Hydrologic and Water-Quality Data for Two Small Watersheds on Catoctin Mountain, North-Central Maryland, 1987-93

By Karen C. Rice, Margaret M. Kennedy, Christiana A. Carter, Robert T. Anderson, and Owen P. Bricker

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CONTENTS

FIGURES

TABLES

TABLES-Continued

CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATIONS

Multiply	By	To obtain
micrometer (µm)	0.00003937	inch
millimeter (mm)	0.03937	inch
meter (m)	3.281	foot
kilometer (km)	0.6214	mile
microliter (µL)	0.00003381	ounce, fluid
milliliter (mL)	0.03381	ounce, fluid
liter (L)	33.82	ounce, fluid
hectare (ha)	2.471	acre
liter per second (L/s)	0.03531	cubic foot per second
meter per kilometer (m/km)	5.280	foot per mile

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviated water-quality units used in this report: Chemical concentrations and water temperature are given in metric units. Chemical concentration in water is given in microequivalents per liter (µeq/L) or micromoles per liter (µmol/L). Microequivalents per liter and micromoles per liter units are used because they are the most accurate and meaningful units with which to report the chemistry of dilute waters. Microequivalents per liter is a unit expressing the concentration of chemical constituents in solution as equivalent charges (equivalents) of solute per unit volume (liter) of water. One thousand microequivalents per liter is equal to one milliequivalent per liter. Stable-isotope concentration is reported in per mille (per mil), which is equivalent to parts per thousand.

Specific conductance of water is expressed in microsiemens per centimeter at 25 degrees Celsius (µS/cm). This unit is equivalent to micromhos per centimeter at 25 degrees Celsius (µmho/cm), formerly used by the U.S. Geological Survey. pH is given in standard units, which can be converted to microequivalents per liter of hydrogen ion (H^+) by use of the following equation:

$$pH = [-\log(H^+)][1 \times 10^6]$$

Temperature is given in degrees Celsius (°C), which can be converted to degrees Fahrenheit (°F) by use of the following equation:

$$°F = 1.8(°C) + 32$$

CONVERSION OF UNITS OF CONCENTRATION

Multiply the concentration of ionic chemical species in microequivalents per liter (μeq/L) or micromoles per liter (μmol/L) by the appropriate factor given below to obtain the concentration in milligrams per liter (mg/L). Concentrations expressed in microequivalents per liter, as they are in this report, are particularly useful when computing cation-anion balances.

Multiply microequivalent per liter units for:	By	To obtain milligram per liter units for:
Hydrogen (H^+)	0.00101	H^+
Calcium (Ca^{2+})	0.02004	Ca^{2+}
Magnesium (Mg^{2+})	0.01215	Mg^{2+}
Sodium (Na^+)	0.02299	Na^+
Potassium (K^+)	0.03910	K^+
Aluminum (Al^{3+})	0.00899	Al^{3+}
Iron (Fe^{2+})	0.02792	Fe^{2+}
Ammonium (NH_4^+)	0.01805	NH_4^+
Chloride (Cl^-)	0.03545	Cl^-
Nitrite (NO_2^-)	0.04601	NO_2^-
Nitrate (NO_3^-)	0.06201	NO_3^-
Sulfate (SO_4^{2-})	0.04803	SO_4^{2-}
Bicarbonate (HCO_3^-)	0.06102	HCO_3^-
Silica (SiO_2) (micromoles per liter)	0.06009	SiO_2

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ABSTRACT

Hydrologic and water-quality data were collected during 1987-93 from a precipitation-collection station and from two small watersheds on Catoctin Mountain, north-central Maryland, as part of investigations of acidic deposition and episodic acidification and their effects on streamwater quality. Detailed descriptions of the site instrumentation in the two watersheds, field data-collection techniques, and laboratory methods used to conduct the studies are included and the information is summarized in tables. Data were collected on precipitation, throughfall, soil water, ground water, streamwater, and other surface and ground waters that were sampled during biannual synoptic surveys.

Data collected since October 1987 from one of the streamwater-quality monitoring sites and data collected since March 1988 from one of the ground-water-quality monitoring sites are included. Also included are data collected since January 1987 from the precipitation station and data collected since June 1990 from all of the other water-quality monitoring sites. Hydrologic data include tables of precipitation and throughfall quantities, streamflow, and synoptic measurements of ground-water levels. Selected hydrologic data are shown in graphs. Water-quality data include tables showing the chemical analyses of samples of precipitation, throughfall, soil water, ground water, streamwater, and other surface and ground waters collected during biannual synoptic surveys.

INTRODUCTION

Hydrologic and water-quality data for precipitation, throughfall, soil water, ground water, streamwater, and other surface and ground waters were collected by the U.S. Geological Survey (USGS), in cooperation with the Maryland Department of the Environment (MDE), the Maryland Department of Natural Resources (DNR), and the National Acid Precipitation Assessment Program (NAPAP), as part of investigations to determine the effects of acidic deposition and episodic acidification on two small watersheds on Catoctin Mountain in Frederick County, Maryland (fig. 1). The episodic acidification investigation was conducted in response to legislature passed by the State of Maryland in 1989 establishing the MDE Stream Acidification Monitoring Program. Data were collected from the Bear Branch watershed during 1990-93 and from the Fishing Creek tributary watershed during 1987-93. Precipitation data have been collected from Catoctin Mountain since 1982.

Precipitation- and streamwater-quality monitoring on Catoctin Mountain is an ongoing effort designed to maintain a long-term data base for future acidic-deposition and water-quality studies. Even though the monitoring is ongoing, this report only provides data collected from 1987 to 1993.

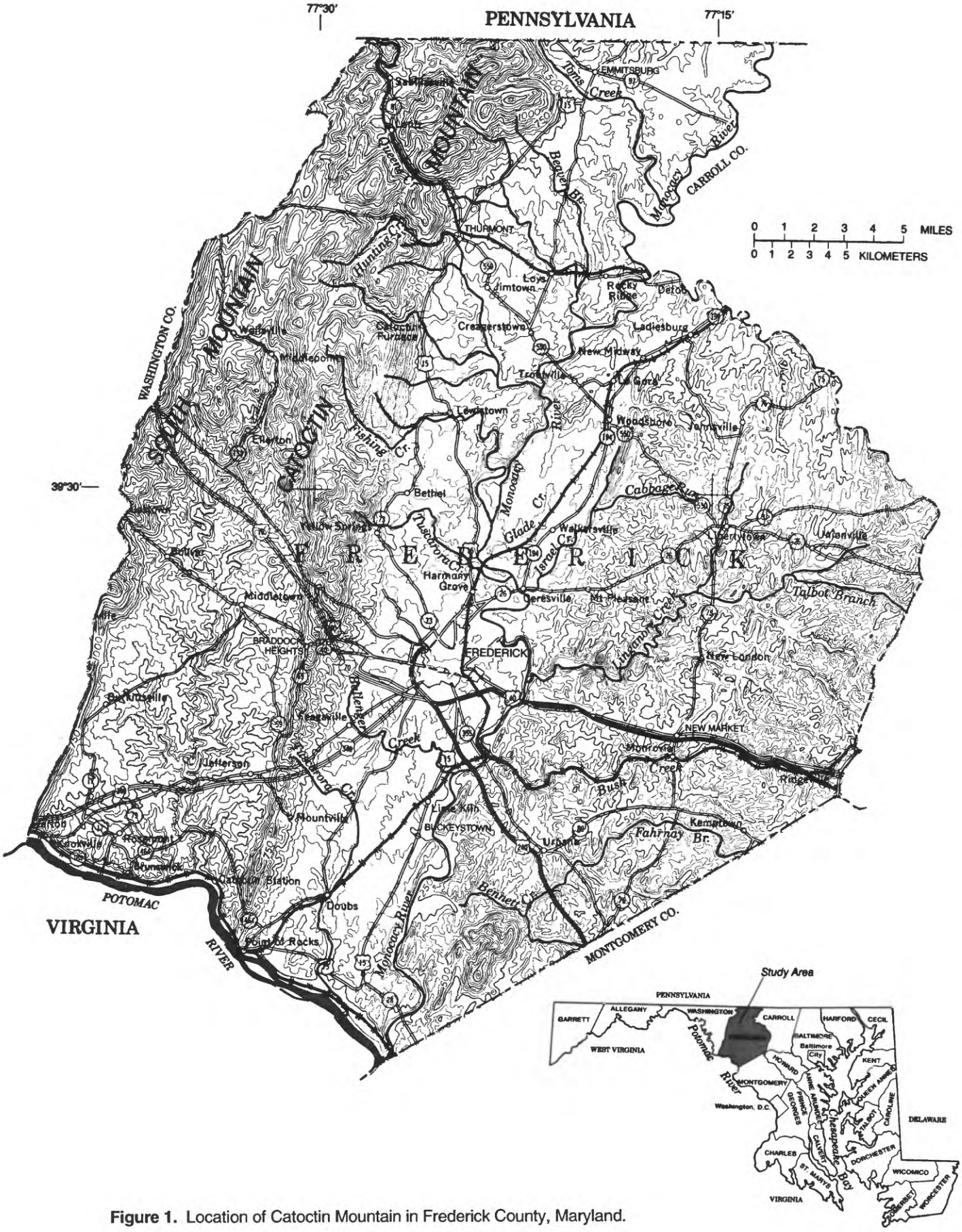

Figure 1. Location of Catoctin Mountain in Frederick County, Maryland.

Purpose and Scope

This report presents hydrologic and water-quality data that were collected from the Bear Branch watershed and the Fishing Creek tributary watershed on Catoctin Mountain, Maryland, during 1987-93. Included in the report are descriptions of the instrumentation in the watersheds, field data-collection techniques, and laboratory methods used to conduct the studies. Data for the quantity and chemical quality of precipitation, throughfall, soil water, ground water, streamwater, and other surface and ground waters sampled during biannual synoptic surveys are listed in tables. Graphs of selected hydrologic data are included.

Description of Study Area

The two watersheds and the precipitation-water-quality-collection station in the study area are located on Catoctin Mountain near the town of Thurmont in the northwestern part of Frederick County, Maryland (fig. 2). This region of Maryland is situated in the Blue Ridge Physiographic Province of the Appalachian Highlands division (Fenneman, 1946). The streams that flow through the watersheds are Bear Branch and an unnamed tributary to Fishing Creek. For simplicity, in this report, the streams and their corresponding watersheds will be referred to as "Bear Branch" and "Fishing Creek tributary." Bear Branch is located approximately 3 km west of the town of Thurmont, and Fishing Creek tributary is located approximately 10 km south of Bear Branch and approximately 3 km west of the town of Lewistown (fig. 2). Both streams drain to the Monocacy River, a tributary of the Potomac River (fig. 1). The Potomac River is a major tributary of Chesapeake Bay.

Bear Branch is located on State-designated wild lands within Cunningham Falls State Park. Bear Branch is a small, eastward-flowing, perennial headwater stream. The 98-hectare (ha) watershed is forested with deciduous (oak, maple, beech, wild cherry, poplar) and coniferous (hemlock) trees. The area is utilized as parkland where only day hiking and hunting are allowed. The topography is steep and rocky, and the average stream gradient is 203 m/km (20 percent). The watershed is underlain entirely by the lower unit of the Weverton Formation (Fauth, 1977). The soils consist of Ultisols and Inceptisols and are mapped as the Edgemont-Chandler series complex, which consists of very stony loams with 20- to 60-percent slopes (Matthews, 1960). A USGS streamflow-gaging station (USGS identification number 01640980) was installed near the outlet of the watershed during May 1990 and has been in continuous operation from June 1990 to the present (1995).

Fishing Creek tributary is located partly on a State-owned fish hatchery and partly on privately owned forested land. Fishing Creek tributary is a small, eastward-flowing, perennial headwater stream. The 104-ha watershed is forested with deciduous trees (oak, maple, beech, poplar) and evergreen shrubs (mountain laurel). The topography is moderately steep and rocky, and the average stream gradient is 118 m/km (12 percent). The watershed is underlain entirely by the upper unit of the Weverton Formation (Fauth, 1977). The soils consist of Ultisols and Inceptisols and are mapped as the Edgemont-Chandler series complex, which consists of very stony loams with 0- to 20-percent and 20- to 60-percent slopes, and as the Braddock series complex, which consists of moderately eroded gravelly and cobbly loams with 8- to 15-percent slopes (Matthews, 1960). A USGS streamflow-gaging station (USGS identification number 01641510) was installed near the outlet of the watershed during September 1987 and has been in continuous operation from October 1987 to the present (1995).

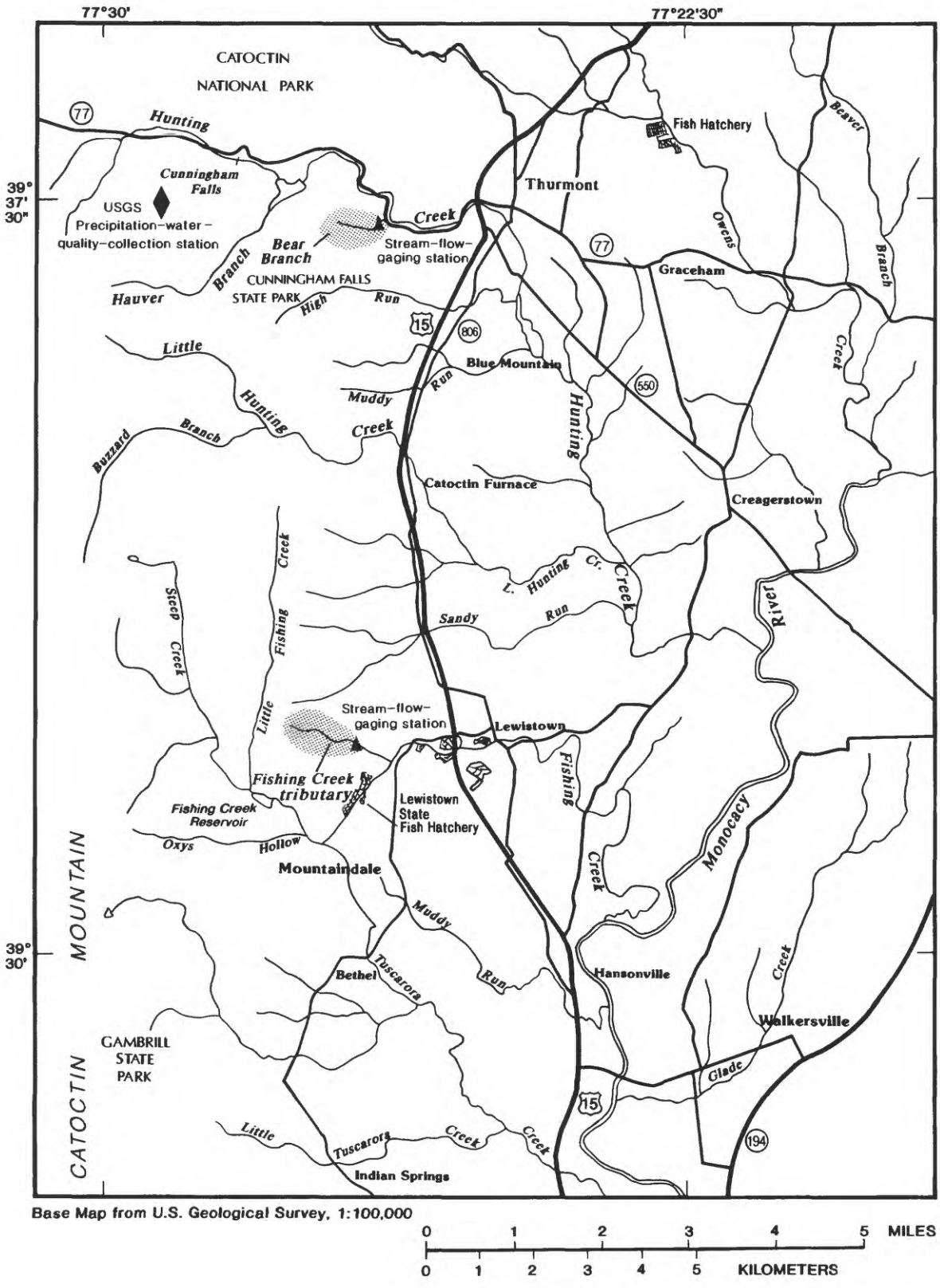

Figure 2. Location of study area.

Acknowledgments

The authors would like to thank the Maryland Department of Natural Resources for allowing the precipitation-collection station and the instrumentation in the Bear Branch watershed to be maintained on Cunningham Falls State Park property, and for the instrumentation in the Fishing Creek tributary watershed to be maintained on Lewistown State Fish Hatchery property. Appreciation is given to the park rangers of Catoctin National Park for their permission and assistance in sampling the well at Camp Peniel. The authors would also like to thank William D. Miller of Cunningham Falls State Park and Michael A. Shaw and Raymond M. Richardson of the Lewistown State Fish Hatchery for providing information and assistance whenever it was needed. Appreciation is given to Karl C. Weaver of the Maryland Department of the Environment and Paul E. Miller of the DNR for their reviews of this report. The authors would also like to thank Kathleen M. Buppert, a former MDE employee, for her assistance in data collection.

COLLECTION AND ANALYSIS OF DATA

The instrumentation used to collect the data, field-data-collection techniques, and laboratory methods and instrumentation used to analyze the samples are described in this section. Hydrologic data include quantities of precipitation and throughfall that were collected when available, ground-water levels that were measured weekly, and stream stage recorded at 15-minute intervals and at more frequent but irregular intervals during stormflow sampling. The water-quality data include chemical analyses of samples of precipitation, throughfall, upper soil water, and lower soil water that were collected when available; samples of ground water from springs and wells that were collected periodically; samples of streamwater that were collected on a weekly and biweekly basis and during stormflow; and samples of other surface and ground waters that were collected during biannual synoptic surveys.

Instrumentation Used in Study Area

Each watershed was equipped with a staff gage and Fisher Porter[1] analog-to-digital stream-stage recorder, a Campbell Scientific CR10 data logger, a stream-stage potentiometer, an ISCO Model 2700 automatic water sampler, a Sierra Misco Model ES-160 tipping-bucket rain gage, a solar panel and voltage regulator, a shelter to house this equipment, throughfall collectors, zero-tension soil lysimeters, and a series of shallow ground-water well points. The locations of all of the sites and instrumentation for hydrologic and water-quality monitoring for Bear Branch and Fishing Creek tributary are shown in figures 3 and 4, respectively.

Data collection by the Campbell Scientific CR10 data logger began in each watershed in June 1990. The CR10 data loggers were grounded with lightning rods and were powered by a 12-volt Power Sonic rechargeable battery. The CR10 data loggers used at each site recorded the streamwater levels sensed by the stream-stage potentiometer, triggered the ISCO automatic sampler to begin the stormflow sampling program, and recorded the number of tips made by the tipping-bucket rain gage during each 15-minute interval. All data recorded by the CR10 data loggers were automatically downloaded to data-storage modules at 15-minute intervals. The data-storage module connected to the CR10 data logger was exchanged with an empty data-storage module on a weekly basis and the data were downloaded to a computer in the office. Each ISCO was powered by a 12-volt marine wet-cell battery that was recharged by a voltage regulator connected to a solar panel.

[1] Any use of trade, product, or firm names is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

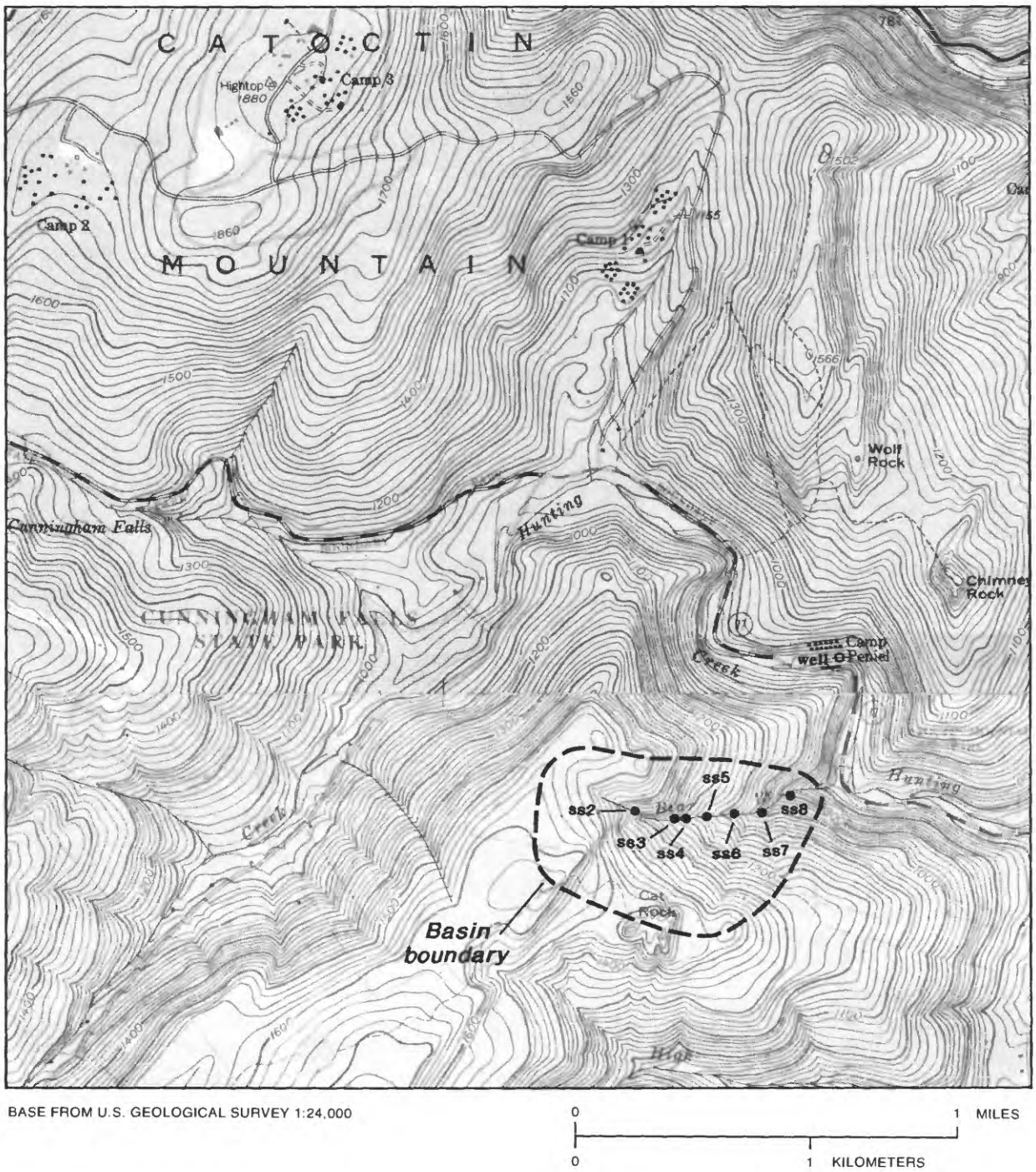

Figure 3. Location of instrumentation sites in the Bear Branch watershed, Frederick County, Maryland.

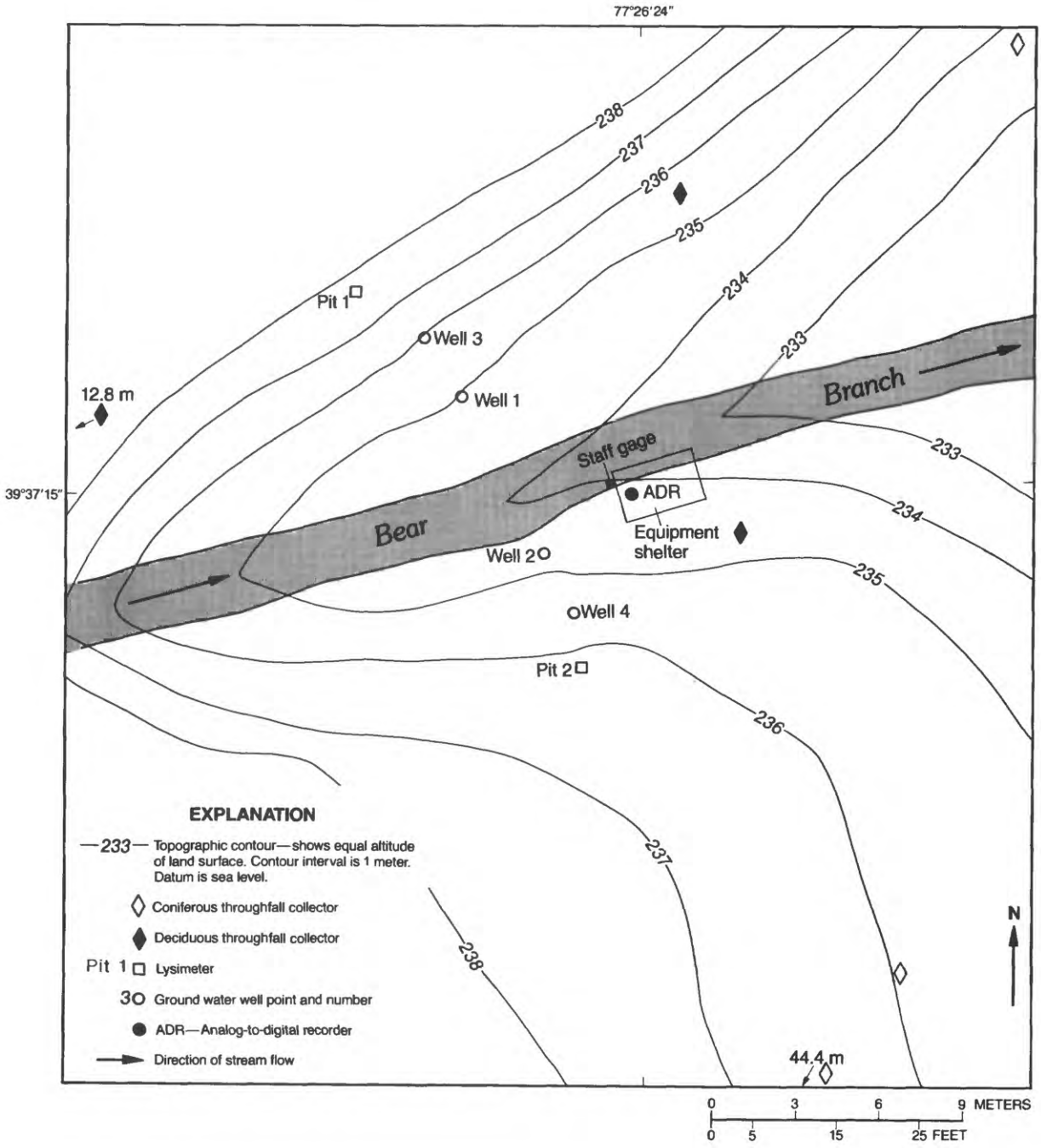

Figure 3. Location of instrumentation sites in the Bear Branch watershed, Frederick County, Maryland--Continued

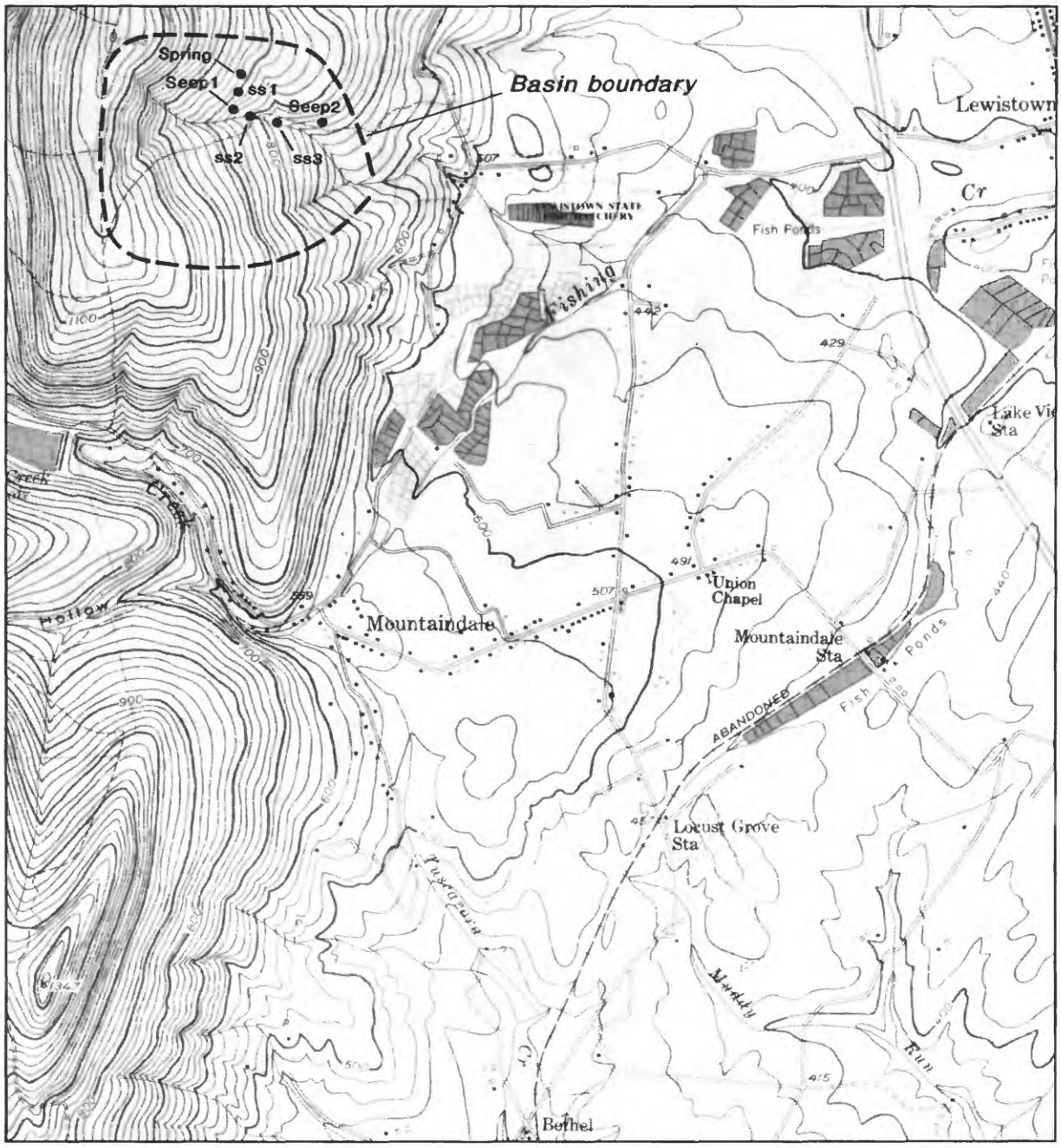

Figure 4. Location of instrumentation sites in the Fishing Creek tributary watershed, Frederick County, Maryland.

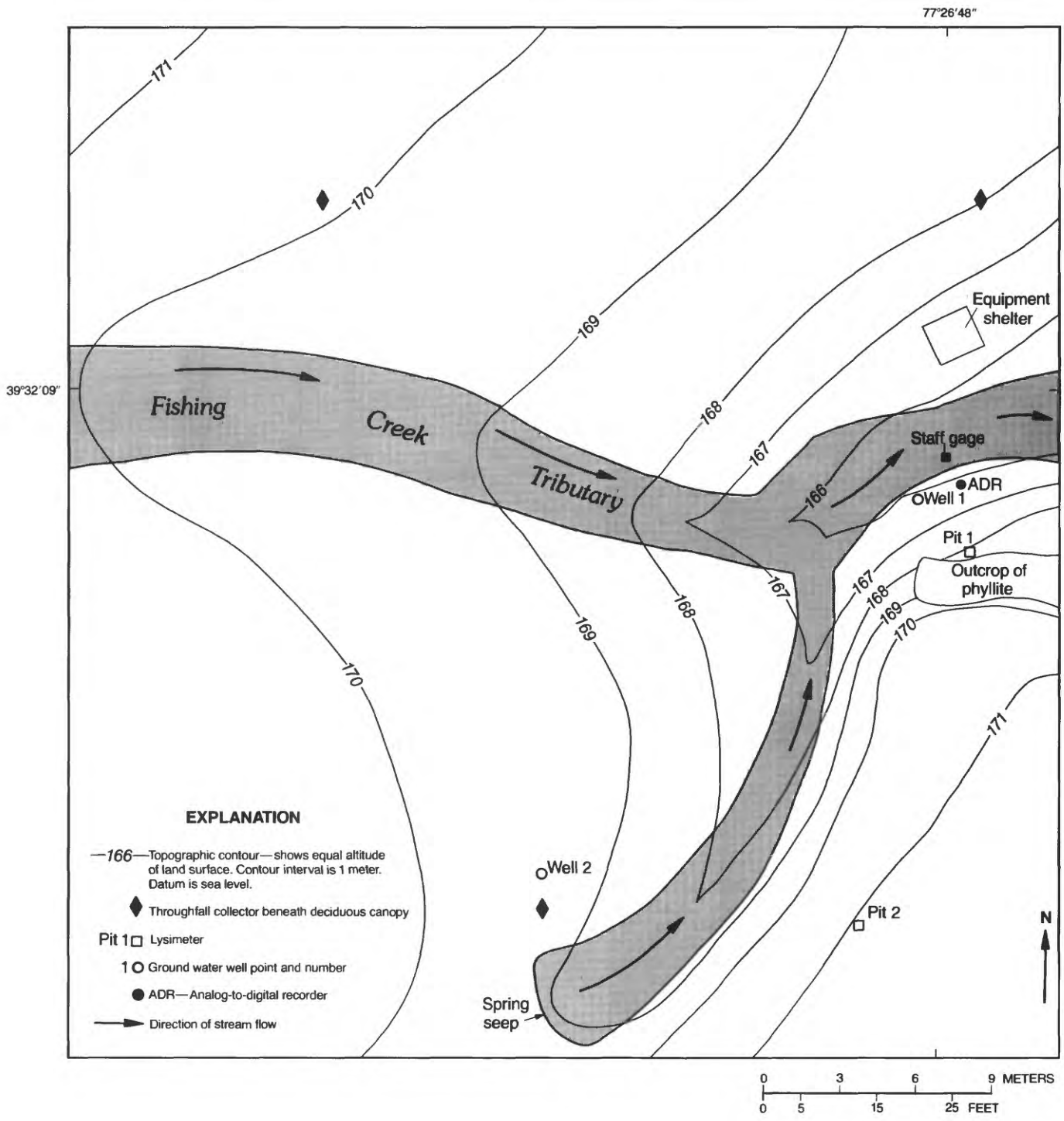

Figure 4. Location of instrumentation sites in the Fishing Creek tributary watershed, Frederick County, Maryland--Continued

Field Data-Collection Techniques

Precipitation samples were collected in accordance with National Acid Deposition Program (NADP) protocols. Specialized instrumentation and methods developed by USGS employees were used in the field to collect the hydrologic and water-quality data for throughfall, soil water, ground water, streamwater, and other surface and ground waters sampled during synoptic surveys. This section is organized into subsections that have descriptions of how each type of water was collected; the subsections are arranged in the general order that water moves through a watershed.

Precipitation

The USGS Catoctin Mountain precipitation-collection station, located in Cunningham Falls State Park, was put in operation in January 1982. Data were collected from the station continuously from 1982 and were used for a variety of USGS projects. The precipitation-collection equipment was situated on top of a 7.6-m-high water-storage tank and was free of surrounding tree canopy, which meets the NADP angle criteria (Robertson and Wilson, 1985). The collection equipment included an Aerochem Metrics Model 301 wet/dry-atmospheric-deposition collector for major inorganic ions, a Belfort 5-780 Series weighing-bucket rain gage, and from June 1990 to December 1993, a Sierra Misco Model ES-160 tipping-bucket rain gage, and a Campbell Scientific CR21 data logger. The tipping-bucket rain gage was added as a backup to ensure collection of data through the entire period of record. The collection equipment was anchored to a 2-m-tall wooden platform on top of the water tank. The elevated equipment served to minimize contamination of the samples by "splash up" from the top of the water tank and to discourage vandalism. In April 1993, the precipitation-collection station was reconstructed to accommodate an additional Aerochem Metrics collector for trace elements for another USGS study. After reconstruction, the platform was increased in size from 1.2 m by 1.2 m to 1.2 m by 3.6 m. The height of the platform above the top of the water tank (2 m) remained the same, which allowed the openings of the weighing- and tipping-bucket rain gages to remain at the same heights as before reconstruction. The orientation of the Aerochem Metrics collector was changed so that the collector opened from west to east, rather than from south to north. A diagram of the precipitation monitoring equipment at the precipitation-collection station on top of the water tank after reconstruction is shown in figure 5.

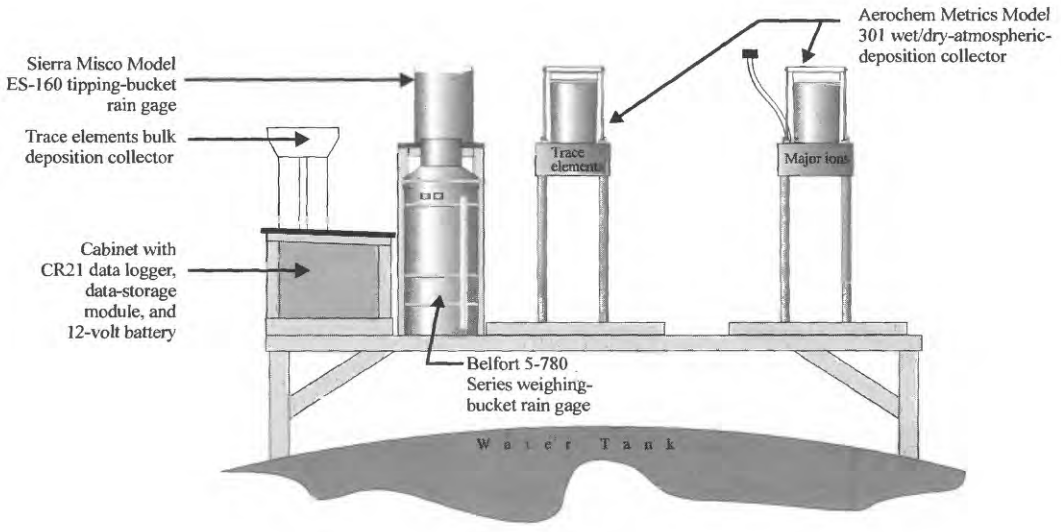

Figure 5. Precipitation-monitoring equipment at the precipitation-collection station, Cunningham Falls State Park, Maryland.

The Aerochem Metrics collector was used to collect a weekly wet-deposition sample (if available) for chemical and isotopic analysis. The collector was powered by a 12-volt marine wet-cell battery. The weighing- and tipping-bucket rain gages recorded the quantity of precipitation that fell at the precipitation-collection station and the time and duration of rainstorms. The weighing-bucket rain gage recorded daily amounts of precipitation on a 7-day strip chart with ink, which was rotated by a spring-wound drive mechanism. The tipping-bucket rain gage was connected to the Campbell Scientific CR21 data logger that was powered by a separate 12-volt Power Sonic rechargeable battery and a data-storage module. The 15-minute total rainfall was recorded by the data logger and automatically downloaded to the data-storage module.

The weekly service site visit included changing the rain chart on the Belfort weighing-bucket rain gage, replacing the Aerochem Metrics wet-deposition collection bucket, and replacing the CR21 data-storage module. Each week, the amount of water in the weighing-bucket rain gage was checked to ensure that there was a depth of approximately 25 mm of water in the bucket. During the winter months, antifreeze was added to the water to prevent freezing, and during the summer months, mineral oil was added to minimize evaporation of the water in the weighing-bucket rain gage. The rain chart was returned to the office where daily and monthly precipitation totals were calculated and recorded. Weekly precipitation samples (if available) were collected from the Aerochem Metrics collector. The wet-deposition collection bucket, which contained the precipitation sample, was replaced with an empty bucket that had been previously rinsed three times with distilled water. When there was no precipitation sample, the bucket was still replaced with a clean one. The precipitation samples were submitted to the USGS trace elements and nutrients laboratory in Reston, Va., for chemical analysis. Starting in June 1990, samples were sent to the USGS isotope fractionation laboratory in Reston, Va., for stable isotope analysis. The data-storage module connected to the CR21 and to the tipping-bucket rain gage was replaced with an empty data-storage module, and the data on the retrieved data-storage module were downloaded to a computer in the office. Results of data collection at the USGS Catoctin Mountain precipitation-collection station during 1982-91 can be found in Rice and others (1993).

Throughfall

Throughfall collectors used for collecting precipitation that falls through the forest canopy were installed in each watershed. The collectors consisted of a 203-mm-diameter polyethylene funnel that was connected to a 1-L brown polyethylene collection bottle by Tygon tubing (fig. 6). The tubing was looped to prevent evaporation of the sample. A Tru-chek plastic rain gage attached to each throughfall collector gave an approximate measure of the amount of throughfall collected at each site. The funnels were located approximately 1.2 m above the forest floor to help minimize "splash up." In the Bear Branch watershed, three collectors were located beneath the canopies of deciduous trees and three collectors were located beneath the canopies of coniferous trees (fig. 3).

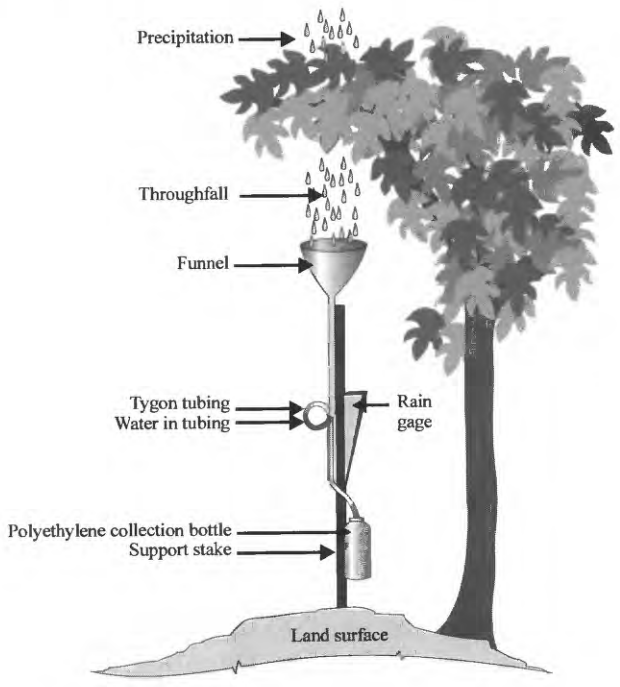

Figure 6. General components of a throughfall collector.

In the Fishing Creek tributary watershed, three collectors were located beneath the canopies of deciduous trees (fig. 4).

Throughfall samples were collected on a weekly basis. Depending on the number of rainstorms during the week, the throughfall sample represented either a single storm or was a composite of more than one storm. At the time of sample collection, the amount of rainfall collected in each rain gage was recorded. The sample in each collection bottle was transferred to a plastic 3.8-L jug; after all the collectors were visited, the 3.8-L jug held a composite sample of the three throughfall collectors. The funnels, throughfall collection bottles, and Tygon tubing were thoroughly rinsed with distilled water after the samples were collected in preparation for the next rainstorm. If there was no precipitation/throughfall during the week, the collectors were still rinsed and cleaned with distilled water. One deciduous and one coniferous composite throughfall sample was collected from Bear Branch and one deciduous composite throughfall sample was collected from Fishing Creek tributary. These samples were submitted to the appropriate laboratories for chemical and isotopic analysis.

Soil Water

Zero-tension soil lysimeters used for collecting gravity-draining soil water were installed near the streams. Two lysimeter pits were hand dug in each watershed. Both pits at Bear Branch and one of the pits at Fishing Creek tributary had lysimeters at two distinct depths; the second pit at Fishing Creek tributary had lysimeters at three distinct depths. The lysimeters in all the pits consisted of two shallow 229-mm by 279-mm polyethylene pans that were filled with polyethylene beads to prevent the pans from filling with soil. A drain hole was drilled into one end of each pan. The drain hole was covered by fiberglass mesh that acted as a filter and a wick for the soil water. Two pans were inserted at a slight upward angle (5° to 10° above the horizontal) into the vertical wall of the dug soil pit, each at the same level. Two pans were used at each level in order to maximize the amount of sample collected. Tubing from the drain holes of both pans led to a Y-connector; from there the water drained by gravity to a 19-L polyethylene carboy. The carboy had a length of tubing, weighted at the bottom, which led up through the cap of the carboy to above the ground surface. The tubing above the ground surface was pinched off with a plastic tube constrictor to prevent evaporation of the sample from the carboy. A diagram of a representative lysimeter pit is shown in figure 7.

In the Bear Branch watershed, pit 1 was dug into the steep north bank of the stream and pit 2 was dug into the less steep south bank of the stream (fig. 3). In each pit, the two upper pans were located beneath the organic-litter layer at a depth of 0.10 to 0.15 m below land surface. The two lower pans were located between 0.46 and 0.51 m below land surface, below most roots and in zones of very rocky soil.

In the Fishing Creek tributary watershed, two lysimeter pits were dug into the steeper south bank of the stream (fig. 4). Pit 1 was located near a rock outcrop above the streamflow-gaging station and had two levels of pans, whereas pit 2 was located approximately 18 m upstream of pit 1 and had three levels of pans. In both pits, the two upper pans were located beneath the organic-litter layer at a depth of 0.10 to 0.15 m below land surface. The two lower pans in pit 1 were located at a depth of 0.51 m, whereas the middle pans in pit 2 were located at a depth of 0.91 m, and the lower pans were installed at a depth of 1.37 m below land surface. Construction data for each of the lysimeter pits are summarized in table 1.

