.8	e4.0	19	12	19	20	2.6	2.0	1.2
16	1.9	9.9	e4.4	e2.8	e3.0	11	17	75	24	2.6	1.6	1.6
17	1.9	20	e4.2	e2.7	e2.6	12	13	116	17	2.8	1.4	3.0
18	3.5	14	e4.1	e2.6	e2.5	26	13	38	12	2.6	1.2	1.4
19	3.3	11	e3.9	e2.5	e2.5	14	12	25	9.9	2.3	1.2	3.8
20	2.6	44	e4.1	e2.4	e2.6	e11	11	19	8.2	4.0	1.7	80
21	2.7	45	4.5	e2.1	e54	e7.6	9.9	17	7.9	3.3	1.3	19
22	11	23	3.7	e2.0	e25	e7.0	8.9	14	7.1	2.7	1.1	24
23	6.0	17	3.5	e2.1	e10	e6.8	8.1	12	9.2	2.3	1.0	42
24	10	15	11	e2.4	e6.0	7.3	7.3	15	14	2.1	.95	18
25	7.0	13	8.8	e2.6	e3.5	14	7.0	11	8.6	1.9	.89	11
26	4.4	11	4.5	e2.5	e3.6	18	6.6	9.7	8.0	1.8	.80	15
27	3.5	11	4.2	e2.6	e5.0	34	6.1	9.0	8.1	1.7	.79	10
28	5.1	16	6.1	e2.4	e4.7	71	5.8	7.5	7.0	3.5	.78	8.5
29	4.8	11	5.4	e2.2	---	74	6.0	6.4	6.1	2.1	1.4	7.6
30	4.0	10	e3.8	e2.4	---	52	6.6	6.3	5.4	1.7	1.6	6.7
31	3.5	---	e3.5	e2.5	---	40	---	5.6	---	1.6	.90	---
TOTAL	106.1	502.9	180.3	82.1	164.3	484.9	403.3	1027.6	258.8	106.3	55.41	264.68
MEAN	3.42	16.8	5.82	2.65	5.87	15.6	13.4	33.1	.63	3.43	1.79	8.82
MAX	1	55	11	3.4	54	74	34	162	24	11	11	80
MIN	1.7	5.3	3.5	2.0	2.1	3.5	5.8	5.6	3.5	1.6	.78	.62
CFSM	.90	4.41	1.53	.70	1.54	4.12	3.54	8.72	2.27	.90	.47	2.32
IN.	1.04	4.92	1.77	.80	1.61	4.75	3.95	10.06	2.53	1.04	.54	2.59

CAL YR 1988 TOTAL 2758.65 MEAN 7.54 MAX 128 MIN .55 CFSM 1.98 IN. 27.01
WTR YR 1989 TOTAL 3636.69 MEAN 9.96 MAX 162 MIN .62 CFSM 2.62 IN. 35.60

e Estimated

Table 15A.--Mean discharge of Biscuit Brook, October 1988 Through September 1989(continued)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.0	16	e8.8	e12	15	e13	11	9.9	10	4.4	2.3	4.9
2	12	9.8	e8.6	e4.0	17	12	9.5	8.3	9.2	3.6	1.9	4.6
3	9.5	8.9	e8.0	e3.5	16	10	20	8.3	8.6	3.1	1.9	4.2
4	7.5	8.0	e6.8	e3.4	13	e9.0	17	9.5	8.0	2.9	1.8	3.9
5	6.7	7.3	e6.4	4.3	e12	e8.2	13	16	6.9	2.7	5.1	3.8
6	6.2	7.7	e6.0	3.6	e11	e7.2	12	11	6.5	2.9	37	3.8
7	5.7	7.2	e6.0	3.4	9.6	e6.8	11	9.7	6.8	2.7	35	3.5
8	5.5	7.1	e5.4	3.3	9.3	e6.4	10	9.9	6.1	2.4	13	3.4
9	5.3	13	e5.0	3.3	10	6.1	9.3	9.0	6.0	3.3	8.1	3.2
10	5.2	11	e4.8	3.3	36	7.1	25	62	5.9	2.6	8.6	5.3
11	7.2	9.1	e4.6	3.2	21	11	70	70	5.5	2.4	12	3.5
12	5.6	8.3	e4.5	3.2	15	42	26	28	4.8	10	7.8	3.4
13	5.3	7.5	e4.3	2.9	14	49	18	68	4.1	8.3	7.7	3.1
14	4.9	7.1	e4.2	e2.8	12	30	15	74	3.9	4.5	9.2	3.0
15	9.8	7.2	e4.0	2.9	11	20	19	34	4.0	4.1	6.3	6.7
16	6.4	40	e3.9	3.2	32	16	15	31	3.8	3.9	5.2	3.0
17	12	25	e3.8	e4.0	42	27	14	29	3.4	3.4	4.8	2.7
18	11	16	e3.7	e16	e16	31	12	25	3.7	3.0	4.4	2.5
19	16	13	e3.5	e10	e13	19	11	22	3.6	2.7	4.6	2.5
20	107	13	e3.3	e8.0	e12	27	11	19	3.1	3.0	4.3	2.6
21	57	13	e3.2	7.3	e13	20	13	25	4.7	3.1	4.5	2.2
22	24	11	e3.0	6.3	15	21	10	19	4.5	2.7	4.0	2.5
23	17	10	e2.9	5.7	61	21	9.3	16	8.4	4.1	3.8	2.4
24	13	10	e2.8	5.8	40	17	8.3	14	6.1	3.4	25	2.1
25	11	8.6	e2.8	13	e20	14	8.9	13	4.3	2.6	23	2.0
26	9.5	8.9	e2.7	80	e16	e12	8.0	12	3.5	2.4	11	2.0
27	8.6	8.1	e2.6	24	e14	e11	7.7	14	3.2	2.3	8.9	2.1
28	7.7	16	e2.6	15	e14	e10	7.4	11	3.0	2.2	7.6	1.9
29	6.8	12	e2.6	13	---	9.7	6.9	13	4.3	2.2	8.5	1.8
30	6.2	10	e2.5	44	---	9.2	15	15	5.0	2.1	6.2	2.1
31	9.6	---	e4.0	21	---	11	---	11	---	2.8	5.2	---
TOTAL	425.2	349.8	137.3	335.4	529.9	513.7	443.3	716.6	160.9	105.8	288.7	94.7
MEAN	13.7	11.7	4.43	10.8	18.9	16.6	14.8	23.1	5.36	3.41	9.31	3.16
MAX	107	40	8.8	80	61	49	70	74	10	10	37	6.7
MIN	4.9	7.1	2.5	2.8	9.3	6.1	6.9	8.3	3.0	2.1	1.8	1.8
CFSM	3.61	3.07	1.17	2.85	4.98	4.36	3.89	6.08	1.41	.90	2.45	.83
IN.	4.16	3.42	1.34	3.28	5.19	5.03	4.34	7.02	1.58	1.04	2.83	.93

CAL YR 1989	TOTAL	759.69	MEAN 10.3	MAX 162	MIN .62	CFSM 2.71	IN. 36.81
WTR YR 1990	TOTAL	4101.3	MEAN 11.2	MAX 107	MIN 1.8	CFSM 2.96	IN. 40.15

e Estimated

Table 15B.--Mean discharge of Black Brook, October 1988 Through September 1989
[Values are in cubic meters per second; CAL Yr, calendar year, WTR YR, water year; E, estimated; dashes indicate missing values]

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e1.1	1.7	e3.7	e1.3	e1.5	e2.0	10	2.9	2.1	2.2	e1.0	.66
2	e1.3	3.3	e3.3	e1.2	e1.6	e1.6	7.0	13	2.3	2.1	e1.0	.80
3	e1.3	2.1	2.9	e1.2	e1.4	e1.4	6.9	6.9	2.0	1.8	e1.2	.60
4	e1.0	2.4	2.8	e1.1	e1.1	e1.3	7.2	5.3	1.8	1.7	e.97	.53
5	e1.0	12	e2.7	e1.1	e1.1	e1.3	7.4	7.0	1.6	4.1	e1.4	.49
6	e1.0	18	e2.5	e1.0	e1.0	e1.5	10	37	4.2	2.5	e.97	.50
7	e1.0	9.3	e2.3	e1.0	e1.0	2.9	8.9	18	3.2	2.0	e.93	.50
8	e1.3	7.0	e2.1	e1.0	e.96	5.0	7.4	12	2.6	1.7	e.89	.42
9	e1.2	5.8	e1.9	e1.3	e.94	1.9	6.3	9.5	2.5	1.5	e.86	.37
10	e1.2	4.5	e1.9	e1.2	e.92	1.1	5.7	11	3.3	1.7	e.82	.39
11	e1.5	6.7	e1.8	e1.1	e.92	1.1	4.7	14	2.6	1.5	e.75	.39
12	e1.3	5.3	e1.7	e1.1	e.98	1.0	3.9	10	e2.3	1.2	e.69	.34
13	e1.2	6.8	e1.6	e1.1	e1.0	1.4	3.8	8.0	e3.7	1.2	e.72	.33
14	.69	e4.5	e1.8	e1.2	e1.1	1.3	3.6	7.5	e4.2	1.1	e.80	.88
15	.67	e4.0	e1.6	e1.2	e1.3	4.9	4.2	6.7	e7.7	.99	e1.2	.55
16	.61	e3.4	e1.4	e1.2	e1.1	3.7	6.0	9.8	e9.3	.98	e1.0	.59
17	.56	e4.5	e1.3	e1.2	e.96	3.8	4.9	e21	e7.0	.94	e.93	1.0
18	.72	e6.6	e1.2	e1.1	e.90	6.5	4.5	e14	e5.4	.86	.50	.58
19	.69	e4.0	e1.2	e1.1	e.88	4.4	e4.2	e11	e4.6	.93	.44	1.7
20	.67	e8.0	e1.1	e1.0	e1.1	4.8	e4.0	e7.4	e3.9	1.5	.42	22
21	.75	e12	e1.1	e.92	11	2.8	e3.8	6.2	3.8	1.1	.34	6.9
22	2.6	e15	e1.2	e.84	6.6	e3.3	3.7	e5.8	3.4	.86	.27	7.0
23	1.7	e7.0	e1.4	e.90	3.6	e3.7	3.5	e5.0	3.2	.82	.26	11
24	3.2	e5.6	1.9	e1.0	e3.5	5.8	3.3	e5.6	8.4	.76	.34	7.3
25	2.0	e4.8	2.1	e.90	e3.0	12	3.1	e4.3	4.2	.71	.37	5.5
26	1.4	e4.0	1.9	e.84	e2.7	10	2.8	e3.9	3.7	.75	.35	6.2
27	1.2	e4.0	e1.7	e.86	e2.4	8.6	2.6	e3.5	3.2	e1.1	.36	4.9
28	1.4	e5.4	e1.6	e.78	e2.1	9.8	2.9	e3.1	2.9	e1.8	.36	4.0
29	1.4	e4.2	e1.5	e.74	---	12	3.0	e2.9	2.6	e1.2	.59	3.7
30	1.3	e3.7	e1.4	e.90	---	13	2.8	2.4	2.4	e1.0	.60	3.3
31	1.3	---	e1.3	e1.1	---	13	---	2.2	---	e1.0	.52	---
TOTAL	38.26	185.6	57.9	32.48	56.66	146.9	152.1	276.9	114.1	43.60	21.85	93.42
MEAN	1.23	6.19	1.87	1.05	2.02	4.74	5.07	8.93	3.80	1.41	.70	3.11
MAX	3.2	18	3.7	1.3	11	13	10	37	9.3	4.1	1.4	22
MIN	.56	1.7	1.1	.74	.88	1.0	2.6	2.2	1.6	.71	.26	.33

WTR YR 1989 TOTAL 1219.77 MEAN 3.34 MAX 37 MIN .26

e Estimated

Table 15B.--Mean discharge of Black Brook, October 1988 Through September 1989. (continued)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	6.1	e4.0	e2.6	5.9	3.8	4.1	5.2	4.2	2.5	1.3	1.7
2	5.4	4.1	e3.8	e1.6	6.4	e3.2	3.9	4.4	4.1	2.2	1.2	1.7
3	4.4	3.9	e3.5	e1.5	5.8	e2.9	7.8	4.0	4.0	2.0	1.1	1.6
4	3.1	3.6	e3.2	e1.4	4.9	e2.9	6.8	4.1	3.6	2.0	1.1	1.4
5	2.7	3.7	e2.9	e1.6	4.3	e2.8	5.4	5.6	3.3	2.0	2.3	1.4
6	2.6	3.8	e2.7	1.5	3.9	e2.7	5.1	4.6	3.2	1.8	6.7	1.4
7	2.2	3.4	e2.5	e1.4	3.6	e2.9	4.6	4.2	3.5	1.7	4.0	1.5
8	1.9	3.4	e2.3	e1.3	3.3	e3.5	4.0	4.3	3.0	1.6	2.4	1.3
9	1.7	5.2	e2.1	e1.2	3.4	3.0	3.8	4.0	3.0	2.3	2.0	1.1
10	1.5	4.2	e1.9	e1.2	8.2	3.1	6.0	24	3.0	1.9	2.6	1.6
11	2.3	4.0	e1.8	e1.2	6.2	4.2	17	28	2.8	1.6	3.6	1.2
12	2.0	3.6	e1.7	e1.1	4.8	9.9	8.5	12	2.6	4.9	2.5	1.2
13	1.8	3.2	e1.8	e1.1	4.2	11	6.7	21	2.3	4.4	2.9	1.1
14	1.5	4.0	e2.0	e1.1	4.2	8.9	5.9	26	2.4	2.7	4.0	1.1
15	3.0	4.2	e1.9	e1.1	3.6	6.8	6.6	14	2.3	2.7	2.6	2.4
16	2.1	13	e1.8	e1.1	6.8	5.9	5.5	11	2.3	2.9	2.4	1.2
17	3.4	8.7	e1.7	e1.4	8.6	8.2	4.9	10	2.3	2.4	2.3	.97
18	4.0	6.4	e1.6	5.0	12	9.1	4.3	9.0	2.3	2.3	2.1	.90
19	6.8	e4.6	e1.6	e4.0	e5.0	6.7	4.0	8.5	2.2	2.2	2.1	.91
20	32	e3.9	e1.7	e3.0	e4.6	7.8	3.8	7.2	2.0	2.3	1.8	1.0
21	23	e3.4	e1.6	e2.7	e4.1	6.8	4.6	8.1	2.5	2.3	1.8	.87
22	12	e3.0	e1.6	e2.4	e4.0	7.0	4.1	6.9	2.6	2.0	1.7	.98
23	8.0	e2.7	e1.5	e2.3	e4.3	8.2	3.8	6.2	4.1	2.4	1.7	.94
24	6.0	e2.7	e1.5	e2.3	e5.6	6.4	3.5	5.7	3.3	2.1	4.4	.86
25	5.3	e2.8	e1.4	e2.5	e7.6	5.7	.8	5.0	2.5	1.8	4.8	.78
26	4.8	e2.9	e1.4	19	14	5.1	3.8	4.5	2.1	1.7	2.8	.81
27	4.1	3.0	e1.3	7.9	28	4.6	3.5	4.4	2.0	1.6	2.4	.80
28	3.8	6.8	e1.3	6.1	5.6	4.9	3.3	4.0	2.0	1.5	2.3	.77
29	3.2	5.4	e1.3	5.2	---	4.1	3.1	4.1	2.4	1.4	2.9	.76
30	2.9	4.5	e1.5	13	---	3.9	7.8	4.6	2.8	1.4	2.1	1.0
31	4.0	---	e2.4	7.1	---	4.2	---	3.4	---	1.4	1.8	---
TOTAL	164.5	134.2	63.3	105.9	182.9	170.2	160.0	268.0	84.7	68.0	79.7	35.25
MEAN	5.31	4.47	2.04	3.42	6.53	5.49	5.33	8.65	2.82	2.19	2.57	1.17
MAX	32	13	4.0	19	28	11	17	28	4.2	4.9	6.7	2.4
MIN	1.5	2.7	1.3	1.1	3.3	2.7	3.1	3.4	2.0	1.4	1.1	.76

CAL YR 1989	TOTAL 1300.01	MEAN 3.56	MAX 37	MIN .26
WTR YR 1990	TOTAL 1516.65	MEAN 4.16	MAX 32	MIN .76

e Estimated

Table 15C.--Mean discharge of East Branch Neversink River, October 1988 Through September 1989
[Values are in cubic meters per second; CAL Yr, calendar year, WTR YR, water year; E, estimated; dashes indicate missing values]