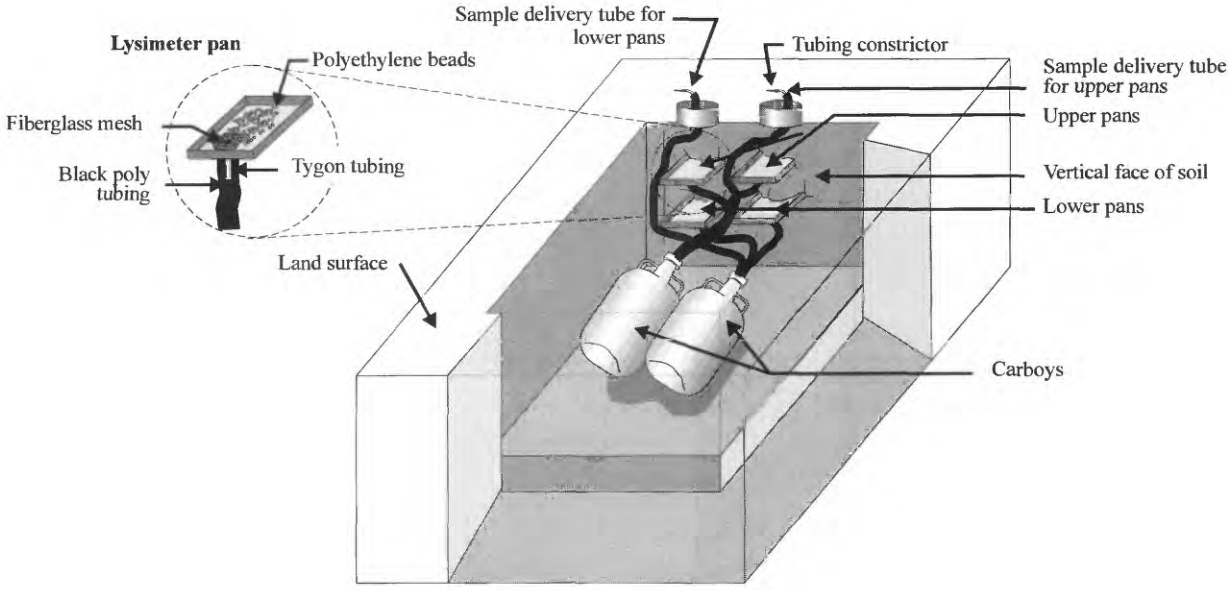

Figure 7. General components of a zero-tension soil lysimeter.

Water in the zero-tension soil lysimeters was withdrawn and a sample was collected whenever stormflow samples had been collected by the ISCO automatic sampler. During periods when no stormflow samples were collected by the ISCO automatic sampler, the lysimeter carboys were emptied every 2 to 4 weeks, which usually allowed enough time to ensure that sufficient sample for chemical and isotopic analysis could be retrieved. The water in the lysimeters was withdrawn using a portable Masterflex peristaltic pump. The tubing from the carboy that led up to the ground surface was connected to the silicon tubing on the peristaltic pump, and the sample was pumped by suction to the surface and into a plastic 3.8-L jug. A different 3.8-L jug was used for each level of lysimeter pans in each pit. The tubing in the peristaltic pump was rinsed with distilled water after each carboy was pumped dry. Both carboys in each pit were pumped dry in preparation for the next rainstorm. The soil-water samples from each pit from each level were submitted to the appropriate laboratories for chemical and isotopic analysis.

Ground Water

Shallow ground-water well points were installed at each site. The well points were used to monitor the depth of the water table and to sample shallow ground water. The well-point casings were constructed of 50-mm-diameter, schedule-40 stainless steel; the screens were 304 stainless steel with a slot size of 0.254 mm (fig. 8). The stainless steel well points were installed by hand, driving with a sledge hammer as far as they would go after the water table was reached. In order to prevent contamination of ground water by well construction, no grout near ground surface, no bentonite seals above the screened portions, and no packing material around the screens were used. A plastic apron was installed around the bottom of each well point where it met ground surface to prevent surface water from draining down the outside of the casing. All well points were capped with stainless-steel caps.

In the Bear Branch watershed, four well points were installed along a line perpendicular to the stream near the streamflow-gaging station--two wells on the south side of the stream and two wells on the north side of the stream (fig. 3). In the Fishing Creek tributary watershed, two well points were installed--one on the south bank of the stream near the streamflow-gaging station, and one in the relatively flat area upstream of the streamflow-gaging station (fig. 4). Construction data for the shallow ground-water well points are summarized in table 2.

Table 1. Construction data for soil-water lysimeters in the Bear Branch and Fishing Creek tributary watersheds, Catoctin Mountain, Maryland

Lysimeter pits	Date constructed	Altitude of land surface (meters)	Depth below land surface (meters)
		Bear Branch	
Pit 1 Upper	9/20/90	237.37	0.10-0.15
Pit 1 Lower	9/20/90	237.37	.51
Pit 2 Upper	9/21/90	236.46	.15
Pit 2 Lower	9/21/90	236.46	.46
		Fishing Creek tributary	
Pit 1 Upper	9/24/90	168.09	0.15
Pit 1 Lower	9/24/90	168.09	.51
Pit 2 Upper	9/24/90	171.02	0.10-0.15
Pit 2 Middle	9/24/90	171.02	.91
Pit 2 Lower	9/24/90	171.02	1.37

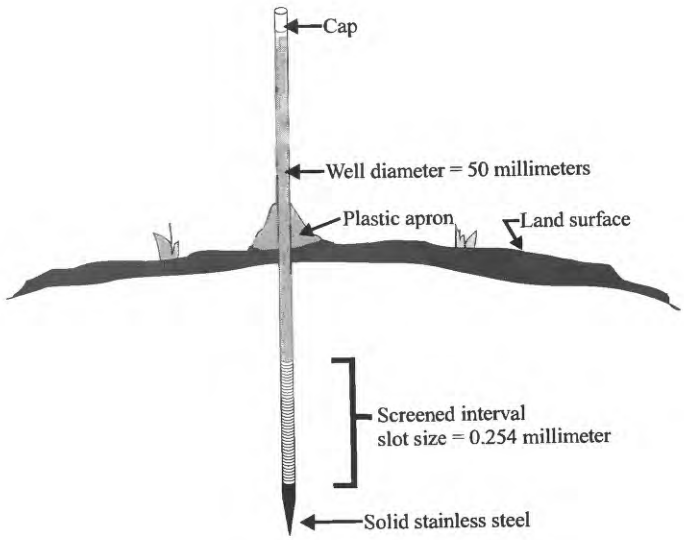

Figure 8. General components of a shallow ground-water well point.

During periods of stream base flow, shallow ground-water samples were collected periodically from selected well points at each site by inserting a length of Tygon tubing into the well and pumping the sample to the surface by suction with a peristaltic pump. Shallow ground-water samples also were collected from a perennially discharging spring in the Fishing Creek tributary watershed (inset map of fig. 4). Water levels in the wells were measured weekly by use of the wetted-steel tape method (Kazmann, 1965, p. 145). Water temperature in each well point was measured by lowering a mercury-filled thermometer tied to nylon line into the well point and allowing it to equilibrate. The thermometer was then pulled up and out of the well-point casing and the temperature was read and recorded.

Deep ground water was sampled monthly beginning in May 1993 from the Camp Peniel well, a deep (62 m) water-supply well completed in the Weverton Formation. The Camp Peniel well is located near the Bear Branch watershed (fig. 3). Water samples were collected at a pumphouse located on the south side of the Camp Peniel Administration building. A garden hose was connected to a spigot inside the pumphouse. The water was pumped to the house spigot by a Red Jacket submersible pump located at a depth of 58 m in the well. The well was purged for approximately 30 minutes prior to sampling. After 30 minutes of pumping, specific conductance and pH measurements were taken every 5 minutes. Once specific conductance and pH values had stabilized, a sample was collected in a 3.8-L jug that had been rinsed three times with sample water. Ground-water samples were submitted to the appropriate laboratories for chemical and isotopic analysis.

Streamwater

The staff gage and analog-to-digital recorder in each watershed were used to determine and record stream stage near the outlet of the watersheds (figs. 3 and 4). Existing natural controls in the streams provided a pool where the staff gage could be located. The stream stage was recorded on paper tape at 15-minute intervals by the Fisher Porter analog-to-digital recorder. Every 6 weeks the paper tape was removed, and a discharge measurement of the stream was made according to methods described in Buchanan and Somers (1968, 1969). The stream-stage data and the periodic discharge measurements were used to develop log-log rating curves, with coefficient of determination (r^2) values ranging from 0.893 to 0.997, from which instantaneous stream discharges were calculated according to methods described in Kennedy (1983, 1984).

Table 2. Construction data for water-level observation and water-quality well points in the Bear Branch and Fishing Creek tributary watersheds, Catoctin Mountain, Maryland

[m, meters; mm, millimeters]

Well-point number	Date of construction	Altitude of land surface (m)	Depth of well point (m)	Casing and screen material	Diameter of screened interval (mm)	Slot size of screened interval (mm)	Depth to top of screened interval (m)	Depth to bottom of screened interval (m)
				Bear Branch				
1	2/13/91	234.82	1.19	stainless steel	50	0.254	0.48	1.09
2	2/13/91	234.88	1.08	stainless steel	50	.254	.55	.98
3	2/13/91	235.92	2.80	stainless steel	50	.254	2.26	2.69
4	2/13/91	235.51	1.75	stainless steel	50	.254	1.22	1.65
				Fishing Creek tributary				
1	4/25/91	166.34	1.03	stainless steel	50	0.254	0.49	0.93
2	4/25/91	169.50	.68	stainless steel	50	.254	.13	.57

Because of erosion of the existing control on Fishing Creek tributary, a 90° V-notch stainless-steel weir plate was installed on April 14, 1992. The weir plate helped stabilize the stage-discharge relation at that site. Mean daily stream discharges for the period of data collection at both sites can be found in the annual Water Resources Data reports published by the U.S. Geological Survey (1988-92). A diagram of the sampling equipment at the Bear Branch streamflow-gaging station is shown in figure 9. The sampling equipment set up in the Fishing Creek tributary streamflow-gaging station was similar to that of Bear Branch.

Streamwater samples were collected weekly from each watershed for most of the study period. The samples were collected as grab samples from a point of maximum flow in the stream near the streamflow-gaging station. More specifically, samples were collected from Bear Branch near the staff gage just off the upstream corner of the deck that supported the streamflow-gaging station. At Fishing Creek tributary, streamwater samples were collected from just below the control, and after the weir plate was installed, from the V-notch of the weir. Streamwater samples from Bear Branch have been collected since June 1990, whereas samples from Fishing Creek tributary have been collected since October 1987. Starting in April 1992, streamwater samples from both sites were collected biweekly. Streamwater samples were submitted to the appropriate laboratories for chemical and, starting in June 1990, for isotopic analysis.

Stormflow samples were pumped by the peristaltic pump of the ISCO automatic sampler from the stream through a polyethylene strainer that was attached to 9.5-mm-diameter braided Tygon tubing. The braided Tygon tubing was connected to silicon tubing inside the peristaltic pump. The tubing ran through the distributor arm inside the ISCO automatic sampler and delivered sample water to the 24 polyethylene 1,000-mL-capacity bottles. Stormflow samples were retrieved from the field on a weekly basis, and sometimes on a storm basis. At that time, the bottles containing the stormflow samples were replaced with a set of clean ISCO bottles. The ISCO sample bottles were transported on ice to the office where they were processed either that day or the following day. The stormflow samples were submitted to the appropriate laboratories for chemical and, starting in June 1990, for isotopic analysis.

From October 1987 to June 1990, the ISCO at Fishing Creek tributary was activated by a water-level actuator, and samples were collected at equal time intervals, which ranged from 15 minutes to 1 hour. Since June 1990, the ISCO automatic samplers at both sites were controlled by a program on the CR10 data loggers. The program for the CR10 was modified from a program originally developed by N.E. Peters (U.S. Geological Survey, written commun., 1990). The site-specific program allowed the user to enter the positive change in stage that would initiate the sampling program and the positive or negative change in stage required for additional streamwater samples to be collected. Once the storm-sampling routine had been initiated by the CR10 program, data on the date, time, stage of the next rising or falling limb of the hydrograph, and sample number were stored on the data-storage module. Observation of the stage/discharge relation at each site allowed the user to enter appropriate numbers into the program that would cause the ISCO to collect representative samples throughout the duration of stormflow. Because the ISCO has the capacity to collect a maximum of 24 samples at a time, the numbers entered in the program provided an optimal sample set for only a specific range of storm sizes. The numbers in the program were periodically changed in order to obtain a data set over a wide range in stormflow conditions. Changes to the CR10 program were made in the office on a computer and the revised program was downloaded to a data-storage module. Upon arrival at the field site, the new program version was downloaded from the data-storage module to the CR10 data logger.

Synoptic Surveys of Other Surface and Ground Waters

Synoptic surveys of other surface and ground waters in both watersheds were conducted biannually--in March during high base flow and in September during low base flow. The synoptic-survey sites in

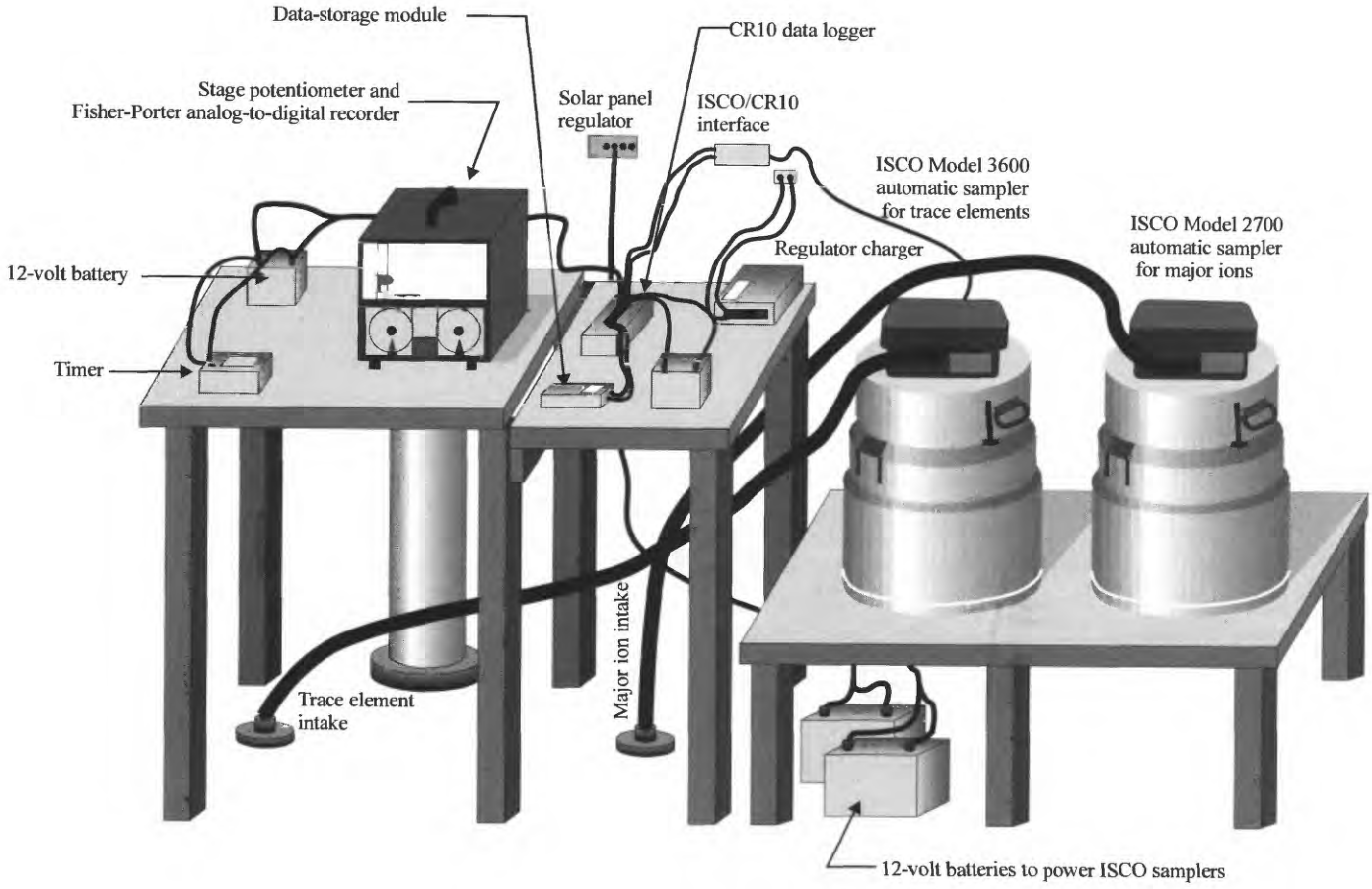

Figure 9. Sampling equipment at the Bear Branch streamflow-gaging station, Catoctin Mountain, Maryland.

the Bear Branch watershed consisted of seven sites (SS2-SS8) located along the main stem of the stream, upstream of the streamflow-gaging station (fig. 3, inset map). Because of varying flow conditions, however, not all of the sites were sampled during each synoptic survey. In the Fishing Creek tributary watershed, the six synoptic-survey sites were a mixture of sites on the main stem of the stream (SS1-SS3), small surface seeps (SP1, SP2), and a spring (SPG) (fig. 4, inset map). Samples of streamwater, seeps, and the spring during the synoptic surveys were collected using the same procedures described previously in the section on Streamwater. The water samples collected during synoptic surveys were submitted to the appropriate laboratories for chemical and, starting in June 1990, for isotopic analysis.

Sample Processing

Aliquots of precipitation, throughfall, soil-water, ground-water, streamwater and water samples collected during synoptic surveys were analyzed on site for specific conductance and pH. Before January 1990, specific conductance was measured using a Labline model MC-1 Mark V temperature-compensated specific conductance meter. Beginning January 1990, specific conductance was measured with a YSI model 34 conductance-resistance meter, a model 3417 conductivity cell, and a temperature compensator. The performance of the conductivity cell was checked on the day of sampling in standard specific conductance solutions. Before January 1989, a Beckman Phi 30 pH meter with a Futura II glass combination electrode was used to measure pH of the samples. Beginning January 1989, a Beckman Phi 31 pH meter, an Orion Ross glass combination electrode, and a Beckman temperature compensator were used to measure pH. The pH electrode was calibrated at the beginning of the sampling day with standard buffer solutions of pH 7.0 and 4.0. The buffers were diluted approximately 50 percent by the addition of distilled water to "sensitize" the electrode to the low-ionic-strength water it was to measure. The calibration of the electrode then was checked in 10^{-4} normal H_2SO_4 (sulfuric acid) (pH = 4.0). The electrode was calibrated two or more times during long sampling days. Water temperature was measured in the wells, streams, and at the synoptic sites with a mercury-filled thermometer calibrated in degrees Celsius.

Precipitation, throughfall, soil-water, ground-water, and streamwater samples, and water samples collected during synoptic surveys were filtered immediately after collection in the field through 0.1-μm (micron) pore-size cellulose-nitrate filters by using positive pressure created by a peristaltic pump. Each sample was split into two aliquots--a filtered, acidified (FA) sample and a filtered, chilled (FC) sample. The FA sample was prepared by filtering approximately 125 mL of sample into a 250-mL white polyethylene bottle that had been rinsed with nitric acid; 200-μL of Baker's InstrAnalyzed nitric acid was then pipetted into the sample bottle. The addition of nitric acid acidified the sample to a pH of less than 2.0 and served to preserve the sample. The FA sample was delivered to the laboratory where it was analyzed for cation and silica concentrations. The FC sample was prepared by filtering approximately 120 mL of sample into a 125-mL brown polyethylene bottle that had been rinsed three times with filtered sample water. When the sample volume retrieved from a collector was insufficient to obtain full filtered samples, the FC sample bottle was rinsed three times with distilled water and then with the first few drops of filtered sample water. The sample was then collected from the available water, as previously described. The FC sample was transported from the field on ice and stored at 4°C in the laboratory. The brown bottle, the filtration, and the chilled storage served to decrease the activity of organisms that can cause the chemistry of the sample to change. The FC sample was analyzed in the laboratory for alkalinity and anion concentrations, and pH.

Stormflow samples were filtered and prepared as previously described, but the sample preparation was generally done later in the day or the following day in the office. The samples were allowed to equilibrate to room temperature before measurements of specific conductance and pH were made. Each

sample was then filtered into discrete sample bottles; that is, no composite samples were collected. The filter was changed after every third or fourth sample, and the filter and tubing to the pump were thoroughly flushed with distilled water after each sample was filtered.

Samples for analysis of the stable isotopes deuterium (D) and oxygen-18 (^{18}O) were collected for all types of water in the watersheds. Sixty milliliters of unfiltered sample were decanted into a flint-glass bottle with a polyseal cap. No preservative was added. The bottle caps were covered with Parafilm laboratory wax paper to further ensure against evaporation of the sample. The types of water-quality samples that were collected in the field and the frequency of sampling during the study are shown in table 3.

Laboratory Methods

Water samples collected for the determination of major inorganic ion concentrations were sent to the USGS trace elements and nutrients laboratory in Reston, Va., for analysis. Precipitation samples were analyzed in the laboratory for dissolved calcium (Ca^{2+}), magnesium (Mg^{2+}), sodium (Na^{+}), potassium (K^{+}), ammonium (NH_4^{+}), chloride (Cl^{-}), nitrite (NO_2^{-}), nitrate (NO_3^{-}), sulfate (SO_4^{2-}), and pH (for quality-assurance purposes). All other water samples were analyzed for Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, Cl^{-}, NO_2^{-}, NO_3^{-}, SO_4^{2-}, bicarbonate (HCO_3^{-}), silicon (reported as SiO_2), total aluminum, and iron, and pH (for quality-assurance purposes). Laboratory analysis methods and minimum detection limits are summarized in table 4.

FA samples were analyzed for dissolved concentrations of Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, SiO_2, and total aluminum and iron. FC samples were analyzed for dissolved concentrations of NH_4^{+}, Cl^{-}, NO_2^{-}, NO_3^{-}, SO_4^{2-}, and HCO_3^{-}. Laboratory pH of these samples was determined for quality-assurance purposes only.

A detection limit--the concentration that can be detected with 95-percent confidence--is determined by statistical calculation. Because the detection limit is affected by the signal and electronic noise of the instrument, it is a function of the whole instrument. The computer software incorporated in the Direct Current Plasma Atomic Emission Spectrophotometer (DCP-A) instrument used by the trace elements and nutrients laboratory can calculate a detection limit for every sample analyzed. A measured concentration reported in the tables can be lower than the instrument detection limit because the unique combination of the signal and the noise for an individual sample makes it possible for a concentration lower than the normal detection limit to be measured.

Dissolved concentrations of Cl^{-}, NO_2^{-}, NO_3^{-}, and SO_4^{2-} were determined using a Dionex 2110i ion chromatograph. The Waters Maxima 820 Chromatography Workstation, a computer program, was used to collect, calculate, and report the ion- chromatographic data. The detection limits, in microequivalents per liter, were as follows: Cl^{-}, 1.8; NO_2^{-}, 0.8; NO_3^{-}, 0.45; and SO_4^{2-}, 0.8. Beginning July 1989, a Dionex 100DX ion chromatograph with Waters Maxima 820 computer program was used to determine NH_4^{+} concentrations with a detection limit of 2.4 µeq/L.

During October 1987 through April 1988, the laboratory used a Perkin-Elmer #603 Atomic Absorption Spectrophotometer (AA) to determine Ca^{2+} and Mg^{2+} concentrations, and an IL 351 AA to determine Na^{+} and K^{+} concentrations. During this period, detection limits, in microequivalents per liter, were as follows: Ca^{2+}, 2.5; Mg^{2+}, 0.8; Na^{+}, 0.4; and K^{+}, 0.6. From October 1987 through October 1988,

Table 3. Summary of collection and analysis of samples from the Bear Branch and Fishing Creek tributary watersheds, Catoctin Mountain, Maryland, 1987-93

[FA, filtered, acidified; FC, filtered, chilled; SC, specific conductance; T, temperature]

Type of water	Number of collectors	Frequency of sampling or attempt of sampling	Types of samples collected	Field measure-ments
Precipitation	1	Weekly	FA, FC; isotope	pH, SC
Throughfall				
Bear Branch				
Coniferous	3	Weekly	Composited FA, FC; isotope	pH, SC
Deciduous	3	Weekly	Composited FA, FC; isotope	pH, SC
Fishing Creek tributary				
Deciduous	3	Weekly	Composited FA, FC; isotope	pH, SC
Soil water				
Bear Branch				
Pit 1 Upper	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 1 Lower	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 2 Upper	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 2 Lower	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Fishing Creek tributary				
Pit 1 Upper	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 1 Lower	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 2 Upper	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 2 Middle	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Pit 2 Lower	1	Storm; 2-4 weeks	FA, FC; isotope	pH, SC
Ground water				
Bear Branch				
Well 3	1	Monthly	FA, FC; isotope	pH, SC, T
Well 4	1	Monthly	FA, FC; isotope	pH, SC, T
Camp Peniel well	1	Monthly	FA, FC; isotope	pH, SC
Fishing Creek tributary				
Well 2	1	Monthly	FA, FC; isotope	pH, SC, T
Spring	1	Quarterly	FA, FC; isotope	pH, SC, T
Streamwater				
Bear Branch	1	Weekly/biweekly	FA, FC; isotope	pH, SC, T
Fishing Creek tributary	1	Weekly/biweekly	FA, FC; isotope	pH, SC, T
Stormwater				
Bear Branch	1	Storm	FA, FC; isotope	pH, SC
Fishing Creek tributary	1	Storm	FA, FC; isotope	pH, SC
Other surface and ground waters				
Bear Branch	7	Biannually	FA, FC; isotope	pH, SC, T
Fishing Creek tributary	6	Biannually	FA, FC; isotope	pH, SC, T

Table 4. Laboratory analysis methods and minimum detection limits at the U.S. Geological Survey trace elements and nutrients laboratory in Reston, Virginia

[µeq/L, microequivalents per liter; µmol/L, micromoles per liter; n.a., not applicable]

Instrumentation	Element	Detection limit (µeq/L)
ARL SpectraSpan-V DCP		
(June 1989-December 1993)	Calcium	0.45
	Magnesium	.05
	Sodium	.13
	Potassium	.2
	Aluminum	.22
	Iron	.38
	Silica	.43 (µmol/L)
Varian Spectra AA 300		
(May 1988-May 1989)	Calcium	.5
	Magnesium	.24
	Sodium	.09
	Potassium	.77
	Aluminum	3.3
	Iron	2.2
Perkin-Elmer Spectrophotometer 603 AA		
(October 1987-April 1988)	Calcium	2.5
	Magnesium	.8
IL Spectrophotometer AA		
(October 1987-April 1988)	Sodium	.4
	Potassium	.6
Beckman Spectrophotometer dU		
(October 1987-October 1988)	Silica	.4 (µmol/L)
Dionex 2110i Ion Chromatograph		
(October 1987-December 1993)	Chloride	1.8
	Nitrite	.8
	Nitrate	.45
	Sulfate	.8
Dionex 100DX Ion Chromatograph		
(July 1989-December 1993)	Ammonium	2.4
Radiometer DTS 833		
(October 1987-July 1991)	Bicarbonate	4
Radiometer LIST		
(July 1991-December 1993)	Acid-neutralizing capacity	n.a.

dissolved SiO_2 concentrations were determined by a colorimetric molybdate blue method (Skougstad and others, 1989), using a Beckman dU Spectrophotometer with a Gilson automated sampler, which gave a detection limit of 0.4 µmol/L. Total dissolved aluminum and iron concentrations were not determined before May 1988. From May 1988 through May 1989, the laboratory used a Varian Spectra AA-300 for determination of cation concentrations. During this period, detection limits, in microequivalents per liter, were as follows: Ca^{2+}, 0.5; Mg^{2+}, 0.24; Na^{+}, 0.09; K^{+}, 0.77; aluminum, 3.3; and iron, 2.2. Beginning October 1988 for SiO_2 determinations, and June 1989 for cation determinations, an ARL Spectra Span V DCP-A (DCP) was used for analyses. The base cations, aluminum, and iron concentrations were analyzed simultaneously by DCP (atomic emission spectroscopy). Silica concentration was determined separately by DCP because of possible interferences. During this period, detection limits, in microequivalents per liter, were as follows: Ca^{2+}, 0.45; Mg^{2+}, 0.05; Na^{+}, 0.13; K^{+}, 0.2; aluminum, 0.22; iron, 0.38; and in micromoles per liter, SiO_2, 0.43. Samples for the determination of SiO_2 collected from October 1988 through June 1989 were archived during the change in instrumentation from the Beckman spectrophotometer to the DCP.

From October 1987 through July 1991, alkalinity determinations were performed using a Radiometer Autotitration System DTS-833, with a detection limit of 4 µeq/L. This is an automated incremental titration system that uses a second derivative calculation. Alkalinity, or more appropriately, total alkalinity, is a measure of the capacity of water to neutralize a specific quantity of acid. In this type of titration, all bicarbonate (HCO_3^-) is measured, as well as the small amount of carbonate (CO_3^{2-}) that may be present. The total alkalinity is essentially the same as the concentration of HCO_3^- for natural waters with pH values ranging between 5.0 and 8.5.

Acid-neutralizing capacity (ANC) can be operationally defined as the equivalent sum of all the base that can be titrated with a strong acid to a determined equivalence point. It measures the net deficiency of protons, which can include noncarbonate contributions such as ammonia, borate, hydroxide, organic ligands, phosphate, silicate, and sulfide (Stumm and Morgan, 1981, p. 186). In a carbonate system of natural water with a pH range of the samples in this study, it can be assumed that alkalinity, bicarbonate concentration, and positive ANC are equivalent.

Since July 1991, Radiometer's Low Ionic Strength Titration System (LIST) has been used to determine ANC. This system employs a modified Gran Titration. The calculation procedure determines the ANC by utilizing the acid-titration data. A modified Gran Titration calculation can result in a negative value; therefore, the method has no detection limit. Negative ANC values have been reported for the data since 1991.

Samples collected for stable-isotope analysis were sent to the USGS isotope fractionation laboratory in Reston, Va. The samples were analyzed for hydrogen-isotope activities using the method of Coplen and others (1991) and for oxygen-isotope activities using the method of Epstein and Mayeda (1953). The results were reported in per mille (‰) relative to VSMOW (Vienna standard mean ocean water). The hydrogen-isotope method had a 2-σ precision of 2 ‰ (T.B. Coplen, U.S. Geological Survey, written commun., 1990). Hydrogen-isotope results were expressed as delta deuterium (δD) relative to VSMOW using the equation:

$$\delta(Deuterium)_{VSMOW} = \left(\frac{Deuterium\ Sample}{Hydrogen} \Big/ \frac{Deuterium\ VSMOW}{Hydrogen} - 1 \right) 1{,}000.$$

The oxygen-isotope method had a 2-σ precision of 0.2 ‰ (T.B. Coplen, U.S. Geological Survey, written commun., 1990). Oxygen-isotope results were expressed as delta O-18 ($\delta^{18}O$) relative to VSMOW and VPDB (Vienna Peedee belemnite) using the equation:

$$\delta^{18}O_{VPDB}^{sample} = 0.97001\,\delta^{18}O_{VSMOW}^{sample} - 29.99$$

Quality Assurance and Quality Control

Quality assurance (QA) and quality control (QC) of field data collection and laboratory analyses were accomplished through a series of approved methods, which included the analysis of field and laboratory standards, duplicates, and blanks, analyses of the distilled and deionized water used in the field and laboratory, and comparison of calculated specific conductivity to measured specific conductivity of selected samples. In addition, interlaboratory comparisons of analytical results of standard reference water samples were performed biannually.

For the anions and NH_4^+ that were analyzed by ion chromatography, each set (20-40) of samples was preceded by four standards. These standards contained all the ions of interest in different quantitative concentrations. The resulting concentration curves must have had a minimum r^2 value of 0.999 for the standards to be acceptable for use in instrument calibration. When the concentration of any ion of interest in the sample had a higher concentration than those that formed the standard curve, a quantitative dilution of the sample was made and it was reanalyzed. During the chemical analysis of a set of samples, known standard solutions were analyzed after every fifth sample. In addition, samples from the National Institute of Standards and Technology were analyzed at the beginning and end of each analysis session in order to provide a record of precision of the instrument.

Cation standard solutions were prepared from commercially available stock solutions by dilution with a 0.5-percent nitric-acid matrix. This acid concentration approximates the acidity of the FA samples analyzed. A blank solution was prepared using just the 0.5-percent nitric-acid solution. This procedure ensured that the generated calibration curve was of the same ionic strength as the analyzed FA samples. During the set of analyses, the high standard solution was analyzed and calibrated after every 5 samples and the low standard solution (the blank) was analyzed and calibrated after every 10 samples. The same rigorous QC methods were used for the determination of SiO_2 concentration.

Ion balances were calculated for each sample as further verification of the quality of data reported. In order to calculate the sum of the microequivalents per liter of cations, aluminum was assumed to have a 3+ oxidation state and iron was assumed to have a 2+ oxidation state. The assumed oxidation states were based upon the most abundant species of each ion that was present in the sample at the particular pH of the sample. The pH of all the samples analyzed indicated that the Al^{3+} form of aluminum and the Fe^{2+} form of iron were the most abundant species (iron oxidation to Fe^{3+} is very slow, kinetically, at low pH).

Samples that had an ion-balance error of more than ±10 percent were repeated if there was no direct evidence of a contributing organic acid or NH_4^+ concentration. For samples with an anion deficit of more than 10 percent, organic acids were not identified, but their presence was determined by an analysis of dissolved organic carbon using a Shimadzu TOC-5000 carbon analyzer. Because NH_4^+ in throughfall samples is unstable, determinations were performed to confirm the presence of NH_4^+ for QA and QC purposes, but not to report or quantify it in throughfall.

Data validation for laboratory data was done by double-checking the values obtained from the instruments against the reported values in the laboratory computer data files. Once the laboratory computer data files were received, the data were transferred by hand to paper files as well as electronically, directly into project computer data files. Data validation for project data files was done by double-checking the values in the paper files against the laboratory computer data files, and by double-checking the data in the project computer data files against the data in the paper files. Ion balances in the project computer data files were calculated and compared to those of the laboratory computer data files as a final check against any data-entry errors in the project computer data files.

WATER-QUALITY DATA

In the following sections of the report, the method of presentation for each type of water collected for the study is discussed and the types of data that can be found in each table are described. Tables 5-18 are found at the end of the report.

Precipitation

Chemical analyses of precipitation collected from the USGS precipitation-collection station at Catoctin Mountain, Md., during January 1987 through December 1993 are shown in table 5. In the table, the column under "Sample-collection date" shows the dates the samples were collected from the field and includes all precipitation that fell since the previous sample-collection date.

Throughfall

Chemical analyses of throughfall collected from the Bear Branch watershed during October 1990 through December 1993 are shown in table 6 . The data in table 6 are divided into two groups--(1) throughfall collected from beneath coniferous tree canopies, and (2) throughfall collected from beneath deciduous tree canopies. Chemical analyses of throughfall collected from the Fishing Creek tributary watershed during October 1990 through December 1993 are shown in table 7 . The columns under "Sample-collection date" in tables 6 and 7 show the dates the samples were collected from the field and include all throughfall that fell since the previous sample-collection date. The columns under "Amount of throughfall" show the mean of the depth of throughfall measured in the three plastic rain gages that were located with each throughfall collector.

Soil Water

Chemical analyses of soil water collected from the Bear Branch watershed during October 1990 through December 1993 are shown in table 8. The data in table 8 are divided into four groups--data collected from (1) the upper pans of lysimeter pit 1, (2) the lower pans of lysimeter pit 1, (3) the upper pans of lysimeter pit 2, and (4) the lower pans of lysimeter pit 2. Chemical analyses of soil water collected from the Fishing Creek tributary watershed during April 1991 through December 1993 are shown in table 9. The data in table 9 are divided into four groups--data collected from (1) the upper pans of lysimeter pit 1, (2) the lower pans of lysimeter pit 1, (3) the upper pans of lysimeter pit 2, and (4) the middle pans of lysimeter pit 2. No samples were ever obtained from the lowest pans (1.37 m deep) of pit 2 in the Fishing Creek tributary watershed. The columns under "Sample-collection date" in tables 8 and 9 show the dates the samples were collected from the field and include all soil water that had gravity drained since the previous sample-collection date.

Ground Water

Altitudes of the water table in the well points in the Bear Branch watershed and the Fishing Creek tributary watershed are shown in tables 10 and 11, respectively. Weekly water-level measurements in the well points were made in tenths of feet, which were converted to meters and reported in the tables. Hydrographs of the water tables in the well points for Bear Branch and Fishing Creek tributary for 1991-93 are shown in figures 10a and 10b, respectively.

Chemical analyses of ground water collected from the Bear Branch watershed during October 1992 through December 1993 are shown in table 12. The data in table 12 are divided into three groups--data collected from (1) well point 3, (2) well point 4, and (3) the Camp Peniel well. Chemical analyses of ground water collected from the Fishing Creek tributary watershed during March 1988 through December 1993 are shown in table 13 . The data in table 13 are divided into two groups--data collected from (1) well point 2, and (2) the spring in the Fishing Creek tributary watershed.

Streamwater

Hydrographs of mean daily stream discharges for Bear Branch and Fishing Creek tributary are shown in figures 11a and 11b, respectively. Discharge was originally calculated in cubic feet per second and was converted to liters per second for this report.

Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed during May 1990 through December 1993 are shown in table 14 . Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed during July 1990 through December 1993 are shown in table 15 . Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed during August 1987 through December 1993 are shown in table 16 . Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed during December 1987 through December 1993 are shown in table 17 .

In all of the water-quality data of streamwater tables (tables 14-17), the time that the sample was collected is given. All times shown in the tables are in eastern standard time and are expressed in military time. In these tables, the discharge of the stream at the streamflow-gaging station at the time of sampling is given. For sample times other than at an even 15-minute interval (for example, a sample collected at 1308), a linear interpolation of the discharges at the adjacent 15-minute intervals was performed (for example, the discharges for 1300 and 1315 were interpolated to obtain a discharge for 1308). For stormflow samples, which were usually collected at intervals of less than 15 minutes, the stage of the stream at the time of sampling was obtained from the CR10 printout, and the corresponding discharge was obtained from the rating table in use at that time for the site.

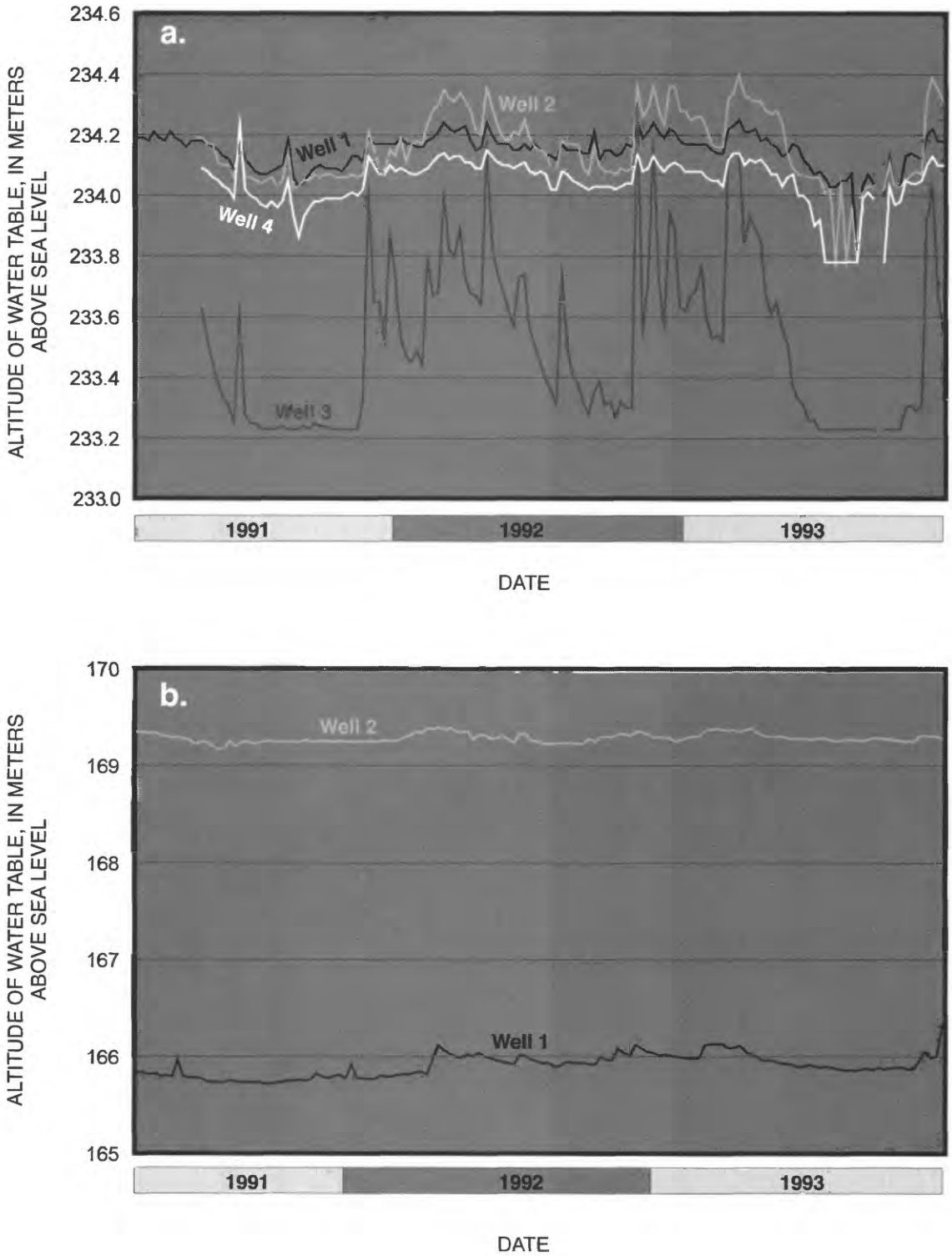

Figure 10. Altitude of the water table in well points in the (**a**) Bear Branch watershed, and (**b**) Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93.

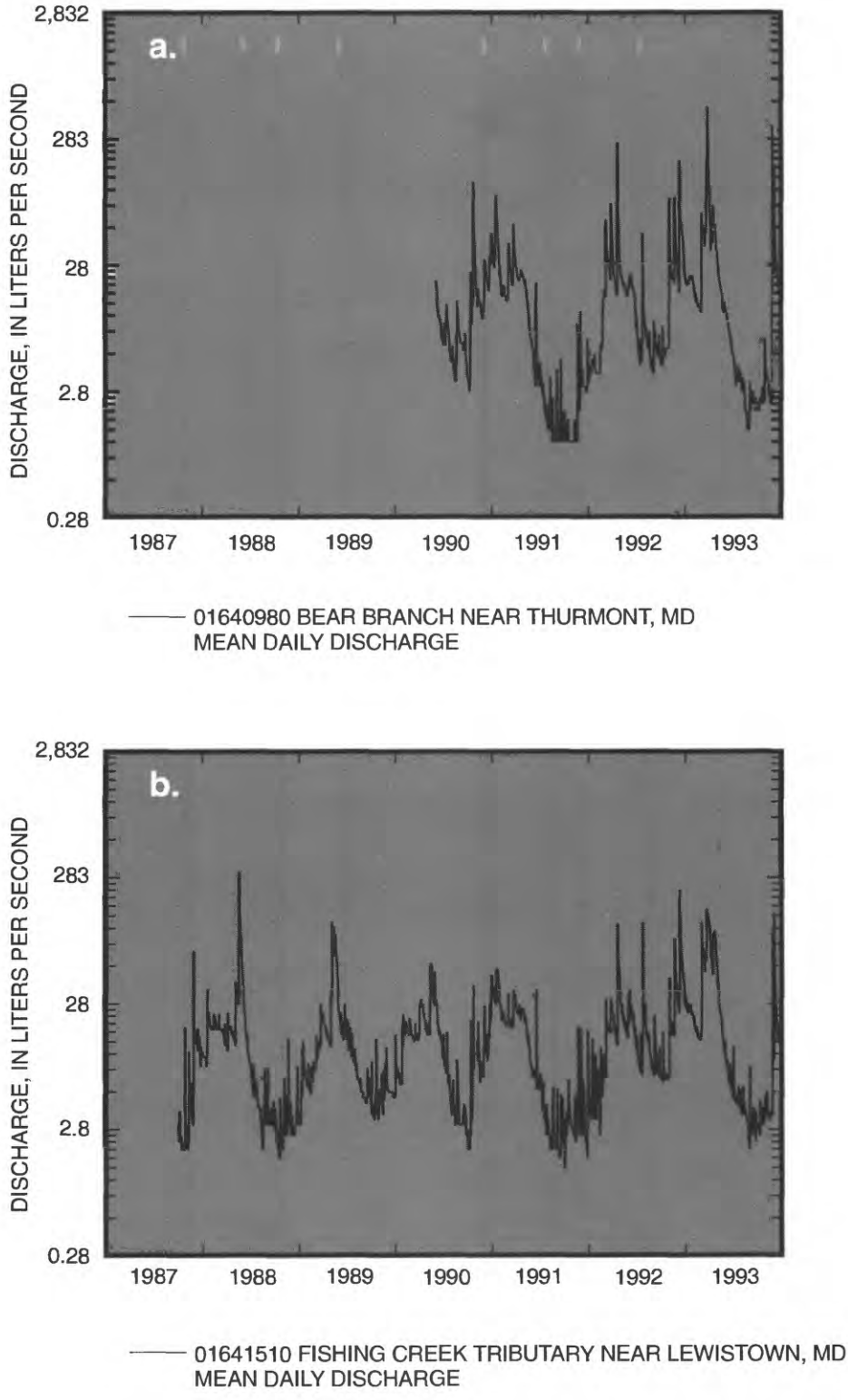

Figure 11. Mean daily discharge at the streamflow-gaging stations in the **(a)** Bear Branch watershed, 1990-93, and **(b)** Fishing Creek tributary watershed, 1987-93, Catoctin Mountain, Maryland.

Other Surface and Ground Waters

Chemical analyses of other surface and ground waters collected biannually from the Bear Branch and Fishing Creek tributary watersheds during 1991-93 are shown in table 18 . In the data collected from the Bear Branch watershed, if a specific site is not shown for a particular sampling date (for example, SS2, SS3, and SS4 on September 12, 1991), the stream was not flowing at any of those locations and a sample could not be collected. As a result, there is no SS1 for Bear Branch and SS2 was sampled only once, on March 29, 1993.