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP
1	e 3.1	e 20	e 42	e 7.4	e 9.0	e 14	e 45	33	21	14	e 13	5.2
2	e 5.5	e 35	e 38	e 7.0	e 11	e 13	22	322	21	13	6.8	5.9
3	e 5.5	e 23	e 35	e 6.6	e 9.0	e 13	e 30	103	19	13	7.6	5.1
4	e 2.6	e 24	e 33	e 6.4	e 7.8	e 13	109	49	e 21	12	6.9	4.8
5	e 2.6	e 157	e 31	e 6.0	e 7.0	e 30	108	85	e 19	22	7.6	4.8
6	e 2.6	e 258	e 30	e 5.6	e 7.4	e 19	159	307	e 28	18	6.9	4.8
7	e 2.6	e 95	e 27	e 5.4	4.2	e 13	78	135	e 23	16	6.8	5.0
8	e 5.5	e 62	e 24	e 5.2	5.2	e 12	50	69	e 21	12	5.3	5.1
9	e 5.0	e 52	e 22	e 6.0	4.8	12	36	49	e 21	12	5.3	5.1
10	e 5.0	e 47	e 21	e 5.8	e 4.6	12	29	202	e 27	12	5.2	5.1
11	e 7.9	e 41	e 20	e 5.4	e 4.5	10	25	443	e 22	12	5.3	5.1
12	e 5.5	e 34	e 19	e 5.4	e 4.4	8.2	23	137	e 20	10	9.6	5.0
13	e 4.1	e 71	e 18	e 10	e 6.6	6.9	22	79	e 28	10	16	4.9
14	6.9	e 57	e 19	e 7.0	e 15	41	23	58	e 31	9.9	10	6.9
15	6.9	e 47	e 17	e 8.8	e 30	e 100	34	57	e 52	9.3	7.6	6.5
16	6.9	e 42	e 16	e 7.8	e 11	e 27	90	180	e 63	9.5	6.8	6.2
17	6.9	e 90	e 15	e 7.4	e 8.6	e 32	52	256	e 48	9.7	6.3	9.3
18	7.5	e 62	e 14	e 7.0	e 8.0	e 45	58	127	e 37	9.1	5.9	6.9
19	7.4	e 47	e 13	e 6.8	e 8.0	e 35	44	75	e 33	8.8	6.0	15
20	6.8	e 205	e 14	e 6.6	e 10	e 27	32	58	e 29	12	7.2	279
21	6.9	e 210	e 16	e 6.0	e 250	e 20	28	51	e 28	11	6.5	53
22	62	e 104	e 12	e 5.6	e 150	e 13	26	42	24	9.7	6.0	40
23	25	e 76	e 11	e 5.8	e 60	e 17	23	36	22	8.9	5.8	82
24	33	e 66	e 47	e 6.8	e 25	e 17	22	59	29	8.3	5.5	44
25	25	e 57	e 37	e 7.4	e 15	e 60	20	47	22	8.0	5.3	27
26	17	e 47	e 16	e 6.8	e 12	e 150	19	36	20	7.7	5.2	37
27	14	e 47	e 15	e 7.2	e 17	e 350	19	32	19	7.7	5.1	27
28	14	e 71	e 24	e 6.4	e 15	1,040	18	28	18	9.9	5.2	21
29	16	e 47	e 20	e 6.0	--	994	20	25	17	7.8	5.7	19
30	13	e 42	e 13	e 6.6	--	424	26	24	15	7.3	6.1	18
31	12	--	e 11	e 7.0	--	e 80	--	22	--	7.1	5.3	--
Total	344.7	2236	690	205.2	720.1	3,653.1	1,290	3,226	798	338.7	214.5	763.7
Mean	11.1	74.5	22.2	6.62	25.7	118	43.0	104	26.6	10.9	6.92	25.5
Max	62	258	47	10	250	1,040	159	443	63	22	16	279
Min	2.6	20	11	5.2	4.2	6.9	18	22	15	7.1	5.1	4.8

e Estimated

Table 15C.—Mean discharge of East Branch Neversink River, October 1988 Through September 1989 (continued)

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	89	e17	e7.0	e32	e28	31	44	31	---	---	---
2	50	38	e15	e6.8	33	e26	30	35	29	---	---	---
3	45	32	e13	e8.0	34	e25	51	31	28	---	---	---
4	29	26	e11	e9.2	29	e23	49	31	27	---	---	---
5	24	26	e12	11	32	e21	37	50	25	---	---	

6	22	27	e15	9.5	37	e19	32	39	24	---	---	---
7	20	23	e20	9.5	23	e18	31	34	24	---	---	---
8	18	23	e15	9.4	22	e17	29	32	23	---	---	---
9	16	89	e12	9.1	23	e16	27	30	22	---	---	---
10	17	52	e11	9.9	81	e15	37	145	22	---	---	---
11	25	34	e9.4	8.9	43	26	301	175	20	---	---	---
12	18	28	e8.5	8.3	34	79	73	74	20	---	---	---
13	15	24	e7.8	8.0	32	113	52	160	20	---	---	---
14	14	25	e7.3	6.8	27	90	45	166	20	---	---	---
15	20	26	e6.8	6.7	25	70	52	86	19	---	---	---
16	---	68	e6.6	e6.8	70	60	46	79	19	---	---	---
17	26	49	6.2	e7.6	84	112	41	84	18	---	---	---
18	30	33	e6.0	e13	66	118	38	76	18	---	----	
19	37	26	e5.6	e10	e39	63	35	64	25	---	----	---
20	370	29	e5.4	e12	e30	112	33	55	37	---	---	---
21	161	31	e5.2	e9.6	e32	81	37	73	26	---	---	---
22	69	29	e5.0	e7.8	54	63	34	59	28	---	---	---
23	47	29	e4.9	e6.6	147	60	32	50	39	---	---	---
24	40	23	e4.7	e5.4	84	49	30	45	35	---	---	---
25	36	21	e4.5	e8.0	48	42	30	42	26	---	---	---
26	32	21	e4.4	e28	e38	e34	30	39	22	---	---	---
27	28	20	e4.3	42	e34	e30	29	37	21	---	---	---
28	28	31	e4.2	33	e31	e29	28	34	20	---	---	---
29	25	24	e5.0	24	---	e27	27	37	25	---	---	---
30	23	20	e5.8	53	---	30	59	44	33	---	---	---
31	50	---	e7.6	33	---	31	---	34	---	---	---	---
TOTAL	---	1016	266.2	427.9	1264	1527	1406	1984	746	---	---	---
MEAN	---	33.9	8.59	13.8	45.1	49.3	46.9	64.0	24.9	---	---	---
MAX	---	89	20	53	147	118	301	175	39	---	---	---
MIN	---	20	4.2	5.4	22	15	27	30	18	---	---	---

e Estimated

Table 15D.--Mean discharge of East Branch Neversink River, October 1988 Through September 1989
[Values are in cubic meters per second; CAL Yr, calendar year, WTR YR, water year; E, estimated; dashes indicate missing values]