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Tables 5 - 18

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93

[mm, millimeters; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; ANC, acid-neutralizing capacity; n.a., not analyzed]

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
01/07/87	19.8	18	4.65	4.66	8.15	1.57	11.3	1.05
01/13/87	106.7	43	4.13	4.19	12.2	1.43	14.4	7.45
01/20/87	23.6	27	4.36	4.85	12.2	1.29	12.3	4.57
01/28/87	39.4	8	4.81	4.38	6.11	0.29	2.59	0.98
02/03/87	1.5	49	4.01	n.a.	n.a.	n.a.	n.a.	n.a.
02/17/87	2.5	61	3.93	n.a.	n.a.	n.a.	n.a.	n.a.
02/24/87	20.3	8	4.8	5.96	10.2	0.86	5.18	0.78
03/03/87	28.7	14	4.61	4.87	4.08	1.72	9.8	0.91
03/31/87	42.7	26	4.34	4.61	14	1.39	11.8	4.32
04/07/87	114	16	4.52	4.77	12	0.28	7.76	3.85
04/14/87	2.5	58	4.23	4.24	21.9	1.39	5.72	2.02
04/21/87	38.1	31	4.34	4.61	7.86	2.53	8.01	3.21
04/28/87	2.3	28	4.33	4.65	14.2	1.01	4.88	1.19
05/06/87	27.9	41	4.16	4.36	2.8	1.52	7.03	3.62
05/13/87	6.4	100	3.77	3.81	18.8	3.04	9.92	7.24
05/19/87	10.2	79	3.77	3.87	3.14	1.01	4.82	2.59
05/26/87	38.1	43	4.11	4.18	1.57	1.01	1.93	1.55
06/02/87	2.3	50	4.05	4.06	1.57	4.05	5.24	2.07
06/09/87	11.9	83	3.84	3.83	14.2	3.8	2.34	2.07
06/16/87	27.7	56	3.95	3.92	6.9	3.15	4.14	2.18
06/23/87	8.1	49	4.04	4	12.4	2.8	12.5	1.12
06/30/87	15	80	3.81	3.77	5.11	1.89	6.13	1.08
07/08/87	48.5	44	4.12	4.12	10.2	2.52	5.57	1.21
07/14/87	33.8	46	4.06	4.19	7.48	1.65	2.78	0.81
08/11/87	10.4	142	3.49	3.5	17	2.46	10.5	2.05
08/19/87	3.6	89	3.81	3.8	33.8	7.92	16.9	25.8
08/24/87	17.8	46	4.07	4.04	12.5	17.3	7.05	1.79
09/01/87	5.1	65	3.98	4.01	22	18.4	15.2	2.8
09/08/87	73.4	8	4.98	5.03	2.25	1.65	4.78	0.51
09/15/87	20.1	45	4.04	4.01	4.04	1.65	3.91	1.54
09/22/87	55.1	27	4.45	4.3	5.47	1.65	3.48	1.28
09/30/87	11.2	19	4.43	4.51	6.49	4.12	2.17	1.79
10/05/87	5.8	36	4.22	4.32	15.7	8.22	21.3	<.64
10/13/87	16	23	4.35	4.48	4.79	2.46	3.48	2.44
10/27/87	3	35	4.11	4.45	23.2	14	16.5	4.8
11/02/87	33	1	5.04	5.16	5	0.82	1.3	1.03
11/13/87	24.1	38	4.14	4.38	6.48	2.46	4.78	1.03
11/24/87	25.7	17	4.58	4.7	6.98	4.11	12.6	2.05
12/01/87	68.3	11	4.85	4.88	2.5	1.65	5.22	0.51
12/08/87	2	25	4.39	4.62	32.4	5.76	7.39	2.02

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	17.1	<0.8	16.8	28.8	n.a.	n.a.	01/07/87
n.a.	19.4	<.8	52.8	73.5	n.a.	n.a.	01/13/87
n.a.	21.7	<.8	25	33.1	n.a.	n.a.	01/20/87
n.a.	7.02	<.8	13.1	16.6	n.a.	n.a.	01/28/87
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/03/87
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/17/87
n.a.	9.9	<.8	8.66	19	n.a.	n.a.	02/24/87
n.a.	10.5	<.8	6.85	21.8	n.a.	n.a.	03/03/87
n.a.	14	<.8	17.6	50.2	n.a.	n.a.	03/31/87
n.a.	14.5	<.8	15.6	28.5	n.a.	n.a.	04/07/87
n.a.	14.1	<.8	44.5	84.4	n.a.	n.a.	04/14/87
n.a.	19.8	<.8	22.6	61.2	n.a.	n.a.	04/21/87
n.a.	16.4	<.8	11.5	43.3	n.a.	n.a.	04/28/87
n.a.	7.79	4.1	36.4	64.2	n.a.	n.a.	05/06/87
n.a.	23.5	<.8	102	140	n.a.	n.a.	05/13/87
n.a.	12.8	<.8	48.3	162	n.a.	n.a.	05/19/87
n.a.	7.5	<.8	30.9	102	n.a.	n.a.	05/26/87
n.a.	25.1	<.8	18	51.4	n.a.	n.a.	06/02/87
n.a.	19.2	<.8	107	230	n.a.	n.a.	06/09/87
n.a.	18	<.8	70.1	198	n.a.	n.a.	06/16/87
n.a.	20.7	<.8	67.1	127	n.a.	n.a.	06/23/87
n.a.	29.7	<.8	79.2	153	n.a.	n.a.	06/30/87
n.a.	11.6	<.8	30.4	80.8	n.a.	n.a.	07/08/87
n.a.	12.9	<.8	36.2	91.3	n.a.	n.a.	07/14/87
n.a.	29.5	<.8	88.6	306	n.a.	n.a.	08/11/87
n.a.	52.3	<.8	55.5	168	n.a.	n.a.	08/19/87
n.a.	10.7	<.8	32.1	84.7	n.a.	n.a.	08/24/87
n.a.	51.1	<.8	41.5	124	n.a.	n.a.	09/01/87
n.a.	11.6	<.8	4.57	27.3	n.a.	n.a.	09/08/87
n.a.	10.2	<.8	34.6	91.1	n.a.	n.a.	09/15/87
n.a.	10.8	<.8	21.7	60.1	n.a.	n.a.	09/22/87
n.a.	12.2	<.8	27.3	38.8	n.a.	n.a.	09/30/87
n.a.	133	<.8	75.8	60.2	n.a.	n.a.	10/05/87
n.a.	11.9	<.8	24.9	33.3	n.a.	n.a.	10/13/87
n.a.	62.3	<.8	60.2	66.6	n.a.	n.a.	10/27/87
n.a.	9.49	<.8	5.05	16.2	n.a.	n.a.	11/02/87
n.a.	6.48	<.8	20.4	35.4	n.a.	n.a.	11/13/87
n.a.	14.3	<.8	12.6	29.8	n.a.	n.a.	11/24/87
n.a.	9.96	<.8	8.23	14.9	n.a.	n.a.	12/01/87
n.a.	21.5	<.8	41.1	34.8	n.a.	n.a.	12/08/87

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
12/15/87	14	30	4.48	4.37	9.98	5.76	15.2	3.59
12/22/87	13.5	31	4.32	4.36	<2.5	<.8	2.17	3.59
12/30/87	14.7	23	4.28	4.58	5.48	1.64	2.17	1.03
01/12/88	4.6	10	4.85	5.26	11.5	2.47	3.48	5.13
01/19/88	8.6	14	4.57	4.82	17.5	2.47	8.26	5.13
01/27/88	31.5	16	4.44	4.6	4.5	0.82	2.17	0.77
02/02/88	2.5	17	4.6	4.72	12.5	4.11	13.9	8.18
02/09/88	12.2	16	4.54	4.61	9.48	2.47	8.08	2.81
02/16/88	17.3	17	4.41	4.55	13.5	1.65	6.76	1.53
02/23/88	10.2	26	4.3	4.49	11.1	4.44	15.3	13.3
03/08/88	21.6	24	4.34	4.43	7.86	1.97	5.22	2.05
03/29/88	16.5	10	4.67	4.77	8.36	3.13	3.48	1.02
04/05/88	2	44	4.05	n.a.	n.a.	n.a.	n.a.	n.a.
04/12/88	22.6	27	4.45	4.37	22.8	3.46	12.2	4.78
04/19/88	10.9	31	4.13	4.38	6.71	5.1	6.96	4.09
04/26/88	7.4	38	4.12	4.27	11	6.25	22.6	16.4
05/03/88	12.2	52	3.88	4.07	10.2	7.4	10.4	8.18
05/10/88	70.4	29	4.18	4.29	8.57	3.46	10.4	3.07
05/17/88	7.6	83	3.78	3.85	20.1	9.21	15.7	12.3
05/24/88	211.8	29	4.08	4.28	10.2	2.47	5.22	2.05
05/31/88	13	45	3.87	4.01	11.4	2.39	3.74	4.22
06/07/88	1.8	96	3.73	n.a.	n.a.	n.a.	n.a.	n.a.
06/14/88	13	38	3.91	4.1	16.7	4.11	2.39	2.3
06/21/88	1.5	268	2.96	n.a.	n.a.	n.a.	n.a.	n.a.
07/12/88	25.4	77	3.4	3.76	15.4	3.7	0.96	1.99
07/19/88	31.5	51	3.79	3.89	7.04	1.07	<.09	0.66
07/28/88	32.3	27	3.86	4.18	2.84	1.32	2.48	0.9
08/02/88	5.1	53	3.7	3.94	23.9	6.58	4.48	1.94
08/09/88	3	35	3.97	n.a.	n.a.	n.a.	n.a.	n.a.
08/23/88	34.8	82	3.44	3.76	13.6	2.71	3.87	0.97
08/30/88	49.8	21	4.17	4.28	5.94	2.3	3.48	0.92
09/06/88	33.5	17	4.25	4.4	2.79	1.23	2.17	0.72
09/13/88	3	33	3.68	n.a.	n.a.	n.a.	n.a.	n.a.
09/19/88	11.9	38	3.72	4.15	18.6	1.97	2.74	2.23
09/27/88	24.9	14	4.22	4.54	7.63	1.32	0.57	0.56

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	13.2	<.8	22	62.2	n.a.	n.a.	12/15/87
n.a.	10.8	<.8	15.4	46.9	n.a.	n.a.	12/22/87
n.a.	12.6	<.8	14.2	47.3	n.a.	n.a.	12/30/87
n.a.	8.54	<.8	31.6	35.5	n.a.	n.a.	01/12/88
n.a.	10.3	<.8	13.8	26.2	n.a.	n.a.	01/19/88
n.a.	10.1	<.8	13.5	31.1	n.a.	n.a.	01/27/88
n.a.	18.5	<.8	19	22.9	n.a.	n.a.	02/02/88
n.a.	6.31	1.1	9.54	34.2	n.a.	n.a.	02/09/88
n.a.	7.32	<.8	15.2	35.7	n.a.	n.a.	02/16/88
n.a.	13.3	<.8	27.3	78.7	n.a.	n.a.	02/23/88
n.a.	12	<.8	18	42	n.a.	n.a.	03/08/88
n.a.	7.13	<.8	22.9	21.4	n.a.	n.a.	03/29/88
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/05/88
n.a.	10.6	<.8	18.3	55.5	n.a.	n.a.	04/12/88
n.a.	9.35	<.8	23.7	62.9	n.a.	n.a.	04/19/88
n.a.	14.2	<.8	34.3	97.5	n.a.	n.a.	04/26/88
n.a.	14.2	<.8	38.8	51	n.a.	n.a.	05/03/88
n.a.	11.1	<.8	28.2	89.2	n.a.	n.a.	05/10/88
n.a.	29.1	<.8	4.86	142	n.a.	n.a.	05/17/88
n.a.	12.5	<.8	29	64.2	n.a.	n.a.	05/24/88
n.a.	11.4	0.39	39.2	79.8	n.a.	n.a.	05/31/88
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/07/88
n.a.	8	0.46	41	72.7	n.a.	n.a.	06/14/88
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/21/88
n.a.	12.1	<.8	40.9	154	n.a.	n.a.	07/12/88
n.a.	7.08	<.8	32.2	104	n.a.	n.a.	07/19/88
n.a.	6.5	<.8	29	52.8	n.a.	n.a.	07/28/88
n.a.	15.2	<.8	43.8	131	n.a.	n.a.	08/02/88
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/09/88
n.a.	9.56	<.8	69	157	n.a.	n.a.	08/23/88
n.a.	8.58	<.8	18.4	45.4	n.a.	n.a.	08/30/88
n.a.	6.4	<.8	14.4	34.9	n.a.	n.a.	09/06/88
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/13/88
n.a.	6.58	<.8	28.5	90.9	n.a.	n.a.	09/19/88
n.a.	4.38	<.8	13.1	28.5	n.a.	n.a.	09/27/88

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
10/04/88	3.8	31	4.15	n.a.	n.a.	n.a.	n.a.	n.a.
10/11/88	1.5	57	3.83	n.a.	n.a.	n.a.	n.a.	n.a.
10/18/88	4.3	23	4.21	n.a.	13.6	5.76	5.13	18
10/25/88	31	18	4.33	n.a.	2.54	1.07	2.44	0.95
11/08/88	37.1	15	4.58	n.a.	8.03	3.95	8.66	1.99
11/15/88	11.9	27	4.16	n.a.	2.59	2.96	12.4	1.25
11/22/88	57.2	18	4.33	4.57	1.1	0.58	1.26	0.23
11/29/88	9.9	9	4.83	4.94	2.84	1.97	7.26	2.05
12/27/88	27.2	22	4.2	4.27	4.24	1.81	5.35	1.64
01/03/89	10.2	16	4.4	4.52	5.74	2.06	4.18	1.2
01/10/89	22.9	24	4.3	4.37	7.78	1.07	1.87	1.59
01/17/89	27.7	15	4.43	4.55	0.6	0.66	0.91	0.28
01/31/89	9.4	35	4.11	4.2	3.39	0.99	1	1.25
02/07/89	17.5	27	4.26	4.3	9.33	2.06	3.52	1.38
02/14/89	11.2	31	4.24	4.33	6.49	1.89	3.05	0.59
02/21/89	23.1	35	4.15	4.25	1.15	0.91	0.3	0.51
02/28/89	9.4	24	4.25	4.23	1.4	0.58	<.09	0.38
03/09/89	17.5	21	4.37	4.36	5.64	1.65	3.48	0.92
03/21/89	25.4	20	4.42	4.54	8.43	1.81	1.13	1.02
03/29/89	29.7	8	4.66	4.73	0.5	0.74	1.22	0.31
04/04/89	20.3	49	3.97	4.09	14.5	3.46	5	1.18
04/11/89	9.7	51	4.01	4.12	17.7	3.78	3.7	5.06
04/18/89	8.9	48	4.01	4.09	6.74	1.56	3.78	9.28
04/24/89	5.1	43	4.06	4.19	18.7	5.68	8.22	10.5
05/02/89	55.4	22	4.31	4.33	0.45	0.33	<.09	0.51
05/09/89	76.5	11	4.56	4.64	0.65	0.41	<.09	4.76
05/17/89	86.9	29	4.21	4.25	1.9	0.66	<.09	0.26
05/23/89	2.5	55	3.96	n.a.	n.a.	n.a.	n.a.	n.a.
05/30/89	22.1	37	4.09	4.15	8.88	2.22	0.3	1.23
06/06/89	13.7	43	3.99	4.05	4.59	1.23	<.13	0.74
06/13/89	49.3	6	4.81	4.75	0.9	0.16	<.13	0.54
06/20/89	36.3	12	4.53	4.58	4.84	1.23	0.74	1.36
06/27/89	24.4	36	4.04	4.1	4.34	1.4	2	0.84
07/05/89	88.1	24	4.24	4.3	2.79	0.91	0.91	0.61
07/11/89	5.1	35	4.11	4.2	11.2	2.38	1.74	4.63
07/18/89	22.9	40	4.01	4.08	2.79	0.66	0.26	0.2
07/25/89	15.2	17	4.36	4.38	2.25	0.99	1.35	0.56
08/01/89	26.4	52	3.95	3.97	3.59	0.9	1	0.97
08/08/89	3.6	53	3.91	4.03	23.4	5.43	11.4	8.59
08/15/89	1.5	10	4.88	n.a.	n.a.	n.a.	n.a.	n.a.

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/04/88
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/11/88
n.a.	9.13	1.62	14.3	43.6	n.a.	n.a.	10/18/88
n.a.	5.21	<.8	20.3	27.5	n.a.	n.a.	10/25/88
n.a.	13.1	<.8	12.2	33.4	n.a.	n.a.	11/08/88
n.a.	18.7	<.8	11.6	44.3	n.a.	n.a.	11/15/88
n.a.	3.63	<.8	12.9	26.2	n.a.	n.a.	11/22/88
n.a.	9.97	<.8	8.07	15.9	n.a.	n.a.	11/29/88
n.a.	10.4	<.8	28.6	52.2	n.a.	n.a.	12/27/88
n.a.	7.53	<.8	23.3	32.1	n.a.	n.a.	01/03/89
n.a.	7.66	0.9	27.3	39.3	n.a.	n.a.	01/10/89
10.4	5.3	<.8	9.88	24.1	n.a.	n.a.	01/17/89
n.a.	5.68	<.8	32.8	46.4	n.a.	n.a.	01/31/89
n.a.	21	<.8	30.8	47.8	n.a.	n.a.	02/07/89
n.a.	8.24	<.8	30	33.8	n.a.	n.a.	02/14/89
n.a.	5.79	<.8	32.4	45	n.a.	n.a.	02/21/89
n.a.	3.81	<.8	24.7	37.4	n.a.	n.a.	02/28/89
n.a.	5.3	<.8	16.8	34.7	n.a.	n.a.	03/09/89
n.a.	4.29	<.8	16	46.2	n.a.	n.a.	03/21/89
n.a.	4.63	<.8	9.1	18.1	n.a.	n.a.	03/29/89
n.a.	7.76	<.8	59.6	88.5	n.a.	n.a.	04/04/89
n.a.	9.23	<.8	57.2	74.8	n.a.	n.a.	04/11/89
n.a.	11.9	<.8	33.7	102	n.a.	n.a.	04/18/89
n.a.	16.1	<.8	39.2	102	n.a.	n.a.	04/24/89
n.a.	3.16	<.8	17.2	41.8	n.a.	n.a.	05/02/89
n.a.	2.39	<.8	9.38	19.5	n.a.	n.a.	05/09/89
n.a.	3.47	<.8	24.2	54.9	n.a.	n.a.	05/17/89
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/23/89
n.a.	5.11	<.8	36.2	76.8	n.a.	n.a.	05/30/89
n.a.	4.47	<.8	29.5	84.9	n.a.	n.a.	06/06/89
n.a.	1.05	<.8	7.14	12.5	n.a.	n.a.	06/13/89
n.a.	2.71	<.8	12.8	26	n.a.	n.a.	06/20/89
n.a.	4.87	<.8	47.2	62.8	n.a.	n.a.	06/27/89
n.a.	3.51	<.8	12.3	57.5	n.a.	n.a.	07/05/89
19.7	6.37	<.8	27.2	75.5	n.a.	n.a.	07/11/89
25.4	3.48	<.8	32.9	84.1	n.a.	n.a.	07/18/89
10.6	3.66	<.8	16.3	45.4	n.a.	n.a.	07/25/89
32.5	5.82	<.8	45.1	96.7	n.a.	n.a.	08/01/89
18.3	16.4	<.8	47.2	122	n.a.	n.a.	08/08/89
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/15/89

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93-- Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
08/22/89	10.9	55	3.89	3.92	8.48	1.73	2.65	9.72
08/29/89	4.3	37	4.01	n.a.	n.a.	n.a.	n.a.	n.a.
09/05/89	6.4	36	4.02	4.09	5.94	0.66	1.39	3.48
09/19/89	16.8	27	4.32	4.33	1.2	0.58	0.26	0.77
09/26/89	40.4	12	4.61	4.62	2.3	2.06	8.13	0.79
10/03/89	44.5	13	4.49	4.57	0.1	0.66	0.44	0.61
10/18/89	22.9	13	4.52	4.54	2.44	0.66	0.7	0.64
10/24/89	59.9	12	4.53	4.58	0.9	<.05	0.13	0.23
10/31/89	1.3	36	4.19	n.a.	n.a.	n.a.	n.a.	n.a.
11/07/89	4.1	20	4.42	4.45	11.2	2.8	3.87	4.02
11/14/89	16.5	17	4.61	4.4	4.64	0.74	0.44	0.97
11/21/89	22.9	8	4.82	4.76	5.49	1.56	3.22	1.25
11/29/89	13.2	24	4.28	4.4	7.54	1.97	4.87	2.84
12/18/89	6.1	n.a.	n.a.	4.44	3.99	1.23	1.83	1.25
12/27/89	6.4	15	4.47	n.a.	n.a.	n.a.	n.a.	n.a.
01/02/90	29.5	22	4.33	4.39	1.75	0.82	2.78	1.28
01/09/90	7.6	18	4.37	4.42	4.34	1.32	3.57	2.89
01/23/90	12.7	26	4.29	4.42	6.79	1.23	3.09	21.7
01/30/90	67.8	20	4.38	4.46	1.2	0.9	2.57	0.2
02/06/90	11.9	36	4.06	4.24	29.7	1.56	4.78	4.96
02/13/90	17.8	30	4.2	4.26	4.34	0.99	1.35	1.1
02/20/90	0.5	143	3.67	n.a.	n.a.	n.a.	n.a.	n.a.
02/27/90	16.8	29	4.24	4.33	5.94	3.21	9.18	3.3
03/13/90	2.5	53	3.94	n.a.	n.a.	n.a.	n.a.	n.a.
03/21/90	27.7	25	4.33	4.4	7.58	2.88	6.96	1.13
03/27/90	4.3	46	4.08	n.a.	n.a.	n.a.	n.a.	n.a.
04/03/90	38.1	53	4.05	4.05	6.87	1.81	3.48	1.2
04/10/90	13.7	30	4.2	4.25	9.13	1.89	1.87	1.15
04/17/90	17.3	39	4.1	4.13	6.79	4.52	13.6	1.25
04/25/90	4.3	111	3.61	3.65	27.1	5.43	5.7	8.21
04/30/90	16.8	33	4.22	4.23	3.34	1.15	1.04	1.53
05/08/90	23.9	43	4.08	4.09	11.2	3.04	2.13	1.46
05/15/90	67.3	75	4.76	4.81	2.99	1.4	1.17	2.02
05/23/90	27.9	25	4	4.49	30	18.2	4.09	21.7
05/29/90	68.6	28	4.27	4.29	2.2	0.58	1.04	0.79
06/05/90	10.4	12	4.7	4.95	12.1	2.22	6.09	2.43
06/12/90	15.5	59	3.88	3.9	14.5	2.88	2.74	1.13
06/19/90	34.8	35	4.17	4.14	10.5	2.22	0.48	0.79
06/26/90	9.4	67	3.81	3.86	18.9	4.36	4.13	3.63
07/03/90	14	55	4.01	3.98	11.3	2.88	1.04	1.48

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
27	5.19	<.8	35.5	127	n.a.	n.a.	08/22/89
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/29/89
4.92	5.2	1.34	25.7	73.7	n.a.	n.a.	09/05/89
17.9	4.02	<.8	28	47.2	n.a.	n.a.	09/19/89
9.46	12.3	<.8	7.09	31.2	n.a.	n.a.	09/26/89
13.9	4.35	<.8	13.1	31.7	n.a.	n.a.	10/03/89
7.63	2.87	<.8	12.7	23.7	n.a.	n.a.	10/18/89
4.48	2	<.8	7.18	20.3	n.a.	n.a.	10/24/89
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/31/89
10.4	9.56	<.8	20.7	40.8	n.a.	n.a.	11/07/89
9.5	4.62	<.8	19.2	39.5	n.a.	n.a.	11/14/89
6.63	5.37	<.8	8.26	18	n.a.	n.a.	11/21/89
9.89	8.32	<.8	23.4	38.1	n.a.	n.a.	11/29/89
8.84	8.89	<.8	31.7	12.9	n.a.	n.a.	12/18/89
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/27/89
10.2	5.49	<.8	12.1	33.6	n.a.	n.a.	01/02/90
8.01	8.08	<.8	20	30.2	n.a.	n.a.	01/09/90
26.4	26.4	<.8	29.7	41.5	n.a.	n.a.	01/23/90
9.36	5.75	<.8	15	28.3	n.a.	n.a.	01/30/90
18.2	8.76	<.8	36.2	54.9	n.a.	n.a.	02/06/90
14.6	3.71	<.8	28.2	48	n.a.	n.a.	02/13/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/20/90
12.8	14.4	<.8	31	37.5	n.a.	n.a.	02/27/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/13/90
20.9	8.53	<.8	28.5	40.8	n.a.	n.a.	03/21/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/27/90
44.9	5.85	<.8	53.5	86.1	n.a.	n.a.	04/03/90
7.57	7.01	<.8	39.5	33.8	n.a.	n.a.	04/10/90
21.4	16.8	<.8	42.3	68.1	-46	-8.05	04/17/90
58.7	21.7	<.8	98.4	246	n.a.	n.a.	04/25/90
25.3	4	<.8	31	58.2	-37	-6.45	04/30/90
33.2	6.11	<.8	47.2	86.5	-22.5	-4.75	05/08/90
5.51	2.94	<.8	7.67	17.6	-38.5	-6.8	05/15/90
29.2	6.92	<.8	36.4	87.6	-7	-2.4	05/23/90
14.6	3.52	<.8	20.5	48.3	-49.5	-8.1	05/29/90
<2.4	8.29	<.8	17.6	17	-56.5	n.a.	06/05/90
29.4	6.68	<.8	52.8	116	-15.5	n.a.	06/12/90
24	3.89	<.8	20.6	75.1	-20.5	n.a.	06/19/90
22.6	9.5	<.8	58.6	138	-58	n.a.	06/26/90
45.2	6.69	<.8	47.1	116	-14	n.a.	07/03/90

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
07/10/90	24.6	43	4.06	4.11	18	3.62	1.91	1.97
07/17/90	85.3	24	4.28	4.29	2.99	1.15	1.57	1.13
07/24/90	19.1	50	3.9	3.95	4.99	0.99	0.74	1.02
07/31/90	0.3	61	3.79	n.a.	n.a.	n.a.	n.a.	n.a.
08/07/90	33	29	4.21	4.33	4.49	0.58	0.57	0.41
08/14/90	25.1	40	4.09	4.2	7.09	1.15	1.13	0.72
08/21/90	48.8	41	4.11	4.12	3.49	0.49	<.13	0.31
08/28/90	53.8	31	3.81	4.26	3.29	1.4	3.96	0.61
09/18/90	16.8	63	3.83	4.25	16	4.77	2.78	1.28
09/25/90	27.4	41	4.03	4.12	3.19	0.49	0.78	0.59
10/02/90	1	94	3.65	4.45	92.8	10.2	16.8	9.08
10/09/90	2.5	40	4.08	4.58	49.3	7.98	14.2	10.9
10/16/90	86.6	17	4.6	5.08	8.63	8.72	38.8	1.25
10/24/90	97	9	4.72	4.99	2.49	1.48	4.13	0.61
11/06/90	11.9	27	4.29	4.47	8.98	3.29	8.53	2.2
11/13/90	27.4	14	4.49	4.74	4.99	1.64	5.48	0.36
11/20/90	4.6	30	4.12	4.67	36.9	3.95	6.96	4.35
11/27/90	5.1	n.a.	4.26	4.63	24	2.71	3.57	11.2
12/04/90	41.1	23	4.3	4.43	3.99	2.3	7.87	0.54
12/18/90	33	17	4.41	4.79	9.48	0.82	0.96	0.38
12/26/90	35.8	16	4.83	5.8	26.4	9.46	57	19.7
01/02/91	27.2	6	4.89	5.25	2.64	1.15	1.17	0.49
01/08/91	9.1	20	4.21	4.6	3.99	2.06	1	0.95
01/15/91	28.2	12	4.55	5.16	7.49	1.35	2.78	1.02
01/22/91	26.2	28	4.16	4.56	11	4.69	9.35	0.64
02/05/91	7.6	23	4.28	5.04	17.5	1.56	1.44	0.92
02/12/91	15.5	63	3.82	4.06	7.98	3.95	4.09	1.46
02/19/91	20.1	36	4.14	4.38	6.49	2.38	0.91	0.56
02/26/91	4.8	26	4.27	4.73	11.5	7.24	5.09	1.2
03/05/91	45.2	18	4.48	4.89	13.5	2.3	7.13	0.56
03/12/91	5.8	36	4.2	4.93	52.9	11.1	5.48	3.07
03/19/91	24.4	22	4.26	4.63	17.5	1.15	1.44	0.69
03/26/91	36.8	23	4.27	4.63	14.5	1.4	1.17	0.56
04/02/91	18.3	50	3.98	4.55	28.9	3.37	3.57	1.79
04/09/91	3.8	23	4.28	5.51	39.9	5.02	7.13	2.3
04/16/91	30.5	28	4.19	4.66	26.4	3.87	4.61	0.89
04/23/91	26.7	34	4.08	4.37	11	2.88	7.57	0.43
04/29/91	4.1	43	4.04	4.44	27.9	14.1	7.39	2.1
05/07/91	30	20	4.4	4.85	16	5.59	2.04	1.56
05/14/91	6.6	73	3.76	4.13	70.4	11.1	4.31	12.3

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
41.1	5.28	<.8	28.6	108	-15.5	n.a.	07/10/90
9.92	5.88	<.8	21.8	41.4	-35.5	n.a.	07/17/90
16.6	5.14	<.8	27.4	108	-37.5	n.a.	07/24/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/31/90
18.5	4.21	<.8	20.5	54.8	-36	n.a.	08/07/90
45.6	5.41	<.8	31.1	85.9	-25.5	n.a.	08/14/90
24.9	3.35	<.8	30.2	73.7	-36	n.a.	08/21/90
13.2	8.79	<.8	27.5	51.9	-37	n.a.	08/28/90
27.3	21.8	<.8	63.8	93.2	-40	-7	09/18/90
28.1	2.88	<.8	32.5	80.6	-31.5	-6.15	09/25/90
41	18	<.8	61.2	120	n.a.	n.a.	10/02/90
28.1	15.8	<.8	29.3	87.4	n.a.	n.a.	10/09/90
6.82	46.9	<.8	6.82	28.5	-13	-3.45	10/16/90
<2.4	5.89	<.8	6.69	14.1	-26.5	-6.25	10/24/90
10.8	9.99	<.8	24.3	43.2	-4.5	-4.05	11/06/90
9.68	8.74	<.8	12	15.9	-51.5	-9	11/13/90
20.9	9.52	<.8	43.8	36.1	-55	-9.5	11/20/90
6.26	12.4	<.8	22.9	29.4	-72	-10.55	11/27/90
11.6	11.8	<.8	18.8	34.4	-10	-4.9	12/04/90
8.24	3.15	<.8	10.2	30.2	-62.5	-10.15	12/18/90
38.7	54.7	<.8	21.8	44.1	-27.5	-5.1	12/26/90
5.62	3.96	<.8	9.17	9.56	-94	-13.45	01/02/91
9.98	4.89	<.8	19.2	30.5	-111	-15.1	01/08/91
6.37	7.6	<.8	13.3	20.3	-63.5	-10.6	01/15/91
n.a.	19.3	<.8	24.4	41.3	-39.5	-8.05	01/22/91
n.a.	4.71	<.8	21.3	33.6	-84.5	-11.85	02/05/91
n.a.	11.3	<.8	74.2	84.5	-14.5	-4.4	02/12/91
n.a.	4.99	<.8	39.9	41.5	-103	-15	02/19/91
n.a.	7.78	<.8	21.7	35.2	-39	-7.4	02/26/91
n.a.	10.9	<.8	20.6	26.2	-47	-7.1	03/05/91
n.a.	8.09	<.8	48	78.4	-44.5	-7.2	03/12/91
n.a.	4.97	<.8	19.6	29.4	-65	-10.8	03/19/91
n.a.	4.03	<.8	21.1	35.8	-50	-7.8	03/26/91
n.a.	7.86	<.8	47	82.7	-60.5	-9.1	04/02/91
n.a.	10.2	<.8	19.3	37.2	-16	-4.6	04/09/91
n.a.	7.49	<.8	24.4	49.8	-28.5	-6.35	04/16/91
n.a.	10.8	<.8	22.4	60.2	-104	-15	04/23/91
n.a.	10.7	<.8	37.4	70	-38.5	-6.95	04/29/91
n.a.	7.12	<.8	22.6	44.4	-34	-6.4	05/07/91
n.a.	16.6	<.8	56.8	141	-32.5	-4.6	05/14/91

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
05/21/91	22.9	18	4.35	4.78	17.5	3.45	1.91	1.13
05/28/91	1	106	3.51	n.a.	n.a.	n.a.	n.a.	n.a.
06/04/91	1	138	3.49	n.a.	n.a.	n.a.	n.a.	n.a.
06/18/91	53.3	36	4.08	4.24	3.99	0.99	0.74	0.43
06/25/91	9.9	88	3.61	4.04	8.48	2.8	2.61	1.43
07/09/91	24.9	56	3.88	4.08	12	2.71	2.91	1.02
07/17/91	17	29	4.07	4.2	2.5	1.07	0.87	0.69
07/23/91	1.3	152	3.36	n.a.	n.a.	n.a.	n.a.	n.a.
07/30/91	24.1	38	4	4.12	10.3	2.06	0.83	<.2
08/06/91	1	290	3.17	n.a.	n.a.	n.a.	n.a.	n.a.
08/13/91	25.4	73	3.75	3.86	4.44	1.15	1.44	0.28
08/20/91	30.5	38	3.99	4.08	0.6	1	3.2	0.08
08/27/91	13.2	68	3.61	3.87	6.04	2.71	3.35	0.7
09/10/91	51.6	42	3.98	4.13	2.4	0.7	0.9	1.3
09/17/91	6.4	52	4.27	4.13	12.9	2.71	1.87	1.2
09/24/91	78.2	48	3.87	4.13	6.1	4.2	0.96	0.28
10/01/91	10.4	37	4.09	4.61	5.1	37.4	0.17	0.56
10/08/91	35.1	19	4.37	4.61	3.89	2.63	<.13	<.2
10/15/91	9.4	55	3.84	4.04	10.1	1.89	0.65	<.2
10/22/91	17	14	4.55	4.94	6.04	6.42	0.22	0.15
11/12/91	14.7	20	4.35	4.79	4.59	1.4	1.52	0.66
11/19/91	2.5	69	3.88	n.a.	n.a.	n.a.	n.a.	n.a.
11/26/91	49.3	13	4.62	5.14	11.3	5.8	2.87	0.51
12/03/91	62.5	11	4.53	4.71	1.65	1.89	0.13	<.2
12/10/91	19.3	17	4.41	4.96	6.89	16.5	0.1	<.2
12/17/91	8.1	20	4.39	4.78	4.54	2.4	0.43	0.08
12/23/91	3.8	68	4.06	4.45	13.7	208	6.61	0.1
12/30/91	26.9	12	4.57	4.9	5.99	1.32	<.13	<.2
01/07/92	14.7	22	4.44	4.82	6.04	42.5	8.05	<.2
01/14/92	14.7	16	4.47	5.09	9.33	8.8	1.17	0.18
01/28/92	10.4	23	4.25	4.61	7.04	2.96	1.87	<.2
02/18/92	25.7	37	4.15	4.33	6.24	25.5	0.7	<.2
02/25/92	10.2	115	3.79	n.a.	n.a.	n.a.	n.a.	n.a.
03/03/92	8.6	26	4.19	4.78	11.9	12.8	<.13	<.2
03/10/92	40.9	23	4.32	4.58	5.99	2.96	3.7	<.2
03/17/92	18.3	27	4.28	4.47	11.3	1.89	1.65	1.41
03/24/92	3.8	46	4	4.21	9.18	3.04	1.52	0.46
03/31/92	45.2	20	4.16	4.43	5.59	1.15	2.31	<.2
04/13/92	4.6	129	3.56	3.82	42.5	9.95	1.78	1.18
04/21/92	5.1	81	3.77	4.1	n.a.	n.a.	n.a.	n.a.

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
16.7	9.24	<.8	15.1	34.4	-45.5	-7.35	05/21/91
n.a.	n.a.	n.a.	n.a.	n.a.	-17	-3.2	05/28/91
n.a.	n.a.	n.a.	n.a.	n.a.	-19.5	-3.5	06/04/91
n.a.	8.04	1.07	31.9	67.4	-29.5	-5.6	06/18/91
n.a.	30.9	<.8	66.4	90.6	-39.5	-6.3	06/25/91
n.a.	9.56	<.8	40.2	113	-26	-4.7	07/09/91
n.a.	11.9	<.8	17.6	60.7	-26.5	-5.45	07/17/91
n.a.	n.a.	n.a.	n.a.	n.a.	4.5	-0.8	07/23/91
n.a.	7.69	<.8	42.4	86.2	-29	-5	07/30/91
n.a.	n.a.	n.a.	n.a.	n.a.	-6	-1.5	08/06/91
n.a.	10.4	<.8	53.1	140	-18.5	-4.5	08/13/91
n.a.	7.84	<.8	23.7	83.1	-52	-8.55	08/20/91
n.a.	13.7	<.8	66.6	146	-49	-8.3	08/27/91
n.a.	5.78	<.8	26.3	79.3	-36	-6.85	09/10/91
n.a.	14.9	<.8	44.7	94.7	-29.5	-5.4	09/17/91
n.a.	9.64	<.8	28.5	107	-14.5	-4.4	09/24/91
n.a.	60.6	<.8	25	40.8	-45	-8.15	10/01/91
n.a.	6.52	<.8	12.8	28	-64	-10.1	10/08/91
n.a.	9.48	<.8	68.4	72.5	-52.5	-8.75	10/15/91
n.a.	4.7	<.8	16.1	30.9	-121	-16.1	10/22/91
n.a.	5.85	<.8	13.4	31.3	-62.5	-10.1	11/12/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/19/91
n.a.	9.96	<.8	8.82	18.6	-17.5	-4.6	11/26/91
n.a.	3.36	<.8	5.57	17.8	-78.5	-11.35	12/03/91
n.a.	21.5	<.8	13.6	27.5	-90	-13.1	12/10/91
n.a.	2.96	<.8	13	26.3	-73	-9.8	12/17/91
n.a.	174	<.8	7.09	8.81	-87	-12	12/23/91
n.a.	2.44	<.8	4.26	17.8	-60	-10.05	12/30/91
n.a.	63.6	<.8	7.38	15.8	-54	-9.5	01/07/92
25.2	15.5	<.8	11.5	24.8	-63.5	-9.5	01/14/92
14.2	6.47	<.8	25.8	31.9	-66	-10.8	01/28/92
11.2	30.9	<.8	30.7	42.1	-96.5	-14.45	02/18/92
n.a.	n.a.	n.a.	n.a.	n.a.	-61.5	-9.7	02/25/92
15.6	12.3	<.8	19.8	38.3	-84	-11.8	03/03/92
16.8	10	<.8	15.1	43.2	-38.5	-6.95	03/10/92
22.7	5.43	<.8	28.5	48.9	-49.5	-7.9	03/17/92
25.2	9.33	<.8	60.4	65	-84.5	-12.8	03/24/92
<2.4	7.26	<.8	21.5	39.9	-93	-14.25	03/31/92
53.5	11.7	1.93	136	179	-22	-4	04/13/92
63.4	15	<.8	73.2	139	-9.5	-2.9	04/21/92

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
04/23/92	96	9	4.66	4.95	0.7	1.15	1.96	<.2
04/28/92	8.1	58	3.87	4.26	21.9	2.63	0.09	<.2
05/03/92	3.6	34	4.23	n.a.	n.a.	n.a.	n.a.	n.a.
05/12/92	29.5	30	4.19	4.43	14.9	3.78	5.83	1.53
05/19/92	24.9	58	3.92	4.11	16.2	3.37	0.35	2.58
05/26/92	13.5	45	4.02	4.36	16.1	1.81	0.22	1.48
06/02/92	41.1	12	4.53	4.84	4.54	0.49	<.13	<.2
06/09/92	41.7	16	4.43	4.93	3.19	0.33	<.13	<.2
06/23/92	17.5	30	4.15	4.66	13.1	3.13	4.87	2.56
06/30/92	30.5	40	4	4.19	9.1	1.3	0.1	0.4
07/07/92	42.2	47	3.95	4.13	8.6	1.7	3.2	0.4
07/14/92	5.3	76	3.7	n.a.	n.a.	n.a.	n.a.	n.a.
07/21/92	43.2	21	4.3	4.51	8.5	1.9	0.8	<.2
07/28/92	105.9	26	4.18	4.41	6.9	0.7	0.5	0.6
08/04/92	29.5	27	4.17	4.52	14	1.23	0.78	<.2
08/11/92	0.5	43	3.94	n.a.	n.a.	n.a.	n.a.	n.a.
08/18/92	26.7	45	3.96	4.3	17.4	2.3	0.87	<.2
08/25/92	26.7	58	3.83	4.07	14.6	1.07	<.13	0.54
09/01/92	8.9	22	4.37	5.22	25.3	5.76	8.18	2.79
09/08/92	40.9	17	4.42	4.99	12.8	2.3	5.48	0.38
09/15/92	41.1	18	4.35	4.81	8.83	0.58	<.13	<.2
09/22/92	1.8	37	4.03	n.a.	n.a.	n.a.	n.a.	n.a.
09/29/92	42.7	10	4.62	5.2	7.34	0.99	0.44	<.2
10/13/92	35.6	11	4.53	4.92	8.33	1.56	2.65	<.2
10/27/92	1	67	3.86	n.a.	n.a.	n.a.	n.a.	n.a.
11/03/92	66	35	4.11	4.29	13.5	1.4	3.18	<.2
11/10/92	5.1	49	3.95	4.32	22.5	3.95	1.34	1.28
11/17/92	15.7	14	4.57	4.76	3.49	2.47	6.48	3.84
11/24/92	57.4	18	4.41	4.66	<.45	4.03	15.8	1.28
12/01/92	5.6	39	4.03	4.42	20.5	2.3	3.44	1.02
12/08/92	5.8	37	4.09	4.31	9.98	1.97	1.65	1.28
12/15/92	85.6	10	4.65	4.75	<.45	0.49	2.26	<.2
12/21/92	19.8	19	4.36	4.54	<.45	0.58	1.57	<.2
12/29/92	11.9	20	4.36	4.66	3.49	3.46	7.05	<.2
01/05/93	18	9	4.99	4.99	1.5	2.72	11.1	1.02
01/12/93	4.6	28	4.16	n.a.	n.a.	n.a.	n.a.	n.a.
01/19/93	6.1	25	4.22	4.45	4.49	1.15	2.61	0.51
01/26/93	32	17	4.12	4.61	2	2.55	1.52	0.2
02/17/93	7.4	20	4.35	4.53	5.99	1.55	2.65	<.2
02/23/93	11.2	33	4.11	4.29	8.48	2.22	3.48	0.84

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
12.3	5.06	<.8	6.81	16.4	-32.5	-5.9	04/23/92
17.5	4.84	<.8	44.6	78.3	-49	-8.1	04/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	-17.5	-2.85	05/03/92
22.9	10.6	<.8	36.6	51.9	-36	-6.3	05/12/92
26.6	7.28	<.8	53.2	110	-20	-4.55	05/19/92
18.4	5.52	<.8	33.3	77.8	-38	-6.55	05/26/92
<2.4	1.82	<.8	11	20	-32	-6.4	06/02/92
<2.4	3.06	<.8	14.3	16.2	-49.5	-7.95	06/09/92
28.8	6.58	<.8	26.8	56.9	-29.5	-5.7	06/23/92
<2.4	3.3	<.8	28.4	81.8	-50	-7.95	06/30/92
<2.4	6.02	<.8	37.4	82	-26	-4.55	07/07/92
n.a.	n.a.	n.a.	n.a.	n.a.	4.5	-0.7	07/14/92
<2.4	2.52	<.8	16	41.6	-32	-5.6	07/21/92
<2.4	2.11	<.8	17.4	44.4	-52	-8.3	07/28/92
<2.4	3.98	1.44	16.6	48	-39.5	-6.1	08/04/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/11/92
n.a.	2.79	<.8	42.1	72.6	-47.5	-7.55	08/18/92
n.a.	2.69	0.61	32.6	117	-48.5	-7.8	08/25/92
n.a.	7.06	<.8	19.7	39	-29	-5.6	09/01/92
n.a.	7.45	<.8	12.3	28.3	-31	-5.75	09/08/92
n.a.	0.86	<.8	11.7	33.6	-30.5	-5.75	09/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	-12	-3.15	09/22/92
n.a.	2.66	<.8	7.36	18.1	-49.7	-8.2	09/29/92
n.a.	11.9	<.8	6.44	20.5	-23.8	-5.37	10/13/92
n.a.	n.a.	n.a.	n.a.	n.a.	-12.9	-3.34	10/27/92
n.a.	7.32	<.8	32.1	53.6	-33	-7.15	11/03/92
n.a.	10.7	<.8	33.2	73.3	-86.8	-12.26	11/10/92
n.a.	13.2	<.8	11	26.2	-25.6	-5.77	11/17/92
n.a.	21	<.8	14.4	24.4	-20.1	-4.22	11/24/92
n.a.	12.9	0.66	37.8	47.2	-44.7	-7.08	12/01/92
n.a.	5.33	<.8	44.2	36.5	-84.7	-13.28	12/08/92
n.a.	5.21	<.8	7.33	15.7	-70.4	-11.4	12/15/92
n.a.	5.14	<.8	11	29.1	-67.2	-9.45	12/21/92
n.a.	10.2	<.8	9.95	32.9	-53.1	-9.17	12/29/92
11.1	12.1	<.8	8.7	14.2	-34.2	-5.76	01/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	-115	-15.09	01/12/93
15.6	7.6	<.8	14.2	44.3	-63.2	-9.41	01/19/93
10.9	6.03	<.8	12.7	30.7	-74.5	-11.45	01/26/93
16.2	4.89	<.8	19.5	35.6	-87.4	-12.88	02/17/93
22.1	7.14	<.8	48.6	42.4	-82.4	-12.55	02/23/93

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
03/08/93	52.1	32	4.19	4.28	<.45	0.39	0.8	0.41
03/17/93	22.6	22	4.37	4.49	7.49	3.62	10.3	0.77
03/23/93	10.2	80	3.79	3.88	16	3.46	7.35	0.87
03/30/93	85.6	25	4.41	4.65	13.5	30.7	3.96	0.64
04/06/93	29	42	4.04	4.43	3.99	12.4	2.56	1.36
04/13/93	51.3	20	4.36	4.59	2.84	4.99	2.74	0.72
04/20/93	67	6	5.35	5.4	2.89	20.5	3.43	0.72
05/11/93	15.2	25	4.34	4.22	9.45	5.27	10.6	3.58
05/18/93	13	64	3.84	4.01	25	7.57	0.91	3.33
05/25/93	9.1	44	4	4.17	8.5	2.3	0.78	2.6
06/01/93	46	17	4.46	4.6	2	0.81	0.7	<.2
06/08/93	21.1	51	3.87	4.03	11.5	2.3	0.44	<.2
06/15/93	11	46	3.94	n.a.	n.a.	n.a.	n.a.	n.a.
06/29/93	1	59	3.78	4.01	15.5	3.7	1	1.02
07/06/93	10.2	99	3.58	3.77	6.49	2.88	4.92	1.28
07/13/93	11.2	35	4.09	4.27	4.99	1.73	2.09	<.2
07/20/93	7.6	48	3.96	4.09	5.99	1.81	1.57	2.2
08/03/93	12	88	3.61	3.82	16	3.95	2.54	1.53
08/10/93	26.7	37	4.03	4.15	<.45	1.33	0.23	<.2
08/17/93	20.1	47	3.93	4.1	5.99	1.56	1.55	0.77
08/24/93	6.4	45	3.86	4.11	11.5	1.56	0.72	0.64
09/07/93	92.7	12	4.55	4.81	5.99	1.48	1.57	0.59
09/14/93	31.8	32	4.05	4.31	10.5	2.47	0.5	0.97
09/21/93	56.4	30	3.69	4.32	4.99	1.23	1.93	0.51
09/28/93	40.6	34	3.67	4.23	<.45	0.56	1.47	0.49
10/05/93	8.6	57	3.65	4.07	10	2.47	2.8	0.77
10/12/93	25.1	28	3.99	n.a.	n.a.	n.a.	n.a.	n.a.
10/19/93	9	15	3.93	4.72	<.45	0.41	0.3	<.2
10/26/93	11.2	18	4	5.07	22.5	2.47	1.14	27.4
11/02/93	31.8	26	3.39	4.45	3.99	1.73	4.44	<.2
11/09/93	13.7	12	4.4	4.81	<.45	0.5	0.61	0.59
11/16/93	1.3	27	4.23	4.43	4.49	1.4	2.32	0.64
11/23/93	8.9	18	4.44	4.58	4.99	1.74	3.44	0.56
11/30/93	120.6	12	4.67	4.75	<.45	3.37	13.9	<.2
12/07/93	81.3	15	4.44	4.8	2.5	1.23	1.78	<.2

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
26.9	3.47	<.8	34	52.9	-96.3	-13.76	03/08/93
15.3	12.4	<.8	19.2	38.1	-39.5	-8.15	03/17/93
12.6	11.7	1.3	68.9	86.1	-77.5	-9	03/23/93
24.8	12.9	<.8	23.4	51.5	-47.3	-7.77	03/30/93
18.2	15.8	<.8	36	52.7	-58.3	-8.71	04/06/93
7.9	5.99	<.8	14.4	35.6	-73.1	-11.06	04/13/93
2.6	8.98	<.8	8.06	23.6	-50	-7.8	04/20/93
6.6	<1.8	<.8	27.2	52.8	-22.5	-4.2	05/11/93
33.6	4.61	1.63	59.9	132	-20	-3.98	05/18/93
20.2	4.16	<.8	52.5	72.7	-25.6	-5.2	05/25/93
16.9	1.57	<.8	9.7	34.3	-39.6	-7.09	06/01/93
24.8	4.14	<.8	45.5	82.7	-30.5	-5.32	06/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/15/93
25.1	5.25	<.8	30.3	117	-29.4	-5.11	06/29/93
37.2	12.5	<.8	105	157	-26.7	-5.19	07/06/93
22.4	2.96	<.8	24.3	64.8	-4.9	-2.26	07/13/93
22.9	6.47	<.8	24.4	92.3	-13.1	-3.44	07/20/93
6.6	5.17	<.8	51.4	128	-15.2	-3.1	08/03/93
4.3	6.67	<.8	22.3	58.2	-72.3	-8.41	08/10/93
28.8	1.14	<.8	35.6	85.3	-49.8	-7.77	08/17/93
34.8	<1.8	<.8	30.5	97.4	-20.4	-4.27	08/24/93
18	<1.8	0.8	12.7	24.2	-25.5	-5.25	09/07/93
28.4	3.66	<.8	20.5	68.7	-32	-6.28	09/14/93
22.1	3.99	<.8	19.9	55.7	-23.8	-5.17	09/21/93
14.2	4.27	<.8	25.6	65.9	-29.2	-6.14	09/28/93
18.6	6.11	<.8	48.3	88.6	-14	-4.16	10/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	-34.8	-6.81	10/12/93
8.71	2.64	<.8	10.9	23.4	-65.4	-10.8	10/19/93
10.4	7.1	<.8	14.8	38.8	-53.3	-8.4	10/26/93
12.3	6.82	<.8	24.7	34.4	-97.6	-14.36	11/02/93
2.8	1.43	1.13	10.6	19.4	-59.3	-9.72	11/09/93
1.8	4.59	<.8	19	29.5	-29.4	-4.98	11/16/93
<2.4	4.26	<.8	15.7	24.8	-48.1	-7.51	11/23/93
<2.4	17.2	<.8	7.72	18.8	-48.7	-8.1	11/30/93
12.6	4.87	<.8	11.9	23.3	-82.8	-12.26	12/07/93

Table 5. Chemical analyses of precipitation collected from the U.S. Geological Survey precipitation-collection station at Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Amount of precipitation (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
			Field	Laboratory				
12/14/93	7.6	34	3.87	4.21	10.5	2.05	4.05	0.61
12/22/93	8.9	30	4.03	4.22	6.49	1.1	2.54	0.41
12/30/93	0.3	48	3.82	n.a.	n.a.	n.a.	n.a.	n.a.

Ammonium, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
4.2	5.02	<.8	23.9	55.1	-61.7	-9.26	12/14/93
<2.4	4.31	<.8	46.8	33.8	-124.3	-17.03	12/22/93
n.a.	n.a.	n.a.	n.a.	n.a.	-141.6	-19.45	12/30/93

Table 6. Chemical analyses of throughfall collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93

[mm, millimeters; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; ANC, acid-neutralizing capacity; n.a., not analyzed]

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
				Coniferous throughfall					
10/09/90	2.2	123	4.45	4.61	270	88.8	24.4	195	12
10/16/90	82.7	38	4.6	5.86	54.4	30.2	66.6	75.7	2.34
10/24/90	72.2	22	5.08	5.53	33.9	20.5	19.1	67	2.11
11/06/90	7.9	106	4.69	5.65	205	110	19.6	394	4.23
11/13/90	17.8	29	5	6.12	48.4	23.4	12.7	84.7	1.78
12/04/90	30.9	54	4.15	4.23	61.4	24.5	18.5	47.8	3.78
05/14/91	1.2	68	5.93	5.37	68.4	37.5	24.9	165	5.78
05/21/91	9.9	59	5.63	5.15	76.8	33.7	9.61	312	9.67
06/18/91	62	85	4.2	4.28	88.3	41.6	6.44	322	11.9
07/09/91	15.8	78	4.21	4.75	125	53	11.4	225	5.67
08/13/91	18.6	70	4.11	4.34	119	56.4	5	82.5	1.89
08/20/91	15.3	76	4.03	4.1	93.2	47	2.31	80.7	1.8
08/27/91	6.6	83	4.04	4.08	134	58.2	4.7	77.4	<.22
09/10/91	38.7	47	4.53	5.56	66.5	28.6	9.9	56.3	2.7
09/24/91	44.3	54	4.06	4.17	38.7	13.9	2.26	26.2	0.6
10/08/91	15.1	40	4.56	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/15/91	5.6	77	4.03	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/22/91	10.4	54	4.17	4.47	66.8	25.8	3.44	54.1	1.11
11/12/91	7.4	152	4.43	4.58	305	108	16.9	289	16.9
11/19/91	1.4	87	4.21	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
04/23/92	68.7	23	4.42	4.53	15.4	4.69	9.7	14.6	1.11
04/28/92	4.9	76	3.9	4.06	82.3	23.5	6.48	53.6	5.34
05/03/92	1.8	147	4.23	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/12/92	18.2	69	4.29	4.78	103	42.3	19.3	118	4.34
05/19/92	14.7	96	4.34	4.88	114	50.3	7.05	166	5.67
05/26/92	10.5	105	4.75	4.86	131	73	7.31	304	9.9
06/02/92	25.8	22	5.29	4.9	23.3	10.2	0.48	66.4	1
06/09/92	21.2	26	4.88	5.1	29.5	10.1	1.22	98.9	2.67
06/23/92	11.6	59	5.97	6.2	74.7	31.5	13.6	305	8.56
06/30/92	19.8	32	5.01	4.9	50.6	23.6	2.8	105	2.22
07/07/92	21.3	54	4.31	4.34	78.7	33.8	8.3	98.4	3.11
07/14/92	1.9	102	6.8	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/21/92	22	33	4.7	4.87	62.1	24.8	4.5	63.3	1.56
07/28/92	79.2	28	4.51	4.63	45.3	17.4	1.5	39.3	2.11
08/04/92	16.8	39	4.55	4.65	59.8	23.2	2	50.6	0.56
08/18/92	17.3	66	4.46	4.39	117	46.7	3.22	85.3	1
08/25/92	22	35	4.29	4.41	34.3	13.2	0.39	24.9	<.22

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<0.38	63.8	<0.8	157	415	<4	27.4	-4.5	-2.6	10/09/90
<.38	102	<.8	<.45	66	36	1.8	-11	-2.8	10/16/90
<.38	28	<.8	7.98	67.2	19	<.43	-23	-5.65	10/24/90
<.38	136	<.8	138	224	261	<.43	-0.5	-3.45	11/06/90
<.38	24.6	<.8	40	54.4	47	<.43	-45	-7.9	11/13/90
<.38	36.9	<.8	84.4	109	<4	<.43	-7.5	-4.35	12/04/90
<.38	30.1	<.8	84.5	128	<4	8.4	-37	-6.1	05/14/91
<.38	27.4	49.6	25.3	156	<4	0.9	-43	-6.75	05/21/91
<.38	32.3	19.6	111	219	<4	2.24	-25.5	-5.15	06/18/91
<.38	37.7	<.8	74.1	246	<4	7	-19	-4.1	07/09/91
0.68	24.1	<.8	80.8	240	<4	2.77	-18.5	-4.1	08/13/91
1.1	28.2	<.8	109	265	<4	<.43	-35	-6.45	08/20/91
<.38	25.9	<.8	132	174	<4	1.7	-46	-7.75	08/27/91
1	28.2	2.61	20.8	186	<4	1	-28	-5.55	09/10/91
<.38	7.64	<.8	47.2	159	<4	<.43	-14	-3.9	09/24/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-61.5	-9.6	10/08/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-44	-7.85	10/15/91
0.75	19.2	<.8	75	154	<4	<.43	-96.5	-13.35	10/22/91
1.11	95.2	<.8	358	455	<4	4	-50.5	-8.5	11/12/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-73	-11.25	11/19/91
<.38	14.4	<.8	18.9	46.7	-34.3	<.43	-24.5	-4.85	04/23/92
1	16.6	<.8	125	151	-109	1	-23.5	-5.05	04/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-9.5	-2.15	05/03/92
0.43	38.3	<.8	163	187	-46.6	2.4	-34	-6.05	05/12/92
0.57	30.9	2.89	234	285	-43	3	-13	-3.4	05/19/92
1.65	47.3	<.8	256	148	5.45	4.7	-27	-5.25	05/26/92
1.25	7.14	<.8	36.2	54	-11	0.6	-25	-5.3	06/02/92
0.57	10.1	<.8	40.1	72.5	-10	1.1	-38	-6.35	06/09/92
1.43	45.1	<.8	52.6	166	98.9	2.7	-21	-4.45	06/23/92
<.38	13.6	<.8	30.1	120	-10	<.43	-45.5	-7.25	06/30/92
<.38	17.1	2.02	55.2	192	-72.2	3	-17.5	-3.9	07/07/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-5	-2.15	07/14/92
0.43	11.3	1.43	31.6	120	-16.3	<.43	-30.5	-4.9	07/21/92
0.68	7.02	<.8	15.9	94.2	-32.1	<.43	-46	-7.6	07/28/92
<.38	16	1.41	55.2	128	-33.1	<.43	-34.5	-5.7	08/04/92
0.65	21.3	<.8	109	237	-42	3.99	-40.5	-6.4	08/18/92
0.54	6.98	<.8	29.8	118	-50.8	<.43	-53	-8.3	08/25/92

Table 6. Chemical analyses of throughfall collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
			Coniferous	**throughfall**	**--**	**Continued**			
09/01/92	4.2	122	5.38	4.79	220	81.3	14.4	162	4
09/08/92	37.7	29	4.83	5.02	34.4	15	10.1	34.3	<.22
09/15/92	26	22	4.78	4.81	21.8	7.24	1.91	27.8	<.22
09/22/92	1.9	91	5.54	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/29/92	26.3	32	4.56	4.64	42.7	14.9	7.26	52.2	6.23
10/13/92	32.5	29	4.67	4.63	46.3	16.6	7.26	43.4	5.56
11/03/92	72.7	72	4.51	4.72	177	81.1	8.13	63.9	7.56
11/10/92	1.3	88	6.29	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/17/92	16.8	53	4.41	4.48	110	39.2	17.9	81.6	4.56
11/24/92	41.3	59	4.17	4.48	95.3	33.7	55.2	62.4	3.22
12/01/92	8.9	104	3.82	3.98	135	51.8	21.4	66.2	5.34
12/08/92	3.9	n.a.	3.51	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12/15/92	96.7	30	4.34	4.37	22.5	8.72	6.74	15.3	1.09
12/21/92	17.3	73	3.87	4.08	74.9	26.8	5.61	24.6	2.15
12/29/92	13	114	3.79	3.95	115	38.1	130	39.4	7.34
01/05/93	12.7	57	4.73	4.16	58.9	18.6	32.5	18.7	4.67
01/12/93	3.5	139	3.63	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
01/19/93	13	80	3.77	3.86	70.4	21.4	15	18.9	5.34
01/26/93	19.2	58	3.94	4.22	64.4	19.3	33.3	15.6	2.84
02/18/93	53.3	110	3.76	3.87	118	34.8	91.8	28.7	7.34
02/23/93	22.5	59	4.04	4.1	45.4	10.5	69.6	7.34	2.65
03/02/93	5.5	74	4.09	4.2	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	56.2	116	3.76	3.81	87.3	18.1	70	20.2	6.23
03/23/93	42.5	102	3.79	3.86	66.9	16.1	77.4	15.4	6.34
03/30/93	53	80	3.82	3.9	45.4	11.4	11.7	12.3	1.92
04/06/93	23.8	63	3.93	4.04	32.4	8.31	4.39	11.3	1.09
04/13/93	27.7	48	4.1	4.16	41.9	12.3	11	20	2.11
04/20/93	32.3	23	4.5	4.61	22	7.41	10.1	13.3	0.78
04/27/93	32.3	50	4.04	4.14	48.9	11.5	13.8	17.1	2
05/11/93	12.5	68	4.28	4.3	108	25.4	25.8	40.2	5.11
05/18/93	11.9	90	5.34	5.35	189	56.2	9.22	175	5.78
05/25/93	5.8	77	4.18	4.24	67.9	31.3	6.09	116	2.89
06/01/93	26.8	39	4.55	4.45	35.4	14.7	4.13	57.8	1.89
06/08/93	12	91	3.92	4.04	105	44.9	4.65	113	4.34
06/15/93	9.2	45	4.27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06/22/93	12.3	55	4.3	4.39	66.4	25.9	5.52	87	3.11
06/29/93	2.7	126	3.96	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/06/93	21.5	110	3.7	3.87	98.3	34.3	8.57	53.7	2.58
07/20/93	4.4	131	4.07	4.2	206	72.7	10.4	189	13.2

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
1.61	37.6	0.77	168	337	-11.7	5.8	-10.5	-3.25	09/01/92
0.59	21.3	<.8	34.9	95.5	-7.5	2.39	-26.5	-5.4	09/08/92
<.38	6.13	<.8	18.1	53.5	-15.1	<.43	-29	-5.45	09/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-11.9	-2.8	09/22/92
0.43	18.8	<.8	36.6	87.6	-8.04	1.6	-44.9	-7.5	09/29/92
0.81	23.8	<.8	35.1	81.2	1.2	0.46	-15.4	-4.5	10/13/92
0.97	57.1	<.8	87.2	245	-5.56	2.85	-31.4	-6.65	11/03/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-61.7	-9.48	11/10/92
<.38	37.3	<.8	65.3	165	-9.06	<.43	-18.3	-4.84	11/17/92
<.38	73.9	<.8	52.5	141	n.a.	9.12	-15.7	-3.65	11/24/92
<.38	36.9	<.8	114	269	n.a.	<.43	-35.9	-6.07	12/01/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-73	-11.15	12/08/92
<.38	15.9	<.8	44.6	50.2	-55.2	<.43	-76.4	-12.18	12/15/92
<.38	18	<.8	86.1	147	-105	<.43	-63.7	-9.5	12/21/92
<.38	176	<.8	115	212	-148	<.43	-49.6	-8.73	12/29/92
<.38	41.4	<.8	48.3	122	-93.3	<.43	-23.5	-4.61	01/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-85.8	-12.7	01/12/93
<.38	30	<.8	52.2	214	-162	<.43	-64.6	-9.87	01/19/93
<.38	52.6	<.8	101	108	-70.9	<.43	-61.6	-9.51	01/26/93
<.38	116	<.8	191	163	-166	<.43	-85.8	-12.58	02/18/93
<.38	76.1	<.8	103	78.1	-108	<.43	-85.5	-12.76	02/23/93
n.a.	185	<.8	108	37.6	-84.9	<.43	-91.2	-13.36	03/02/93
<.38	71.1	<.8	191	138	-176	<.43	-99	-13.83	03/08/93
<.38	91.2	<.8	133	109	-147	<.43	-57	-9.69	03/23/93
<.38	15.5	<.8	81.8	122	-137	<.43	-45.2	-7.84	03/30/93
<.38	8.4	<.8	61.6	87.8	-90	<.43	-56	-8.75	04/06/93
<.38	23.4	<.8	70.7	75	-79.2	<.43	-49.4	-8.12	04/13/93
<.38	16.7	<.8	27.9	46	-27	<.43	-46.3	-7.37	04/20/93
<.38	20.5	<.8	72.8	82.5	-80.8	0.78	-46.7	-8.23	04/27/93
<.38	56.8	<.8	200	100	-53.5	1.32	-19.2	-3.86	05/11/93
<.38	26	29.9	142	243	74.4	2.17	-17.7	-3.67	05/18/93
<.38	13.9	<.8	146	217	-58.2	2.49	-21.6	-5.01	05/25/93
<.38	13.3	1.54	86.2	76.5	-34	1.25	-36.6	-6.41	06/01/93
1.89	19.3	1.55	159	217	-93.4	3.6	-27.5	-4.56	06/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/15/93
<.38	21.8	<.8	108	122	-42.2	<.43	-0.8	-1.78	06/22/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/29/93
<.38	20.5	<.8	156	135	-42.2	<.43	-24.4	-4.74	07/06/93
1.79	50	<.8	293	319	-68.2	3.71	-11.9	-2.88	07/20/93

Table 6. Chemical analyses of throughfall collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
			Coniferous throughfall -- Continued						
08/03/93	6.4	135	3.71	3.82	156	51.7	7.7	97	6.89
08/10/93	23.5	58	4.03	4.13	51.9	18.8	1.91	41.2	2.12
08/17/93	10.2	122	3.62	3.75	139	35.6	4.57	62.9	5.56
08/24/93	10.8	63	4.05	4.19	104	27.3	3.18	85.4	3.5
09/07/93	57	32	4.31	4.52	39.9	11.2	2.91	29.7	1.77
09/14/93	28.3	39	4.04	4.27	40.4	11.6	0.99	25.1	1.13
09/21/93	27.5	35	3.28	4.36	43.9	12.1	2.59	24.1	1.15
09/28/93	27.7	54	3.7	4.13	47.9	15.4	2.32	44.3	0.81
10/05/93	5.7	71	3.66	4.11	97.3	29.1	8.39	51.9	2.19
10/12/93	16.7	30	4.47	4.82	36.9	12	8.83	50.1	0.64
10/19/93	4.2	10	4.85	5.35	16	5	2.02	17.1	<.22
10/26/93	7.9	66	4.92	5.44	190	65.3	13	154	6.23
11/02/93	19.7	65	5.57	5.81	157	80.6	27.3	271	4.67
11/09/93	9.4	40	3.97	4.56	65.4	25.6	2.91	49.4	2.06
11/16/93	3.6	102	4.11	4.26	198	78.2	10.9	143	9.45
11/23/93	6.5	66	4.07	4.14	88.8	33.4	9.05	66	6.12
11/30/93	87	37	4.41	4.41	33.9	14.5	45.7	16.1	1.37
12/07/93	59	41	3.81	4.31	27.9	11.5	7.39	15.1	0.96
12/14/93	8.3	64	3.87	4.06	61.4	22.5	4	21	2.71
12/21/93	17	74	3.64	3.96	67.9	22.4	5.92	20.7	3.21
			Deciduous throughfall						
10/09/90	3.4	83	6.31	6.4	232	75.7	21	253	7.23
10/16/90	80.3	34	5.92	6.36	58.9	40.2	71.3	95.7	2.78
10/24/90	80.8	22	6.03	6.27	49.9	28.3	16.7	86.8	2.56
11/06/90	9.2	148	5.83	6.11	379	223	12.1	667	2.22
05/14/91	1.7	45	6.1	5.75	97.8	51.5	12.7	131	3.89
05/21/91	11.4	44	4.37	4.43	75.8	41.4	8.31	132	4.89
06/18/91	74.7	94	3.92	3.98	97.3	49	5.83	235	11.4
07/09/91	20.5	n.a.	3.34	3.53	n.a.	n.a.	n.a.	n.a.	n.a.
08/13/91	23.2	49	4.34	4.65	80.2	28.1	4	78.1	1.22
08/20/91	21.7	49	4.32	4.37	72.3	31	1.52	71.6	<.22
08/27/91	9.8	81	4.05	4.06	122	44.8	7	85.9	0.67
09/10/91	44.2	37	4.59	4.69	47.8	18	7.3	45.2	1.11
09/24/91	46.7	39	4.3	4.4	41.3	13.8	2.34	30.2	0.4
10/08/91	17.9	30	5.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/15/91	6.7	43	6.44	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/22/91	13	26	5.86	5.28	61.8	20.9	3	84.1	1.11
11/12/91	11.3	119	6.2	6.16	162	103	9.96	606	13.4
11/19/91	2.3	39	6.83	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<.38	31.6	1.36	182	278	-165	4.11	-17.3	-3.28	08/03/93
3.22	15.8	<.8	85.5	125	-80.2	1.39	-91	-12.89	08/10/93
<.38	26.8	<.8	183	138	-379	1.64	-33.3	-5.8	08/17/93
<.38	19.6	<.8	42.5	122	-56.4	2	-28.4	-5.01	08/24/93
<.38	7.69	1.63	25.1	54.1	-78.5	<.43	-21.3	-4.46	09/07/93
<.38	8.21	<.8	28.4	110	-58.5	<.43	-38.4	-6.88	09/14/93
<.38	9.91	<.8	26.4	95.2	-45.6	<.43	-20.1	-4.7	09/21/93
<.38	9.89	<.8	39.4	147	-73.7	<.43	-26.4	-5.86	09/28/93
<.38	24.4	<.8	79.1	179	-110	1.4	-16	-4.44	10/05/93
<.38	22	<.8	34.1	65.1	-7.3	<.43	-48.8	-8.75	10/12/93
<.38	5.9	<.8	5.32	27	0.5	<.43	-67.7	-10.89	10/19/93
<.38	52.5	<.8	60.9	249	25	7.16	n.a.	n.a.	10/26/93
<.38	69.9	<.8	61.1	177	218	4.13	n.a.	n.a.	11/02/93
<.38	15	<.8	36.8	123	-6.8	<.43	n.a.	n.a.	11/09/93
<.38	61.5	<.8	241	211	-69.6	2.71	n.a.	n.a.	11/16/93
<.38	27.5	<.8	80.8	134	-75.7	1.6	n.a.	n.a.	11/23/93
<.38	65.9	<.8	37	58.9	-37.9	<.43	n.a.	n.a.	11/30/93
<.38	11.4	<.8	47.3	77.5	-59.7	<.43	n.a.	n.a.	12/07/93
<.38	12.5	<.8	57	129	-87.7	0.68	n.a.	n.a.	12/14/93
<.38	16.8	<.8	89	147	-110	<.43	n.a.	n.a.	12/21/93
<.38	48.6	<.8	70.6	276	193	13.5	-4	-2.75	10/09/90
<.38	95.9	<.8	<.45	59.2	102	1.8	-10.5	-2.8	10/16/90
<.38	22.4	<.8	<.45	45.3	103	<.43	-27.5	-5.95	10/24/90
8.13	92.4	<.8	<.45	155	1030	<.43	-3	-3.5	11/06/90
<.38	18.5	<.8	42.7	167	<4	4.8	-31	-4.3	05/14/91
<.38	11.3	<.8	<.45	77.6	<4	0.3	-44	-6.65	05/21/91
<.38	15	17.5	53.3	158	<4	6	-23.5	-5.2	06/18/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-21.5	-4.25	07/09/91
0.54	10.5	<.8	40.3	189	<4	2.81	-19	-4.3	08/13/91
<.38	12.3	2.47	59.5	181	<4	2.1	-38.5	-6.8	08/20/91
<.38	20.4	<.8	147	168	<4	2	-45.5	-7.7	08/27/91
0.4	16.5	1.87	30.8	130	<4	1	-33	-6.25	09/10/91
<.38	6.57	<.8	32.8	139	<4	1	-14	-3.7	09/24/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-60.5	-9.45	10/08/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-45.5	-8.1	10/15/91
0.82	16.7	<.8	30.1	98.6	<4	<.43	-99.5	-13.3	10/22/91
0.57	44	<.8	12.8	193	<4	2	-57.5	-9.3	11/12/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-85	-12.75	11/19/91

Table 6. Chemical analyses of throughfall collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
			Deciduous	**throughfall**	**--**	**Continued**			
05/03/92	2.5	73	6.43	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/12/92	18.8	47	5.89	6.13	68.6	43.9	13.8	157	4.11
05/19/92	12.8	78	5.97	5.93	107	69.7	6.13	225	22.5
05/26/92	13.4	57	4.6	3.93	91.2	51.2	4	143	6.78
06/02/92	30.3	22	4.59	4.71	27	14.6	0.22	73.4	3.34
06/09/92	29.7	54	4.03	4.13	52.6	27.1	1.7	135	6.78
06/23/92	15	87	3.93	4.24	103	61.3	11.9	264	11.3
06/30/92	23.1	29	5.54	4.96	39.9	21.6	1.9	84.8	2.89
07/07/92	30.3	48	4.26	4.41	64.7	30.8	9.1	112	4.56
07/14/92	2.5	77	4.43	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/21/92	25.2	19	5.19	5.34	44.2	17.3	3.4	57	0.56
07/28/92	91	20	4.98	4.92	41.3	15.5	1.3	51	1.33
08/04/92	18.7	25	5.32	4.79	47	20.2	1.39	67.9	1.11
08/18/92	18.5	43	5.39	5.2	95.3	36.8	6.83	103	4.23
08/25/92	24	31	4.48	4.45	43.8	15.9	0.39	31.9	0.11
09/01/92	5.3	70	6.53	5.84	141	50.2	14	11.5	2
09/08/92	43	24	5.42	5.36	47.9	18.8	11.8	56.6	<.22
09/15/92	27.5	17	5.38	5.44	34.1	13.2	1.22	42.7	0.33
09/22/92	2.8	71	6.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/29/92	33	22	5.45	6.14	52.7	20.6	6	76.1	<.22
10/13/92	37.3	19	5.58	5.88	46.1	21.9	6.83	54.1	2.78
11/03/92	74.3	66	5.95	5.88	224	93.2	6.44	144	17.5
11/10/92	1.9	52	6.86	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/17/92	21.3	50	6.26	6.26	79.8	44.9	15.9	281	6.78
11/24/92	43.7	39	5.95	6.1	49.4	30.3	47.4	180	3.22
12/01/92	9.4	45	5.64	5.55	72.4	28.8	13.4	202	5.34
12/08/92	4.2	67	4.63	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12/15/92	101.3	13	4.9	5.09	11	5.84	6.48	25.6	0.17
12/21/92	15.5	32	4.4	4.59	37.9	13.4	3.33	46.8	0.87
12/29/92	11.1	40	4.41	4.58	39.9	17.4	50.5	53.5	1.85
01/05/93	13.3	20	5.52	4.91	25.4	13.1	17.9	38.4	0.59
01/12/93	3.7	116	3.68	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
01/19/93	8.6	32	4.32	4.4	29.9	9.63	5.26	39.9	0.83
01/26/93	20.3	25	5.07	4.78	33.4	12.9	12.5	33.8	0.88
02/18/93	53.7	69	4.11	4.18	93.3	37.2	64.4	45.5	3.02
02/23/93	21.5	42	4.22	4.26	29.9	10.6	37.7	12.7	1.82
03/02/93	8.2	59	4.1	4.18	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	66.8	53	4.08	4.13	40.9	12.8	14.5	17.1	1.63
03/23/93	39.7	48	4.15	4.19	34.9	12.7	25.2	16.9	1.92

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-14.5	-2.3	05/03/92
0.11	22.8	1.31	51.4	111	186	2.5	-39	-6.6	05/12/92
<.38	22.7	30.7	61.6	125	193	4.8	-13.5	-3.65	05/19/92
0.25	15.5	<.8	67	156	-25.5	2.7	-31	-5.55	05/26/92
<.38	5.63	<.8	<.45	36.7	-11.2	0.8	-27	-5.6	06/02/92
0.5	12.4	1.63	<.45	57.4	-106	1.8	-40.5	-6.45	06/09/92
1.61	58.7	<.8	1.79	104	-209	3.4	-23.5	-4.8	06/23/92
<.38	7.01	<.8	<.45	88.4	6	3	-49.5	-8.15	06/30/92
<.38	14.7	<.8	8.76	161	-41.2	4	-18	-3.85	07/07/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-7	-2.6	07/14/92
0.39	7.11	<.8	1.09	76.9	16.9	<.43	-30.5	-4.85	07/21/92
0.11	5.78	1.41	16.7	82.1	-8.07	1	-49	-7.45	07/28/92
<.38	8.66	<.8	34.2	90.1	-15.8	<.43	-35	-5.75	08/04/92
0.81	12.7	<.8	72.5	166	11.3	5.8	-41.5	-6.55	08/18/92
0.86	5.58	<.8	29.7	124	-46.6	1.21	-51.5	-8.1	08/25/92
0.64	12.3	<.8	28.6	99.1	-11.7	4.52	-10.5	-3.35	09/01/92
<.38	19.6	<.8	25.7	77.9	16.3	6.3	-25.5	-5.35	09/08/92
<.38	5.69	<.8	14.4	57.9	18.2	2.49	-27.5	-5.4	09/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-7.3	-2.49	09/22/92
<.38	14.2	<.8	11.4	62.5	33	2.6	-44.1	-7.5	09/29/92
<.38	19.6	<.8	7.97	52.6	n.a.	0.32	-16.2	-4.42	10/13/92
0.64	24.5	<.8	15.9	216	237	2.17	-38	-7.74	11/03/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-68.7	-9.8	11/10/92
<.38	26.2	<.8	0.96	81.7	278	<.43	-21.3	-5.11	11/17/92
<.38	50.6	<.8	0.87	79.8	n.a.	11.2	-17.4	-4.23	11/24/92
<.38	28.5	<.8	31.8	179	n.a.	<.43	-38.2	-6.14	12/01/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-82.2	-12.44	12/08/92
<.38	12.5	<.8	14.1	29.7	-6.5	<.43	-76.3	-12.32	12/15/92
<.38	21.2	<.8	27.7	85.9	-34.5	<.43	-64.3	-9.48	12/21/92
<.38	52.7	<.8	36.8	88.2	-38.8	<.43	-49.4	-8.52	12/29/92
<.38	24.2	<.8	17.9	55.4	-18.8	<.43	-28	-5.25	01/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-108.3	-15.53	01/12/93
<.38	15.7	<.8	21.2	84.8	-49.1	<.43	-62	-9.57	01/19/93
<.38	22.6	<.8	40.9	64.1	-20.2	<.43	-70.6	-11.14	01/26/93
<.38	82.8	<.8	122	124	-83.4	<.43	-84.1	-12.42	02/18/93
<.38	44.6	<.8	82	60.2	-69	<.43	-83.3	-12.82	02/23/93
n.a.	174	<.8	107	33.1	-86.3	<.43	-93	-13.65	03/02/93
<.38	21.4	<.8	84.7	80.7	-79.8	<.43	-99	-14.01	03/08/93
<.38	30.9	<.8	58.3	63.2	-69.6	<.43	-61.9	-10.33	03/23/93

Table 6. Chemical analyses of throughfall collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
			Deciduous	**throughfall**	**--**	**Continued**			
03/30/93	60.3	48	4.03	4.1	20	7.24	5.74	10.4	0.87
04/06/93	26.3	45	4.08	4.13	20	6.25	1.91	10.6	0.47
04/13/93	29.7	26	4.37	4.44	19	7.82	7.13	10.7	1.22
04/20/93	35.2	14	4.77	4.82	14.8	5.68	9.26	6.65	<.22
04/27/93	35.7	28	4.35	4.44	24.5	8.31	10.5	19.2	0.56
05/11/93	14.3	29	6	5.4	67.9	20.8	20.4	28.7	1.11
05/18/93	11.7	58	5.48	5.68	117	43	5.35	69.3	2
05/25/93	6.3	62	4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06/01/93	30.8	29	5	4.08	46.9	23.3	3.83	83.9	3.11
06/08/93	20	67	5.28	4.28	99.8	57.3	3.91	251	7.89
06/15/93	8.4	34	6.11	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06/22/93	16.7	35	5.4	5.76	65.9	33.3	5.87	161	4.34
06/29/93	2.5	89	4.3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/06/93	27.3	92	3.74	3.91	83.3	30.1	8.31	53.2	4.48
07/20/93	5.1	88	4.31	4.4	205	72.6	11.3	192	16.1
08/03/93	7.7	63	4.64	4.75	176	61	8.35	139	11.3
08/10/93	28.3	31	4.45	4.63	45.4	17.3	1.67	55	2.72
08/17/93	13.2	53	4.43	4.53	93.3	28.2	8.48	80.1	4.76
08/24/93	12.3	52	4.09	4.38	91.8	27.4	2.91	95.9	5.54
09/07/93	58.7	22	4.67	4.78	50.9	13.8	3.07	41.7	2.31
09/14/93	32.2	25	4.55	4.84	52.4	16.3	1.25	39.7	1.88
09/21/93	32	23	3.76	5.12	66.4	20	2.7	48.1	2.19
09/28/93	37.2	39	3.98	4.42	56.4	17.6	2.6	53	1.89
10/05/93	8	42	4.51	4.85	103	33.4	8.66	87.7	3.11
10/12/93	19.8	35	5.66	5.52	61.9	23	13.5	123	2.65
10/19/93	5.6	22	6.45	6.41	44.9	18.1	4.09	78.3	0.3
10/26/93	11.5	66	6.64	6.5	205	88.9	11.8	264	12.7
11/02/93	31.6	92	6.18	6.27	272	140	21.7	389	13.6
11/09/93	11.2	23	5.9	5.95	39.9	19.5	1.92	101	1.77
11/16/93	4.2	56	7	6.9	85.3	53.3	9.09	251	4.67
11/23/93	7.4	41	6.72	6.14	45.9	29	6.31	227	3.84
11/30/93	91.7	24	5.23	5.5	21.5	15.9	44	57.8	1.09
12/07/93	65.3	23	4.29	4.51	8.5	6.9	3.83	29.7	1.07
12/14/93	10.2	28	4.26	4.47	28.4	12	1.97	29.7	1.3
12/21/93	20.7	48	3.92	4.2	42.4	17.6	4.13	33.3	1.68

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<.38	9.6	<.8	50.9	85.9	-85.9	<.43	-45.8	-7.58	03/30/93
<.38	4.5	<.8	48	75.8	-71.4	<.43	-58.8	-9.19	04/06/93
<.38	12.8	<.8	35.1	48	-39.6	<.43	-53.9	-8.4	04/13/93
<.38	13.7	<.8	17.6	33.7	-14	<.43	-48	-7.53	04/20/93
<.38	13.8	<.8	35.5	53.5	-35.6	<.43	-46.6	-8.27	04/27/93
<.38	31	2.5	66.6	67.3	23.5	1.42	-22.1	-4.06	05/11/93
<.38	14	14.5	91.6	220	34.8	2.78	-17.8	-3.67	05/18/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-20.1	-4.96	05/25/93
<.38	7.5	17.4	1.12	66.1	-133	1.6	-36.4	-6.29	06/01/93
<.38	15.5	2.22	17.5	176	-71.7	4.49	-27.4	-4.57	06/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/15/93
<.38	13.2	<.8	0.87	86.2	74.7	0.91	-2.9	-1.85	06/22/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/29/93
<.38	15.6	<.8	104	137	-140	<.43	-23.5	-4.72	07/06/93
<.38	28.7	40.8	88.2	233	-47.6	3	-11.8	-2.97	07/20/93
<.38	17.4	1.26	31	248	-12	5.3	-15.8	-3.2	08/03/93
<.38	9.62	<.8	18.6	95.4	-19	1.6	-89.9	-12.92	08/10/93
<.38	15.1	<.8	25.6	170	-64.5	1.53	-33.3	-5.92	08/17/93
<.38	13.3	<.8	3.14	178	-35.7	1.78	-29.4	-5.14	08/24/93
<.38	3.4	<.8	1.35	47.8	-23	<.43	-22.1	-4.67	09/07/93
<.38	5.5	<.8	4.81	97.2	-6.4	<.43	-37.7	-6.83	09/14/93
<.38	7.8	<.8	7.3	98.1	7.2	2.49	-23.8	-5.26	09/21/93
<.38	7.9	<.8	31.8	122	-50.4	1.07	-25.9	-5.92	09/28/93
<.38	16.9	<.8	60.2	126	-25.1	3.56	-16.6	-4.31	10/05/93
<.38	26.5	<.8	30.3	63.3	121	1.07	-47.3	-8.69	10/12/93
<.38	11.4	0.7	11	51.5	52.3	2.49	-65.6	-10.54	10/19/93
<.38	27.6	<.8	26.2	161	277	10.3	n.a.	n.a.	10/26/93
<.38	50.5	1	26.3	132	504	4.84	n.a.	n.a.	11/02/93
<.38	9.14	<.8	0.8	71.1	87.1	0.68	n.a.	n.a.	11/09/93
<.38	32.6	1.22	36	113	171	1.74	n.a.	n.a.	11/16/93
<.38	15.5	<.8	<.45	72.6	176	1.32	n.a.	n.a.	11/23/93
<.38	56.3	<.8	20.4	45.8	9.9	<.43	n.a.	n.a.	11/30/93
<.38	7.1	<.8	25.4	47.4	-29.3	<.43	n.a.	n.a.	12/07/93
<.38	5.85	<.8	22.6	67.6	-31.6	<.43	n.a.	n.a.	12/14/93
<.38	11.3	<.8	72.4	88.4	-62.2	<.43	n.a.	n.a.	12/21/93

Table 7. Chemical analyses of throughfall collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1990-93

[mm, millimeters; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; ANC, acid-neutralizing capacity; n.a., not analyzed]

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
				Deciduous throughfall					
10/05/90	3.2	82	5.91	6.4	187	71	25.4	206	7.34
10/16/90	66.7	45	5.97	6.24	65.4	94.6	78.3	134	2.45
10/24/90	67.2	20	5.72	5.94	36.9	34.4	17.4	64.2	0.89
11/06/90	81.7	69	5.78	5.81	154	81.9	12.3	268	<.22
05/14/91	2.2	54	4.48	4.97	126	80.6	7.57	71.1	3.78
05/21/91	7.3	48	4.3	4.88	53.4	36.8	10.7	107	3.89
06/04/91	2.3	72	6.16	6.04	190	123	20.3	274	8.23
06/18/91	47.8	43	4.44	4.57	77.3	34.1	4.44	80.3	2.56
07/09/91	16.8	37	5.02	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/13/91	8.1	81	4.03	4.22	181	71.7	10.4	90.1	3.11
08/20/91	22.5	65	3.87	3.95	65.5	27.8	1.78	38.2	2.34
08/27/91	9.3	39	4.13	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/10/91	29.7	41	4.28	4.41	49.5	22.5	8.4	37	1.89
09/24/91	17.2	52	4.21	4.4	70.6	24.8	3.87	44	1.45
10/08/91	12.5	36	5.98	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/15/91	6.7	40	4.77	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/22/91	17.5	38	5.21	5.15	47.5	19.8	2.96	56.8	0.44
11/12/91	6.2	50	6.02	5.73	102	59.1	9.8	145	2.56
11/19/91	1.7	28	6.35	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/03/92	1.9	78	6.68	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/12/92	19.8	39	5.8	6.36	58.8	52.3	14	135	0.78
05/19/92	18.7	60	5.57	5.3	88.9	64.9	5.26	130	2.11
05/26/92	14.1	38	4.7	4.02	67.7	42.5	2.48	93.6	1.89
06/02/92	39.8	23	4.49	4.65	22.3	14.3	0.48	48.8	0.67
06/09/92	41.2	33	4.45	4.55	32.6	34	0.48	99.9	0.78
06/23/92	25	30	4.85	5.05	71.9	30.8	12.9	95.3	1.11
06/30/92	18.2	25	4.71	4.96	50.4	27.2	2.1	53.9	1.33
07/07/92	24.8	39	4.25	4.36	50.1	23.6	6.5	46	1.67
07/14/92	1.3	33	6.47	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/21/92	45.3	20	4.64	4.84	32	14.2	2.1	22.2	<.22
07/28/92	88.7	30	4.27	4.4	26.6	10.9	1.6	27.4	2.78
08/04/92	41.5	29	4.35	4.53	29.5	14	1.34	16.7	<.22

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<0.38	41.1	<0.8	134	284	91	11	-2.5	-2.8	10/05/90
<.38	107	<.8	<.45	86.3	156	4.3	-9.5	-2.35	10/16/90
<.38	24.2	<.8	<.45	48.9	65	<.43	-34	-6.2	10/24/90
<.38	80.3	90.8	2.69	119	271	<.43	-1.5	-3.25	11/06/90
<.38	14.1	<.8	78.5	222	<4	5.6	-26	-3.05	05/14/91
<.38	22	<.8	<.45	112	<4	2.9	-27.5	-5.3	05/21/91
<.38	31.1	21	35.5	230	<4	13.5	-21.5	-4.5	06/04/91
<.38	15.5	5.37	52.9	136	<4	3.3	-28.5	-5.65	06/18/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-21.5	-4.5	07/09/91
0.25	26.4	<.8	168	262	<4	5.87	-20	-4.45	08/13/91
0.4	36	<.8	7.87	62.8	<4	<.43	-31.5	-5.65	08/20/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-64.5	-9.75	08/27/91
0.9	14.5	<.8	39.5	129	<4	1	-30.5	-5.6	09/10/91
1	9.5	<.8	51	169	68	2	-6	-2.75	09/24/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-56.5	-8.65	10/08/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-49	-8.5	10/15/91
0.97	12.1	<.8	41.7	80.8	<4	<.43	-94	-12.6	10/22/91
0.36	45.4	<.8	96.8	139	<4	2	-54.5	-9.2	11/12/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-76	-11.25	11/19/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-25.5	-3.35	05/03/92
<.38	22.3	1.63	33.2	101	149	4.3	-37	-6.35	05/12/92
<.38	19.2	3.55	70.5	123	67.9	5.2	-13.5	-3.55	05/19/92
0.18	12	<.8	25.6	107	-44.6	3	-33.5	-6.1	05/26/92
0.57	5.71	<.8	2.57	46.1	-14.4	1.1	-27.5	-5.6	06/02/92
0.54	7.37	<.8	1.4	49.4	73	2.2	-45	-7.3	06/09/92
<.38	36.9	<.8	1.76	96.5	6.07	2.9	-8.5	-3.05	06/23/92
<.38	8.07	<.8	0.86	111	-11	3	-46	-7.35	06/30/92
<.38	11.9	<.8	8.14	142	-55.4	3	-17.5	-3.75	07/07/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-29.5	-5.35	07/14/92
0.29	5.48	1.46	9.44	68.5	-17.8	<.43	-30	-5	07/21/92
<.38	5.77	<.8	27.1	78.9	-45.4	<.43	-47	-7.45	07/28/92
<.38	7.52	1.39	29.2	77.9	-40.1	<.43	-34	-5.7	08/04/92

Table 7. Chemical analyses of throughfall collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1990-93–Continued