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	e8.4	e3.2	e3.0	e3.7	e23	e10	4.5	4.1	1.9	1.7
2	---	---	e7.2	e3.1	e3.3	e3.5	13	e27	3.2	4.0	2.1	2.0
3	---	---	e6.8	e2.9	e2.7	e3.5	14	e17	3.6	3.8	2.5	1.6
4	---	7.9	e6.6	e2.8	e2.3	e3.6	16	e13	5.2	3.9	2.3	1.5
5	---	36	e6.2	e2	e2.1	e5.4	15	e25	5.7	9.2	2.6	1.4
6	---	38	e5.6	e2.5	e2.0	e4.0	20	57	7.1	6.3	2.0	1.4
7	---	16	e5.2	e2.5	e2.1	e3.3	17	34	5.6	4.8	1.9	1.4
8	---	11	e4.7	e2.4	e2.0	e2.5	14	24	5.6	4.3	1.7	1.4
9	---	9.6	e4.4	e2.8	e2.0	e2.0	12	19	4.7	3.7	1.7	1.5
10	---	12	e4.2	e2.6	e1.9	e1.9	11	24	5.9	4.3	1.6	1.5
11	---	7.8	e4.0	e2.4	e1.9	e1.9	9.9	26	4.7	3.8	1.6	1.4
12	---	5.6	e3.8	e2.4	e2.1	e1.9	8.7	20	4.3	3.3	2.4	1.2
13	---	13	e3.7	e2.4	e2.1	e2.5	8.5	16	6.8	3.2	3.1	1.2
14	---	8.2	e4.0	e2.6	e2.8	e3.8	8.2	14	8.0	3.1	1.9	2.4
15	---	5.7	e3.7	e2.6	e3.6	e5.2	9.4	13	12	3.0	1.7	1.8
16	---	7.4	e3.3	e2.6	e2.8	3.4	12	22	13	3.0	1.6	2.2
17	---	13	e3.1	e2.5	e2.4	4.8	e9.0	35	6.5	3.0	1.5	3.1
18	---	6.9	e3.0	e2.4	e2.3	12	8.6	21	3.8	2.9	1.4	1.8
19	---	6.9	e2.9	e2.3	e2.2	8.5	8.1	17	4.0	2.8	1.6	4.6
20	---	34	e5.4	e2.2	e2.4	15	7.8	15	4.3	4.1	1.8	44
21	---	30	4.5	e2.0	e40	e6.0	7.5	14	5.6	3.6	1.7	12
22	---	17	3.6	e1.8	e19	e5.8	7.4	11	4.3	3.7	1.5	12
23	---	15	3.5	e1.9	e11	e5.6	7.2	10	2.9	3.2	1.5	16
24	---	12	7.5	e2.1	e5.6	e5.8	7.0	13	3.8	2.6	1.3	8.0
25	---	10	5.2	e2.4	e3.2	10	6.8	9.9	3.2	2.4	1.	7.1
26	---	10	12	e2.3	e3.3	12	6.5	8.8	4.2	2.3	1.2	11
27	---	14	22	e2.4	e4.5	13	6.5	8.4	3.9	2.2	1.1	8.1
28	---	e13	e4.5	e2.1	e4.0	18	6.3	7.3	3.5	2.7	1.1	7.7
29	---	e9.2	e4.0	e2.0	---	e26	6.5	6.7	4.0	2.1	---	7.3
30	---	e8.2	e3.5	e2.2	---	e26	6.7	6.6	4.5	2.0	6.0	6.8
31	---	---	e3.3	e2.5	---	e24	---	6.9	---	1.9	.6	---
TOTAL	---	---	169.8	75.6	138.6	244.6	313.6	551.6	158.4	109.3	---	175.1
MEAN	---	---	5.48	2.44	4.95	7.89	10.5	17.8	5.28	3.53	---	5.84
MAX	---	---	22	3.2	40	26	23	57	13	9.2	---	44
MIN	---	---	2.9	1.8	1.9	1.9	6.3	6.6	2.9	1.9	---	1.2

e Estimated

Table 15D.--Mean discharge of East Branch Neversink River, October 1988 Through September 1989 (continued)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	14	e13	e3.3	9.7	39	8.7	7.9	7.6	---	---	---
2	11	9.1	e11	e3.0	12	14	8.2	7.1	7.3	---	---	---
3	7.4	8.6	e9.2	e2.9	11	9.8	12	6.5	7.0	---	---	---
4	6.1	8.0	e8.0	e2.9	9.8	14	8.4	7.0	6.8	---	---	---
5	5.8	7.8	e7.2	e2.9	12	28	7.3	9.6	6.3	---	---	---
6	6.0	8.1	e6.4	e2.8	18	10	7.0	7.4	6.0	---	---	---
7	5.6	7.7	e5.8	e2.8	7.8	36	6.6	7.1	6.4	---	---	---
8	5.3	7.7	e5.4	e2.8	7.7	30	6.3	7.1	5.9	---	---	---
9	5.2	13	e4.9	e2.7	8.0	7.4	6.1	6.6	5.8	---	---	---
10	5.5	9.3	e4.5	e2.7	19	7.7	10	29	5.6	---	---	---
11	7.2	8.5	e4.1	e2.7	11	9.6	28	35	5.3	---	---	---
12	5.6	8.1	e3.9	e2.7	9.0	17	14	21	4.9	---	---	---
13	5.3	7.2	e4.4	e2.7	13	25	11	37	4.6	---	---	---
14	5.1	7.2	e4.1	e2.8	7.9	23	9.9	38	4.5	---	---	---
15	7.4	7.6	e3.9	e2.8	7.5	17	12	26	4.4	---	---	---
16	5.6	23	e3.8	e3.0	15	15	10	26	4.3	---	---	---
17	7.9	14	e3.6	3.4	19	20	9.5	25	4.0	---	---	---
18	6.8	11	e3.5	6.0	26	20	8.4	21	4.0	---	---	---
19	10	e9.2	4.0	5.6	16	15	7.9	19	3.9	---	---	---
20	46	e8.6	e3.6	19	18	22	7.6	5	3.6	---	---	---
21	41	e8.2	e3.4	4.1	31	16	8.7	19	4.5	---	---	---
22	25	e7.8	e3.2	3.7	11	15	7.7	14	4.0	---	---	---
23	17	e7.4	e3.1	3.5	28	15	7.4	13	7.5	---	---	---
24	14	e7.0	e3.0	3.8	22	12	7.1	12	5.2	---	---	---
25	12	e6.8	e2.9	7.3	15	11	7.4	10	3.8	---	---	---
26	11	e6.6	e2.9	27	31	11	7.0	9.7	3.4	---	---	---
27	10	e6.8	e2.8	9.0	40	12	6.7	9.8	3.3	---	---	---
28	9.4	10	e2.8	7.0	47	12	6.5	8.8	3.3	---	---	---
29	8.7	9.4	e2.7	7.2	---	8.5	6.3	11	4.4	---	---	---
30	8.4	18	e2.6	22	---	8.3	14	10	4.6	---	---	---
31	12	---	e3.8	15	---	9.0	---	8.1	---	---	---	---
TOTAL	339.8	285.7	147.5	189.1	482.4	509.3	77.7	483.7	152.2	---	---	---
MEAN	11.0	9.52	4.76	6.10	17.2	16.4	9.26	15.6	5.07	---	---	---
MAX	46	23	13	27	47	39	28	38	7.6	---	---	---
MIN	5.1	6.6	2.6	2.7	7.5	7.4	6.1	6.5	3.3	---	---	---