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
			Deciduous	**throughfall**	**--**	**Continued**			
08/18/92	17.5	50	4.2	4.35	69.1	32	2.39	53	2.56
08/25/92	1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/01/92	3.3	79	6.29	5.16	n.a.	n.a.	n.a.	n.a.	n.a.
09/08/92	32.8	20	5.25	5.21	40.2	23.9	10.7	40.9	<.22
09/15/92	35.7	17	5.02	5.39	27.6	16.8	1.22	36.3	<.22
09/22/92	1.1	46	7.19	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/29/92	24.3	18	5.33	5.27	30.6	15.4	6.26	50.2	0.67
10/13/92	36.8	20	5.44	5.67	36.2	20	11.3	61.7	3.22
11/03/92	51	46	5.72	5.84	81.3	73.2	9.83	179	1.22
11/10/92	2.3	33	6.12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/17/92	15.5	21	6.12	5.95	28.9	27.3	12.3	83.9	0.29
11/24/92	53.2	27	4.51	4.54	20.5	17.5	42.6	22	1.08
12/01/92	10.5	50	4.06	4.26	35.7	19.8	8.87	27.4	2.05
12/08/92	6.8	44	4.22	4.59	56.9	24.7	4	38.4	1.21
12/15/92	73.2	11	4.81	4.87	4.99	3.87	3.22	6.65	0.17
12/21/92	14.8	32	4.2	4.38	19.5	7.9	2.54	15.1	0.17
12/29/92	8.6	39	4.23	4.34	32.4	13.5	16.9	16.1	1.71
01/05/93	15.7	20	5.1	4.98	28.9	18.2	23.3	15.1	0.36
01/12/93	3.1	53	4.01	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
01/19/93	12	41	4.17	4.22	32.9	14.4	7.74	26.9	0.63
01/26/93	15.3	37	3.9	4.3	28.9	11.3	6	12.5	<.22
02/18/93	31.8	45	4.16	4.21	42.9	17	15.1	10.6	0.91
02/23/93	15.2	41	3.95	4.24	18	4.85	4.26	3.81	1.05
03/02/93	5.2	52	4.68	4.09	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	25.2	38	4.14	4.2	21	7.41	2.81	8.44	0.57
03/23/93	22.8	40	4.17	4.24	23	9.46	7.26	10.6	0.57
03/30/93	18.3	42	4.13	4.21	13.5	5.02	4.78	8.49	<.22
04/06/93	17.2	44	3.93	4.16	11.5	3.95	1.44	6.88	<.22
04/13/93	23.2	21	4.46	4.5	18.5	6.58	7.31	8.18	<.22
04/20/93	39	15	4.68	4.81	15.8	6.83	9.4	5.88	<.22
04/27/93	36	24	4.4	4.75	22.5	8.64	6.26	12	0.44
05/11/93	15	29	6.09	5.85	47.4	25.9	18.8	51.2	0.6
05/18/93	6	131	6.67	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/25/93	5.2	49	4.48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
1.18	10.8	<.8	67	157	-57.5	4.02	-33.5	-5.6	08/18/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-28.5	-4.95	08/25/92
n.a.	n.a.	n.a.	n.a.	n.a.	-2.95	n.a.	-15	-3.75	09/01/92
0.97	19	<.8	27.2	72.4	2.8	3.77	-23.5	-5.05	09/08/92
0.38	4.9	<.8	15.7	65	3.9	1.2	-22.5	-4.5	09/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/22/92
<.38	14.9	<.8	13.3	53.2	25.5	2.6	-43.6	-7.35	09/29/92
0.22	26.1	<.8	12.1	57.4	50.2	2.46	-14.1	-4.04	10/13/92
<.38	39.6	0.32	38.9	158	90.6	3.03	-33.7	-7.05	11/03/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-62.2	-8.62	11/10/92
<.38	21.8	<.8	7.05	53.6	50	<.43	-19.9	-4.93	11/17/92
5.12	56.3	<.8	31.3	53.5	-26.3	<.43	-15.6	-3.94	11/24/92
<.38	10.8	<.8	75	88.6	-50.1	<.43	-39.4	-6.5	12/01/92
<.38	14.6	<.8	99.9	65.6	-36.6	<.43	-74.3	-11.2	12/08/92
<.38	18.4	<.8	13.6	17.9	-19.7	<.43	-69.3	-11.26	12/15/92
<.38	11.4	<.8	34.6	28	-54.7	<.43	-57.4	-8.27	12/21/92
<.38	27.8	<.8	49.7	66.8	-59.1	<.43	-46.8	-8.49	12/29/92
<.38	39	<.8	18.6	55.3	-13.1	<.43	-26.6	-5.05	01/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-110.3	-15.08	01/12/93
<.38	20.5	<.8	36.7	105	-70.5	<.43	-61.6	-9.42	01/19/93
<.38	17.6	<.8	52.9	57.8	-60.5	<.43	-67.6	-10.39	01/26/93
<.38	20.7	<.8	67.7	85.7	-78.1	<.43	-81.9	-12.57	02/18/93
<.38	8.78	<.8	54.8	44.6	-75.2	<.43	-88	-13.22	02/23/93
n.a.	17	<.8	124	40.1	-107	<.43	-87.8	-13.37	03/02/93
<.38	6.66	<.8	63.6	63.2	-74.5	<.43	-95.9	-13.75	03/08/93
<.38	12.2	<.8	49.6	52.5	-65.6	<.43	-59.3	-10.04	03/23/93
<.38	9.24	<.8	42.9	69.7	-69.2	<.43	-47	-7.9	03/30/93
<.38	4.21	<.8	45.9	70.6	-74.5	<.43	-57.6	-9.2	04/06/93
<.38	10.3	<.8	30.2	44	-36.6	<.43	-49.9	-7.43	04/13/93
<.38	12.6	<.8	16.4	36.2	-15.5	<.43	-44.1	-6.7	04/20/93
<.38	10.4	<.8	31.9	48.3	-15.7	<.43	-59.3	-9.54	04/27/93
<.38	26.1	10.9	32	60.9	64.8	1	-24.3	-4.35	05/11/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-17.9	-3.38	05/18/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-23.3	-5.4	05/25/93

Table 7. Chemical analyses of throughfall collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Amount of throughfall (mm)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
			Deciduous	**throughfall**	**--**	**Continued**			
06/01/93	14.1	37	4.74	4.61	72.9	35.8	6.22	89.5	2
06/08/93	13.5	61	4.19	4.51	76.4	41.2	3.26	142	3
06/15/93	3.6	47	4.46	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06/22/93	22.8	49	4.08	4.23	52.9	28	5.26	40.2	1.88
06/29/93	4.1	61	4.37	4.51	135	45.7	6.31	52.4	4.27
07/06/93	28.3	100	3.67	3.8	41.4	17.7	8.18	29.4	2.08
07/13/93	3.9	39	4.67	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/21/93	16.9	35	4.37	4.45	62.9	25.2	2.95	33	2.11
08/03/93	7.2	107	3.68	3.84	125	49	6	57	6.5
08/10/93	20.8	41	4.18	4.27	45.4	22.2	1.45	35.8	1.06
08/17/93	9.4	57	4.1	4.47	88.8	26	3.75	43.8	2.8
08/24/93	3.7	78	3.79	4.11	126	37	2.67	69.1	3.76
09/07/93	62.7	21	5.03	5.17	64.4	25	3.3	32	1.4
09/14/93	8.3	50	4.05	4.3	71.9	28.3	1.93	40.9	3.5
09/21/93	24.2	31	4.74	5.13	76.9	42.5	4.78	58.3	1.8
09/28/93	22.7	42	4.06	4.46	51.9	23.9	3.8	64	1.5
10/05/93	3.5	55	5.73	5.73	n.a.	n.a.	n.a.	n.a.	n.a.
10/12/93	17.7	28	5.41	5.72	50.4	22.6	11.1	73.4	0.8
10/26/93	17.7	44	6.16	6.25	107	90.5	6.05	127	1.91
11/02/93	15.5	58	5.8	6.17	109	160	17.8	253	1.99
11/09/93	5.9	18	5.8	5.75	40.4	30	2.88	48.1	0.58
11/16/93	4.7	32	5.66	5.43	74.4	42.7	7.22	71.6	1.75
11/23/93	9.4	20	4.78	4.76	37.4	20.8	5.44	21.7	1.08
11/30/93	79	19	4.74	4.73	13	11.6	32.7	9.75	<.22
12/07/93	57.3	30	4.09	4.23	14.5	7.65	4.48	8.4	0.61
12/14/93	9	32	4.03	4.36	38.4	14.3	2.82	10.1	1.6
12/21/93	21.8	34	4.17	4.25	26.5	9.2	2.47	9.29	0.91

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrite, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<.38	12.7	<.8	68.6	92.3	-23.4	2.6	-33.3	-5.96	06/01/93
<.38	12.1	2.8	82.2	157	-29.5	3.2	-25.2	-4.24	06/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/15/93
<.38	10.9	<.8	52	125	-66.4	<.43	-5.1	-2.71	06/22/93
<.38	15.3	<.8	99.5	165	-34.1	1	n.a.	n.a.	06/29/93
<.38	14.6	<.8	88.9	110	-176	1.4	-21.4	-4.31	07/06/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/13/93
<.38	9.21	<.8	58	104	-36	<.43	-15.2	-3.47	07/21/93
3.9	13.9	1.22	114	260	-161	2.91	-16.1	-3.47	08/03/93
<.38	8.83	<.8	50.9	114	-57.6	0.2	-80.1	-11.64	08/10/93
<.38	8.92	<.8	45.6	113	-93.6	2.35	-41.6	-6.72	08/17/93
<.38	11.8	0.92	58.9	120	-169	2.14	-30.8	-5.44	08/24/93
<.38	3.44	<.8	1.41	47.8	-23	<.43	-21.4	-4.31	09/07/93
<.38	7.94	<.8	54.1	144	-58.8	1.64	-29.6	-5.72	09/14/93
<.38	12.2	<.8	33	119	3.5	3.56	-24.2	-5.08	09/21/93
<.38	10.9	<.8	43.8	134	-27.4	1.11	-22.1	-5.3	09/28/93
<.38	22.3	<.8	124	177	21.7	<.43	-16.4	-3.68	10/05/93
<.38	22.7	<.8	38.7	59.1	104	1.07	-45.8	-8.35	10/12/93
<.38	25.3	<.8	16.6	140	127	5.84	-48	-7.76	10/26/93
<.38	51.7	<.8	42.9	121	332	5.41	n.a.	n.a.	11/02/93
<.38	9.02	1.14	18.8	56.5	28.6	0.75	n.a.	n.a.	11/09/93
<.38	24.3	<.8	87.9	71.3	5.2	1.07	n.a.	n.a.	11/16/93
<.38	11.6	<.8	24.3	55.1	-15.8	<.43	n.a.	n.a.	11/23/93
<.38	42.8	<.8	19.4	29.2	-16.3	<.43	n.a.	n.a.	11/30/93
<.38	8.77	<.8	36.3	46.5	-52.6	<.43	n.a.	n.a.	12/07/93
<.38	9.31	<.8	31.2	66.8	-45.2	<.43	n.a.	n.a.	12/14/93
<.38	6.27	<.8	40.1	44.7	-53	<.43	n.a.	n.a.	12/21/93

Table 8. Chemical analyses of soil water collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93

[µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; ANC, acid-neutralizing capacity; n.a., not analyzed]

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
				Lysimeter pit 1 upper				
10/24/90	44	4.49	4.58	80.3	50.4	30.2	53.7	63.2
04/22/91	49	4.32	4.53	83.8	66.6	20.4	40.9	74
05/07/91	93	4.19	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/14/91	n.a.	4.62	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/21/91	122	3.92	4.07	234	127	20.4	98.5	180
06/18/91	46	4.57	4.28	100	52.1	10.8	327	73.7
07/09/91	99	3.81	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/13/91	30	5.05	5.18	72.9	30.9	4.13	92	11.3
08/20/91	37	5.15	5.1	62.9	29.5	3.22	82.9	8.9
08/27/91	39	5.58	5.45	73.2	38.3	5.55	90	9.58
09/10/91	40	4.83	5	101	50.6	6.1	75.2	28.2
09/24/91	49	4.42	4.52	124	53.8	3.61	58.3	15
10/08/91	63	4.24	4.49	181	72.6	5.65	52.4	49.9
10/22/91	66	4.2	4.49	161	67.1	3.96	38.2	27.7
11/26/91	46	4.44	4.6	128	66	5.31	43.3	57.2
12/10/91	40	4.37	4.58	109	60.6	5.87	28.2	66.6
12/30/91	42	4.38	4.77	96.5	58.6	5.61	21.7	68.6
02/18/92	50	4.37	4.52	117	68.8	11.3	22	79.6
03/10/92	50	4.32	4.41	115	65.1	11.7	17.8	65.7
03/31/92	44	4.39	4.42	102	58.5	13.4	16.4	64.5
04/23/92	38	4.38	4.48	76.2	40.4	13	19.9	5.4
05/19/92	45	4.27	4.38	96.1	46.6	12.6	18.7	55.8
06/02/92	39	4.35	4.44	87.2	41.5	11.5	15.6	61.8
06/30/92	27	4.68	4.87	36.7	57.9	9.2	49.6	55.8
07/14/92	39	4.32	4.46	35.4	49.4	5	29.3	51.9
07/28/92	36	4.35	4.48	77.5	32.3	6.1	28.3	52.1
08/18/92	45	4.14	4.59	75.9	32.4	4.57	18.3	43.9
09/08/92	38	4.26	4.56	75	32.6	4.78	19.1	33.7
09/29/92	41	4.25	4.5	90.9	35.5	5.79	19.5	40.2
11/03/92	40	4.36	4.53	89.1	38.2	6.74	17.5	67.3

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
2.15	77.5	53.9	121	<4	15.3	-12.5	-3.9	10/24/90
<0.38	34	102	144	<4	13.2	-41.5	-7.5	04/22/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/07/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/14/91
<0.38	37.7	532	130	<4	11.2	-34.5	-6.05	05/21/91
7.52	21.5	<0.45	116	<4	105	-29	-5.8	06/18/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/09/91
4.26	9.83	4.15	114	19	6.59	-18.5	-4.15	08/13/91
1.5	8.19	30.6	146	<4	5.8	-36	-6.45	08/20/91
2.56	7.5	41.6	134	17	<0.43	-43.5	-7.5	08/27/91
2.94	14.9	55.1	154	<4	7.16	-30	-6.1	09/10/91
1.15	7.32	98.8	164	<4	12.5	-15.5	-4.4	09/24/91
2.33	17.2	171	171	<4	19	-42	-7.4	10/08/91
2.72	19.2	170	152	<4	13	-67.5	-9.95	10/22/91
1.36	34	56.1	175	<4	33.3	-31.5	-5.95	11/26/91
1.97	20	17.7	193	<4	38.2	-44	-7.45	12/10/91
1.32	17.4	25.9	188	<4	29	-64	-9.45	12/30/91
1.93	40	61.6	177	<4	22	-62.5	-9.7	02/18/92
1.36	37.2	44.9	190	4	27	-69	-10.65	03/10/92
0.5	24.7	8.63	257	-56.4	21	-50.5	-8.25	03/31/92
1.04	16.8	46.4	122	-40	8	-33	-6	04/23/92
1.22	15.2	82.5	119	-51.7	14.2	-30.5	-5.45	05/19/92
2.11	14	29.1	141	-46.1	17.2	-24	-4.55	06/02/92
6.23	9.98	<0.45	106	-2	20	-40.5	-7.05	06/30/92
7.63	11.6	18.4	149	-44.5	16	-30.5	-5.5	07/14/92
1.86	8.16	19.5	120	-39	15	-32	-5.3	07/28/92
2.26	9.72	37.3	112	-30.1	16.8	-40.5	-6.7	08/18/92
3.65	9.57	32.1	112	-32.5	12	-49	-7.6	09/08/92
1.29	9.75	39.1	104	-15.4	16.5	-33.3	-6.15	09/29/92
1.72	17.3	66.7	114	-38.8	9.97	-24.6	-5.69	11/03/92

Table 8. Chemical analyses of soil water collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
Lysimeter pit 1 upper-- Continued								
11/17/92	40	4.38	4.57	97.3	41.7	7.96	23.5	59.6
11/24/92	43	4.3	4.52	98.3	43.8	8.66	17.9	59.7
12/15/92	47	4.29	4.45	91.3	42.2	8.74	13.5	63.2
12/29/92	46	4.24	4.38	81.8	37.5	12.8	14.1	66.3
01/12/93	48	4.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
02/09/93	49	4.31	4.41	93.3	41.9	16.1	25.6	66.8
03/08/93	48	4.48	4.49	92.8	42.5	21.5	15.9	73.6
03/29/93	30	4.49	4.55	49.9	22.2	13.8	9.26	45.5
04/20/93	36	4.4	4.47	63.4	27.7	13.8	13.6	47.4
05/11/93	45	4.25	4.44	76.9	27	12.4	15.9	45.8
06/01/93	45	4.3	4.49	88.8	34.1	9.09	33	44.4
07/06/93	53	4.2	4.33	111	48.5	10.3	41.2	49.6
08/24/93	35	5.35	5.68	124	58.3	5.18	79.8	29.5
09/21/93	32	3.59	4.84	82.3	33.5	4.78	49.1	29.8
10/19/93	66	3.81	4.17	107	42.6	8.87	26.1	62.2
11/16/93	57	4.16	4.28	93.8	39.9	8.13	24.6	52.6
11/30/93	39	4.42	4.53	82.3	34.3	14.7	13.6	52.8
12/07/93	31	4.44	4.6	61.4	24.8	11.6	11.8	38.6
12/21/93	44	4.14	4.38	n.a.	n.a.	n.a.	n.a.	n.a.
Lysimeter pit 1 lower								
04/22/91	42	4.85	5.27	127	74.8	29.8	42.7	41.4
09/10/91	39	5.12	5.41	59.6	51.3	10.9	137	41.1
Lysimeter pit 2 upper								
10/16/90	65	3.97	4.18	61.4	46.9	34.6	85.4	59.9
10/24/90	60	4.03	4.13	51.9	42.2	32.3	75.4	65.6
02/21/91	54	4.12	4.32	58.4	46.1	26.2	74.7	61.8
02/26/91	13	5.12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/19/91	34	4.47	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/26/91	39	4.43	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
04/02/91	43	4.42	4.93	52.9	35	13.8	99.5	78.7
04/16/91	54	4.27	4.42	60.9	40.5	15.6	126	73.3
05/07/91	73	4.15	4.26	79.3	52.5	19.1	148	75.5
05/21/91	78	4.06	4.15	97.8	53.9	20.4	171	86.3

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<0.38	25.7	38.5	136	-32.8	12.4	-22.5	-5.8	11/17/92
<0.38	32.4	25.5	126	-36.9	31.1	-23.8	-5.57	11/24/92
<0.38	28.6	52.4	145	-47.1	13	-25.4	-5.47	12/15/92
<0.38	17.7	41.4	165	-55.2	10.6	-55.6	-9.15	12/29/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-56	-9.07	01/12/93
<0.38	27.7	53.6	167	-44.9	8.9	-59.4	-8.66	02/09/93
<0.38	47.6	66.2	136	-35.6	4.63	-80.6	-12.18	03/08/93
<0.38	13.6	36.3	86.2	-28.3	2.85	-86.5	-12.53	03/29/93
<0.38	16.6	67.8	81.6	-35.7	5.34	-49.6	-7.52	04/20/93
<0.38	14.7	88.2	84.1	-35.5	10.6	-45.8	-7.65	05/11/93
<0.38	14.7	96.5	94.1	-28.9	8.65	-31.5	-5.75	06/01/93
<0.38	15.4	81.6	169	-49.9	10.3	-20.9	-4.3	07/06/93
7.09	9.84	27.4	145	61	5.34	-73.7	-10.77	08/24/93
2.76	9.5	42	88.7	-3.3	9.26	-26.3	-5.22	09/21/93
<0.38	16.4	115	156	-53.8	24.9	-29.7	-6.2	10/19/93
<0.38	19	64.2	154	-47.3	28.5	n.a.	n.a.	11/16/93
<0.38	43.5	12	130	-26.4	12.5	n.a.	n.a.	11/30/93
<0.38	13.9	10.1	118	-24.9	13.9	n.a.	n.a.	12/07/93
n.a.	7.58	56	122	-29.8	n.a.	n.a.	n.a.	12/21/93
<0.38	54.5	16.7	217	17	50.8	-30	-5.95	04/22/91
2.2	21.9	17.7	162	8	6	n.a.	n.a.	09/10/91
5.66	95.8	10.6	144	<4	28.1	-12.5	-3.45	10/16/90
7.16	78	9.38	143	<4	<0.43	-15	-4	10/24/90
6.09	50.7	17.8	156	<4	20.5	-38.5	-7	02/21/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/26/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/19/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/26/91
11.8	13.8	17.2	121	<4	11.7	-47.5	-7.55	04/02/91
10.4	22.3	33.8	145	<4	19.9	-39	-6.65	04/16/91
10.4	43.2	62.2	188	<4	19.9	-34.5	-6.25	05/07/91
8.59	35.5	58.5	168	<4	12	-36.5	-6.45	05/21/91

Table 8. Chemical analyses of soil water collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
Lysimeter pit 2 upper-- Continued								
06/18/91	65	4.48	4.67	100	46.2	7.74	90	37.1
06/25/91	150	3.63	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/09/91	176	3.79	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/13/91	163	3.64	3.82	177	113	10.9	403	41.9
08/20/91	58	4.37	4.8	60.1	42.5	5.92	185	11.3
08/27/91	48	4.97	5.15	65.6	47.9	6	222	14.7
09/10/91	59	5.55	5.78	108	74	19.3	194	23.2
09/24/91	42	4.88	4.87	66.3	47	10.1	112	10.3
10/08/91	45	4.64	4.77	88	54.5	13.1	88.9	36.4
11/26/91	80	4.21	4.3	166	109	23.4	155	78.5
12/10/91	56	4.14	4.28	136	83.1	22.7	77.4	76.5
12/30/91	60	4.05	4.24	88.7	58.2	14.5	49.3	63.5
02/18/92	75	3.98	4.1	100	68.9	15.7	44	68.8
03/10/92	62	4.05	4.21	89.4	61.7	18	49.4	65.3
03/31/92	51	4.11	4.29	59.8	40.7	14	39.7	68.7
04/23/92	68	3.92	4.01	76.3	45.1	15.7	44.2	60
05/19/92	58	4	4.29	70	41	16.2	35.9	57.6
06/02/92	82	3.82	4.02	82.8	44.7	22.7	38	77.9
06/30/92	44	4.37	4.34	68.2	41.9	3.7	13.7	50.1
07/14/92	51	4.2	4.33	64.9	41.1	16.4	74.1	57
07/28/92	49	4.18	4.31	65.3	37.6	14	54.6	63.3
08/18/92	67	3.97	4.14	65.3	39.5	7.05	71.1	29.4
09/08/92	56	4.04	4.19	62.7	38.5	8.87	58	32.4
09/29/92	63	3.99	4.03	72.7	42.6	11.6	51.3	50.4
11/03/92	74	3.88	4.04	69.9	43	10.4	39.2	60.6
11/17/92	64	3.91	4.11	62.9	37.4	10.1	55.2	66.4
11/24/92	76	3.87	4.01	80.8	50.8	15.1	61.6	78.4
12/15/92	57	4.09	4.27	63.4	39.2	12.6	43.7	55.3
12/29/92	58	3.96	4.16	52.9	31.4	11.9	25.8	64.2
01/12/93	68	3.93	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
02/09/93	68	3.95	4.02	56.4	36.6	13.9	27.4	63.4
03/08/93	80	3.95	4	76.9	47.9	16.4	30.4	64.8
03/29/93	45	4.1	4.21	34.4	23.8	12.1	21.5	54.9
04/20/93	43	4.16	4.23	36.9	24.9	14.1	26.6	59.2
05/11/93	53	4.04	4.19	48.9	27.3	15.1	36.8	63.9

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<0.38	12.8	130	100	<4	7.19	-29	-5.7	06/18/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-31.5	-5.55	06/25/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/09/91
9.24	45.8	<.45	273	<4	23.5	-19.5	-3.85	08/13/91
2.6	14.2	9.02	195	<4	15.5	-35.5	-6.5	08/20/91
6.45	20.9	0.99	164	<4	17.2	-38.5	-6.8	08/27/91
4.69	38.7	7.19	265	<4	10	-22	-4.9	09/10/91
1.22	13.2	20.1	192	<4	10.9	-15	-4.25	09/24/91
3.72	17.7	9.65	168	<4	19	-42	-7.25	10/08/91
8.27	66.2	9.14	301	<4	63.2	-46	-7.35	11/26/91
6.23	51.7	1.11	247	<4	58.4	-47	-7.7	12/10/91
6.6	27.5	1.45	179	<4	36.4	-63.5	-9.5	12/30/91
6.2	45.3	18.8	265	<4	30	-67	-10.5	02/18/92
6.2	35.1	9.35	183	<4	29	-58	-9.15	03/10/92
6.16	23.3	6.69	132	-78.2	18	-55.5	-9.15	03/31/92
8.24	26.7	14.8	164	-124	20	-41	-6.8	04/23/92
7.31	16	20.6	140	-99.8	25.5	-31	-5.2	05/19/92
8.16	15	8.09	215	-165	34	-22	-4.3	06/02/92
13	5.97	5.77	108	-56.6	19	-34	-6.25	06/30/92
5.34	12.5	3.15	166	-66.9	34	-24.5	-4.95	07/14/92
7.16	10.6	9.05	146	-61.6	39	-38	-6.5	07/28/92
3.06	10.5	76.1	156	-88.5	22.1	-36.5	-6	08/18/92
5.75	19.2	31.7	150	-79.2	24.4	-36.5	-6.45	09/08/92
7.2	18.4	32.6	148	-77.9	41.7	-33.2	-6.05	09/29/92
6.55	32.2	13.3	174	-124	31.7	-23.8	-5.58	11/03/92
<0.38	27.9	35.6	156	-101	30.2	-23.7	-5.55	11/17/92
<0.38	65.7	0.97	179	-121	37.8	-21.4	-5.3	11/24/92
3.94	28.2	0.99	144	-71.6	24.9	-45	-8.08	12/15/92
5.73	17.4	9.1	111	-93.7	21.4	-57	-9.05	12/29/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-48	-8.13	01/12/93
4.66	28.8	19.5	152	-118	21	-63.5	-9.66	02/09/93
5.01	43.4	26.2	177	-131	32.4	-72.2	-10.64	03/08/93
6.8	20.1	8.75	84.1	-71.5	10	-81.6	-12	03/29/93
8.16	20.9	11.9	78.1	-73.4	8.54	-58	-8.96	04/20/93
7.91	20.9	7.55	102	-77.9	14.5	-44.2	-7.31	05/11/93

Table 8. Chemical analyses of soil water collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
Lysimeter pit 2 upper-- Continued								
06/01/93	88	4.14	4.04	126	72.4	13.3	217	59.7
07/06/93	79	4.33	4.49	117	78.2	17.2	269	76.7
08/24/93	54	4.98	5.13	102	65	10.4	251	43.1
09/21/93	44	3.68	4.92	96.3	48.4	7.92	190	43.6
10/19/93	88	3.93	4.13	134	71.4	14.9	146	76.1
11/16/93	95	3.98	4.13	160	91.3	23.3	96.2	89.6
11/30/93	69	4.06	4.28	86.3	52.9	23.9	77.3	66.9
12/07/93	51	4.06	4.24	57.9	35.1	16.4	59.1	69.6
12/21/93	54	3.94	4.17	61.4	38.7	15.7	45.3	66.1
Lysimeter pit 2 lower								
08/13/91	40	5.16	5.36	57.1	33.9	6.79	169	26.1
08/27/91	40	5.66	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/10/91	39	5.12	5.41	59.6	51.3	10.9	137	41.1
09/24/91	41	5.04	4.92	57.7	49.2	8.98	119	22.9
10/08/91	55	4.84	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/26/91	50	4.41	4.71	82.6	69.5	17.1	86.5	80.5
12/10/91	42	4.51	4.6	87.2	76.2	21.8	70.8	73.8
12/30/91	50	4.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/10/92	46	4.48	4.63	81.3	69	19.1	57.9	87.5
03/31/92	44	4.56	4.71	75	63.9	19.2	48.7	88.1
04/23/92	40	4.53	4.71	60.5	54.6	16.4	50.3	80.8
06/02/92	48	4.31	4.73	n.a.	n.a.	n.a.	n.a.	n.a.
06/30/92	28	4.68	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/28/92	40	4.46	4.58	61	47.6	17.1	60.6	75.3
09/08/92	45	4.27	4.94	64.8	45.2	9.96	62.5	68.6
11/03/92	49	4.42	4.62	86.5	63.9	21.1	36.6	99.8
11/24/92	43	4.46	4.55	69.4	55	18.8	47.8	90.1
12/15/92	42	4.52	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12/29/92	42	4.47	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
3.19	37.6	<0.45	201	-155	10.2	-32.1	-5.92	06/01/93
16.3	51.9	3.56	151	-31.1	19.9	-21.6	-4.23	07/06/93
8.85	24.6	0.76	194	48.2	12.8	-64.4	-9.46	08/24/93
5.69	13.8	<0.45	124	24.9	13.5	-25.7	-4.84	09/21/93
3.65	18.9	81.3	227	-94.4	38.5	-28.9	-5.88	10/19/93
4.83	50.5	12.4	284	-92.3	54.1	n.a.	n.a.	11/16/93
5.19	41.2	5.41	126	-58.7	26.7	n.a.	n.a.	11/30/93
6.16	16.5	<0.45	122	-66.6	15	n.a.	n.a.	12/07/93
5.59	11	7.42	126	-66.5	22.4	n.a.	n.a.	12/21/93
2.22	13.9	<0.45	140	23	11	-18	-4.2	08/13/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-35.5	-6.65	08/27/91
2.2	21.9	17.7	162	8	6.34	-30	-6.1	09/10/91
1	12.1	23.2	178	<4	14.1	-16.5	-4.35	09/24/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-27	-5.75	10/08/91
1.75	39.4	25.3	207	<4	35.1	-25	-5.25	11/26/91
0.47	47.6	9.37	250	<4	40	-32	-5.95	12/10/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-37	-6.5	12/30/91
0.79	36.4	11.9	237	<4	31	-54.5	-8.7	03/10/92
<0.38	31.6	5.14	246	-21.2	29	-56.5	-9	03/31/92
1.36	31.3	1.88	166	-18.6	28	-51	-8.35	04/23/92
n.a.	14.2	16.2	89.1	-21.5	n.a.	-47.5	-7.65	06/02/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-42.5	-7.35	06/30/92
0.47	15.4	5.94	187	-29.5	33	-38	-6.15	07/28/92
1.72	12.2	4.98	147	7.1	25.4	-45.5	-7.3	09/08/92
1.18	32.8	9.43	240	-27.4	40.9	-30.8	-5.56	11/03/92
<0.38	32.1	1.22	208	-29.4	49.1	-24.9	-5.04	11/24/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-25.1	-4.95	12/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-25.5	-5.23	12/29/92

Table 8. Chemical analyses of soil water collected from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
Lysimeter pit 2 lower-- Continued								
03/29/93	41	4.65	4.67	64.4	51.6	13.4	34	86
04/20/93	38	4.6	4.68	56.4	48.1	13.3	38.4	71.9
05/18/93	36	4.46	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06/01/93	75	4.39	4.54	n.a.	n.a.	n.a.	n.a.	n.a.
08/24/93	50	5.81	5.99	132	79.8	11.1	211	73.1
09/21/93	38	3.87	5.23	81.3	43.8	8.39	131	56.9
10/19/93	90	4.29	4.55	n.a.	n.a.	n.a.	n.a.	n.a.
11/30/93	51	4.35	4.4	77.8	50.9	23.8	54.5	84.1
12/07/93	43	4.09	4.52	69.4	45.7	21.4	46.8	76.6

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<0.38	25.5	8.84	211	-14	22.4	-69.5	-10.68	03/29/93
<0.38	21.7	11.3	196	-15.5	24.2	-70.7	-10.44	04/20/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-67.8	-10.4	05/18/93
n.a.	38.5	33.7	188	-37.6	<0.43	-46.7	-8.02	06/01/93
10.4	29.5	0.96	155	120	14.2	-51.4	-8.03	08/24/93
2.04	14.4	2.41	132	34.2	12.1	-22.9	-4.55	09/21/93
n.a.	11	200	141	-40.6	n.a.	-23.7	-5.12	10/19/93
<0.38	52.8	21.3	184	-34.9	25.3	n.a.	n.a.	11/30/93
<0.38	36.6	<0.45	208	-29.1	27.1	n.a.	n.a.	12/07/93

Table 9. Chemical analyses of soil water collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93

[µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; ANC, acid-neutralizing capacity; n.a., not analyzed]

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
				Lysimeter pit 1 upper				
04/25/91	43	4.43	4.63	32.4	30.9	34.8	103	39.7
05/07/91	52	4.59	5.39	37.9	51.9	15.2	228	65.9
05/21/91	45	4.82	5.1	53.4	56.6	15	179	39.9
06/18/91	53	4.53	4.51	52.9	54.8	11.5	143	30.7
07/09/91	58	4.97	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/13/91	84	4.26	4.54	97.8	105	12	155	21.5
08/20/91	58	4.25	4.35	65.9	71.7	48	19.4	15.8
08/27/91	45	4.23	4.48	51.9	56.8	7.96	81.1	22
09/10/91	61	4.31	4.35	77.7	84.3	16.2	114	46.3
09/24/91	53	4.31	4.44	67.8	68.5	10.3	85.4	15.3
10/08/91	54	4.28	4.51	77.5	88.4	15.7	83.8	52.6
10/22/91	66	4.23	4.45	83.5	107	18.1	87.4	33.1
11/26/91	56	4.81	4.93	88	111	17.8	194	65.3
12/10/91	57	4.17	4.3	93	138	21.4	115	97.7
12/30/91	76	4.21	4.39	94.9	143	26.3	117	98.4
02/18/92	77	4.25	4.49	111	148	33.9	129	93.3
03/10/92	69	4.17	4.27	56.5	113	23.8	121	89.4
03/31/92	57	4.29	4.68	45.7	88.4	19.1	99.6	92.1
04/23/92	56	4.2	4.29	42.5	68.7	17.4	88.4	62.4
05/19/92	45	4.38	4.55	48.8	68.3	14.2	73.9	44.4
06/02/92	39	4.31	4.45	26.2	51	9.66	45.1	56
06/30/92	43	4.25	4.3	73.5	32.6	7.4	45.4	48.8
07/14/92	41	4.34	4.46	89.3	38.4	6.5	24.7	59.3
07/28/92	39	4.22	4.35	29.9	45.8	6.8	35.1	51.1
08/18/92	38	4.33	4.51	36.1	50.3	4.83	34.5	39.1
09/08/92	38	4.31	4.35	34.6	41.8	10.3	40.8	36.5
09/29/92	38	4.24	4.24	35	46.5	5.74	24.4	51.3
11/03/92	51	4.14	4.31	36.2	63.2	9.35	24.2	91.4
11/17/92	47	4.17	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/24/92	46	4.13	4.27	21	42.5	13.6	31.7	76.9

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
3.94	56.9	7.88	154	<4	15.4	-23.5	-5.35	04/25/91
10.4	27.1	7.09	157	40	10.1	-31	-5.75	05/07/91
5.01	19.2	31	196	<4	7.51	-28.5	-5.35	05/21/91
4.66	24.8	65.1	185	<4	9	-29	-5.6	06/18/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/09/91
4.87	24.2	178	283	<4	6.37	-15.5	-3.95	08/13/91
4.3	18.8	60.9	220	<4	7.9	-31	-5.3	08/20/91
6.59	16.6	25	167	<4	11.2	-55.5	-8.6	08/27/91
5.8	34.8	46.2	235	<4	15	-31	-5.75	09/10/91
3.51	17.1	41	194	<4	11.8	-11	-3.45	09/24/91
6.02	25	19.5	199	<4	24	-36	-6.95	10/08/91
7.31	46	19.9	260	<4	26	-98.5	-13	10/22/91
11.6	67.9	<.45	222	<4	33	-33	-6.05	11/26/91
14.2	58.5	0.97	274	14	44.4	-49.5	-7.85	12/10/91
9.7	42.3	2.66	448	<4	42.9	-60	-9.05	12/30/91
8.13	63.6	29.1	351	<4	38.1	-65	-10.3	02/18/92
8.77	45.4	8.36	148	<4	42	-43.5	-7.3	03/10/92
9.24	24.4	34.5	184	-29	29	-60	-9.55	03/31/92
7.2	28.6	5.78	230	-60.5	32	-28.5	-5	04/23/92
4.76	21	23.9	182	-38.2	15.7	-27	-4.4	05/19/92
7.23	9.17	3.05	147	-49.7	21.3	-26	-4.9	06/02/92
13	11.7	18.9	145	-64	13	-38	-6.45	06/30/92
3.33	11.3	19.8	76.9	-46.5	20	-20	-4.2	07/14/92
6.05	10.4	7.31	130	-60.6	18	-41	-6.8	07/28/92
12.8	13	17.3	139	-40.2	16.9	-35	-5.8	08/18/92
9.13	21.5	7.97	127	-57.8	20.8	-27	-5.4	09/08/92
10.9	11.4	11.9	119	-39.6	29.1	-29.5	-5.55	09/29/92
9.08	34.4	9.81	170	-68.1	29.9	-23.5	-5.24	11/03/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-23.1	-5.32	11/17/92
6.09	31.4	<.45	130	-67.2	25.2	-18.6	-4.27	11/24/92

Table 9. Chemical analyses of soil water collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
				Lysimeter pit 1 upper --Continued				
12/15/92	49	4.28	4.37	36.4	75.7	14.5	48.3	86
12/29/92	40	4.26	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
01/12/93	39	4.28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
02/09/93	40	4.29	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	63	4.23	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/29/93	27	4.38	4.44	11	22	8.44	30.7	45.1
04/20/93	32	4.4	4.47	18.5	28.9	7.13	47.8	59.9
05/11/93	30	4.38	4.43	14.5	18.3	6.44	37.4	46
06/08/93	78	4.5	4.55	31.4	29.6	97.9	146	42
07/06/93	88	4.02	4.14	61.9	89.7	49.2	122	68.2
08/24/93	137	3.62	3.86	113	123	51.8	169	111
09/21/93	51	4.27	4.38	55.4	59.2	19	103	42.9
10/19/93	91	3.84	4.12	99.8	103	28	118	68.8
11/16/93	98	3.96	4.06	99.8	133	29.3	95.7	113
11/30/93	89	4	4.14	54.4	81.5	43.5	98.5	103
12/07/93	74	4.02	4.22	41.4	66.2	25.7	64.2	126
				Lysimeter pit 1 lower				
08/13/91	86	4.16	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/10/91	76	4.43	4.67	118	113	27.1	161	68.7
09/24/91	54	4.47	4.63	75.3	72.6	13.7	106	20.1
11/26/91	n.a.	4.11	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/10/92	74	4.31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
04/23/92	70	4.32	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/28/92	90	4.99	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/06/93	87	4.51	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/24/93	134	3.54	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/19/93	64	4.59	4.8	76.8	64	32.7	211	57.2
11/30/93	19	5.46	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12/07/93	105	6.43	6.03	84.8	80.6	51.8	420	101

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
4.66	24.4	4.47	196	-54.5	28.8	-46.5	-7.92	12/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-53.4	-8.61	12/29/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-47.7	-8.01	01/12/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-58.9	-9.22	02/09/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-64.6	-9.62	03/08/93
5.37	8.96	10.2	87.6	-31.2	7.48	-74.4	-11.17	03/29/93
9.38	17.6	7.74	93.5	-39.7	13.9	-50.1	-7.43	04/20/93
7.56	10	11.7	78.9	-37.8	13.8	-45.6	-7.49	05/11/93
8.24	168	82.4	186	-27.7	6.41	-34	-6.12	06/08/93
5.94	54	82.4	144	-84.8	28.8	-18.8	-4.06	07/06/93
<.38	75.2	234	164	-262	34.2	-33	-5.58	08/24/93
6.7	33.1	35.6	166	-46.2	18.2	-19.7	-3.98	09/21/93
7.2	36.8	140	211	-92.8	20.3	-33.7	-6.49	10/19/93
9.17	84.9	30.6	333	-96.4	39.5	n.a.	n.a.	11/16/93
6.95	97	2.68	225	-75.8	28.5	n.a.	n.a.	11/30/93
8.06	59	14.1	233	-68	26.3	n.a.	n.a.	12/07/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-23.5	-5.05	08/13/91
1.7	64.2	84.5	171	<4	13.4	-20	-4.4	09/10/91
2	23.4	49	257	<4	13.6	-12.5	-3.6	09/24/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-22	-4.7	11/26/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-40	-7	03/10/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-41	-7.05	04/23/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-36.5	-6.35	07/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-8.3	-3.22	07/06/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-13.2	-3.54	08/24/93
4.05	49.2	88.4	191	-19.3	13.5	-20.1	-4.22	10/19/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/30/93
10.4	65.4	13.1	360	165	35.2	n.a.	n.a.	12/07/93

Table 9. Chemical analyses of soil water collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
				Lysimeter pit 2 upper				
04/25/91	35	4.33	4.47	27	22.6	27.2	33.5	54.9
05/07/91	27	4.53	4.8	24.4	20.2	8.39	50.4	28
05/21/91	34	4.34	4.54	31.9	23.4	8.35	54.7	30.4
06/18/91	40	4.28	4.41	38.9	29.4	9.35	54.7	46.2
08/13/91	35	4.51	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/20/91	39	4.32	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
08/27/91	33	4.26	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/10/91	n.a.	4.51	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/26/91	34	4.23	4.42	31.2	30	9.48	29.5	41.1
12/10/91	31	4.31	4.5	28.5	40.1	12.1	21.1	72.9
12/30/91	31	4.43	4.53	19.9	32.2	2.39	12	74.1
02/18/92	38	4.44	4.63	43.8	46.7	14.4	24.9	69.2
03/10/92	40	4.34	4.38	32.3	43.5	12.9	19.3	77.1
03/31/92	37	4.36	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
04/23/92	37	4.26	4.46	22.4	29	12.1	15.2	62.4
05/19/92	36	4.29	4.54	34	28.6	8.05	20.6	46.6
06/02/92	33	4.27	4.62	19.9	23.8	5.7	8.59	57.7
06/30/92	31	4.26	4.63	19.9	19.3	4.7	10.1	43.5
07/14/92	34	4.18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
07/28/92	34	4.19	4.28	19.9	19.7	5.1	10	61.2
08/18/92	35	4.17	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09/08/92	37	4.16	4.31	20.7	23.5	7.13	9.49	46.5
09/29/92	34	4.19	4.31	16.6	20.9	5.13	5.63	58.9
11/03/92	36	4.26	4.37	19	20.9	6.44	4.53	88.5
11/17/92	35	4.22	4.42	15	18.2	8.92	5.88	81
11/24/92	38	4.21	4.34	15.5	20.9	12.2	5.86	80.2
12/15/92	37	4.28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12/29/92	34	4.3	4.46	16	18.7	15.9	4.32	84.7
01/12/93	36	4.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/29/93	32	4.37	4.41	12.5	19.3	10.4	4.12	83.5
04/20/93	33	4.3	4.4	14	18.8	9.87	6.65	66.3
05/11/93	30	4.33	4.41	12	14.2	7.31	5.91	53
06/08/93	31	4.24	4.41	13	14.2	7	9.75	46.8
07/06/93	43	4.16	4.29	25.5	24.8	10.9	31.5	54.6

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<.38	38.2	2.62	136	<4	11.9	-23.5	-5.4	04/25/91
<.38	12.2	5.53	110	<4	7.8	-32	-6.15	05/07/91
<.38	10.6	15.9	125	<4	6.7	-28	-5.4	05/21/91
<.38	17.3	43.7	140	<4	11.5	-28.5	-5.7	06/18/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-25	-4.95	08/13/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-29.5	-5.25	08/20/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-39	-6.55	08/27/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-40	-6.8	09/10/91
<.38	17.4	9.61	139	<4	24.8	-29	-5.65	11/26/91
0.36	14.4	0.42	187	<4	31.3	-53.5	-8.15	12/10/91
1.43	8.51	<.45	143	<4	11.2	-59	-9.35	12/30/91
1.43	20.6	12.8	156	<4	10.6	-78	-11.85	02/18/92
0.47	13.2	5.53	180	<4	24	-58.5	-9.15	03/10/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-55.5	-9.1	03/31/92
1	11.1	2.87	150	-48.6	29	-37.5	-6.4	04/23/92
0.14	10.3	14.4	130	-33.6	16.7	-28.5	-5	05/19/92
0.47	5.68	3.69	130	-49.9	20.1	-26	-4.85	06/02/92
<.38	15	0.94	105	-15.3	19	-32	-5.85	06/30/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-25.5	-4.65	07/14/92
<.38	5.17	2.75	122	-65.5	23	-37	-6.05	07/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-33.5	-5.65	08/18/92
1.02	8.86	5.4	137	-64.2	35.7	-25.5	-4.85	09/08/92
<.38	5.07	3.38	123	-50.4	31.1	-30.7	-5.5	09/29/92
1.56	17.7	1.19	132	-57.4	25.4	-25.2	-5.54	11/03/92
<.38	20.4	2.33	123	-54.3	23.8	-26	-5.59	11/17/92
<.38	17.6	7.84	138	-59.4	24.4	-23.2	-4.94	11/24/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/15/92
<.38	17.9	2.51	127	-42.7	19.9	-32.8	-6.13	12/29/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-43.8	-7.06	01/12/93
<.38	13.2	7.45	131	-33.8	10.7	-68.3	-10.51	03/29/93
<.38	11.6	2.1	134	-43.6	18.2	-48.3	-7.52	04/20/93
<.38	7.27	3.04	124	-38.1	19.6	-46.2	-7.17	05/11/93
<.38	6.82	2.18	111	-38.5	17.1	-44.2	-6.9	06/08/93
<.38	10.7	7.32	162	-53.8	18.9	-20.1	-4.24	07/06/93

Table 9. Chemical analyses of soil water collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93--Continued

Sample-collection date	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
		Field	Laboratory					
Lysimeter pit 2 upper --Continued								
08/24/93	40	4.11	4.31	25	24.7	9.7	39.7	48.3
09/21/93	36	4.04	4.35	16.5	18.6	9.53	26.4	45.4
10/19/93	41	4.03	4.35	16.5	23.9	10.7	29.4	59.9
11/16/93	43	4.26	4.36	n.a.	n.a.	n.a.	n.a.	n.a.
11/30/93	39	4.31	4.35	17.5	26.5	23.8	16.4	81.4
12/07/93	31	4.32	4.51	13	20	12.9	12.5	64.1
Lysimeter pit 2 middle								
03/31/92	43	4.45	4.5	9.08	40.5	22.7	16.6	155
04/23/92	43	4.44	4.45	9.78	38.9	24.1	11.6	151
05/19/92	44	4.41	4.63	12.7	39.1	24.5	11.7	137
06/02/92	43	4.41	4.61	15	39.4	24.7	12.8	138
07/28/92	44	4.34	4.44	8.7	34.8	28.3	16.6	142
11/03/92	49	4.23	4.34	25.3	52.2	19.8	31	123
11/24/92	42	4.41	4.51	6.49	34.3	30.4	13.6	150
05/11/93	44	4.38	n.a.	8.98	30	26.4	11.5	137
10/19/93	43	4.18	4.45	6.99	30.8	25.4	15.9	137

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<.38	15.3	14.3	144	-50.8	17.8	-49.8	-7.6	08/24/93
<.38	20.6	3.95	118	-45.7	24.6	-21	-4.11	09/21/93
<.38	12.9	18.6	128	-41.9	25.3	-26.9	-5.23	10/19/93
n.a.	21.9	12.9	140	-41.1	<.43	n.a.	n.a.	11/16/93
<.38	39.6	2.81	149	-42.8	21	n.a.	n.a.	11/30/93
<.38	11.2	2.93	108	-32.8	15.3	n.a.	n.a.	12/07/93
1.36	35.1	11.1	230	-39.5	44	-41.5	-6.9	03/31/92
0.07	33.5	6.65	232	-35.5	47	-44.5	-7.25	04/23/92
0.04	28.9	5.82	191	-31.9	42.9	-45.5	-7.3	05/19/92
<.38	26.4	4.84	186	-23.5	45	-45	-7.15	06/02/92
34.8	23.2	2.9	232	-44.7	56	-38	-6.15	07/28/92
5.21	28	5.22	203	-60.7	47	-29	-5.6	11/03/92
<.38	6.68	1.04	239	-36.2	51.5	-32.3	-5.24	11/24/92
<.38	17.3	1.56	262	-30.3	51.3	-42.6	-6.94	05/11/93
<.38	15.8	1.02	230	-31.5	48.1	-41	-6.83	10/19/93