e Estimated

Figures 4-5

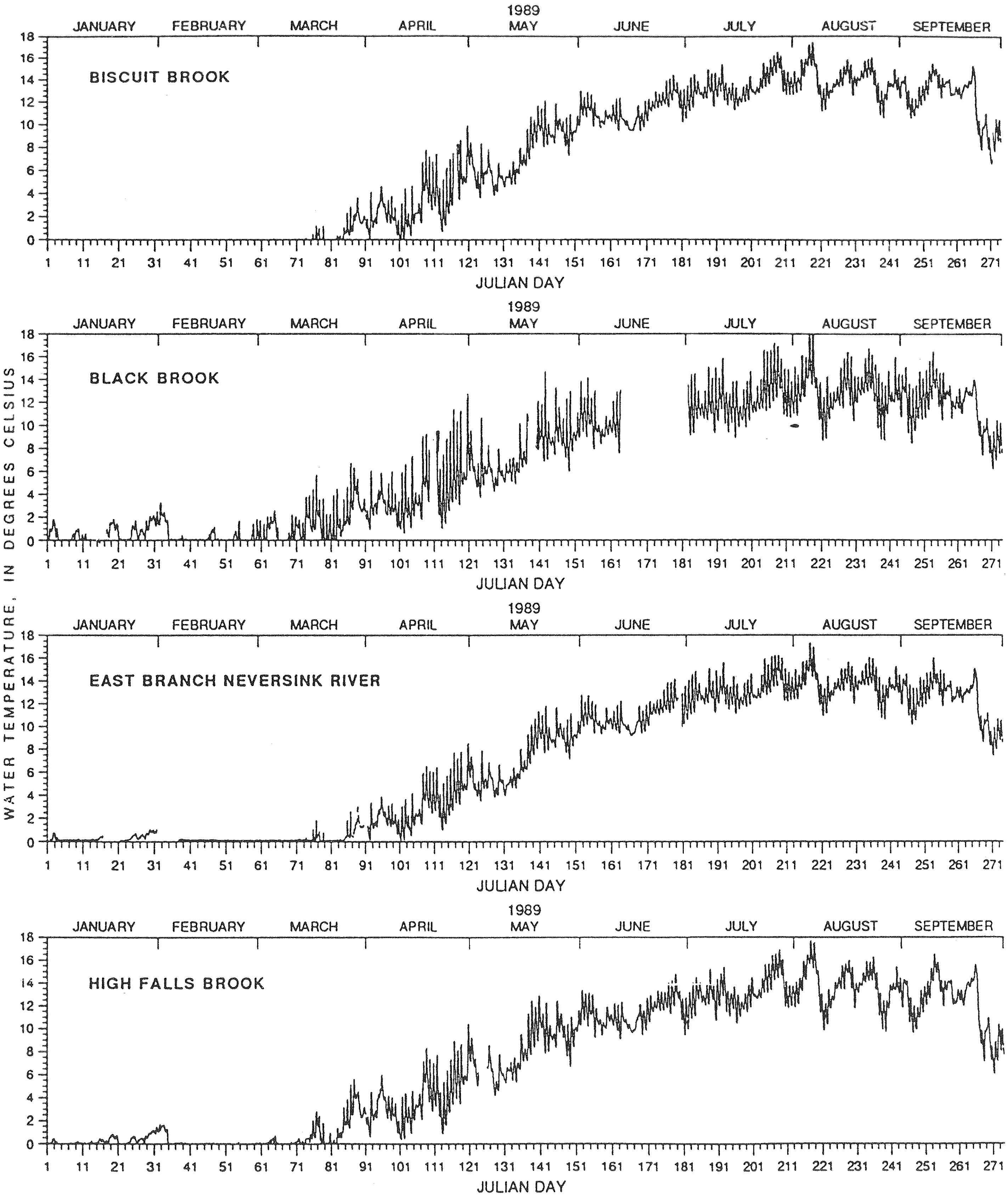


Figure 4A. 1989-90 minimonitor data from the four study streams: Mean daily water temperature.

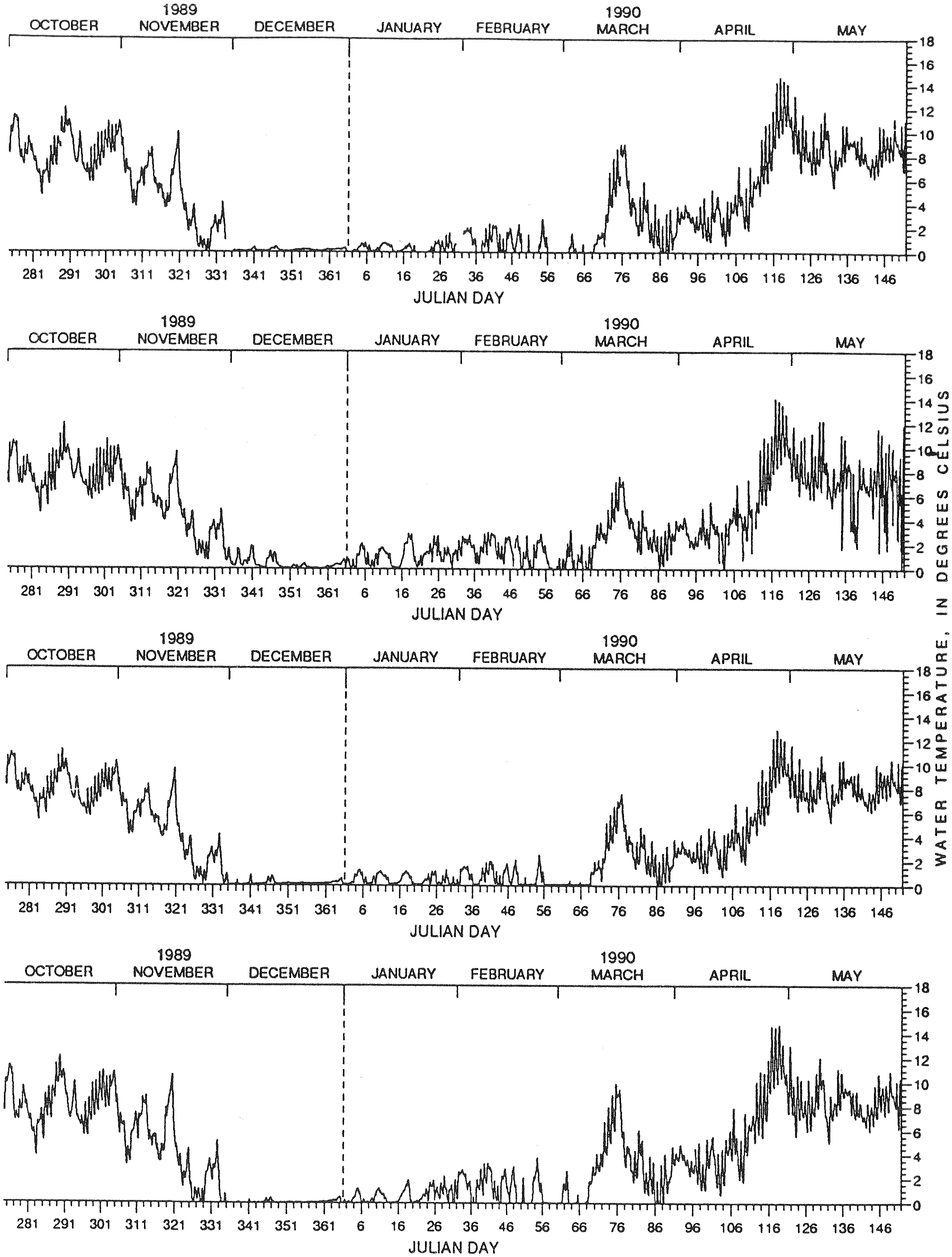


Figure 4A. 1989-90 minimonitor data from the four study streams: Mean daily water temperature (continued)

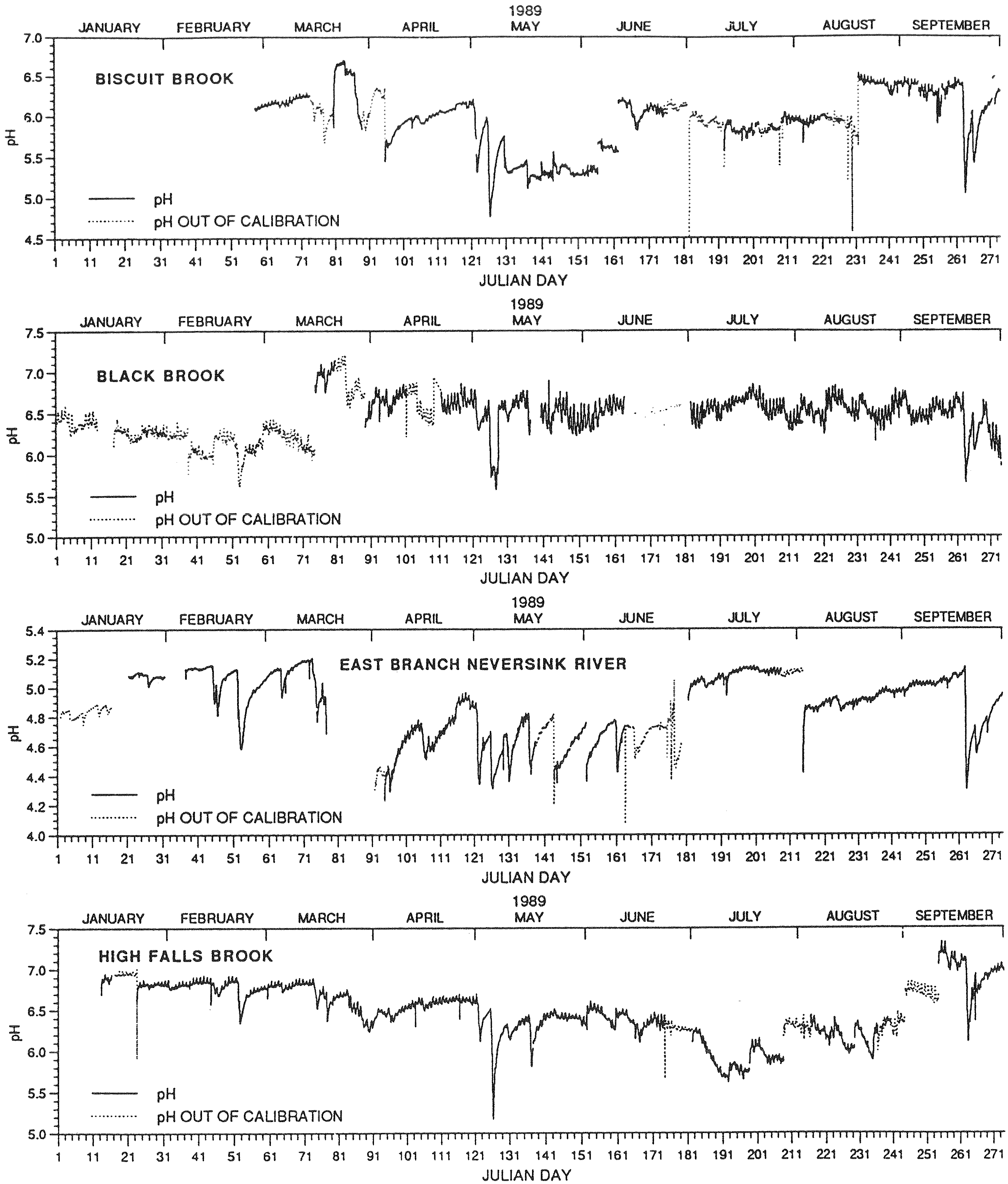


Figure 4B. 1989-90 minimonitor data from the four study streams: Specific conductance.

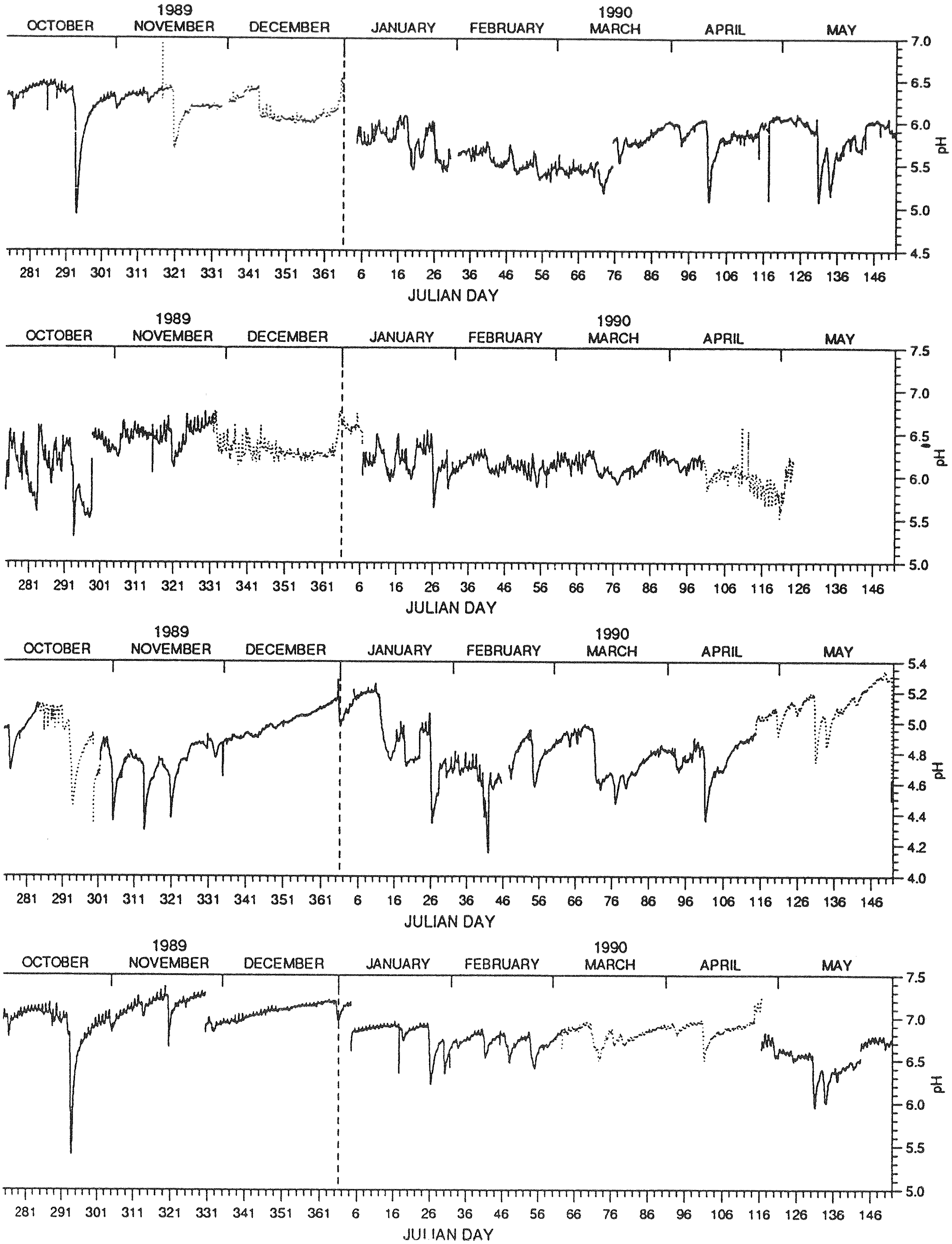


Figure 4B. 1989-90 minimonitor data from the four study streams: Specific conductance (continued)

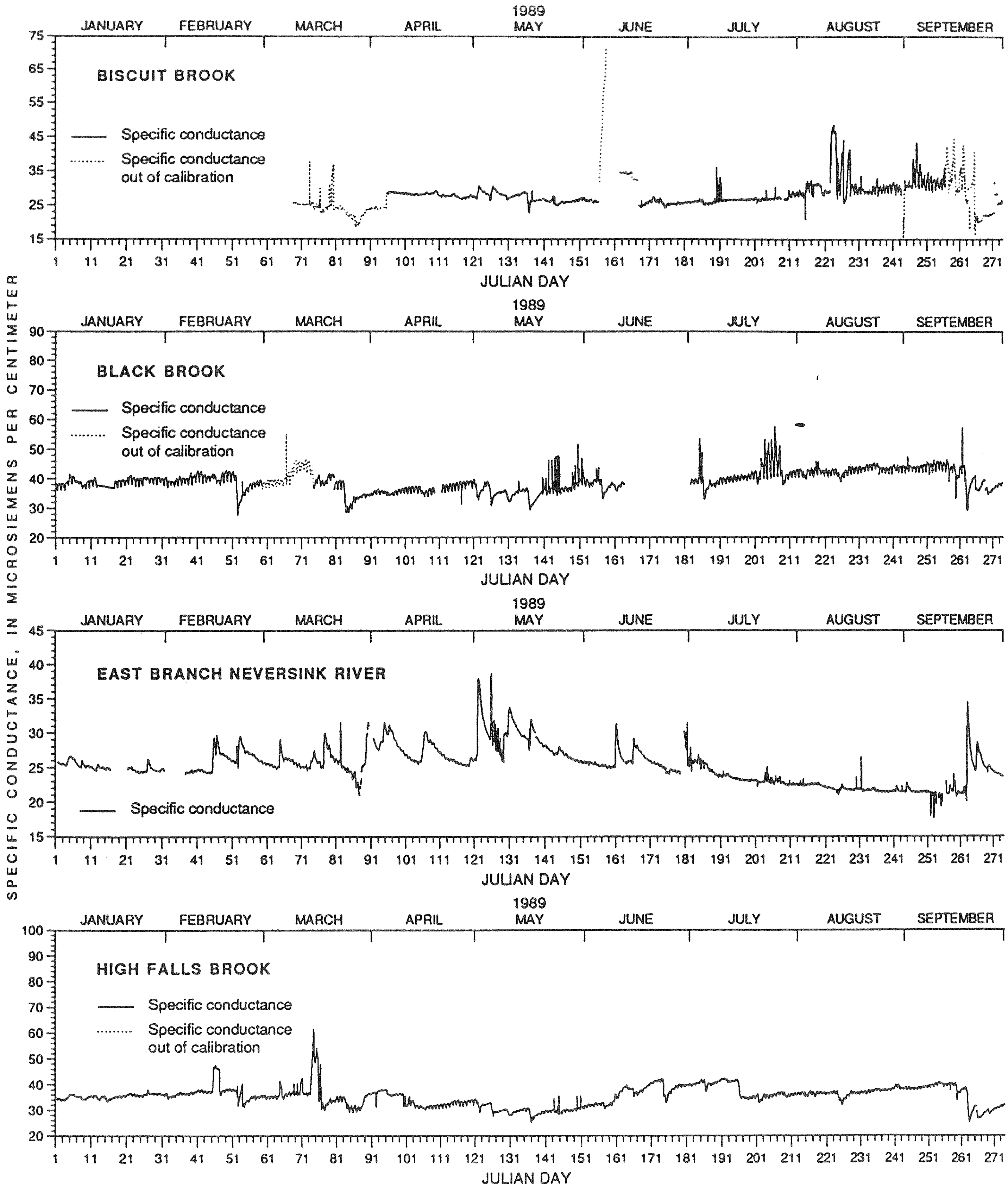


Figure 4C. 1989-90 minimonitor data from the four study streams: pH.