Table 10. Altitude[1] of the water table in well points in the Bear Branch watershed, Catoctin Mountain, Maryland, 1991-93

[All altitudes in meters; –, missing data; <, less than]

Date	Well point 1	Well point 2	Well point 3	Well point 4
02/13/91	234.19	–	–	–
02/19/91	234.19	–	–	–
02/26/91	234.18	–	–	–
03/05/91	234.21	–	–	–
03/12/91	234.19	–	–	–
03/19/91	234.18	–	–	–
03/26/91	234.21	–	–	–
04/02/91	234.19	–	–	–
04/09/91	234.18	–	–	–
04/16/91	234.16	–	–	–
04/22/91	234.18	–	–	–
04/23/91	234.18	234.19	–	–
04/29/91	234.18	234.19	233.63	234.09
05/07/91	234.17	234.17	233.52	234.08
05/14/91	234.16	234.17	233.45	234.06
05/21/91	234.15	234.11	233.38	234.05
05/28/91	234.13	234.1	233.33	234.03
06/04/91	234.12	234.1	233.31	234.02
06/11/91	234.09	234.06	233.25	233.99
06/18/91	234.2	234.2	233.62	234.24
06/25/91	234.12	234.06	233.28	234.02
07/02/91	234.1	234.06	233.25	234
07/09/91	234.08	234.05	233.25	233.99
07/17/91	234.07	234.04	<233.23	233.97
07/23/91	234.07	234.05	<233.23	233.96
07/30/91	234.08	234.06	<233.23	233.98
08/06/91	234.09	234.03	<233.23	233.96
08/13/91	234.1	234.05	233.24	233.98
08/20/91	234.18	234.15	<233.23	234.05
08/27/91	234.06	234.02	<233.23	233.93
09/03/91	234.03	234.03	<233.23	<233.86
09/10/91	234.04	234.05	233.24	233.93
09/17/91	234.07	234.05	233.23	233.96
09/24/91	234.09	234.07	233.25	233.98
10/01/91	234.1	234.06	233.24	233.98

Table 10. Altitude[1] of the water table in well points in the Bear Branch watershed, Catoctin Mountain, Maryland, 1991-93--Continued

Date	Well point 1	Well point 2	Well point 3	Well point 4
10/08/91	234.09	234.07	233.24	233.99
10/15/91	234.09	234.07	233.23	233.99
10/22/91	234.09	234.06	233.23	233.99
10/29/91	234.08	234.06	<233.23	233.99
11/05/91	234.1	234.06	<233.23	234
11/12/91	234.13	234.07	<233.23	234.01
11/19/91	234.13	234.06	<233.23	234
11/26/91	234.11	234.07	233.32	234.02
12/03/91	234.2	234.21	234.02	234.13
12/10/91	234.17	234.16	233.65	234.1
12/17/91	234.17	234.09	233.65	234.07
12/23/91	234.17	234.08	233.52	234.07
12/30/91	234.17	234.15	233.87	234.1
01/07/92	234.17	234.13	233.73	234.08
01/14/92	234.19	234.19	233.53	234.09
01/21/92	234.17	234.11	233.47	234.08
01/28/92	234.17	234.17	233.45	234.07
02/04/92	234.16	234.18	233.49	234.07
02/11/92	234.16	234.17	233.44	234.08
02/18/92	234.18	234.24	233.79	234.09
02/25/92	234.19	234.28	233.67	234.11
03/03/92	234.21	234.3	233.68	234.13
03/10/92	234.24	234.35	234	234.14
03/17/92	234.22	234.32	233.82	234.12
03/24/92	234.21	234.31	233.8	234.13
03/31/92	234.22	234.34	233.89	234.13
04/06/92	234.23	234.31	233.73	234.11
04/13/92	234.18	234.28	233.68	234.11
04/20/92	234.15	234.21	233.67	234.09
04/21/92	234.16	234.2	233.64	234.09
04/23/92	234.24	234.36	234.17	234.15
04/28/92	234.2	234.29	233.84	234.13
05/03/92	234.17	234.23	233.74	234.11
05/12/92	234.17	234.19	233.69	234.1
05/19/92	234.17	234.18	233.63	234.1

Table 10. Altitude[1] of the water table in well points in the Bear Branch watershed, Catoctin Mountain, Maryland, 1991-93–Continued

Date	Well point 1	Well point 2	Well point 3	Well point 4
05/26/92	234.15	234.21	233.57	234.09
06/02/92	234.15	234.2	233.73	234.1
06/09/92	234.17	234.25	233.74	234.11
06/16/92	234.15	234.19	233.56	234.08
06/23/92	234.17	234.16	233.5	234.07
06/30/92	234.15	234.15	233.45	234.08
07/07/92	234.14	234.14	233.39	234.07
07/14/92	234.13	234.09	233.36	234.02
07/21/92	234.12	234.09	233.31	234.02
07/28/92	234.17	234.18	233.75	234.08
08/04/92	234.15	234.17	233.5	234.07
08/11/92	234.15	234.17	233.41	234.05
08/18/92	234.15	234.17	233.38	234.04
08/25/92	234.14	234.09	233.32	234.03
09/01/92	234.14	234.07	233.28	234.02
09/08/92	234.21	234.16	233.35	234.03
09/15/92	234.12	234.1	233.39	234.03
09/22/92	234.15	234.08	233.31	234.03
09/29/92	234.15	234.08	233.32	234.03
10/06/92	234.13	234.07	233.27	234.02
10/13/92	234.14	234.09	233.32	234.03
10/20/92	234.17	234.08	233.3	234.04
10/27/92	234.16	234.09	233.3	234.04
11/03/92	234.24	234.36	234.3	234.14
11/10/92	234.19	234.26	233.55	234.08
11/17/92	234.21	234.29	233.71	234.09
11/24/92	234.24	234.36	234.17	234.13
12/01/92	234.21	234.28	233.73	234.1
12/08/92	234.19	234.23	233.57	234.08
12/15/92	234.22	234.36	233.94	234.1
12/21/92	234.21	234.36	233.89	234.11
12/29/92	234.18	234.28	233.63	234.1
01/05/93	234.17	234.28	233.62	234.08
01/12/93	234.17	234.25	233.67	234.08
01/19/93	234.17	234.26	233.69	234.08

Table 10. Altitude[1] of the water table in well points in the Bear Branch watershed, Catoctin Mountain, Maryland, 1991-93--Continued

Date	Well point 1	Well point 2	Well point 3	Well point 4
01/26/93	234.17	234.26	233.77	234.08
02/02/93	234.17	234.22	233.59	234.06
02/09/93	234.15	234.17	233.53	234.05
02/23/93	234.14	234.16	233.54	234.05
03/02/93	234.14	234.16	233.52	234.03
03/08/93	234.22	234.32	234.13	234.12
03/23/93	234.23	234.34	--	234.14
03/30/93	234.25	234.4	234.14	234.14
04/06/93	234.21	234.33	233.84	234.1
04/13/93	234.21	234.32	233.93	234.12
04/20/93	234.22	234.31	233.89	234.11
04/27/93	234.18	234.31	233.85	234.12
05/04/93	234.19	234.28	233.67	234.1
05/11/93	234.17	234.27	233.61	234.07
05/18/93	234.16	234.28	233.65	234.07
05/25/93	234.13	234.24	233.56	234.03
06/01/93	234.14	234.14	233.51	234.06
06/08/93	234.17	234.09	233.37	234.07
06/15/93	234.16	234.07	233.33	234
06/22/93	234.12	234.07	233.31	234
06/29/93	234.1	234.06	233.26	233.98
07/06/93	234.07	234.06	233.26	233.9
07/13/93	234.08	234.06	<233.23	233.92
07/20/93	234.06	234.01	<233.23	<233.86
07/27/93	234.03	<233.9	<233.23	<233.86
08/03/93	234.03	233.78	<233.23	<233.86
08/10/93	234.05	<233.9	<233.23	<233.86
08/17/93	234.05	233.78	<233.23	<233.86
08/24/93	234.07	<233.9	<233.23	<233.86
08/31/93	233.78	233.78	<233.23	<233.86
09/07/93	234.03	234.01	<233.23	233.99
09/14/93	234.07	234.03	<233.23	234.01
09/21/93	234.04	234.03	<233.23	233.99
09/28/93	--	--	--	--
10/05/93	234	234.02	<233.23	233.78

Table 10. Altitude[1] of the water table in well points in the Bear Branch watershed, Catoctin Mountain, Maryland, 1991-93--Continued

Date	Well point 1	Well point 2	Well point 3	Well point 4
10/12/93	234.13	234.11	<233.23	234.03
10/19/93	234.03	234.03	<233.23	233.97
10/26/93	234.03	234.03	<233.23	233.98
11/02/93	234.13	234.05	233.3	234.05
11/09/93	234.14	234.07	233.31	234.04
11/16/93	234.13	234.08	233.29	234.04
11/23/93	234.12	234.07	233.31	234.05
11/30/93	234.2	234.33	233.92	234.1
12/07/93	234.22	234.39	234.03	234.13
12/14/93	234.18	234.35	233.68	234.1
12/21/93	234.18	234.31	233.56	234.1

[1]Referenced to sea level

Table 11 follows.

Table 11. Altitude[1] of the water table in well points in the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93

[All altitudes in meters]

Date	Well point 1	Well point 2	Date	Well point 1	Well point 2
04/29/91	165.84	169.35	12/30/91	165.81	169.26
05/07/91	165.84	169.34	01/07/92	165.77	169.25
05/14/91	165.81	169.33	01/14/92	165.92	169.25
05/21/91	165.82	169.34	01/21/92	165.78	169.25
05/28/91	165.81	169.31	01/28/92	165.77	169.25
06/04/91	165.81	169.3	02/04/92	165.77	169.25
06/11/91	165.79	169.29	02/11/92	165.77	169.25
06/18/91	165.96	169.29	02/18/92	165.81	169.25
06/25/91	165.8	169.28	02/25/92	165.79	169.26
07/02/91	165.78	169.26	03/03/92	165.8	169.25
07/09/91	165.78	169.22	03/10/92	165.81	169.26
07/17/91	165.78	169.25	03/17/92	165.82	169.29
07/23/91	165.74	169.24	03/24/92	165.81	169.31
07/30/91	165.74	169.2	03/31/92	165.84	169.35
08/06/91	165.74	169.17	04/06/92	165.84	169.34
08/13/91	165.74	169.18	04/13/92	165.81	169.38
08/20/91	165.76	169.26	04/21/92	165.96	169.37
08/27/91	165.74	169.2	04/23/92	166.11	169.4
09/03/91	165.74	169.25	04/28/92	166.06	169.37
09/10/91	165.74	169.25	05/03/92	166.02	169.39
09/17/91	165.74	169.23	05/12/92	166	169.36
09/24/91	165.74	169.24	05/19/92	165.98	169.34
10/01/91	165.72	169.25	05/26/92	166.02	169.36
10/08/91	165.72	169.26	06/02/92	166	169.27
10/15/91	165.73	169.25	06/09/92	166.04	169.32
10/22/91	165.74	169.25	06/16/92	166	169.32
10/29/91	165.75	169.25	06/23/92	165.98	169.28
11/05/91	165.75	169.24	06/30/92	165.96	169.28
11/12/91	165.76	169.24	07/07/92	165.94	169.31
11/19/91	165.75	169.26	07/14/92	165.93	169.27
11/26/91	165.76	169.25	07/21/92	165.92	169.23
12/03/91	165.83	169.25	07/28/92	166.01	169.33
12/17/91	165.78	169.25	08/04/92	166.01	169.33

Table 11. Altitude[1] of the water table in well points in the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1991-93-- Continued

Date	Well point 1	Well point 2	Date	Well point 1	Well point 2
08/11/92	165.97	169.26	05/04/93	166.05	169.37
08/18/92	165.95	169.26	05/11/93	166.02	169.39
08/25/92	165.93	169.23	05/18/93	166	169.34
09/01/92	165.93	169.22	05/25/93	165.96	169.31
09/08/92	165.89	169.23	06/01/93	165.96	169.3
09/15/92	165.91	169.23	06/08/93	165.95	169.3
09/22/92	165.94	169.24	06/15/93	165.93	169.3
09/29/92	165.94	169.23	06/22/93	165.93	169.29
10/06/92	165.93	169.23	06/29/93	165.92	169.28
10/13/92	165.94	169.23	07/06/93	165.89	169.28
10/20/92	165.92	169.28	07/13/93	165.9	169.28
10/27/92	165.92	169.25	07/20/93	165.92	169.27
11/03/92	166	169.3	07/27/93	165.9	169.28
11/10/92	165.97	169.3	08/03/93	165.89	169.29
11/17/92	165.96	169.3	08/10/93	165.9	169.28
11/24/92	166.08	169.32	08/17/93	165.89	169.26
12/01/92	166.04	169.33	08/24/93	165.87	169.26
12/08/92	166.01	169.31	08/31/93	165.86	169.27
12/15/92	166.12	169.34	09/07/93	165.86	169.27
12/21/93	166.09	169.35	09/14/93	165.85	169.26
12/29/92	166.05	169.33	09/21/93	165.87	169.26
01/05/93	166.04	169.29	09/28/93	165.88	169.26
01/12/93	166.02	169.3	10/05/93	165.86	169.28
01/19/93	166.02	169.29	10/12/93	165.89	169.28
01/26/93	166.01	169.28	10/19/93	165.87	169.27
02/02/93	166	169.26	10/26/93	165.88	169.27
02/09/93	165.99	169.27	11/02/93	165.89	169.26
02/18/93	165.98	169.29	11/09/93	165.89	169.26
02/23/93	165.98	169.3	11/16/93	165.87	169.26
03/03/93	165.98	169.3	11/23/93	165.87	169.25
03/23/93	166.13	169.37	11/30/93	165.96	169.31
03/30/93	166.13	169.38	12/07/93	166.05	169.31
04/06/93	166.13	169.37	12/14/93	165.98	169.3
04/13/93	166.09	169.37	12/21/93	166	169.3
04/20/93	166.09	169.37	12/29/93	166.34	169.28

[1]Referenced to sea level

Table 12. Chemical analyses of ground water collected from and near the Bear Branch watershed, Catoctin Mountain, Maryland, 1992-93

[°C , degrees Celsius; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; ANC, acid-neutralizing capacity; n.a., not analyzed]

Sample-collection date	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
Well point 3									
03/08/93	6	132	4.94	4.88	823	69.7	28.9	23.8	52.3
04/06/93	8	100	4.82	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
04/13/93	9	133	4.9	5.04	798	111	31.1	29.9	12.7
05/18/93	11	87	4.39	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11/30/93	11	202	5.08	5.17	1370	107	50.9	42	27
12/07/93	10	243	4.95	5.06	1780	83.1	48.7	32.5	47.7
12/21/93	9	114	4.87	5.22	n.a.	n.a.	n.a.	n.a.	n.a.
Well point 4									
10/13/92	12	39	4.95	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	5	65	5.06	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
04/06/93	8	173	5.14	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
05/18/93	13	38	5.29	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06/15/93	13	39	4.94	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Camp Peniel well									
05/20/93	n.a.	36	5.72	6.07	151	53.4	65.7	32.7	0.22
06/22/93	n.a.	36	5.64	6.11	136	52.3	68.7	35.3	<.22
07/27/93	n.a.	39	5.75	6.09	141	54.6	73.1	33	<.22
08/31/93	n.a.	40	5.9	6.18	163	55.4	78.7	38.1	0.18
09/28/93	n.a.	40	5.74	6.09	156	60.7	78.7	36.8	<.22
10/26/93	n.a.	39	5.75	6.18	147	56	77.9	37.6	<.22
12/02/93	n.a.	37	5.53	5.95	160	53.3	69.2	36.1	0.41
12/30/93	n.a.	40	5.81	5.88	179	58.9	77.9	36.1	0.41

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
4.23	34.2	12.4	913	-8.94	82.2	-59.6	-9.01	03/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/06/93
4.87	30.7	15.9	952	-3.91	94.7	-59.2	-8.77	04/13/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/18/93
4.3	55.2	11.3	1500	7.74	168	n.a.	n.a.	11/30/93
9.2	61.2	16.6	1870	2.9	172	n.a.	n.a.	12/07/93
n.a.	36	3.46	698	2.88	n.a.	n.a.	n.a.	12/21/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-42.9	-7.21	10/13/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-62.3	-9.37	03/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-52.6	-8.3	04/06/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/18/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/15/93
<.38	33.3	8.86	84.2	188	150	n.a.	n.a.	05/20/93
<.38	32.9	10.5	80.1	183	142	n.a.	n.a.	06/22/93
<.38	35.2	11.5	82.5	201	149	n.a.	n.a.	07/27/93
<.38	32.9	1.07	77.4	219	157	n.a.	n.a.	08/31/93
<.38	39.4	2.16	81.8	194	154	n.a.	n.a.	09/28/93
<.38	30.4	9.44	63.1	209	148	n.a.	n.a.	10/26/93
<.38	52.2	12.4	71.2	189	143	n.a.	n.a.	12/02/93
<.38	11.1	7.4	126	208	148	n.a.	n.a.	12/30/93

Table 13. Chemical analyses of ground water collected from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1988-93

[°C , degrees Celsius; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; n.a., not analyzed]

Sample-collection date	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)	Aluminum, total, dissolved (µeq/L)
			Field	Laboratory					
					Well point 2				
03/08/93	7	39	5.42	5.44	149	54.6	40.6	30.2	6
04/06/93	10	27	5.42	5.79	79.8	39.5	38.2	23.8	3.36
05/11/93	15	22	5.51	6.14	56.4	35.1	40.2	19.7	2.33
06/15/93	17	18	5.61	5.93	33.9	33.3	39.1	13.6	2.45
07/13/93	21	42	5.2	5.86	n.a.	n.a.	n.a.	n.a.	n.a.
09/21/93	17	47	4.76	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10/19/93	14	26	5.6	5.79	n.a.	n.a.	n.a.	n.a.	n.a.
11/16/93	11	39	5.01	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12/07/93	8	42	5.15	5.25	n.a.	n.a.	n.a.	n.a.	n.a.
12/21/93	6	80	5.52	5.55	449	60.5	49.6	29.4	9.12
					Spring				
03/22/88	11	26	5.7	6.15	51.8	61.7	60.9	6.14	n.a.
06/14/88	12	23	5.49	5.98	48.1	48.6	48.7	21.7	n.a.
09/27/88	12	19	5.32	5.89	27.9	46.2	40.4	25.5	n.a.
12/20/88	12	19	5.45	5.94	27.4	45.3	43	25.5	n.a.
03/16/89	10	23	5.51	5.87	32.8	57.1	46.5	28.4	n.a.
06/13/89	11	22	5.58	5.4	27.6	52.7	45.7	29.2	n.a.
09/14/89	12	22	5.4	5.74	30.9	51.2	49.2	29.4	n.a.
12/18/89	11	20	5.71	6.11	30.3	50.3	44.8	26.1	n.a.
03/13/90	12	24	5.37	5.82	33.9	58.3	50.9	30.2	<.22
06/12/90	11	24	5.28	6.07	33.2	58.3	47	29.2	<.22
09/18/90	12	21	5.64	5.9	33.2	51.2	45.7	28.4	<.22
12/18/90	11	22	5.4	6.01	35.4	56.9	48.3	29.2	<.22
03/12/91	11	24	5.43	5.66	36.9	60.9	53.1	34.5	<.22
06/25/91	12	22	5.41	5.92	33.9	56.7	49.6	30.7	<.22
09/12/91	12	20	5.65	5.96	30.1	54.6	46.7	30.2	<.22
12/17/91	10	20	5.72	6.32	33	53.2	46.3	26.8	0.33
03/17/92	11	24	5.38	6.02	37.4	62.5	49.4	31.3	0.22
06/16/92	12	24	5.47	5.79	35.8	64.4	50.7	32.8	<.22
09/15/92	12	22	5.63	6.69	34.4	56.4	47	28.9	<.22
12/15/92	10	26	5.32	5.59	34.4	70.8	47.8	35.8	0.67
03/29/93	11	28	5.47	6.33	35.4	71.3	44.8	36.3	0.71
09/15/93	12	22	5.16	5.77	31.4	53	45.2	29.7	0.3
12/13/93	10	26	5.1	5.46	35.4	64.1	49.2	31.2	0.9

Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
<0.38	34.5	25.3	205	5.81	89.7	-48.6	-7.4	03/08/93
<0.38	37.9	17.7	117	12.3	87.9	-47.3	-7.47	04/06/93
<0.38	37.6	13.8	82.3	30.6	96.4	n.a.	n.a.	05/11/93
2.61	37.8	4.83	51.2	34.1	118	n.a.	n.a.	06/15/93
n.a.	45.1	2.58	113	17.7	n.a.	n.a.	n.a.	07/13/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/21/93
n.a.	34.5	1.65	115	18.6	n.a.	n.a.	n.a.	10/19/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/16/93
n.a.	37.9	10.6	228	2.75	n.a.	n.a.	n.a.	12/07/93
8.06	27.3	8.21	493	13.2	102	n.a.	n.a.	12/21/93
n.a.	46.8	18.7	43.1	69	106	n.a.	n.a.	03/22/88
n.a.	47.9	16.8	37.6	73	122	n.a.	n.a.	06/14/88
n.a.	38.9	21.6	31.3	67	110	n.a.	n.a.	09/27/88
n.a.	37	19	30	65	115	n.a.	n.a.	12/20/88
n.a.	42.2	21.2	57.9	56	107	n.a.	n.a.	03/16/89
n.a.	45.6	16.7	38.1	75	107	n.a.	n.a.	06/13/89
n.a.	42.3	25.7	32.9	64	116	n.a.	n.a.	09/14/89
n.a.	40.1	23.8	31.6	63	115	n.a.	n.a.	12/18/89
<.38	49.7	26.4	43.3	66	111	n.a.	n.a.	03/13/90
<.38	46.8	24.3	44.9	66	112	-48	n.a.	06/12/90
<.38	40.4	28.9	32.1	65	114	-47.5	-8.25	09/18/90
<.38	43.4	30.6	37.8	70	111	-48	-8.05	12/18/90
<.38	46.3	24.9	55.8	68	106	-47	-7.9	03/12/91
<.38	44.3	33.5	37.3	48	110	-50	-8.1	06/25/91
0.11	39.9	30.2	31.8	64	117	-49.5	-8.1	09/12/91
<.38	37.2	27	25.3	63	113	-48.5	-8.2	12/17/91
<.38	43.4	29.5	50.7	81	109	-47.5	-7.95	03/17/92
0.57	49.4	28.7	50.2	73.4	108	-45	-7.55	06/16/92
0.91	42	24.1	33.7	76.3	116	-47	-7.8	09/15/92
<.38	40.5	15.1	73.6	61.9	99	-42	-6.88	12/15/92
<.38	47.2	3.29	91.8	45.3	91.9	-46.1	-7.68	03/29/93
<.38	40.2	31.2	32.3	68.4	118	n.a.	n.a.	09/15/93
<.38	48	19.8	54.6	61	106	n.a.	n.a.	12/13/93

Table 14. Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93

[L/s, liters per second; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; n.a., not analyzed; ANC, acid-neutralizing capacity]

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
05/04/90	1225	n.d.	11	23	5.71	5.65	42.9	56.5	29.4	22.6
05/08/90	1230	n.d.	12	24	5.7	n.a.	n.a.	n.a.	n.a.	n.a.
05/15/90	1235	n.d.	11.5	27	5.47	n.a.	n.a.	n.a.	n.a.	n.a.
05/23/90	1230	n.d.	11	27	5.04	n.a.	n.a.	n.a.	n.a.	n.a.
05/29/90	1500	n.d.	10.8	29	5.37	n.a.	n.a.	n.a.	n.a.	n.a.
06/05/90	1320	n.d.	11	25	5.43	n.a.	n.a.	n.a.	n.a.	n.a.
06/12/90	1230	n.d.	13	24	5.36	n.a.	n.a.	n.a.	n.a.	n.a.
06/19/90	1115	n.d.	15	22	5.44	5.47	43.3	52.8	26.8	17.5
06/26/90	1155	7.64	14	20	5.42	5.45	38.5	48.4	29.8	14
07/03/90	1340	6.23	16	20	5.36	5.4	35.4	44.5	30	12.1
07/10/90	1140	6.8	18	20	5.38	5.41	34.4	41.9	29.3	11.5
07/17/90	1115	11.9	16.5	21	5.33	5.45	39.9	48.9	29.4	17.3
07/24/90	1215	6.8	17	20	5.33	5.47	38.9	47.4	28.6	14.6
07/31/90	1400	4.81	18	19	5.25	5.55	37.5	46.3	30.4	12.6
08/07/90	1225	5.38	17	21	5.28	5.45	38.9	47.6	29.9	14.2
08/14/90	1215	3.68	17.5	19	5.29	5.47	36.1	44.6	29.9	13.9
08/21/90	1200	4.25	15.5	21	5.17	5.42	38.3	47.2	28.6	16.6
08/28/90	1130	9.63	17.5	25	5.32	5.25	50.4	60.6	29.4	19
09/04/90	1100	6.8	16	22	5.41	5.67	47.1	55.6	28	15.4
09/11/90	1100	6.8	16	20	5.4	5.76	43.3	51.2	29.3	14.2
09/18/90	1115	5.38	12	21	5.41	5.38	37.7	49.4	29.8	13.5
09/25/90	1115	5.38	12	18	5.38	5.31	35.3	46.4	30.1	13.2
10/02/90	1115	3.68	13	18	5.35	5.48	33.9	44	30.8	11.8
10/09/90	1130	2.83	15	18	5.31	5.46	32.5	40.7	30.6	10
10/16/90	1015	9.63	12.5	20	5.23	5.64	40.3	47.8	33	18.4
10/23/90	940	292	12.5	37	4.94	5.23	93.8	81.4	26.1	43
10/24/90	1045	124	11.5	35	4.95	5.13	77.4	79	32.6	29.7
10/30/90	945	31.1	9	28	5.14	5.54	62.9	66.1	32.1	23.8
11/06/90	1230	16.1	11	37	4.42	5.64	49.9	58.9	31.4	26.6
11/13/90	1015	14.7	7	23	5.51	5.46	46.4	58.8	31.4	24
11/20/90	1015	14.7	7	22	5.64	5.7	51.9	59.5	31.8	23.3
11/27/90	1000	10.8	9	n.a.	5.68	5.61	46.9	52.1	30.8	23.8
12/04/90	945	31.1	8	30	5.6	5.85	63.9	70.7	31.6	36.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
3.34	<0.38	36.9	24.1	97.4	7	82.2	n.a.	n.a.	05/04/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/08/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/15/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/23/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/29/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-48	n.a.	06/05/90
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-47.5	n.a.	06/12/90
5.11	<.38	34.1	18.9	99.6	7	85.1	-46.5	n.a.	06/19/90
4.45	<.38	34.6	12.6	87.9	10	91.1	-47.5	n.a.	06/26/90
4.45	<.38	34.4	11.4	83	8	94.3	-48	n.a.	07/03/90
4.56	<.38	34	10.9	79.4	10	96.5	-48	n.a.	07/10/90
5	<.38	34.1	23.4	84.2	7	94	-47	n.a.	07/17/90
4.56	<.38	34.6	17.2	84.8	10	95.4	-46.5	n.a.	07/24/90
4.67	<.38	36.3	14.3	85.6	6	93.6	-48	n.a.	07/31/90
5.34	<.38	35.4	16.8	83.5	7	93.3	-46.5	n.a.	08/07/90
4.78	<.38	35.8	12.8	81.1	6	95.8	-48	n.a.	08/14/90
5.11	<.38	34	16.9	85.9	<4	n.a.	-47	n.a.	08/21/90
4.89	<.38	36.8	37.8	99.2	6	n.a.	-45.5	n.a.	08/28/90
4.23	<.38	38.2	22.4	96	7	n.a.	-48	-8	09/04/90
3.89	<.38	37.7	17.4	94.8	7	91.8	-46.5	-7.95	09/11/90
4.23	<.38	36.8	15.4	91.6	6	91.5	-47.5	-7.95	09/18/90
4.23	<.38	35.2	14.2	87	<4	91.5	-47.5	-7.95	09/25/90
4.34	<.38	36.6	10.7	84.7	<4	95.8	-49	-8.05	10/02/90
4.34	<.38	35	9.08	75	5	96.8	-49	-8.15	10/09/90
5.23	<.38	39.6	15.3	77.3	7	93.6	-44	-7.6	10/16/90
31.6	<.38	40.6	63.4	154	6	54.8	-25.5	-5.65	10/23/90
15.8	<.38	42.6	90.7	117	7	81.5	-40	-7	10/24/90
9.45	<.38	39.1	46.6	105	<4	82.2	-44	-7.65	10/30/90
6.12	<.38	38.5	25.8	97.4	<4	84.7	-46	-7.7	11/06/90
5.06	<.38	36.4	26	92.3	7	84.4	-46	-7.75	11/13/90
4.23	<.38	39.7	28.6	96.7	13	84.4	-47.5	-7.75	11/20/90
3.22	<.38	37.6	25.6	93.1	12	86.2	-45.5	-7.85	11/27/90
6.45	<.38	41.5	37.5	124	13	75.8	-37	-7.1	12/04/90

Table 14. Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
12/11/90	1005	23.8	6	25	5.66	5.91	63.4	61.4	31.8	24.6
12/18/90	1015	21.5	7	25	5.6	5.64	57.4	67.7	29.5	26.8
12/26/90	1300	34	5.5	31	5.55	5.76	61.4	70	31.1	25.6
01/02/91	1030	51	6	28	5.44	5.48	60.9	71.8	31.5	26.3
01/08/91	1215	34	4.5	27	5.35	5.64	55.9	68.2	30.9	25.3
01/15/91	1015	34	6	26	5.64	5.77	59.4	69.2	33.4	28.1
01/22/91	1030	65.1	3.5	28	5.28	5.65	61.4	71.4	31.8	25.3
01/29/91	1015	31.1	5	25	5.48	5.72	66.4	64.1	32	25.6
02/05/91	1000	19.5	6.5	24	5.4	5.51	52.9	60.7	31.4	25.3
02/12/91	930	16.1	3	24	5.59	5.81	55.4	58.6	31.2	23.8
02/19/91	1015	16.1	5	25	5.48	5.73	58.9	61.8	30.4	24.3
02/26/91	1045	16.1	5	24	5.52	5.92	55.4	60.8	31.4	24.3
03/05/91	1015	39.6	6.5	27	5.52	5.55	58.4	71.2	32	28.4
03/12/91	1030	26	4.5	26	5.48	5.76	61.9	66.4	32.5	27.1
03/19/91	1000	19.5	7	26	5.48	5.38	56.4	64.6	31.7	27.9
03/26/91	1015	48.1	8	27	5.37	5.05	60.9	70.2	33.1	28.9
04/02/91	1015	27.2	7	26	5.38	5.59	55.9	66.4	31.3	26.1
04/09/91	1045	22.6	12.5	24	5.5	6	56.4	60.5	30.8	26.3
04/12/91	1015	21.2	8.5	n.a.	5.6	n.a.	n.a.	n.a.	n.a.	n.a.
04/16/91	1315	22.6	11	25	5.53	5.3	52.4	63.6	31.3	27.1
04/23/91	1015	24.1	8.5	25	5.57	5.37	54.9	67.4	32	26.6
04/29/91	930	22.6	11	25	5.58	5.55	59.4	65.8	33.1	26.1
05/07/91	1030	19.5	11	24	5.56	5.55	50.9	61.3	30.3	23
05/14/91	1200	15	14.5	22	5.48	5.51	44.4	57.3	31.3	20.7
05/21/91	1015	11.9	12.5	21	5.5	5.69	44.9	56.1	31.5	18.9
05/28/91	1045	7.36	16.5	19	5.56	5.8	39.4	48.9	31.6	18.4
06/04/91	1000	6.23	16	18	5.49	5.68	37.4	45.9	30.9	13.3
06/11/91	1045	3.96	15.5	18	5.35	5.54	35.4	43.1	31.2	10.2
06/18/91	1140	16.4	17	23	5.36	5.6	48.9	54.8	28.7	30.4
06/25/91	1030	3.96	15.5	16	5.32	6.31	31.9	37.7	31.5	12
07/02/91	1200	3.11	18	17	5.29	6.06	32.4	36.5	32.7	10.7
07/09/91	1130	3.11	18	15	5.44	6.06	27.4	33.1	31.8	12.5
07/17/91	1300	2.55	18	16	5.42	6.02	25.4	31.7	31.2	11.2
07/23/91	1000	1.98	20.5	16	5.42	5.03	22.5	30.9	29.5	8.3
07/30/91	1100	1.98	18	16	5.36	5.48	21.7	31.8	29.4	10.2

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
2	<.38	40.1	40.9	101	<4	84	-44	-7.75	12/11/90
5.45	<.38	38.9	38.9	112	<4	79	-45	-7.8	12/18/90
4	<.38	41.7	54	107	<4	87.6	-44	-7.6	12/26/90
6.12	<.38	40.6	56.4	106	<4	84.7	-44	-7.55	01/02/91
5.67	<.38	40.6	47.2	106	<4	84.7	-45	-7.7	01/08/91
2.34	<.38	41.1	48.6	104	<4	87.2	-45	-7.6	01/15/91
8.12	<.38	41.9	53.5	110	<4	82.1	-44.5	-7.5	01/22/91
5.56	<.38	40	40.9	98	<4	81	-45.5	-7.6	01/29/91
5	<.38	38.6	38.9	92.6	<4	82.2	-44.5	-7.65	02/05/91
4.23	<.38	36.8	35.5	87.2	<4	81.4	-44.5	-7.7	02/12/91
4.34	<.38	38.2	37.9	96.6	<4	81.5	-44	-7.7	02/19/91
3.89	<.38	38.1	38.4	92.3	<4	82.5	-44	-7.7	02/26/91
5.67	<.38	38.8	49.9	112	<4	80.1	-43.5	-7.55	03/05/91
4.67	<.38	39.1	45.9	103	12	83.5	-44	-7.5	03/12/91
4.56	<.38	38.9	42	105	20	79.8	-44.5	-7.7	03/19/91
5.56	<.38	39.2	54.6	109	12	80.9	-43.5	-7.55	03/26/91
5.34	<.38	39.7	45.5	106	<4	78.4	-45.5	-7.55	04/02/91
3.78	<.38	38.6	39.5	99.7	<4	78.4	-44.5	-7.7	04/09/91
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/12/91
4.34	<.38	38.2	40.8	105	<4	81.8	-44.5	-7.7	04/16/91
4.45	<.38	39.1	41.7	107	<4	82.1	-43	-7.55	04/23/91
3.78	<.38	40.3	41.3	106	<4	81.1	-43.5	-7.55	04/29/91
3.56	<.38	39.4	32	102	<4	81	-43.5	-7.55	05/07/91
3.22	<.38	39.4	26.8	96.9	<4	83.8	-44.5	-7.75	05/14/91
3.78	<.38	38.1	19.3	91.4	11	83.5	-43	-7.75	05/21/91
3.56	<.38	38.2	8.87	88.7	10	89	-47	-7.85	05/28/91
3.78	<.38	37.7	11.8	84.1	<4	87	-44	-7.9	06/04/91
4.45	<.38	36.8	13	78.7	<4	90.5	-44.5	-7.9	06/11/91
8.45	<.38	32	23.8	104	7	67.2	-39.5	-7.15	06/18/91
4.56	<.38	36	5.09	75.3	8	92.8	-46.5	-7.85	06/25/91
4.78	<.38	35.7	9.78	68.5	7	96.5	-47	-8	07/02/91
4.45	<.38	35.9	2.91	68.2	5	98.4	-47.5	-8	07/09/91
4.34	<.38	36.8	2.55	65.6	9	104	-46.5	-7.95	07/17/91
2.11	0.39	37.3	7.17	61.5	5	97.9	-46.5	-8.05	07/23/91
1.89	0.79	36.6	6.74	57.4	5	101	-46.5	-8	07/30/91

Table 14. Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93–Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
08/06/91	945	1.42	17	16	5.3	5.35	23.6	31.7	32.5	11.1
08/13/91	1200	1.42	17.5	17	5.32	5.32	24.5	32.7	29.1	9.08
08/20/91	1100	3.4	18.5	21	5.03	5.41	35	45	30.8	20.7
08/27/91	1400	1.13	18.5	16	5.32	5.67	23.1	32.4	30.6	7.21
09/03/91	1030	1.13	16	15	5.27	5	24.3	31.8	31	6.47
09/10/91	1045	1.13	17	16	5.2	5.35	23.7	31.2	31.4	10.1
09/12/91	1155	1.13	16.5	15	5.26	5.18	22.6	30	30.6	8.8
09/17/91	1120	1.13	19	15	5.64	5.15	22.1	28.2	31	7.24
09/24/91	1045	1.13	14	15	5.28	5.22	24.2	30	29.2	7.83
10/01/91	1005	1.13	13	14	5.26	5.13	23.5	31.3	31.6	7.3
10/08/91	1050	1.13	11	16	5.26	5.22	26.2	32.6	30.2	5.98
10/15/91	1015	1.13	11	14	5.27	4.99	21	28.2	29.4	5.7
10/22/91	1030	1.13	8.5	15	5.32	5.35	21.7	29	29.9	5.24
10/29/91	935	1.13	10.5	16	5.3	5.63	25.5	30.4	31	7.67
11/05/91	940	1.42	6.5	14	5.3	5.59	25	30.1	30.2	8.7
11/12/91	1025	1.32	7	16	5.49	6.22	25.2	33.2	30.8	22
11/19/91	1050	1.13	8	16	5.6	5.63	24.5	32.6	32.6	13.9
11/26/91	1135	2.55	5.5	16	5.71	5.78	26.5	40.2	32.4	21.1
12/03/91	1010	11.9	6.5	25	5.64	5.85	53.6	70.3	34.3	36.4
12/10/91	1125	3.96	8	20	5.78	5.72	38.9	51.4	33.8	26.7
12/17/91	1000	3.11	3	19	5.87	6.57	35.9	43.4	33.4	19.8
12/23/91	1030	2.83	3	19	5.64	5.66	34.9	45.7	33.9	20.5
12/30/91	1030	3.96	4	22	5.63	5.43	44.3	56.2	32.8	23.8
01/07/92	1045	3.96	4	21	5.58	5.96	43.1	54.7	33.5	22.7
01/14/92	930	6.23	6.5	23	5.7	5.8	46.5	49.4	28.3	24.3
01/21/92	1020	4.53	0.5	22	5.75	6.48	49.2	55.3	31.8	21.5
01/28/92	1120	3.96	2	23	5.71	6.4	47.5	57.9	30.3	22.1
02/04/92	1015	3.96	2	23	5.8	6.29	48.3	60.1	32	22.9
02/11/92	955	3.96	0.5	23	5.72	5.82	48.7	60.1	30.8	22.2
02/18/92	1030	7.36	3.5	26	5.65	6	58.6	77.3	32.4	28.2
02/25/92	1145	10.2	5.4	27	5.59	5.78	61.3	75.7	31	29.8
03/03/92	1010	17	7	26	5.72	5.48	60.2	77.2	32.6	27.4
03/10/92	1020	38.7	9	29	5.34	5.31	67.7	79.6	32.4	30.2
03/17/92	1425	27.6	5	27	5.54	5.3	61.4	75.9	31.1	27.3
03/24/92	1020	21.2	4	26	5.5	5.45	60.8	67.1	30.5	25.3

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
2.11	1.47	38.6	7.8	58.5	4	106	-46.5	-8.05	08/06/91
2.11	0.25	37.2	8.75	59.1	<4	107	-48.5	-7.95	08/13/91
3	<.38	30.8	23.6	84.2	5	76.9	-47	-8.05	08/20/91
0.33	<.38	34.3	7.98	58.6	<4	96.8	-46	-8.05	08/27/91
2.11	1.25	35.9	7.89	58.3	<4	94.1	-47	-8.1	09/03/91
4.67	0.4	35.5	8.57	61.4	19	110	-48	-8.05	09/10/91
4.45	<.38	34.4	7.01	57.3	<4	109	-46	-8	09/12/91
2.7	0.5	34.4	8.17	56	<4	96.1	-47.5	-7.95	09/17/91
2.6	1.15	33.1	7.91	62.1	4	91.7	-45.5	-7.95	09/24/91
3.89	0.07	31.8	7.28	57.7	5	96.2	-46	-8.05	10/01/91
4.78	<.38	34	6.63	64.3	7	97.9	-47.5	-8.15	10/08/91
2.22	1.11	32.5	6.72	58.9	<4	90	-48	-8.1	10/15/91
2.34	0.9	32.5	6.09	61.1	7	87	-47	-7.8	10/22/91
4.45	0.07	35.3	3.09	63.1	<4	106	-48	-8.15	10/29/91
4	<.38	36.4	2.28	65.5	5	102	-48	-8.15	11/05/91
4	0.14	35.9	0.4	71.9	4	101	-48.5	-8.15	11/12/91
2.11	<.38	33	<.45	60.9	7	96.7	-48.5	-8.1	11/19/91
2.45	0.14	37.6	2.85	75	5	96.3	-47	-7.8	11/26/91
8.5	0.54	41.4	7.35	120	6	84	-46.5	-7.85	12/03/91
5.6	0.43	33.7	8.12	82.6	10	90.2	-47.5	-8	12/10/91
2.56	0.04	42.2	6.19	71	17	91.5	-48.5	-7.9	12/17/91
2.78	0.11	87.7	9.58	71.5	8	89.4	-47.5	-8.05	12/23/91
3.11	0.25	50.7	9.64	101	10	88.4	-47.5	-8.05	12/30/91
2.56	<.38	35.9	12.5	87.3	7	90	n.a.	n.a.	01/07/92
4.11	<.38	36.7	18.4	103	10	73	n.a.	n.a.	01/14/92
1.45	<.38	39.5	22.1	97.2	17	88.3	n.a.	n.a.	01/21/92
1.67	<.38	38.2	22	98.8	6	86.8	n.a.	n.a.	01/28/92
1.56	<.38	38.9	22.4	101	6	84.2	n.a.	n.a.	02/04/92
1.45	0.11	38.8	23.9	99.8	9	84.9	n.a.	n.a.	02/11/92
2.89	0.29	38.6	28.7	116	8	78.2	-49.5	-8.35	02/18/92
3.34	0.29	39.5	30.9	120	5	82	n.a.	n.a.	02/25/92
2.56	0.47	41.7	34.8	118	<4	82.6	n.a.	n.a.	03/03/92
5.45	0.32	43.1	44.2	125	<4	82.2	-43.5	-7.65	03/10/92
5.11	<.38	38.3	36.4	112	8	80.2	-44	-7.65	03/17/92
4.23	<.38	39.5	33.7	114	8.4	75.9	n..a.	n.a.	03/24/92

Table 14. Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
03/31/92	1215	39.6	9	27	5.36	5.36	60.1	70.6	31.2	28.8
04/06/92	1110	25.5	7	26	5.42	5.61	57.8	67.5	29.2	25
04/13/92	910	19.5	7	24	5.59	5.53	58.2	60.1	29.7	24
04/21/92	900	16.4	10	23	5.51	5.56	50.4	57.8	29.1	24.1
04/23/92	1240	108	12	29	5.11	4.96	63.2	68.4	31.6	31.2
04/28/92	940	34	9.5	26	5.29	5.15	56.4	65.7	28.8	25.3
05/03/92	900	24.1	12.5	24	5.39	n.a.	n.a.	n.a.	n.a.	n.a.
05/12/92	900	19.5	12	23	5.41	5.34	47.7	61.5	29.8	24.2
05/19/92	1000	18.1	12.5	23	5.4	n.a.	n.a.	n.a.	n.a.	n.a.
05/26/92	1140	18.1	10.5	23	5.41	5.07	51	63.3	29.8	21.4
06/02/92	1020	18.1	12.5	23	5.36	n.a.	n.a.	n.a.	n.a.	n.a.
06/09/92	1004	24.1	14	24	5.46	5.25	50.7	66.9	31.4	21.9
06/16/92	940	18.1	13.5	22	5.38	5.76	47.4	57.3	30.4	16.8
06/23/92	1015	16.4	12	20	5.39	n.a.	n.a.	n.a.	n.a.	n.a.
06/30/92	930	10.2	16	19	5.43	5.15	38.3	49.8	31.1	12.6
07/07/92	950	7.36	15.5	18	5.49	n.a.	n.a.	n.a.	n.a.	n.a.
07/14/92	1230	5.38	19	18	5.2	5.21	33.9	42.6	30.6	9.7
07/21/92	1030	4.53	18.5	17	5.28	n.a.	n.a.	n.a.	n.a.	n.a.
07/28/92	940	13.3	17	22	5.16	5.06	44.7	55.9	30.7	17
08/04/92	930	8.78	17	22	5.16	n.a.	n.a.	n.a.	n.a.	n.a.
08/11/92	855	7.36	18	20	5.09	5.43	45.2	46.9	29.5	10.4
08/18/92	945	6.23	16	19	5.17	n.a.	n.a.	n.a.	n.a.	n.a.
08/25/92	1010	4.53	17	19	5.19	5.3	34.4	43.1	27.6	10
09/01/92	955	3.96	15	18	5.22	n.a.	n.a.	n.a.	n.a.	n.a.
09/08/92	1140	4.53	16	19	5.15	5.44	36.8	43.7	27.4	12.3
09/15/92	1005	6.23	14	19	5.25	n.a.	n.a.	n.a.	n.a.	n.a.
09/17/92	913	6.23	16	20	5.25	5.9	34.6	46.2	27.9	10.7
09/22/92	930	5.38	15	20	5.17	5.6	44.2	48.6	31.4	9.28
09/29/92	1050	5.38	14	20	5.18	n.a.	n.a.	n.a.	n.a.	n.a.
10/06/92	915	4.53	9	19	5.15	5.3	39.5	48.4	30.1	7.9
10/13/92	1040	6.23	11	19	5.21	n.a.	n.a.	n.a.	n.a.	n.a.
10/20/92	945	6.23	7	19	5.23	5.28	37.1	50.5	31.2	8.57
10/27/92	1025	6.23	8	18	5.23	n.a.	n.a.	n.a.	n.a.	n.a.
11/03/92	1130	73.6	10	34	4.9	4.86	80.6	80.4	27	31.9
11/10/92	1225	22.1	8	24	5.32	n.a.	n.a.	n.a.	n.a.	n.a.

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
6.23	<.38	38.8	36.5	120	-0.3	76.6	n.a.	n.a.	03/31/92
4.67	0.18	42.5	26.8	103	10	76.1	n.a.	n.a.	04/06/92
3.22	0.75	39	33	110	4	75.9	n.a.	n.a.	04/13/92
2.78	0.57	38.6	25.3	101	2.3	77.9	n.a.	n.a.	04/21/92
11	0.61	38.3	42.6	124	-3.6	79.5	-43.5	-7.7	04/23/92
6.12	0.97	38.3	34.6	113	-3.9	76.9	n.a.	n.a.	04/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/03/92
3.89	<.38	36.8	23.4	109	1.8	72.4	n.a.	n.a.	05/12/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/19/92
5.78	0.18	35.7	24	108	-4.84	78.6	n.a.	n.a.	05/26/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/02/92
4.34	0.07	35.5	16.2	103	-0.8	86.3	n.a.	n.a.	06/09/92
3.34	<.38	38.3	15.4	102	4.71	84.5	n.a.	n.a.	06/16/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/23/92
4.23	<.38	34.7	5.78	91.3	-4	90.9	n.a.	n.a.	06/30/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/07/92
4.56	<.38	35.7	8.07	79.7	-4.45	94.7	n.a.	n.a.	07/14/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/21/92
6.89	<.38	34.4	17.2	96.6	-12.1	89.2	n.a.	n.a.	07/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/04/92
2.67	<.38	35.8	3.28	86	9	92.5	n.a.	n.a.	08/11/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/18/92
4.67	1.34	42.3	6.71	83.4	-7.57	90.9	n.a.	n.a.	08/25/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/01/92
4.22	0.38	34.4	8.54	81.1	-2.7	88.8	n.a.	n.a.	09/08/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/15/92
3.89	<.38	35.7	9.98	84	-1.8	94.8	n.a.	n.a.	09/17/92
<.22	5.34	37.5	0.5	83.9	12.4	97.1	n.a.	n.a.	09/22/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/29/92
11.8	0.11	32	6.16	74.3	11.4	93.4	n.a.	n.a.	10/06/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/13/92
7.56	0.32	36.1	4.48	77	1.2	98.7	n.a.	n.a.	10/20/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/27/92
35.5	2.15	34.4	34.9	157	-17.2	78.3	-37.6	-6.87	11/03/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/10/92

Table 14. Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
11/17/92	1215	23.2	6	24	5.41	5.4	48.9	64.4	31.6	22.8
11/24/92	945	79.3	9	28	5.21	n.a.	n.a.	n.a.	n.a.	n.a.
12/01/92	1050	28.3	7	26	5.24	5.28	53.4	62.1	31	24
12/08/92	1010	17	4	25	5.29	n.a.	n.a.	n.a.	n.a.	n.a.
12/15/92	1210	62.3	6	28	5.11	5.41	60.9	64	31.6	26.3
12/21/92	1220	53.8	7	27	5.11	n.a.	n.a.	n.a.	n.a.	n.a.
12/29/92	1725	25.2	7	26	5.23	5.11	47.4	61.1	30.7	25.3
01/05/93	1230	21.5	9	24	5.41	n.a.	n.a.	n.a.	n.a.	n.a.
01/12/93	1300	19.8	6	26	5.31	5.23	48.9	63.8	31	25.3
01/19/93	945	23.2	4	26	5.38	n.a.	n.a.	n.a.	n.a.	n.a.
01/26/93	1050	23.2	5	25	5.4	5.29	49.9	65.3	31.1	24.3
02/02/93	950	19.8	2	27	5.44	n.a.	n.a.	n.a.	n.a.	n.a.
02/09/93	1200	15.6	2.5	24	5.35	5.26	43.9	59.6	30.8	24
02/18/93	1000	14.2	1	24	5.35	n.a.	n.a.	n.a.	n.a.	n.a.
02/23/93	1415	13	3	23	5.53	5.43	45.4	59.4	28.2	22.8
03/02/93	1030	11.9	7	25	5.49	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	1259	48.1	7	31	5.35	5.31	60.9	79	29.9	28.9
03/17/93	1315	45.3	5	28	5.33	n.a.	n.a.	n.a.	n.a.	n.a.
03/23/93	1100	62.3	7	32	5.2	5.15	61.9	79.8	28.9	28.1
03/24/93	1325	190	7.5	34	5.11	5.18	66.4	78.2	25.6	30.7
03/29/93	1454	311	9	31	4.98	n.a.	n.a.	n.a.	n.a.	n.a.
03/30/93	1245	156	9.5	n.a.	5.05	n.a.	n.a.	n.a.	n.a.	n.a.
04/06/93	1015	62.3	8	28	5.22	5.34	48.9	59.3	29.1	26.1
04/13/93	1020	48.1	9	27	5.17	n.a.	n.a.	n.a.	n.a.	n.a.
04/20/93	1103	53.8	12	26	5.35	5.42	48.9	62.6	29.1	26.9
04/27/93	1055	45.3	9.5	26	5.11	n.a.	n.a.	n.a.	n.a.	n.a.
05/04/93	920	28.3	12	25	5.25	5.52	48.4	55	28.4	23
05/11/93	1400	19.8	14	24	5.35	n.a.	n.a.	n.a.	n.a.	n.a.
05/18/93	815	17	12	23	5.27	5.32	43.4	52.4	28.3	17.9
05/25/93	950	13	13	22	5.3	n.a.	n.a.	n.a.	n.a.	n.a.
06/01/93	935	13	12.5	21	5.34	5.38	40.9	47	27.9	16.9
06/08/93	1000	11.9	13	20	5.28	n.a.	n.a.	n.a.	n.a.	n.a.
06/15/93	1035	8.78	15	20	5.26	5.41	38.9	40.4	29.3	12.5
06/22/93	948	8.21	11	19	5.17	n.a.	n.a.	n.a.	n.a.	n.a.
06/29/93	1032	5.66	17	19	5.14	5.08	33.9	41.4	29.8	10.2

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
5	<.38	32.8	21.8	109	-1.75	90.8	-45.1	-7.37	11/17/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/24/92
6.12	<.38	33.4	29.5	110	-6.37	83.8	-44.2	-7.35	12/01/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/08/92
10.8	<.38	43.2	32.6	117	-2.5	81.2	-42.7	-7.06	12/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/21/92
8.23	<.38	31.2	27.6	107	-10.1	80.8	n.a.	n.a.	12/29/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	01/05/93
2.48	<.38	36.7	27.8	110	-3.97	83	n.a.	n.a.	01/12/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	01/19/93
5.67	<.38	37.1	28.5	109	-4.14	84	n.a.	n.a.	01/26/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/02/93
4.56	<.38	36.1	25.7	100	-7.28	83.7	n.a.	n.a.	02/09/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/18/93
4.11	<.38	34.1	23.4	92.6	0.24	80.5	n.a.	n.a.	02/23/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/02/93
9.12	<.38	35.6	37.2	132	-2.5	79.7	n.a.	n.a.	03/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/17/93
12.1	<.38	34.3	39.2	139	-4.12	74.1	n.a.	n.a.	03/23/93
17.6	<.38	30.5	38.5	151	-3.7	66.9	n.a.	n.a.	03/24/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/29/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/30/93
8.45	<.38	32.9	26.2	114	-1.67	74.8	n.a.	n.a.	04/06/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/13/93
6.56	<.38	31.2	22.7	113	-1.11	74.1	n.a.	n.a.	04/20/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/27/93
4.78	<.38	34.1	22.6	113	4.92	78.3	n.a.	n.a.	05/04/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/11/93
4.56	<.38	33.5	17.3	104	4.93	85.1	n.a.	n.a.	05/18/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/25/93
4.67	<.38	33	10	98.7	6.95	83.7	n.a.	n.a.	06/01/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/08/93
3.89	<.38	33.3	7.24	87.4	4.95	89	n.a.	n.a.	06/15/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/22/93
5.34	<.38	32.3	8.53	77.6	-6.04	92.9	n.a.	n.a.	06/29/93

Table 14. Chemical analyses of streamwater collected weekly and biweekly from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
07/06/93	1550	4.81	19	19	5.01	n.a.	n.a.	n.a.	n.a.	n.a.
07/13/93	930	3.4	19	18	5.1	5.1	27	34.6	31.7	10.7
07/20/93	1630	3.54	19	18	5.12	n.a.	n.a.	n.a.	n.a.	n.a.
07/27/93	1030	3.91	19	18	4.94	5.28	24.5	32.5	29.8	7.7
08/03/93	1007	3.11	19	18	5.14	n.a.	n.a.	n.a.	n.a.	n.a.
08/10/93	1045	2.83	18	17	5.06	5.36	28.4	32.3	30.8	9.21
08/17/93	1125	1.98	19	17	5.23	n.a.	n.a.	n.a.	n.a.	n.a.
08/24/93	1330	1.7	18.5	16	5.12	5.34	24	30.4	30.1	8.95
08/31/93	1130	1.42	19	17	5.43	n.a.	n.a.	n.a.	n.a.	n.a.
09/07/93	1030	1.98	18	17	5.3	5.41	27	30.9	29.8	10.3
09/14/93	1040	2.26	16.5	16	4.75	n.a.	n.a.	n.a.	n.a.	n.a.
09/15/93	1317	2.26	18	17	4.53	n.a.	n.a.	n.a.	n.a.	n.a.
09/21/93	1140	2.26	14	16	3.87	5.44	26	30.5	30.2	10.7
09/28/93	1107	2.26	14	18	4.47	n.a.	n.a.	n.a.	n.a.	n.a.
10/05/93	957	2.26	12	16	4.72	5.36	25.5	32.9	31.1	9.16
10/12/93	1050	2.83	10	20	4.84	n.a.	n.a.	n.a.	n.a.	n.a.
10/19/93	1000	2.26	11	15	4.55	5.41	23	30.2	31.2	8.44
10/26/93	1340	2.26	11	15	4.82	n.a.	n.a.	n.a.	n.a.	n.a.
11/02/93	1730	2.83	7	16	5.13	5.38	25.4	36.2	30.1	17.7
11/09/93	1322	2.83	6.5	17	5.05	n.a.	n.a.	n.a.	n.a.	n.a.
11/16/93	1200	2.26	10	17	5.45	5.75	25	35.3	30.5	18.7
11/23/93	1147	2.83	6	17	5.75	n.a.	n.a.	n.a.	n.a.	n.a.
11/30/93	1300	45.3	7	29	5.07	5.08	60.9	67.3	28.1	25.8
12/07/93	1302	59.5	8	30	4.98	n.a.	n.a.	n.a.	n.a.	n.a.
12/14/93	1155	25.2	6	27	4.49	5.14	52.4	63.1	27.5	23.5
12/21/93	1426	18.4	5	25	4.64	n.a.	n.a.	n.a.	n.a.	n.a.
12/29/93	1415	15.6	0.5	25	5.34	5.18	44.9	58.2	29.5	22.2

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/06/93
5.01	<.38	33.1	10.5	72.2	-3.72	102	n.a.	n.a.	07/13/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/20/93
5.11	<.38	34.1	9.21	67.7	-2.55	104	n.a.	n.a.	07/27/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/03/93
5.23	<.38	32.1	5.09	62.9	-0.47	104	n.a.	n.a.	08/10/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/17/93
5.36	<.38	32.9	5.69	62.8	0.98	110	n.a.	n.a.	08/24/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/31/93
5.74	<.38	31.5	1.7	66.1	4.39	109	n.a.	n.a.	09/07/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/14/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/15/93
4.58	<.38	31.7	3.48	65.7	6.79	103	n.a.	n.a.	09/21/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/28/93
4.61	<.38	31.8	6.13	65.3	6.74	102	n.a.	n.a.	10/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/12/93
4.45	<.38	31.7	1.96	63.6	5.39	102	n.a.	n.a.	10/19/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/26/93
4.26	<.38	35.5	0.6	78	7.28	98.6	n.a.	n.a.	11/02/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/09/93
3.56	<.38	32.8	nd	70.3	13.7	99	n.a.	n.a.	11/16/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/23/93
11.5	<.38	33.1	23.4	132	-4.43	82.6	n.a.	n.a.	11/30/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/07/93
9.12	<.38	35.6	19.1	128	-2.33	80.8	n.a.	n.a.	12/14/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/21/93
6.45	<.38	32.9	17.6	111	-0.08	83	n.a.	n.a.	12/29/93

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93

[L/s, liters per second; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; n.a., not analyzed; ANC, acid-neutralizing capacity]

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
08/05/90	2038	7.64	27	5.12	5.28	48	53	30.5	27.1
08/05/90	2108	10.7	26	5.12	5.47	48.4	56.2	29.7	23.1
08/05/90	2308	7.64	26	5.22	5.62	46.8	56.4	30.4	18
08/06/90	108	6.82	24	5.15	5.58	44.8	54.4	30.8	16.1
08/06/90	1349	8.58	24	5.13	5.4	40.3	46.7	28.1	19.7
08/06/90	1413	11.9	25	5.18	5.53	41.3	48	27.4	20.5
08/06/90	1613	13.2	24	5.15	5.56	48.8	58	29	21.1
08/06/90	1813	8.58	25	5.18	5.58	49.1	56.7	30.2	21.6
08/13/90	1818	5.38	24	5.18	5.54	42.1	45.1	27.6	32.7
08/13/90	2018	6.82	22	5.24	5.62	39.9	48.7	30.1	17.3
08/13/90	2218	5.38	21	5.13	5.64	38.6	48	30.8	17
08/14/90	18	5.38	21	5.19	5.63	37.3	47.1	30.9	17.1
08/14/90	218	5.38	20	5.26	5.61	36.1	45.7	31.3	15.8
08/14/90	418	5.38	20	5.28	5.52	35.9	45.9	30.7	15.5
08/14/90	618	4.76	20	5.28	5.56	35.7	45.5	31.1	15.9
08/14/90	818	4.76	20	5.33	5.58	36.5	45.5	30.4	16.3
08/14/90	1018	4.76	19	5.25	5.67	34.8	44.8	30.5	15.2
08/20/90	524	11.9	26	5.18	5.3	49.9	56.8	28	23.5
08/20/90	612	16.2	26	5.14	5.17	54.9	61.8	26.8	25.4
08/20/90	812	16.2	28	5.14	5.06	60.9	68.8	27.2	26.1
08/20/90	1012	11.9	29	5.13	5.14	58.4	68.2	28.1	24.5
08/22/90	2146	14.6	27	5	5.32	59.4	66.7	28.5	24.9
08/22/90	2317	19.6	29	5.08	5.35	59.9	68.3	27.4	25.8
08/23/90	117	23.8	31	5.08	5.25	66.9	76.4	28.7	28.1
08/23/90	317	19.6	32	5.12	5.22	68.4	79.3	29.8	27.6
08/23/90	517	17.8	31	5.08	5.26	65.4	76.7	28	26.1
10/11/90	506	7.64	25	5.11	5.29	42.9	48.7	39.4	23.9
10/11/90	533	9.57	25	5.12	5.28	41.8	49.7	41.1	24.7
10/11/90	611	11.9	26	5.18	5.31	44.5	52.8	43.5	27.6
10/11/90	700	14.6	26	5.11	5.25	51.9	59	43.9	29.4
10/11/90	742	17.8	28	5.16	5.29	53.9	63.1	44.4	30.9
10/11/90	942	19.6	31	5.06	5.25	58.4	68.4	43.5	32.7

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
9.12	<0.38	38.2	26.6	90	7	86.5	-44	n.a.	08/05/90
9.12	<0.38	34.3	30	91.6	7	81.5	-42	n.a.	08/05/90
31.5	<0.38	32.8	28.3	79.1	6	87.2	-45	n.a.	08/05/90
6.12	<0.38	36	25.1	83.7	7	91.1	-46	n.a.	08/06/90
8.01	<0.38	33.4	16.6	78.4	6	84	-46	n.a.	08/06/90
9.12	<0.38	28.8	18.7	73.7	7	78	-44.5	n.a.	08/06/90
9.01	<0.38	28.4	31	75.4	6	79	-46.5	n.a.	08/06/90
7.34	<0.38	31.6	29.3	75.6	5	83.7	-44	n.a.	08/06/90
9.01	<0.38	39.6	13.2	87.4	6	82.9	-43.5	n.a.	08/13/90
6.45	<0.38	33.4	19.2	84	5	86.9	-44.5	n.a.	08/13/90
6	<0.38	32.8	16.7	76	6	89.4	-46.5	n.a.	08/13/90
5.78	<0.38	33.8	15.3	75.7	6	92.2	-48	n.a.	08/14/90
5.56	<0.38	33.7	14.4	76.2	6	92.2	-46.5	n.a.	08/14/90
5	<0.38	34	13.8	75.5	6	94.7	-48	n.a.	08/14/90
5.23	<0.38	37	14.1	81	6	95.1	-47	n.a.	08/14/90
5	<0.38	38.2	13.7	80.9	6	92.9	-47	n.a.	08/14/90
4.78	<0.38	37.2	15.3	80.3	6	93.3	-47.5	n.a.	08/14/90
9.56	<0.38	27.3	34.8	91.1	<4	77.3	-44.5	n.a.	08/20/90
11.8	<0.38	27.3	45.4	102	<4	73.7	-42	n.a.	08/20/90
11.9	<0.38	27.1	56.6	106	11	73.7	-42	n.a.	08/20/90
10.4	<0.38	28.8	56.5	109	6	78	-42	n.a.	08/20/90
9.9	<0.38	29.4	45	110	7	79.4	-43.5	n.a.	08/22/90
11.6	<0.38	23.8	40.4	92.2	6	74	-41	n.a.	08/22/90
13.6	<0.38	26.1	50.5	104	7	76.2	-41	n.a.	08/23/90
12.4	<0.38	26.2	53.1	110	6	77.3	-41.5	n.a.	08/23/90
11.6	<0.38	27.8	53.5	116	10	82.2	-41.5	n.a.	08/23/90
9.12	<0.38	60.2	15.1	83.2	6	86.5	-43.5	-7.4	10/11/90
8.78	<0.38	64.3	14.3	86.9	5	86.5	-42	-7.35	10/11/90
9.12	<0.38	70.8	17.7	87.5	5	82.6	-39.5	-7.15	10/11/90
10.3	<0.38	74	24.5	89.6	7	80.1	-38	-6.9	10/11/90
10.6	<0.38	76.5	29.2	92.2	6	76.5	-35.5	-6.65	10/11/90
12.1	<0.38	76.2	37.9	95.6	5	73.3	-32.5	-6.25	10/11/90

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93–Continued

Sample-collection date	Time	Discharge (L/s)	Specific conduct-ance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
10/11/90	1015	23.8	31	5.07	5.21	66.4	74.8	47	37.6
10/11/90	1129	19.6	32	5.03	5.15	69.4	81.4	45.2	34.8
10/11/90	1215	16.2	31	5.04	5.2	67.9	78.9	43.9	33
10/11/90	1330	13.2	30	5.03	5.21	61.9	75.6	42.6	30.4
10/11/90	1530	11.9	28	5.04	5.22	55.4	69.5	41.3	27.4
10/11/90	1730	10.7	26	5.11	5.23	54.4	65.5	38.7	24.6
10/11/90	1930	11	25	5.16	5.36	50.4	60.9	37.4	22.5
10/11/90	2130	8.58	24	5.17	5.29	46.4	57.7	37	21.2
10/12/90	2327	7.64	21	5.25	5.37	38.9	46.1	34.8	26.8
10/12/90	2336	10.7	20	5.37	5.47	39.4	46.3	35.2	23.5
10/12/90	2352	13.2	20	5.34	5.51	39.9	46.9	37.8	26.3
10/13/90	2	16.2	21	5.37	5.51	38.9	46.5	36.1	27.1
10/13/90	18	19.6	22	5.19	5.47	41.9	49	37.8	28.1
10/13/90	143	23.8	24	5.27	5.38	46.4	54.1	36.5	31.2
10/13/90	149	28.5	23	5.33	5.42	46.4	53.9	34.4	30.4
10/13/90	154	33.9	23	5.32	5.43	47.4	54.1	34.4	32.2
10/13/90	201	43.5	25	5.31	5.41	49.9	57.3	34.4	33.5
10/13/90	331	36.9	30	5.19	5.26	67.9	77.3	36.5	35.3
10/18/90	1400	14.6	22	5.73	5.58	44.4	52	34.4	27.4
10/18/90	1415	19.6	21	5.71	5.64	40.9	50.2	33	30.2
10/18/90	1421	23.8	21	5.71	5.6	42.4	51.1	33.5	30.9
10/18/90	1543	28.5	23	5.67	5.59	47.9	56.1	34.4	31.4
10/18/90	1743	23.8	23	5.63	5.5	50.9	61.4	33.9	28.4
10/18/90	1900	19.6	25	5.6	5.46	50.4	62.3	34.4	28.1
10/18/90	2100	17.8	24	5.61	5.5	49.4	61.3	34.4	26.8
10/18/90	2300	16.2	24	5.61	5.53	48.4	59.6	36.1	24.6
10/19/90	100	16.2	23	5.57	5.47	46.9	58.4	33	23.5
10/23/90	421	21.6	23	5.6	5.55	45.4	57	32	27.1
10/23/90	438	26	22	5.62	5.63	46.4	56.8	31.2	28.1
10/23/90	447	31.1	22	5.6	5.53	45.4	55.8	30	28.4
10/23/90	459	36.9	22	5.56	5.57	46.9	57	28	27.4
10/23/90	540	43.5	22	5.53	5.54	51.4	59	28.1	30.7
10/23/90	600	51.1	23	5.51	5.42	54.4	60.8	27.7	32.5
10/23/90	608	64.4	25	5.46	5.44	56.4	64	27.7	33
10/23/90	619	74.8	26	5.47	5.43	59.9	66.8	27.8	34.5

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
2.61	<0.38	77.4	43.9	98.9	8	71.9	-32.5	-6	10/11/90
2.79	<0.38	77	53.7	105	9	76.2	-32.5	-6.2	10/11/90
2.12	<0.38	75.1	53.1	104	12	80.1	-32.5	-6.35	10/11/90
1.81	<0.38	71.9	48.1	102	9	82.9	-36	-6.5	10/11/90
1.59	<0.38	68.4	38	100	8	84.4	-38.5	-6.7	10/11/90
1.37	<0.38	63.9	31.3	97	10	87.6	-38	-6.9	10/11/90
0.73	<0.38	59.8	25.5	91.5	11	89	-39.5	-7.05	10/11/90
0.93	<0.38	58.1	22.4	93	8	89.7	-39.5	-7.25	10/11/90
0.74	<0.38	52.3	9.89	84.7	7	85.4	-38.5	-7.1	10/12/90
0.51	<0.38	51.4	8	83	8	84.4	-40.5	-7.25	10/12/90
0.49	<0.38	51.3	8.6	83.6	11	79	-38.5	-6.95	10/12/90
0.49	<0.38	49.7	10.6	80.6	8	75.8	-36.5	-6.75	10/13/90
0.73	<0.38	48.7	13.8	79.6	9	73	-35	-6.55	10/13/90
1.02	<0.38	51.2	22.7	87.2	7	70.1	-35	-6.25	10/13/90
0.9	<0.38	50.9	24	86.6	7	65.9	-31	-6	10/13/90
0.98	<0.38	49.6	24.9	86	7	63.7	-31.5	-5.9	10/13/90
1.14	<0.38	52.4	29.1	91.7	7	64.1	-31	-5.9	10/13/90
2.17	<0.38	57.2	52.3	107	6	70.5	-32.5	-5.95	10/13/90
0.29	<0.38	44.4	18.9	88.9	6	82.6	-41	-7.45	10/18/90
0.22	<0.38	41.5	18.2	87.2	<4	77.6	-44	-7.55	10/18/90
0.31	<0.38	40.8	19	86.1	5	77.6	-43.5	-7.55	10/18/90
0.39	<0.38	40.4	23.6	90.1	<4	n.a.	-43	-7.55	10/18/90
0.5	<0.38	42.4	29.8	98	<4	76.5	-42	-7.45	10/18/90
0.52	<0.38	44.6	30.2	100	<4	78.7	-41.5	-7.15	10/18/90
0.39	<0.38	44.8	28.6	99.6	<4	82.6	-42	-7.4	10/18/90
0.34	<0.38	43.5	24.6	97	7	83.7	-43	-7.45	10/18/90
0.4	<0.38	43.1	24.5	96.4	10	86.5	-42.5	-7.5	10/19/90
0.31	<0.38	38.1	23.5	94.3	8	81.5	-41	-7.35	10/23/90
0.23	<0.38	37.3	23.9	91.9	7	76.2	-40	-7.4	10/23/90
0.39	<0.38	36.4	24.4	93.1	10	74	-39.5	-7.15	10/23/90
0.36	<0.38	35.5	24.8	92.5	8	72.6	-39	-7.15	10/23/90
0.59	<0.38	34.7	28.1	95	10	66.9	-37.5	-6.9	10/23/90
1.16	<0.38	34.6	31.1	98.6	8	63.4	-34.5	-6.9	10/23/90
1.13	<0.38	35.7	35.3	104	8	61.6	-35	-6.8	10/23/90
1.25	<0.38	36.4	38.5	107	7	62.7	-34.5	-6.7	10/23/90

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
10/23/90	632	86.6	27	5.46	5.36	62.9	68.9	26.7	34.5
10/23/90	638	107	28	5.49	5.4	65.4	70.6	26.9	35.3
10/23/90	647	122	28	5.5	5.4	65.9	71.3	26.8	35.8
10/23/90	702	140	30	5.44	5.29	70.4	75.6	27.4	37.6
10/23/90	843	159	35	5.33	5.16	79.8	82.2	27.9	40.7
10/23/90	851	181	35	5.31	5.16	83.8	83	27.4	39.6
10/23/90	904	204	35	5.25	5.2	82.8	82.2	26.6	39.4
10/23/90	1001	345	38	4.99	5.12	94.8	83.9	26.7	43.5
10/23/90	1026	385	39	4.95	4.96	96.8	83.9	26.6	45.3
10/23/90	1217	345	41	4.81	4.84	94.3	82.2	25.8	44.2
10/23/90	1221	275	42	4.81	4.79	94.3	82.2	26.2	43.7
10/23/90	1230	245	41	4.81	4.77	95.8	83	26.4	44.5
10/23/90	1330	217	42	4.82	4.78	95.8	84.7	26.7	43
10/23/90	1530	192	42	4.82	4.78	93.8	88	28.6	42.7
10/23/90	1730	192	42	4.84	4.86	93.3	88.8	28.4	39.1
10/23/90	1930	181	41	4.87	4.85	94.8	90.5	30.5	39.4
10/23/90	2130	170	40	4.87	4.87	87.8	88.8	31.4	37.6
10/23/90	2330	159	39	4.91	4.87	84.8	88	31.6	36.1
10/24/90	130	159	38	4.94	4.9	81.8	86.3	32.6	35
10/24/90	330	149	37	4.96	4.93	78.8	83	33	33.8
10/24/90	530	149	36	4.99	4.94	76.8	82.2	33.8	33.2
10/24/90	730	140	35	5.01	4.97	76.8	81.4	33.9	32.5
10/24/90	930	131	35	5.02	4.98	75.3	80.6	34.3	32
10/24/90	1130	131	34	5.05	5.01	72.8	78.9	34.7	32
10/24/90	1330	114	33	5.05	5.02	71.4	77.3	34	31.2
10/24/90	1530	114	32	5.06	5.04	69.4	75.6	33.3	29.9
10/24/90	1730	107	32	5.08	5.04	71.8	78.9	34.4	30.2
10/24/90	1930	107	32	5.1	5.04	72.8	78.9	33	28.9
10/24/90	2130	107	32	5.09	5.05	73.4	78.9	33	28.9
10/24/90	2330	99.7	32	5.09	5.07	71.4	79.8	32.6	28.4
10/25/90	130	99.7	32	5.09	5.08	72.4	78.9	33.8	28.9
11/05/90	2243	19.6	26	5.26	5.75	55.4	60.4	31.6	30.7
11/05/90	2349	23.8	26	5.31	5.54	53.4	63.2	31.1	33.5
11/06/90	149	23.8	25	5.35	5.33	50.4	63	31.1	30.2
11/06/90	349	21.6	24	5.37	5.38	48.4	60.3	30.6	28.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
1.75	<0.38	37	42.8	110	8	60.5	-34	-6.55	10/23/90
1.52	<0.38	36.6	44.6	111	7	61.2	-33	-6.4	10/23/90
1.56	<0.38	36.8	46.9	113	8	59.5	-32.5	-6.45	10/23/90
2.77	<0.38	38.2	52.4	121	10	59.8	-30.5	-6.35	10/23/90
5.3	<0.38	41	59.1	142	8	60.2	-30.5	-5.95	10/23/90
5.49	<0.38	40.3	57.9	142	8	59.5	-29	-5.95	10/23/90
4.87	<0.38	39.1	56.6	139	8	57.7	-28	-5.9	10/23/90
33.5	<0.38	40	62.3	154	8	56.6	-27.5	-5.65	10/23/90
37.7	<0.38	40.9	62.8	166	7	58	-28	-5.55	10/23/90
41.5	<0.38	42.4	62.4	176	8	60.2	-25.5	-5.5	10/23/90
42.4	<0.38	42.4	62.5	177	<4	60.5	-26.5	-5.55	10/23/90
43.2	<0.38	42.5	63.5	178	<4	61.2	-26.5	-5.55	10/23/90
41.4	<0.38	43.2	68	177	7	63.7	-28	-5.65	10/23/90
38.1	<0.38	43.5	77.6	173	<4	66.6	-30	-5.9	10/23/90
33	<0.38	40.3	79.3	146	7	69.8	-32	-6.05	10/23/90
31.1	<0.38	44.9	90.6	157	8	76.2	-34	-6.3	10/23/90
27.9	<0.38	43.9	93.1	150	8	78.7	-35.5	-6.6	10/23/90
25.6	<0.38	43.8	94.2	143	8	82.9	-37	-6.65	10/23/90
23.8	<0.38	44	94.9	133	7	80.8	-38.5	-6.7	10/24/90
22.3	<0.38	43	93.2	125	6	84	-39	-6.9	10/24/90
21.2	<0.38	43.7	105	124	7	87.9	-39.5	-6.95	10/24/90
20.2	<0.38	42.5	90.8	118	7	85.8	-39	-7.05	10/24/90
19.4	<0.38	44.2	93.3	121	7	85.8	-41	-7.05	10/24/90
18.6	<0.38	42.9	90.1	116	6	83.7	-40.5	-7.05	10/24/90
17.4	<0.38	42.8	88.2	114	10	84.4	-40.5	-7.05	10/24/90
16.9	<0.38	42.4	86.2	112	<4	85.1	-41.5	-7.2	10/24/90
17.1	<0.38	43	86.9	112	<4	85.8	-42	-7.15	10/24/90
16.3	<0.38	41.9	84.3	111	7	85.4	-43	-7.15	10/24/90
16.1	<0.38	41.8	83.6	111	6	85.8	-41.5	-7.15	10/24/90
16.2	<0.38	41.8	82.8	112	5	85.1	-41.5	-7.25	10/24/90
16	<0.38	41.3	80.7	111	4	85.8	-41	-7.25	10/25/90
9.34	<0.38	37.8	34.2	101	<4	82.9	-43.5	-7.55	11/05/90
9.23	<0.38	39.6	37.6	106	<4	80.8	-43	-7.45	11/05/90
7.89	<0.38	40.1	36.6	104	<4	79	-43.5	-7.5	11/06/90
7.12	<0.38	39.1	32.6	101	<4	80.8	-45	-7.5	11/06/90

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conduct-ance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
11/06/90	549	21.6	24	5.36	5.27	46.4	60.3	29.7	26.3
11/06/90	749	21.6	23	5.37	5.36	44.9	59.1	31	26.8
11/06/90	949	21.6	23	5.39	5.38	43.4	58.4	30	26.1
12/04/90	345	31.1	25	5.63	5.58	53.9	64	31.6	39.9
12/04/90	421	36.9	25	5.7	5.77	56.4	68	31.6	40.2
12/04/90	621	36.9	28	5.72	5.68	59.4	72.4	31.1	37.8
12/04/90	821	33.9	28	5.72	5.74	58.9	72.4	31.3	37.1
01/11/91	2018	33.9	24	5.47	5.57	52.9	62.7	27.8	24.8
01/11/91	2043	40.1	23	5.44	5.51	48.9	62.1	26.8	24.8
01/11/91	2243	40.1	25	5.43	5.52	56.9	69.3	28.3	26.3
01/12/91	43	36.9	24	5.45	5.54	55.9	69.7	28.4	26.6
01/12/91	443	36.9	26	5.45	5.56	51.4	69.8	28	25.8
01/12/91	843	33.9	26	5.45	5.54	53.9	69.6	29.1	26.8
01/12/91	1243	33.9	26	5.48	5.52	62.4	77.3	32.7	29.9
01/12/91	1643	33.9	27	5.46	5.51	51.4	69.8	29.6	27.4
01/16/91	243	36.9	25	5.59	5.74	59.4	69	32	25.6
01/16/91	443	36.9	26	5.55	5.6	59.4	71.4	31.4	26.3
01/16/91	544	43.5	27	5.52	5.57	59.9	71.5	32.3	27.9
01/16/91	629	51.1	26	5.51	5.53	59.9	71.5	31	28.4
01/16/91	706	59.7	26	5.49	5.51	60.9	71.6	29.7	28.1
01/16/91	906	74.8	26	5.48	5.5	62.9	73.2	29.4	29.2
01/16/91	1106	69.5	27	5.47	5.46	65.9	77.3	29.8	29.9
01/16/91	1306	64.4	28	5.45	5.47	66.9	79.8	30.3	29.7
01/16/91	1506	64.4	26	5.46	5.49	66.9	80.6	30.7	30.2
01/16/91	1706	69.5	30	5.44	5.48	68.4	81.4	31.4	30.7
01/16/91	1844	80.5	29	5.42	5.51	69.4	83	30.3	30.2
01/16/91	2044	86.6	31	5.41	5.44	72.8	86.3	30.4	30.7
01/16/91	2244	86.6	30	5.35	5.48	71.8	88	30	30.4
01/17/91	44	92.9	32	5.37	5.43	73.8	89.6	30.9	30.9
01/17/91	244	99.7	32	5.35	5.41	75.3	91.3	30.2	30.4
01/17/91	444	99.7	32	5.36	5.43	75.3	90.5	31.2	31.2
03/04/91	215	21.6	25	5.81	5.82	58.4	58.7	31	27.1
03/04/91	250	26	26	5.61	5.7	57.4	62.5	30.2	28.4
03/04/91	402	31.1	26	5.54	5.65	54.9	64.3	29.5	28.9
03/04/91	417	36.9	26	5.55	5.68	58.4	65	28.4	28.6

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
6.67	<0.38	39	30.3	101	<4	82.2	-43.5	-7.6	11/06/90
6.67	<0.38	38.4	27.2	107	<4	84.4	-46	-7.65	11/06/90
6.56	<0.38	38.3	29.6	101	<4	81.9	-46	-7.65	11/06/90
9.01	<0.38	39.8	30.7	110	<4	71.2	-38	-6.95	12/04/90
9.67	<0.38	39.2	32.9	115	<4	70.5	-36	-6.95	12/04/90
7.89	<0.38	40.6	44.4	120	<4	73.3	-36.5	-6.95	12/04/90
7.12	<0.38	42.2	40.6	130	<4	75.5	-38.5	-7	12/04/90
5.67	<0.38	35.9	40.4	96.9	<4	75.8	-47.5	-8.15	01/11/91
4.89	<0.38	34.7	45.8	99.3	<4	110	-48	-8.3	01/11/91
6.56	<0.38	34.8	42.4	106	<4	70.8	-49.5	-8.2	01/11/91
6.56	<0.38	35.8	41.9	108	<4	74.4	-49	-8.15	01/12/91
2.67	<0.38	37.4	42.4	111	<4	79	-47.5	-8	01/12/91
4.45	<0.38	38.5	43.3	112	<4	83.3	-48.5	-7.9	01/12/91
8.01	<0.38	39	43.9	114	<4	83.7	-46.5	-7.8	01/12/91
4.34	<0.38	39.2	44.9	115	<4	82.2	-46.5	-7.9	01/12/91
5.67	<0.38	40.5	48.1	104	<4	81.1	-45	-7.65	01/16/91
6.34	<0.38	40.7	51	109	<4	79.9	-45.5	-7.65	01/16/91
7.34	<0.38	40.2	51.1	112	<4	76.4	-43.5	-7.55	01/16/91
8.12	<0.38	39	50	111	<4	72.7	-43	-7.55	01/16/91
8.45	<0.38	37.9	49.4	106	<4	70.6	-43	-7.6	01/16/91
9.78	<0.38	36.4	49.1	112	<4	67.2	-43	-7.6	01/16/91
10.1	<0.38	36.8	50.4	120	<4	70.7	-44	-7.75	01/16/91
10.6	<0.38	37.8	50.9	123	<4	71.7	-44	-7.65	01/16/91
10.7	<0.38	38.5	52.9	125	<4	72.4	-43.5	-7.65	01/16/91
9.9	<0.38	40.3	56.7	131	<4	73.8	-43.5	-7.55	01/16/91
11.3	<0.38	39.8	58.2	129	<4	73.8	-44.5	-7.7	01/16/91
11.8	<0.38	40.4	62.7	132	<4	73.7	-44.5	-7.6	01/16/91
11.9	<0.38	40.7	66.3	133	<4	75.7	-44	-7.55	01/16/91
12.2	<0.38	41.2	69.2	134	<4	75.7	-44.5	-7.5	01/17/91
12	<0.38	42.1	72.3	134	<4	74.9	-43.5	-7.55	01/17/91
12.3	<0.38	42	73.3	133	<4	77.3	-45	-7.4	01/17/91
6.34	<0.38	37.5	36.7	96.4	<4	71	-45.5	-7.6	03/04/91
6.89	<0.38	39	40.4	104	<4	70.3	-43.5	-7.5	03/04/91
7.56	<0.38	37.6	39.4	105	11	67.8	-43.5	-7.65	03/04/91
8.12	<0.38	36.4	38.9	106	<4	66.1	-44	-7.55	03/04/91

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
03/04/91	435	43.5	26	5.53	5.64	56.9	67.4	29	30.2
03/04/91	509	51.1	27	5.53	5.64	59.4	69.3	29.5	31.4
03/04/91	709	51.1	29	5.5	5.58	65.4	78.1	29.8	33
03/04/91	844	43.5	29	5.5	5.56	66.4	78.9	28.8	31.2
03/04/91	1044	40.1	29	5.5	5.56	67.4	78.9	29.4	30.7
03/04/91	1244	36.9	29	5.49	5.57	64.4	78.9	30.1	30.4
03/04/91	1644	36.9	29	5.5	5.6	61.9	78.1	30.8	30.7
03/04/91	2044	36.9	29	5.49	5.56	61.9	77.3	31.3	30.2
03/05/91	244	36.9	28	5.5	5.61	58.4	75.6	31.8	29.2
03/05/91	444	40.1	28	5.51	5.61	57.4	73.2	32.4	29.4
03/05/91	844	40.1	28	5.52	5.64	56.9	72.4	32.2	29.2
03/23/91	943	33.9	26	5.61	5.67	61.4	64.3	29.7	28.9
03/23/91	1016	43.5	26	5.58	5.64	57.9	65.4	29.3	29.7
03/23/91	1038	51.1	26	5.56	5.62	57.4	66.9	28.9	29.9
03/23/91	1059	59.7	26	5.55	5.6	59.4	67.7	27.3	29.4
03/23/91	1259	65.7	30	5.49	5.52	67.9	78.1	28.6	32.7
03/23/91	1459	57.2	30	5.47	5.49	68.4	79.8	29.2	32.2
03/23/91	1900	57.2	30	5.44	5.43	67.4	80.6	30	31.2
03/24/91	301	57.2	30	5.38	5.43	62.4	77.3	31.8	31
03/24/91	701	60.9	30	5.43	5.44	63.9	79	32.3	31
03/24/91	1102	65.7	30	5.48	5.49	61.9	77.3	32.3	30.7
03/24/91	1902	65.7	29	5.51	5.58	61.4	75.7	33.7	30.4
03/24/91	2303	70.7	29	5.54	5.61	59.4	74.8	33	29.9
03/25/91	304	65.7	29	5.54	5.61	60.9	75.7	33.8	29.7
05/06/91	1621	22.6	24	5.49	5.15	45.9	56.2	30.2	27.1
05/06/91	1644	25.6	24	5.6	5.46	45.4	55.8	28	26.1
05/06/91	1824	22.6	25	5.58	5.54	50.4	64.6	29.9	26.6
05/07/91	947	11.9	24	5.59	5.65	50.4	62.8	29.5	23
06/16/91	2033	3.54	26	5.45	5.66	48.9	51.9	34.6	60.4
06/16/91	2056	4.67	30	5.53	5.79	46.4	53.6	33.4	70.1
06/17/91	1726	3.54	18	5.44	5.54	32.4	38.8	32	16.4
06/18/91	351	5.41	23	5.46	5.68	37.9	40.9	28.5	51.4
06/18/91	355	7.42	22	5.47	5.65	38.9	41	27.9	51.2
06/18/91	357	11.9	22	5.44	5.65	39.4	41.7	27.8	49.4
06/18/91	359	15	24	5.45	5.64	39.4	42.1	27.2	56.3

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
9.23	<0.38	35.7	39.1	106	<4	63.4	-44.5	-7.65	03/04/91
10.2	<0.38	35.3	40.6	112	<4	61.6	-45.5	-7.7	03/04/91
10.2	<0.38	35.6	46.2	125	<4	63.4	-46.5	-7.85	03/04/91
8.9	<0.38	36.2	48.5	128	9	65.8	-46.5	-7.8	03/04/91
8.23	<0.38	36.9	48.2	129	<4	67.2	-46	-7.85	03/04/91
7.78	<0.38	37.3	48.1	129	<4	71	-46	-7.8	03/04/91
7.78	<0.38	38.6	49.2	127	<4	73.3	-45.5	-7.65	03/04/91
7.45	<0.38	39.2	51.6	126	<4	75.2	-44.5	-7.7	03/04/91
6.78	<0.38	32.2	40.3	97.4	10	78	-44	-7.5	03/05/91
6.34	<0.38	39.3	49.1	117	10	78.2	-44.5	-7.6	03/05/91
6.23	<0.38	38.8	49.6	114	<4	81.1	-44	-7.6	03/05/91
7.12	<0.38	35.7	41.4	106	11	71.8	-44	-7.55	03/23/91
7.89	<0.38	31	38.4	99.1	12	69.7	-45	-7.55	03/23/91
8.9	<0.38	31.6	40.1	103	11	66.7	n.a.	n.a.	03/23/91
9.9	<0.38	31.8	41.7	110	11	64.3	-46	-7.65	03/23/91
11.1	<0.38	32.7	47.9	124	11	67.1	-44.5	-7.75	03/23/91
10.3	<0.38	29.7	41.9	112	10	66.8	-46	-7.75	03/23/91
9.9	<0.38	36.1	48.9	134	13	71.4	-44.5	-7.65	03/23/91
8.34	<0.38	37.7	51	125	12	74.8	-43.5	-7.55	03/24/91
7.56	<0.38	38.7	54.6	124	12	77.9	-44	-7.5	03/24/91
7.23	<0.38	38.3	54.3	118	13	77.5	-43	-7.55	03/24/91
6.89	<0.38	38.6	55.1	113	<4	80	-43.5	-7.6	03/24/91
6.67	<0.38	39.2	56	111	9	80.1	-43.5	-7.5	03/24/91
6.56	<0.38	38.6	55.4	110	<4	79.8	-44	-7.55	03/25/91
7.89	<0.38	37.8	31.4	96.9	<4	73.3	-42.5	-7.6	05/06/91
5.78	<0.38	35.3	31.8	95.7	<4	69.1	-42	-7.6	05/06/91
5.11	<0.38	33.4	32.4	91.7	<4	73.3	-40	-7.65	05/06/91
3.78	<0.38	36.2	29.9	92.3	<4	80.1	-43	-7.7	05/07/91
19.9	<0.38	41	2.28	95.2	7	91.5	-42	-7.65	06/16/91
20.1	<0.38	39.4	2.91	92.2	7	83.3	-42.5	-7.6	06/16/91
5.56	<0.38	38.9	1.77	79	<4	90.9	-44.5	-7.85	06/17/91
11.1	<0.38	37.1	2.35	91.8	6	78.4	-41	-7.4	06/18/91
11.8	<0.38	35	5.88	90.8	6	72.6	-40	-7.2	06/18/91
12.6	<0.38	32.7	8.03	90.1	6	72.2	-40	-7.2	06/18/91
14.8	<0.38	35	10.6	94.4	6	69.4	-40	-7.25	06/18/91

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
06/18/91	401	18.1	25	5.43	5.69	40.4	43.8	27.1	65.2
06/18/91	404	22.6	25	5.51	5.65	39.4	42.8	26.6	67.5
06/18/91	407	27.2	25	5.55	5.66	39.9	43.7	25.8	65.2
06/18/91	410	29.7	24	5.59	5.85	38.9	44	25.9	67.8
06/18/91	415	34.2	25	5.57	5.79	42.9	45.8	25.8	73.4
06/18/91	418	39.8	27	5.55	5.67	45.4	48.8	24.6	76
06/18/91	420	53.8	28	5.55	5.78	45.4	50.1	25.5	80
06/18/91	425	60.9	28	5.56	5.63	48.4	52.4	25.3	81.3
06/18/91	427	70.7	28	5.52	5.57	49.9	53	24.4	77.7
06/18/91	432	94.4	29	5.53	5.6	51.9	54.3	24.2	77
06/18/91	435	116	28	5.52	5.65	52.4	54.9	24.2	76.7
06/18/91	438	142	29	5.51	5.55	51.9	53.1	22.9	72.4
06/18/91	441	161	28	5.52	5.58	51.9	53.9	23.9	73.4
06/18/91	512	142	30	5.43	5.41	59.4	63.2	24.1	61.6
06/18/91	523	124	30	5.38	5.49	62.9	65.2	24.6	58.6
06/18/91	531	101	29	5.38	5.43	63.9	65.8	25	56.8
06/18/91	541	88	30	5.37	5.48	64.4	67.6	26.2	55.8
07/02/91	1452	4.08	38	4.67	5.34	40	43.3	33.2	56.4
07/02/91	1701	6.23	31	5.32	5.6	41.9	38.8	31.4	60.1
07/02/91	1704	8.78	29	5.41	5.65	38.9	40.1	30.5	54.5
07/02/91	1708	11.9	29	5.4	5.67	39.4	42.9	30.8	55.2
07/02/91	1718	15	29	5.45	5.66	38.4	43.1	31.3	59.8
07/02/91	1921	11.9	22	5.68	5.83	31.9	40.7	32.8	38.4
07/02/91	2026	8.78	n.a.	5.75	5.74	32.4	40.8	32.9	33.5
07/02/91	2350	6.23	n.a.	5.82	5.8	30.4	37.1	32.4	26.8
08/09/91	1853	2.26	25	5.48	5.8	39.4	31.2	27.4	41.7
08/09/91	1859	3.17	23	5.55	5.75	32.1	31.7	25.8	38.8
08/09/91	1902	4.67	23	5.54	5.75	34.7	33.6	24.6	37.9
08/09/91	1904	7.42	24	5.53	5.78	37.6	37.2	23.9	39.5
08/09/91	1906	11.9	25	5.49	5.64	38.8	37.8	25.1	41.3
08/09/91	1908	16.5	25	5.51	5.59	38.9	40.2	24.7	40.2
08/09/91	1910	19.6	26	5.53	5.65	39.1	41.5	25	41.2
08/09/91	1913	24.1	27	5.52	5.54	38.5	41.9	24.7	42.6
08/09/91	1951	21.2	29	5.51	5.51	43.1	51.3	29.4	41.8
08/09/91	2021	18.1	27	5.5	5.46	44.1	52.7	31.4	36.7