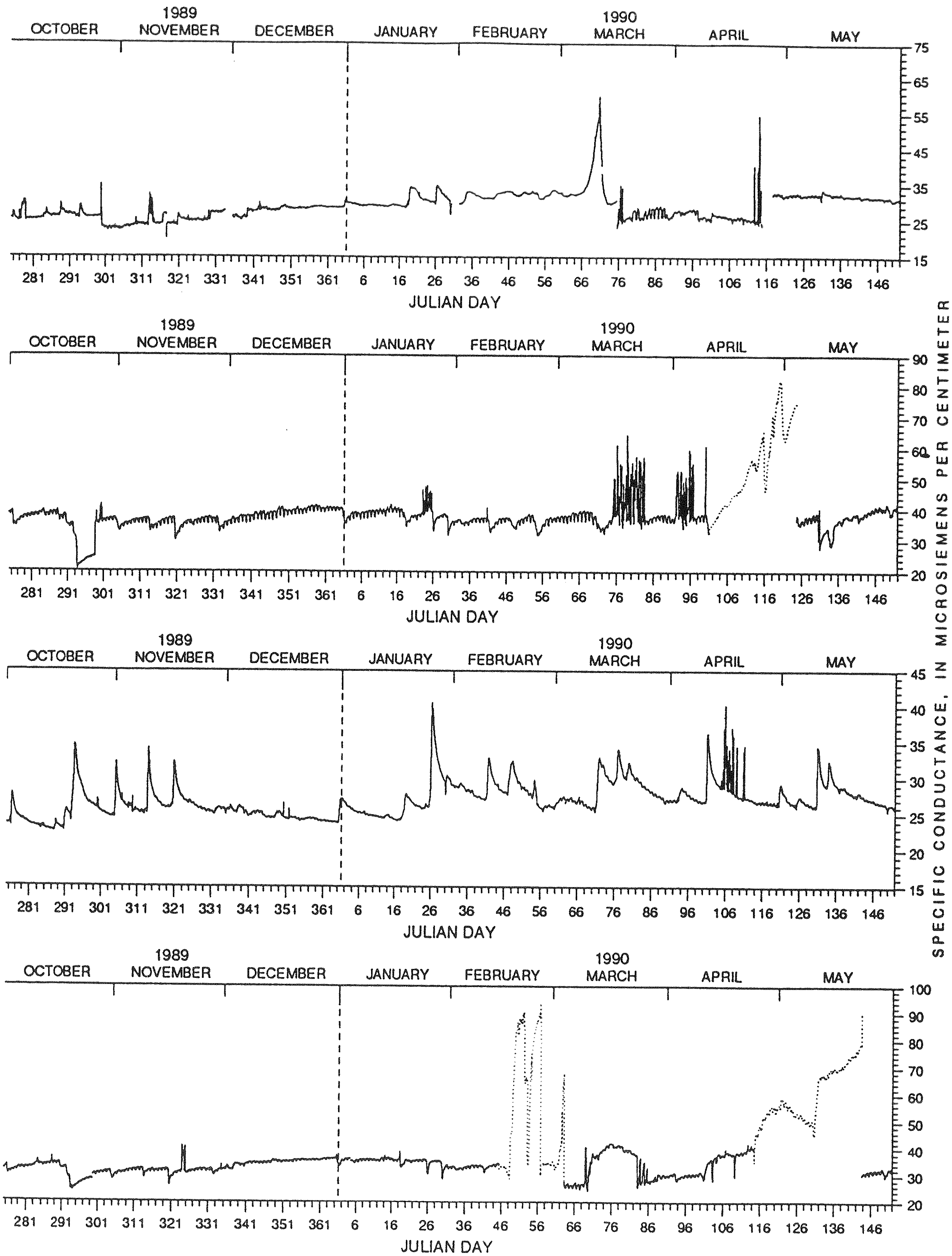
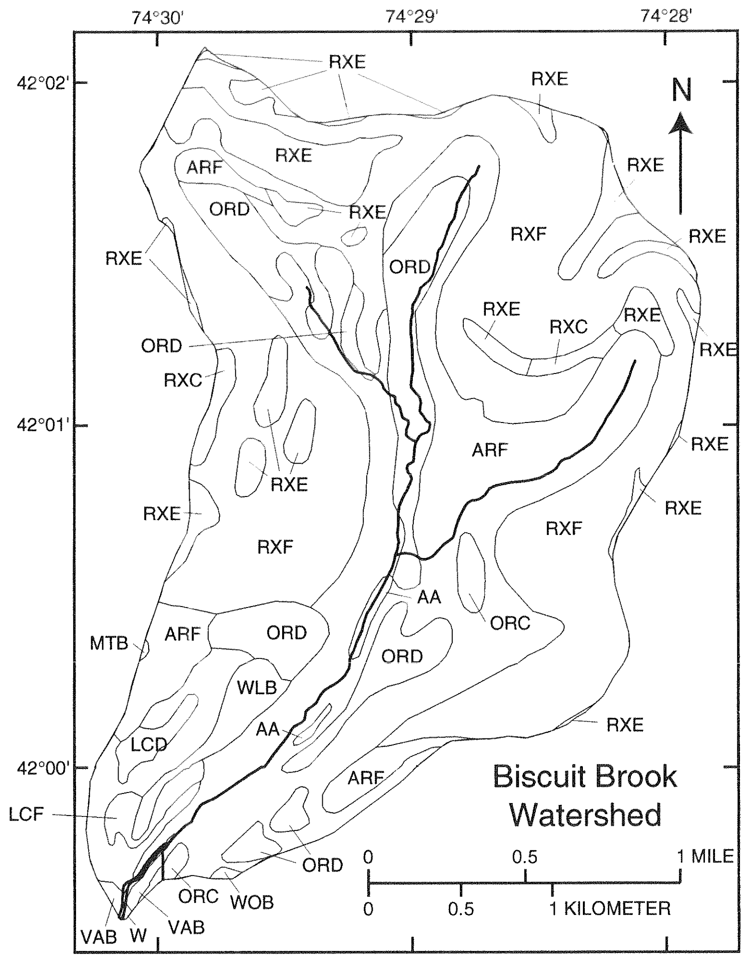
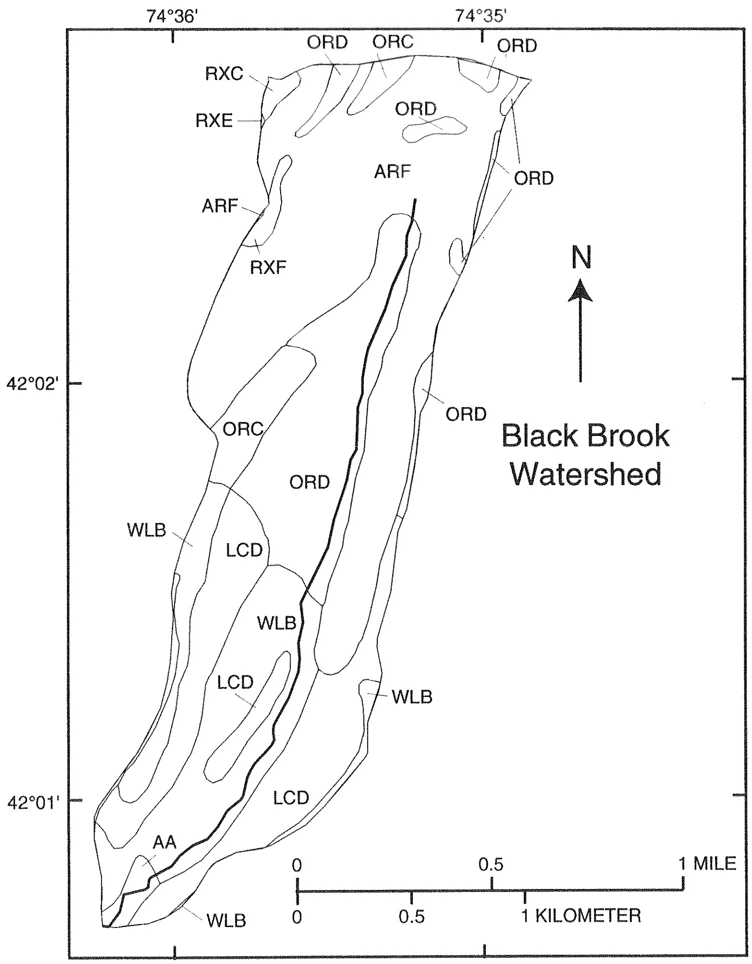


Figure 4C. 1989-90 minimonitor data from the four study streams: pH (continued)



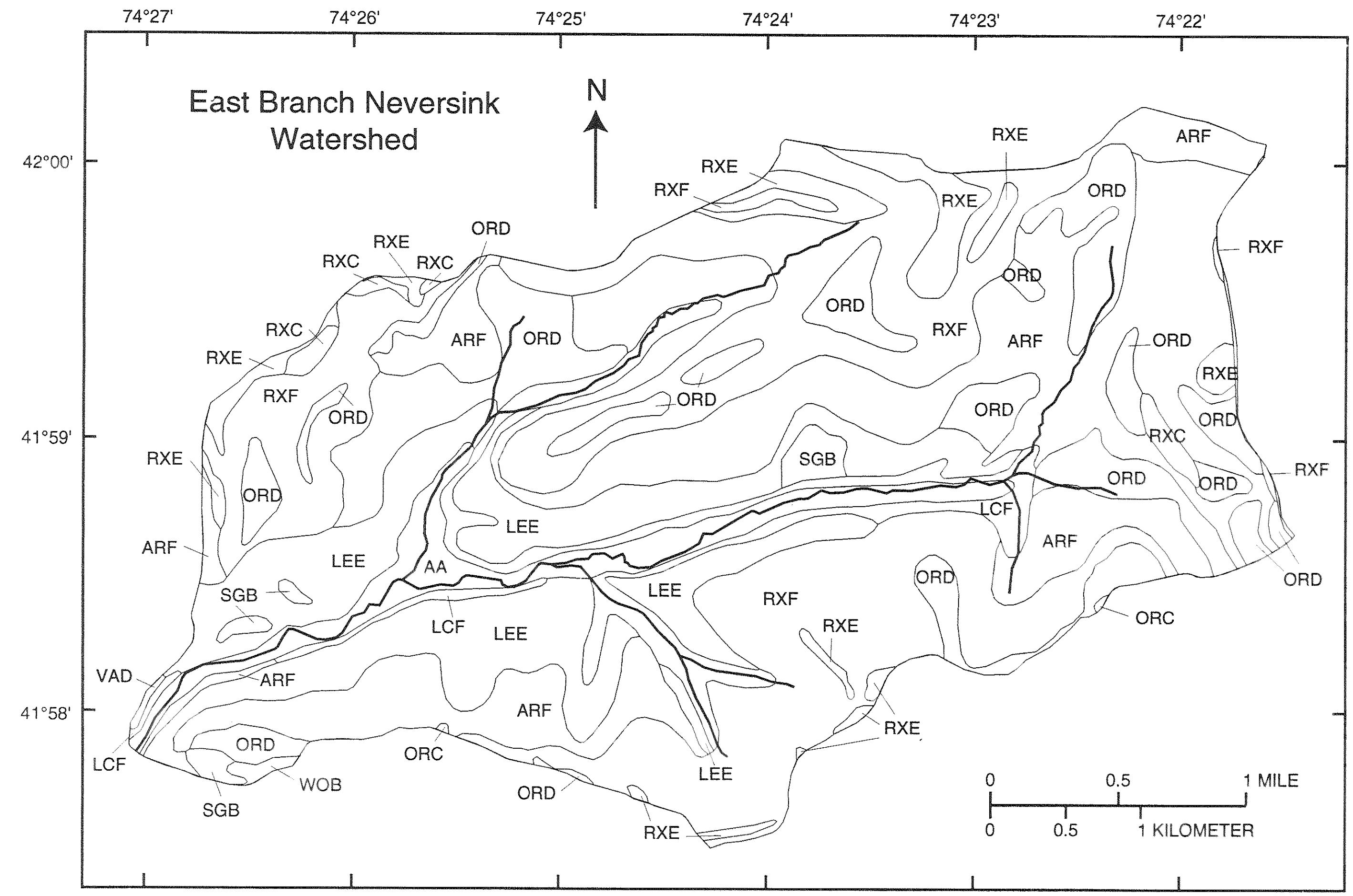
Base from USDA Soil Conservation Service, Sullivan County Soil Survey
State base map, 1:24,000

Figure 5A. Distribution of soil groups in the Biscuit Brook watershed.



Base from USDA Soil Conservation Service, Sullivan County Soil Survey
State base map, 1:24,000

Figure 5B. Distribution of soil groups in the Black Brook watershed



Base from USDA Soil Conservation Service, Sullivan County Soil Survey
State base map, 1:24,000

Figure5C. Distribution of soil groups in the East Branch Neversink River watershed

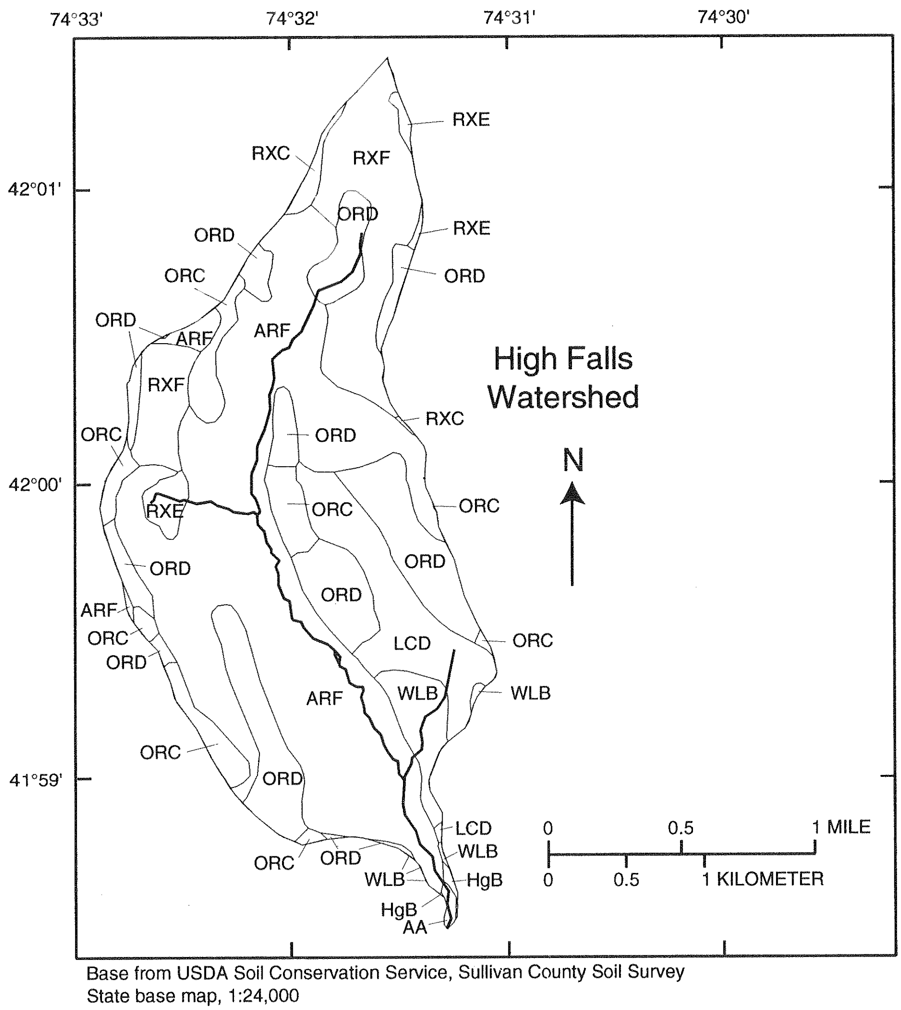


Figure 5D. Distribuiton of soil groups in the High Falls Brook watershed