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
16.6	<0.38	32.7	11.1	97.8	7	66.3	-39	-7.2	06/18/91
16.8	<0.38	25.3	10.1	79.1	8	61.1	-39	-7.1	06/18/91
18.8	<0.38	28.7	8.34	90.7	9	55.9	-38	-7.1	06/18/91
18.9	<0.38	29.3	7.61	93.3	6	57.6	-38	-7	06/18/91
20.3	<0.38	28.8	12.5	96.7	6	53.2	-37.5	-6.85	06/18/91
23	<0.38	28.8	16.1	95.9	<4	50.2	-37	-6.75	06/18/91
22.7	<0.38	27.1	19.5	100	<4	49.9	-36.5	-6.75	06/18/91
24.5	<0.38	27	20.5	101	<4	46.8	-36	-6.8	06/18/91
25.2	<0.38	22.2	18	83.3	<4	44.9	-36	-6.85	06/18/91
24.8	<0.38	26.4	23.1	102	<4	45.6	-37	-6.85	06/18/91
23.9	1.79	25.4	25.5	103	<4	44.1	-36	-6.8	06/18/91
23.6	<0.38	23.4	27	96.8	<4	41.9	-36.5	-6.75	06/18/91
23.8	<0.38	25.3	29.8	104	<4	41.9	-36.5	-6.65	06/18/91
22.2	<0.38	23.4	44.3	103	<4	43	-36	-6.7	06/18/91
21.6	<0.38	26.6	50.3	114	<4	44.4	-36	-6.8	06/18/91
20.9	<0.38	26	49.2	113	<4	44.3	-36	-6.85	06/18/91
20	<0.38	27.1	50.5	116	<4	43.9	-38	-6.85	06/18/91
22.6	6.09	38.2	<0.45	87.6	22	92	-45	-7.5	07/02/91
15.8	2.51	35.5	3.58	86.2	25	80.4	-40.5	-7.2	07/02/91
12.1	<0.38	35.4	1.59	87.9	25	83.1	-42	-7.2	07/02/91
13	<0.38	34.6	1.85	89.8	24	85.3	-42	-7.25	07/02/91
13	<0.38	34	2.2	90.6	8	80.2	-41	-7	07/02/91
5.23	<0.38	35.1	1.95	87.8	9	85.8	-41.5	-7.25	07/02/91
4.11	<0.38	35.8	1.78	86.6	10	94.6	-43.5	-7.45	07/02/91
3.67	<0.38	38.2	2.04	82.6	7	92	-43.5	-7.5	07/02/91
4.67	1.07	27.8	13.6	73.9	<4	84.4	-39.5	-7.1	08/09/91
4.67	0.75	25.8	14.8	75.6	<4	77.6	-38	-6.8	08/09/91
4.56	0.82	24.8	16.6	74.9	<4	72.6	-38	-6.65	08/09/91
5	0.65	21.3	17.4	66.8	<4	70.7	-37.5	-6.8	08/09/91
5.78	1.18	24.5	23.9	78.5	4	70.3	-36.5	-6.65	08/09/91
5.67	1.65	26.1	23.7	77.4	<4	70.6	-36.5	-6.75	08/09/91
5.56	1.22	22.8	23.4	77.3	<4	65.1	-34.5	-6.7	08/09/91
5.45	1.54	24.3	25.1	84.2	<4	64.2	-34.5	-6.5	08/09/91
6.23	1.25	25	32.8	88.1	<4	70.4	-34.5	-6.65	08/09/91
4.89	1.15	26.3	34.4	84.8	<4	76.8	-37	-6.7	08/09/91

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
08/09/91	2107	15	26	5.52	5.36	41.1	50.9	31.6	29.9
08/09/91	2139	11.9	26	5.53	5.49	39.4	49.9	32.4	28.3
08/09/91	2211	7.42	26	5.54	5.51	40	49.8	32.2	26.2
08/09/91	2311	5.41	25	5.56	5.48	38.5	49.6	32.1	23.6
08/10/91	115	4.08	24	5.58	5.43	34.6	44.4	31.5	20.3
08/19/91	1923	1.42	24	5.54	5.34	41.1	35	30.1	24.6
08/19/91	1932	1.98	26	5.69	5.35	41	39.5	28.9	23.1
08/19/91	1939	2.55	24	5.74	5.39	35.1	38.1	27.8	22
08/19/91	1950	3.17	26	5.76	5.48	36.1	42	29.8	22.6
08/19/91	2234	2.55	22	5.75	5.33	31.8	39	30.2	13.2
08/20/91	814	1.7	21	5.75	5.36	30.1	35.6	27.1	21.7
09/04/91	1513	1.27	34	5.16	5.9	62.3	53.6	33.4	55.2
09/04/91	1524	1.56	28	5.33	5.46	46.6	50.4	34	41.7
09/04/91	1526	2.26	27	5.31	5.86	44.7	50.9	34.2	35.3
09/04/91	1530	2.83	28	5.22	5.45	49	51.1	34.4	33.7
09/04/91	1539	3.54	30	5.22	5.68	54.9	58.5	35.5	38.2
09/04/91	1559	4.67	33	5.16	5.28	61.2	64.7	35.1	48.9
09/04/91	1604	7.42	33	5.16	5.49	62.4	63.9	33.4	44
09/04/91	1607	10.2	33	5.1	5.2	65.4	67.7	34.4	43.1
09/04/91	1620	13.4	33	5.15	5.44	67.9	73.1	34.9	45.2
09/04/91	1653	10.2	33	5.17	5.24	71.4	80.5	37.7	42
09/04/91	1706	7.42	32	5.19	5.44	64.5	76.4	37.8	38.5
09/04/91	1734	5.41	31	5.17	5.31	62.5	73.7	37.3	34.2
09/04/91	1825	4.08	28	5.2	5.45	56.6	67.7	37.2	27.8
09/04/91	1915	3.17	26	5.24	5.5	52.4	63.8	37.1	23.7
09/04/91	2114	4.08	25	5.24	5.42	49	54.7	30.3	31.6
09/04/91	2117	5.41	25	5.24	5.36	50.9	57	31.2	32
09/04/91	2121	8.78	26	5.2	5.51	51.4	57.4	31	31.9
09/04/91	2125	11.9	26	5.21	5.1	50.7	55.4	29	33.2
09/04/91	2129	15	26	5.19	5.76	53.3	57	28.8	34.4
09/04/91	2135	18.1	26	5.2	5.28	52.8	57.1	28.4	36
09/04/91	2140	21.2	26	5.22	5.62	54.2	59	27.4	37.1
09/04/91	2146	24.1	27	5.21	5.65	54.7	58.1	26.1	38.5
09/04/91	2155	28.4	28	5.18	5.58	57.5	62	26.6	42
09/04/91	2310	24.1	31	5.22	5.42	66	73.5	30.5	40

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
3.56	0.97	32.9	34.7	81.6	<4	80.9	-38	-6.95	08/09/91
3	1	29.4	36	79.6	<4	85.1	-39.5	-7.05	08/09/91
3.11	1	31	36.9	80.8	<4	86.3	-41.5	-7.05	08/09/91
3	0.43	29.5	30.6	72.8	<4	88.3	-41	-7.1	08/09/91
2.56	<0.38	32.1	24.4	72	<4	93.3	-41.5	-7.3	08/10/91
4.56	<0.38	34.8	17.2	85.8	<4	87.7	-45.5	-7.8	08/19/91
5	0.64	32.9	16.1	85.4	<4	80.8	-44	-7.7	08/19/91
4.11	<0.38	31.9	18.7	84.1	<4	83.3	-45.5	-7.7	08/19/91
4.23	<0.38	33.6	23.5	89.2	6	89.9	-45	-7.7	08/19/91
2.78	<0.38	31.2	18.2	72.7	6	87.7	-43.5	-7.75	08/19/91
4.34	0.8	27.9	14.3	74.2	<4	75.3	-47.5	-8	08/20/91
10	<0.38	46.1	43.5	137	<4	85.3	-41	-7.15	09/04/91
7.67	<0.38	41.7	36.3	108	<4	90.6	-41.5	-7.25	09/04/91
7.55	<0.38	40.3	36.6	104	<4	90.5	-41	-7.35	09/04/91
8.56	<0.38	38.2	35.8	99.2	6	90.6	-41.5	-7.35	09/04/91
9.67	<0.38	42.3	44.7	116	<4	88.6	-41	7.3	09/04/91
12	<0.38	39.1	46.9	127	<4	79	-40	-6.95	09/04/91
12.5	<0.38	38.5	51.5	127	4	76.8	-38.5	-6.9	09/04/91
13.1	0.5	37.8	51.5	126	<4	77.8	-38.5	-7	09/04/91
13.7	0.5	37.2	51.6	132	<4	76.5	-37.5	-6.9	09/04/91
12.3	0.4	38	57.3	129	<4	81	-38.5	-7	09/04/91
5.6	1.2	38.5	55.5	119	<4	81.6	-37	-7.05	09/04/91
5	0.4	36.9	55.1	121	<4	85.1	-39	-7.1	09/04/91
4.6	0.8	32.9	42.5	102	<4	88	-39.5	-7.15	09/04/91
3.89	0.1	29.4	31.7	97.9	<4	89.1	-41	-7.25	09/04/91
5.67	0.3	28.6	33.3	98.9	<4	77.2	-39.5	-7	09/04/91
6	0.6	26.7	31.8	94	<4	76	-39	-7	09/04/91
6.34	0.9	26.3	31.3	93.2	<4	75.6	-39	-7.05	09/04/91
6.45	0.4	31.4	37.4	99.2	<4	71.4	-38.5	-6.95	09/04/91
7.23	0.9	23.6	30.7	91.8	4	71.3	-38	-7.05	09/04/91
7.23	0.9	26.6	34.3	88.4	7	67.7	-39	-6.95	09/04/91
7.45	1.1	25.9	33.8	83.4	7	65.2	-38.5	-7.05	09/04/91
7.56	0.8	26.5	34.7	85.3	6	64.5	-39	-7.05	09/04/91
8.45	1.9	26.6	38.4	86.2	6	60.9	-41	-7.2	09/04/91
7.12	0.9	28.8	65.3	106	<4	69.8	-39.5	-7.25	09/04/91

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
09/18/91	1614	1.42	26	5.13	5.17	54.1	37.5	27	38.1
09/18/91	1620	1.7	25	5.22	4.93	51.1	38.9	26.7	35.8
09/18/91	1628	3.17	23	5.2	5.19	44.4	39.7	28.1	22.9
09/18/91	1820	5.41	26	5.16	5.17	49.5	50	30.5	25.2
09/18/91	2038	3.17	23	5.22	5.48	42.6	46.2	32	16.3
09/18/91	2108	4.67	24	5.17	5.32	45.5	46.1	27.8	27
09/18/91	2121	15	26	5.16	5.27	50.5	50.3	26.4	31.3
09/18/91	2141	24.1	29	5.1	5.22	n.a.	n.a.	n.a.	n.a.
09/18/91	2258	29.7	31	5.11	5.22	66.7	66.4	24.9	38.1
09/19/91	41	24.1	35	5.11	5.17	71.8	75	29.2	35.4
09/19/91	351	8.78	29	5.15	5.37	57.3	63.8	31.1	25.5
03/06/92	2118	22.6	29	6.02	5.51	66.6	84.2	30.3	32.4
03/07/92	226	27.2	29	5.82	6.06	72.6	91.5	30.2	34.4
03/07/92	341	29.7	31	5.8	6.09	75.1	92	29.7	35.8
03/07/92	509	32.6	32	5.7	5.68	76.3	91.6	29.3	37
03/07/92	545	36	31	5.66	5.69	77.8	92.8	28.9	38.5
03/07/92	600	43.9	32	5.62	5.7	77.5	92.4	28.5	39.5
03/07/92	616	53.8	32	5.59	5.48	77.9	91.9	27.7	41.4
03/07/92	646	60.9	32	5.55	5.48	82.3	98.3	28.3	41.2
03/07/92	823	70.7	35	5.51	5.4	90.2	104	28.5	45.6
03/09/92	216	60.9	30	5.57	5.57	70.6	83.7	33.8	34.1
03/09/92	1201	53.8	29	5.56	5.45	68.3	80.9	32.4	31.2
03/10/92	301	43.9	29	5.52	5.47	68.1	81.4	32.2	29.9
04/21/92	1450	24.1	26	5.39	5.27	58.4	73.1	30.2	32.2
04/21/92	1531	32.6	27	5.55	5.51	61.1	74.2	28.6	34.4
04/21/92	1617	57.2	28	5.48	5.39	66.1	78.4	27.4	37.1
04/21/92	1739	88	30	5.41	5.4	73.5	84.7	27.1	39.5
04/21/92	1754	142	30	5.45	5.34	71.3	80	24.4	39.5
04/21/92	1830	206	33	5.3	5.34	80.3	86.5	24.1	45.3
04/21/92	1904	310	33	5.26	5.22	83.8	87.1	22.8	45.8
04/21/92	1928	454	34	5.21	5.22	88.6	89.2	22.9	48.2
04/21/92	1957	561	36	5.11	5.15	92.3	89.6	21.6	47.7
07/24/92	1215	8.78	19	5.31	5.39	43.5	44.3	28.1	13.6
07/25/92	137	11.9	20	5.32	5.33	43.7	49.4	27.1	20
07/25/92	142	15	20	5.3	5.24	44	48.8	25	20.9

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
5.45	0.61	26.8	28.7	87.4	<4	75.6	-38	-6.75	09/18/91
6.34	1	29.6	33.4	92.5	7	73.6	-38.5	-6.85	09/18/91
4.89	1.25	29.2	28.8	85.1	4	80.3	-40.5	-7.15	09/18/91
5.6	1.04	28.4	34.2	90.7	5	73.8	-37.5	-6.9	09/18/91
3.7	<0.38	31.3	30.9	82.6	5	84.1	-40	-7.25	09/18/91
6	<0.38	26.3	31.2	87.8	<4	69.6	-35	-6.75	09/18/91
4.67	0.4	23.2	42.1	72.5	<4	66.4	-33.5	-6.45	09/18/91
n.a.	n.a.	23.2	42.1	61.8	<4	62.5	-32	-6.2	09/18/91
9.12	0.21	22.2	51.1	109	<4	57	-29	-5.8	09/18/91
7.89	<0.38	23.3	57.4	100	<4	67.7	-30	-5.9	09/19/91
5.23	<0.38	29.9	46.8	103	<4	80.5	-33.5	-6.45	09/19/91
5.78	0.79	37.7	35.8	125	<4	69.8	-43	-7.45	03/06/92
6.34	0.5	40.1	39	140	6	72.2	-44.5	-7.6	03/07/92
7.23	1.07	38.7	39.1	143	7	70.7	-44.5	-7.65	03/07/92
8.78	0.79	38.7	39.2	148	<4	68.5	-45	-7.7	03/07/92
9.67	0.39	37.7	38.8	150	<4	65.9	-45.5	-7.7	03/07/92
10.1	0.07	38.7	39.6	153	<4	64.7	-45	-7.75	03/07/92
11	0.65	34.6	36.6	144	<4	62.8	-45.5	-7.7	03/07/92
12.2	0.57	37.4	39.8	159	<4	63.8	-46	-7.8	03/07/92
13.8	0.36	39.3	40.8	176	<4	61.8	-45.5	-7.9	03/07/92
6.56	0.39	42.2	48.2	131	<4	80.9	-44	-7.7	03/09/92
5.78	<0.38	41.6	47.6	125	<4	83.2	-44.5	-7.65	03/09/92
5.23	0.04	42.4	47	127	<4	81.7	-43	-7.7	03/10/92
8.12	0.36	34.7	26.6	107	7.94	68.2	-42	-7.25	04/21/92
10.2	0.25	34.1	30	117	8.44	62.7	-40.5	-7	04/21/92
13.5	0.5	33.1	32.7	123	8.19	58.5	-39.5	-6.85	04/21/92
15	0.32	33.3	36.7	136	5.75	55.5	-39	-6.85	04/21/92
15.6	0.61	30	31	123	7.67	51.2	-39	-6.8	04/21/92
21.7	0.43	30.6	36.8	150	7.2	51.7	-40.5	-7	04/21/92
23.1	0.79	29.9	35.2	156	2.22	47.7	-41.5	-7.15	04/21/92
25.7	0.64	28.9	34.6	165	0.64	47.2	-41.5	-7.3	04/21/92
29.9	0.97	29.1	33	174	0.11	46.7	-43	-7.3	04/21/92
8.12	0.04	31.3	13.1	83	0.36	82	n.a.	n.a.	07/24/92
9.12	<0.38	28.4	14.9	104	-1.1	75	-43.5	-7.2	07/25/92
9.9	<0.38	26.2	15.2	82.4	-1.25	72.9	-43	-7.35	07/25/92

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
07/25/92	154	22.6	21	5.32	5.32	44.7	50.1	23.7	22
07/25/92	159	25.6	21	5.34	5.3	47	51.7	23.9	22.9
07/25/92	205	28.4	22	5.36	5.3	49.5	54.6	23.8	24.1
07/25/92	213	32.6	22	5.34	5.19	52.3	55.5	23	25.1
07/25/92	218	36	21	5.36	5.39	53.2	56.6	22.9	25.1
07/25/92	222	43.9	22	5.36	5.44	54.5	57.3	21.8	27.3
07/25/92	225	53.8	22	5.36	5.5	54.9	58.7	22.2	26.8
07/25/92	228	60.9	23	5.35	5.34	53.6	57.3	21.8	26.4
07/25/92	232	70.7	23	5.35	5.34	56.5	58.8	21.4	27.6
07/25/92	235	88	23	5.36	5.3	56	57.9	21.2	27
07/25/92	238	108	24	5.33	5.33	59.4	60.3	21.2	28.6
07/25/92	241	124	24	5.31	5.36	60.4	62.3	21.7	29.4
07/25/92	245	151	25	5.3	5.34	62.9	63.5	20.9	29.2
07/25/92	249	171	26	5.28	5.25	n.a.	n.a.	n.a.	n.a.
07/25/92	253	194	26	5.26	5.33	67.4	67.7	20.9	32.5
08/18/92	2047	8.78	23	5.2	5.27	47.7	43	22.1	28.2
08/18/92	2051	13.4	22	5.29	5.32	43.1	44	21.3	25.2
08/18/92	2052	18.1	22	5.29	5.26	43	44.6	21.1	23.2
08/18/92	2054	21.2	22	5.2	5.28	41.8	44.5	20.2	24
08/18/92	2056	25.6	23	5.23	5.19	44.2	45	19.4	25.6
08/18/92	2058	29.7	23	5.16	5.21	46.3	47.3	18.6	27.6
08/18/92	2100	32.6	24	5.18	5.22	45.8	47.6	17.9	26.6
08/18/92	2104	36	24	5.21	5.19	47.6	49.5	17.6	29
08/18/92	2157	32.6	27	5.15	5.14	57.7	65.1	22.8	27.4
08/18/92	2207	29.7	26	5.17	5.08	57.2	66.1	22.7	25.5
08/18/92	2218	27.2	26	5.18	5.15	57.2	66.3	23.2	26.3
08/18/92	2237	24.1	27	5.19	5.13	56.8	67.6	25.1	20.7
08/18/92	2256	21.2	26	5.19	5.16	55.3	66.2	25.4	18.2
08/18/92	2329	18.1	25	5.24	5.17	54.4	67.1	26.3	18
08/19/92	115	15	24	5.3	5.21	49.6	61.6	26.3	16.3
11/02/92	1916	19.6	22	n.a.	5.45	53.6	69.5	29	32.9
11/02/92	2000	22.6	23	n.a.	5.42	58.4	73.6	28.3	35.5
11/02/92	2032	25.6	24	n.a.	5.39	59.7	73.8	27	39.1
11/02/92	2121	28.4	25	n.a.	5.34	66.4	82.1	28.1	39
11/02/92	2137	31.1	25	n.a.	5.34	66.5	81.1	27.4	39.2

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
11.8	<0.38	24.6	16.6	85.7	-0.59	65.4	-43.5	-7.25	07/25/92
13.7	<0.38	23.4	17	85.3	-0.45	62.4	-44.5	-7.45	07/25/92
15.8	0.39	22.5	18.4	86.2	0.28	61.4	-43.5	-7.3	07/25/92
18	0.18	20.4	17.3	78.1	2.49	60.4	-44.5	-7.3	07/25/92
18.6	0.04	23.1	22.3	93.3	8	58.5	-44.5	-7.35	07/25/92
18.6	0.54	22.2	22.2	91.8	8.3	58.4	-45.5	-7.3	07/25/92
19.6	0.64	22.4	22.8	94.2	12.8	56.8	-44.5	-7.3	07/25/92
19.1	0.18	20.6	22.6	89.3	4.46	54.9	-45.5	-7.45	07/25/92
20.8	0.64	19.2	21.8	84.1	5.43	54.6	-44	-7.35	07/25/92
20.8	0.79	22.1	26.7	95.9	13	55.2	-45.5	-7.25	07/25/92
22.6	0.72	20.7	25.5	96.4	11.1	53.5	-45	-7.3	07/25/92
23.2	0.29	20.7	27.1	98	4.52	54.1	-44	-7.3	07/25/92
23.9	0.39	21.8	32.2	179	4.41	53.5	-44.5	-7.35	07/25/92
n.a.	n.a.	19.7	30	101	-0.49	n.a.	-44.5	-7.25	07/25/92
26.7	0.32	20.3	29.6	101	5.35	50.6	-43.5	-7.2	07/25/92
7.12	0.59	28.9	11.9	95.6	4.04	72.4	-47	-7.9	08/18/92
8.78	0.59	28.7	16.9	94.4	-3.9	72.2	-49	-8	08/18/92
8.78	0.75	27.6	17.7	89.7	-3.4	70.9	-47	-7.95	08/18/92
9.9	0.64	26.5	19.1	90.5	-3.22	68.7	-48	-7.95	08/18/92
9.12	0.86	24.9	21.5	93.2	-4.65	63.2	-49	-7.95	08/18/92
10.3	1.13	23.2	23.8	95.7	-4.78	57.8	-50	-8	08/18/92
1.12	0.48	22.2	24.3	93.3	-2.8	55.1	-49	-7.85	08/18/92
12.9	0.81	21.2	26.3	94.8	-5.55	53.9	-49	-7.9	08/18/92
13.7	1.34	25.8	41	102	-7.2	68.1	-48	-7.75	08/18/92
12.9	1.5	25.4	29.6	98.9	-6.72	69	-48	-7.75	08/18/92
12.5	1.5	24.8	38.7	94.3	-6.55	70.4	-47.5	-7.7	08/18/92
10	0.43	26.5	39	98.2	-7.44	72.6	-47	-7.75	08/18/92
9.78	0.7	28	38.7	100	-8.04	74	-46.5	-7.85	08/18/92
7.67	0.59	28.8	39	104	-7.18	76.4	-47.5	-7.7	08/18/92
7	0.81	31.2	30	102	-7.15	80.6	-46	-7.65	08/19/92
12.2	0.81	35.8	22.5	112	0	78.7	-41	-7.41	11/02/92
16.7	0.75	36.6	28.8	121	0.56	77.3	n.a.	n.a.	11/02/92
18.5	1.45	42.3	32.6	125	0.38	75.6	-38.6	-7.22	11/02/92
15.7	0.32	33.9	34.8	126	-0.78	74	n.a.	n.a.	11/02/92
18.6	0.48	38.2	42.1	136	-0.41	72.7	-37.2	-6.99	11/02/92

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conduct-ance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
11/02/92	2156	34.2	26	n.a.	5.34	73.7	88	28.1	39.4
11/02/92	2205	43.9	26	n.a.	5.31	74	86.6	27.4	40
11/02/92	2218	54.8	27	n.a.	5.31	74.6	87.1	26.8	42.3
11/02/92	2231	62.3	27	n.a.	5.29	78	90.8	26.2	41.3
11/02/92	2249	70.6	28	n.a.	5.27	79.1	90.3	25.4	43.2
11/02/92	2256	79.6	28	n.a.	5.24	82.9	94.8	25.6	44.2
11/02/92	2305	89.6	28	n.a.	5.24	79.6	90.2	23.7	33.4
11/02/92	2311	100	28	n.a.	5.21	82.3	92.3	23.7	46
11/02/92	2320	112	29	n.a.	5.2	85.3	97.4	24.4	43.6
11/02/92	2336	132	30	n.a.	5.15	86.1	94.6	23.4	46.1
11/03/92	21	147	31	n.a.	5.08	92.8	100	23.4	45.1
11/03/92	102	162	32	n.a.	5.04	93.1	97.3	23.1	43.4
11/03/92	142	180	32	n.a.	5.01	91.4	94.2	22	43.1
11/03/92	148	198	32	n.a.	4.96	89.1	90.4	21.9	43.2
11/03/92	349	180	32	n.a.	4.92	91.4	89.3	21.1	41.3
11/03/92	430	162	32	n.a.	4.89	88.3	87.6	20.9	41.7
11/03/92	454	147	32	n.a.	4.89	84.5	83.4	20.6	44
11/03/92	542	132	32	n.a.	4.89	83.1	82.9	21.2	39.4
11/03/92	633	112	32	n.a.	4.9	81	81	21.4	39.7
12/10/92	2319	34	24	5.39	5.74	56.4	57.8	28.2	27.9
12/10/92	2326	39.2	24	5.41	5.53	51.4	58.4	25.8	27.4
12/10/92	2331	48.1	23	5.41	5.48	48.9	57.2	24.7	27.6
12/10/92	2336	54.8	23	5.42	5.48	46.9	56.2	23.8	27.6
12/10/92	2341	62.3	22	5.42	5.48	45.9	55.6	23.1	27.6
12/10/92	2348	70.6	22	5.41	5.45	47.9	55.9	22.8	27.6
12/10/92	2353	79.6	22	5.4	5.5	48.9	54.3	22.4	27.9
12/10/92	2358	94.9	23	5.41	5.43	47.4	54.2	22.1	28.4
12/11/92	3	106	22	5.41	5.4	46.9	54.1	21.8	29.2
12/11/92	7	119	22	5.42	5.43	48.4	55.4	21.3	29.2
12/11/92	12	139	22	5.4	5.42	45.4	53.9	22.1	30.7
12/11/92	21	154	24	5.35	5.36	49.9	57.3	21.5	30.7
12/11/92	145	171	28	5.19	5.21	59.9	66.4	21.5	33
12/11/92	239	189	30	5.14	5.11	67.9	71.4	20.7	33.2
12/11/92	700	212	32	5.03	4.97	71.9	75.7	21.2	35.3
12/11/92	752	244	34	5.02	4.99	69.9	74.9	22	36.3

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
16.7	0.7	37.4	45.3	136	-0.41	68.1	n.a.	n.a.	11/02/92
17.9	0.48	38.4	45.4	130	-1.48	66.4	-36.7	-6.89	11/02/92
18.7	0.48	37.1	49	138	1.93	67.4	n.a.	n.a.	11/02/92
18.2	0.81	37.9	50.4	140	3.46	65.2	-34.9	-6.83	11/02/92
17.9	0.97	36.2	54.8	141	3.12	63.6	n.a.	n.a.	11/02/92
22	1.72	35.4	56.2	146	1.84	60.9	-34.8	-6.72	11/02/92
25.1	1.07	35.1	58.7	144	0.3	61.1	n.a.	n.a.	11/02/92
21.7	1.66	33	57.3	137	-0.47	60.3	-34.3	-6.73	11/02/92
23.6	0.81	35.9	62.5	149	0.96	60	n.a.	n.a.	11/02/92
30	1.34	37.1	67.3	154	-0.56	61.1	-34	-6.65	11/02/92
29.8	1.29	37.5	67.4	164	-2.39	60.5	n.a.	n.a.	11/03/92
33.7	0.59	36.2	64.4	178	-6.19	59.4	-31.3	-6.54	11/03/92
33.9	0.91	36	59.4	173	-5.62	59.2	n.a.	n.a.	11/03/92
35.4	0.75	34.6	56.6	168	-8.21	59.3	-32.8	-6.51	11/03/92
39.1	0.16	34.9	44.7	188	-11.1	62.5	n.a.	n.a.	11/03/92
37.6	0.43	34.6	40.5	190	-14	63.2	-34.1	-6.51	11/03/92
38.6	0.75	34.8	39.2	189	-13.5	61.9	n.a.	n.a.	11/03/92
38.6	0.81	34.9	37.6	187	-14.2	64.9	-35.3	-6.6	11/03/92
36.6	1.13	34.7	35.8	186	-13.5	66.5	n.a.	n.a.	11/03/92
7.45	<0.38	36.2	27.8	98.5	6.1	63.7	-48.5	-8.19	12/10/92
7.56	<0.38	34	26.6	96.7	-0.64	61.6	-48.9	-8.33	12/10/92
8.01	<0.38	32.7	26.3	95.4	-0.7	59.8	-50.3	-8.29	12/10/92
8.67	<0.38	32.3	25.3	94.2	-0.39	58.4	-51.4	-8.17	12/10/92
8.89	<0.38	31.2	24.7	92.9	0.05	54.5	-51.7	-8.6	12/10/92
10.6	<0.38	30.5	24.6	93.1	-0.11	53	-50.8	-8.58	12/10/92
10.8	<0.38	32	24	91.8	0.17	52	-51.6	-8.86	12/10/92
11.6	<0.38	29.5	24.1	92.9	0.09	49.8	-51.4	-8.89	12/10/92
12	<0.38	29.6	23.4	92.8	-0.68	49.1	-52.3	-8.68	12/11/92
12.6	<0.38	28.8	23.1	93.4	-0.54	47.4	-52.8	-8.8	12/11/92
13.2	<0.38	28.3	23.8	94.1	-1.36	46.3	-52.9	-8.77	12/11/92
14.6	<0.38	28.1	24	98.6	-1.26	45.9	-52.5	-8.69	12/11/92
22	<0.38	27.8	26.4	120	-6.35	44.5	-47	-8.33	12/11/92
24.9	<0.38	29.3	27.5	137	-5.74	45.6	-45.6	-7.84	12/11/92
29.2	<0.38	30.6	28	154	-9.46	50.2	-44.1	-7.49	12/11/92
30.2	<0.38	40	29.6	146	-4.58	52	-43.7	-7.68	12/11/92

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
12/11/92	1301	278	33	5.01	4.98	68.4	73.8	23.5	34.5
12/12/92	326	244	32	5.07	5.04	61.4	70.2	28.4	31.4
12/12/92	649	212	31	5.07	5.04	61.9	70.4	27.9	29.4
12/12/92	1008	189	30	5.11	5.07	58.9	69.2	30	29.9
12/12/92	1539	171	30	5.11	5.07	57.9	68.2	30	29.7
12/12/92	1916	154	30	5.12	5.07	57.9	67.8	29.4	28.4
12/12/92	2316	139	30	5.14	5.09	57.9	68.8	31	28.9
12/13/92	554	125	30	5.14	5.12	56.4	68.2	32	28.6
03/04/93	909	25.2	33	5.4	5.35	69.9	80.6	30	34
03/04/93	928	29.3	32	5.46	5.29	70.4	82.3	27.1	33.5
03/04/93	946	34	32	5.47	5.3	71.4	80.6	26.8	34.5
03/04/93	1007	39.2	33	5.53	5.28	69.9	81.5	27.1	35.6
03/04/93	1026	45	34	5.38	5.28	69.9	80.6	25.5	34.5
03/04/93	1102	51.4	35	5.39	5.18	77.4	86.4	24	34.5
03/04/93	1235	62.3	36	5.22	5.13	78.9	87.2	23.6	35.6
03/04/93	1321	70.6	35	5.2	5.15	74.9	83.9	22.5	35.8
03/04/93	1337	79.6	35	5.2	5.15	73.9	83.1	22.7	36.3
03/04/93	1351	89.6	34	5.25	5.13	75.4	82.3	21.8	36.3
03/04/93	1408	100	35	5.25	5.09	73.4	81.5	21	35.3
03/04/93	1438	112	34	5.19	5.09	74.4	82.3	21.4	36.8
03/04/93	1531	125	35	5.2	5.07	76.9	83.9	21.4	37.1
03/04/93	2101	112	36	5.19	5.02	74.9	84.8	22.3	35.3
03/04/93	2335	100	35	5.14	5.06	73.9	87.2	23.7	34.5
03/05/93	200	89.6	35	5.15	5.07	71.4	86.4	24.8	34
03/05/93	531	79.6	34	5.21	5.15	65.9	83.1	26.6	33
03/05/93	1201	70.6	32	5.28	5.84	60.9	78.2	28.7	32.2
03/06/93	103	62.3	30	5.35	5.25	56.9	74.4	29.5	29.7
03/06/93	1346	54.8	28	5.45	5.32	52.4	69	30.4	28.7
03/27/93	1730	162	30	5	5.23	57.4	64.1	27.1	27.9
03/27/93	1817	180	31	5.08	5.16	59.9	64.3	25.7	28.4
03/27/93	1902	198	32	5.05	5.09	62.4	66	24.5	28.7
03/27/93	2003	228	31	5.03	5.08	62.4	64	24.5	29.7
03/28/93	349	260	32	5.01	5.05	61.4	62.2	24.4	29.2
03/28/93	607	317	31	5.01	5	60.9	60.3	23.4	28.1
03/28/93	612	361	31	5.03	5.03	63.4	61.8	23.5	28.7

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
28	<0.38	31.8	30.2	151	-10.7	58.7	-44.5	-7.69	12/11/92
21.5	<0.38	36.1	32.9	141	-10.3	73	-42.5	-7.35	12/12/92
19.1	<0.38	44.7	34.3	136	-8.13	74.4	-43.3	-7.51	12/12/92
18.3	<0.38	45	34.3	131	-9.2	76.5	-42.7	-7.47	12/12/92
16.7	<0.38	37.3	35.6	129	-8.48	79.4	-42.3	-6.34	12/12/92
15.6	<0.38	32.1	35	126	-8.83	79.7	-42.1	-7.06	12/12/92
16	<0.38	32.7	35.6	126	-11.6	80.5	-42	-7.1	12/12/92
14.9	<0.38	34.2	37.4	127	-13.6	82.6	-41.7	-7.01	12/13/92
9.2	<0.38	32.1	52.5	115	-0.3	60.9	-58.3	-8.94	03/04/93
10.3	<0.38	29.8	53.8	116	-2.9	57.3	-60.3	-8.99	03/04/93
10.7	<0.38	29.3	54.9	120	-2.5	53.8	-63.6	-9.67	03/04/93
12	<0.38	28.9	56.9	121	-3.4	52.3	-64.5	-9.68	03/04/93
12.7	<0.38	25	51.4	110	-3.1	49.8	-65.8	-9.97	03/04/93
15.1	<0.38	27.4	57.2	130	-4.8	48.8	-65.7	-9.49	03/04/93
20.4	<0.38	26.5	54.2	114	-6.6	49.8	-66.3	-9.91	03/04/93
21.6	<0.38	26.1	51.7	148	-6.6	46.6	-65.7	-9.86	03/04/93
22.8	<0.38	25.4	50.6	150	-6.7	47	-66.1	-9.8	03/04/93
23.1	<0.38	24.5	48.1	145	-7.2	45.2	-65.2	-9.34	03/04/93
23.9	<0.38	24.6	49.6	149	-7.5	42	-67.8	-10.11	03/04/93
26.4	<0.38	24.5	48.7	150	-7.7	43.1	-68	-10.44	03/04/93
28.1	<0.38	26.3	46.9	157	-7.9	42.7	-64.1	-9.37	03/04/93
25.4	<0.38	28.3	42.3	176	-9.2	54.8	-60.5	-9.39	03/04/93
22.9	<0.38	25.5	35.3	143	-10.3	58.7	-56.9	-8.62	03/04/93
20	<0.38	28.9	38.2	152	-9.7	62.3	-54.5	-8.28	03/05/93
16.6	<0.38	25	32.1	123	-7.8	64.8	-54	-8.47	03/05/93
13.8	<0.38	22.7	29.1	102	16.1	71.9	-51.9	-8.07	03/05/93
10.2	<0.38	30.1	34.7	117	-7.5	75.8	-47.2	-7.03	03/06/93
8.01	<0.38	28.9	30.4	105	-8.8	73.7	-47	-7.69	03/06/93
14.8	<0.38	34	35.1	130	-1.4	68.7	n.a.	n.a.	03/27/93
17.5	<0.38	30.5	33.4	133	-3.2	64.1	n.a.	n.a.	03/27/93
18.8	<0.38	29.9	33.6	138	-3.7	60.9	n.a.	n.a.	03/27/93
25	<0.38	28.2	32.3	138	-5.9	57.7	n.a.	n.a.	03/27/93
23.5	<0.38	26.8	28.2	137	-5.1	58.7	n.a.	n.a.	03/28/93
20.1	<0.38	27.3	29.5	137	-6.3	58	n.a.	n.a.	03/28/93
20.7	<0.38	27.8	29	140	-5.2	58.4	n.a.	n.a.	03/28/93

Table 15. Chemical analyses of streamwater collected during stormflow from the Bear Branch watershed, Catoctin Mountain, Maryland, 1990-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conduct-ance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
03/28/93	624	409	31	5.02	5.08	62.9	61.9	22.5	27.9
03/28/93	658	463	31	5.01	5.08	64.4	61.9	21.8	29.4
03/28/93	704	523	31	5	5.08	61.9	59	22.6	30.4
03/28/93	712	624	30	5.03	5.07	63.9	60.4	22.5	31.2
03/28/93	1714	523	33	4.96	5	63.4	60.9	23.8	30.7
03/28/93	2152	463	32	4.98	4.94	63.4	61.3	25	29.4
03/29/93	214	409	33	4.96	4.98	60.4	59.7	26.8	30.4
03/29/93	515	361	32	4.96	5.01	59.9	60.2	26.7	29.9
03/29/93	1030	317	31	5	5.03	59.9	59.9	26.9	28.9
03/29/93	1516	278	31	5	5.05	58.9	59.8	27.6	28.9
04/16/93	859	62.3	27	5.34	5.49	51.4	62.2	28.5	27.4
04/16/93	911	70.6	25	5.26	5.49	51.9	61.4	28	27.1
04/16/93	929	79.6	26	5.4	5.42	50.9	60.2	26.8	26.6
04/16/93	2234	89.6	28	5.32	5.33	56.4	69.5	27	29.4
04/17/93	1021	100	28	5.32	5.32	56.4	71.8	29.1	29.7

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
19.9	<0.38	27.6	28.8	140	-5.3	57	n.a.	n.a.	03/28/93
21.2	<0.38	27.3	30.3	144	-4.6	55.2	n.a.	n.a.	03/28/93
21.5	<0.38	24.7	27.8	131	-7	53	n.a.	n.a.	03/28/93
21.9	<0.38	25.6	27.8	136	-4.27	53	n.a.	n.a.	03/28/93
22	<0.38	26.7	28.6	142	-6.1	60.5	n.a.	n.a.	03/28/93
20.6	<0.38	27.7	32.8	137	-8.83	63	n.a.	n.a.	03/28/93
21.4	<0.38	29	30.6	140	-7.8	63	n.a.	n.a.	03/29/93
20.6	<0.38	28.5	29.3	136	-7.12	62.7	n.a.	n.a.	03/29/93
18.9	<0.38	30.1	29.5	138	-6.63	64.4	n.a.	n.a.	03/29/93
18.4	<0.38	31	29	136	-6.3	66.2	n.a.	n.a.	03/29/93
7.89	<0.38	35.1	29.1	114	1.28	67.3	n.a.	n.a.	04/16/93
8.45	<0.38	34.5	28.7	112	1.6	64.8	n.a.	n.a.	04/16/93
9.67	<0.38	33	28.6	111	1.3	64.1	n.a.	n.a.	04/16/93
11.3	<0.38	30.4	27.3	130	-0.37	67.6	n.a.	n.a.	04/16/93
9.34	<0.38	31.4	27.4	132	-1.27	73.7	n.a.	n.a.	04/17/93

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93

[L/s, liters per second; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; n.a., not analyzed; n.d., not determined]

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
08/24/87	1445	n.d.	16	19	6.75	6.93	35.5	47	38.4	18.4
09/30/87	1030	n.d.	16	17	6.49	7.02	36.8	40.2	57.4	26.6
10/05/87	1630	1.98	12	17	6.57	6.92	38.2	40.5	50.9	25.6
10/13/87	1230	3.11	10	16	6.56	6.82	40	35.5	52.2	19.4
10/20/87	1130	3.11	12	16	n.a.	6.55	53.9	48.7	55.6	23.5
10/27/87	1315	10.3	9	22	6.29	6.4	45.9	41.9	52.2	24.8
11/02/87	1315	3.11	12	18	6.51	6.34	52.5	46.7	52.2	26.6
11/10/87	930	6.51	10	22	6.45	6.26	52.5	50.2	55.6	36
11/17/87	1045	4.25	10	21	6.42	6.37	50.3	53	52.2	33.8
11/24/87	1000	6.51	7	18	6.35	6.38	48.9	46.4	30.2	24.6
12/01/87	1300	17	8	20	6.15	6.19	48.7	43.6	34	23.7
12/08/87	1400	13.6	7	18	6.31	6.29	39.9	44.8	39.2	25.6
12/15/87	1015	23.2	7	24	6.57	6.46	48.3	43.8	55.6	21.9
12/22/87	1045	10.8	6	17	6.64	6.3	46	43.1	27.8	26.6
12/30/87	1030	10.8	3	16	6.55	6.27	31.9	45.1	26.1	27.6
01/05/88	1000	10.8	2	16	6.39	7.21	24.4	45.4	50.4	24.6
01/12/88	1115	10.8	2	16	6	6.98	29.7	45.7	46.1	22.7
01/19/88	1015	10.8	3	18	6.57	6.68	28.2	52.6	50.4	27.6
01/27/88	1100	21.5	3	18	6.25	6.62	n.a.	n.a.	n.a.	n.a.
02/02/88	1330	16.1	9	18	6.5	6.53	40.2	50	48.7	27.6
02/09/88	1045	17.8	4	16	6.44	6.93	36.5	46.7	47	24.6
02/16/88	1000	19.5	5	18	6.39	6.59	46.9	56.6	45.2	26.6
02/23/88	1100	17.8	6	17	6.57	6.76	25.5	46.1	29.6	19.4
03/01/88	1000	17.8	5	17	6.49	6.75	23.5	45.1	47	25.6
03/08/88	1045	17.8	7	17	6.54	6.52	49.6	43.1	48.7	23.5
03/15/88	1115	16.1	6	16	6.63	6.38	25	43.6	48.6	29.7
03/22/88	1100	14.7	6	17	6.17	6.3	25.6	43.8	45.2	29.8
03/29/88	1100	13.3	10	18	6.19	6.34	37.9	47.2	46.1	25.6
04/05/88	1015	12.2	12	18	6.46	6.29	25.8	40.9	41.8	23.1
04/12/88	1145	17.8	10	16	6.32	6.6	25.4	41.3	39.4	21.4
04/19/88	1015	16.1	9	16	6.3	5.79	27.6	47.6	48.7	22.6
04/26/88	1045	14.7	11	16	6.27	7.3	26	45.4	43.9	24.6

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	52	<.45	37	54	131	n.a.	n.a.	08/24/87
n.a.	n.a.	49.3	2.39	36.9	56	131	n.a.	n.a.	09/30/87
n.a.	n.a.	53.1	5.2	34.3	54	134	n.a.	n.a.	10/05/87
n.a.	n.a.	57.1	4.68	34.9	53	137	n.a.	n.a.	10/13/87
n.a.	n.a.	40.9	10.9	47.5	59	128	n.a.	n.a.	10/20/87
n.a.	n.a.	43.2	9.88	48.3	60	116	n.a.	n.a.	10/27/87
n.a.	n.a.	46.7	8.18	44.8	58	119	n.a.	n.a.	11/02/87
n.a.	n.a.	48.1	0.3	66.6	61	124	n.a.	n.a.	11/10/87
n.a.	n.a.	49.7	0.69	52.2	60	127	n.a.	n.a.	11/17/87
n.a.	n.a.	30.6	3.88	38.9	62	123	n.a.	n.a.	11/24/87
n.a.	n.a.	39.6	2.8	37.4	56	115	n.a.	n.a.	12/01/87
n.a.	n.a.	38.4	0.3	36.8	64	119	n.a.	n.a.	12/08/87
n.a.	n.a.	36.5	9.58	88.6	21	107	n.a.	n.a.	12/15/87
n.a.	n.a.	37.7	5.33	51.5	35	108	n.a.	n.a.	12/22/87
n.a.	n.a.	34.2	4.6	48.5	31	108	n.a.	n.a.	12/30/87
n.a.	n.a.	43.4	0.3	48	44	89	n.a.	n.a.	01/05/88
n.a.	n.a.	43.7	8.14	44.8	48	113	n.a.	n.a.	01/12/88
n.a.	n.a.	42.6	8.81	56.3	42	109	n.a.	n.a.	01/19/88
n.a.	n.a.	43.2	7.03	48.4	45	n.a.	n.a.	n.a.	01/27/88
n.a.	n.a.	48.7	7.17	49.4	45	105	n.a.	n.a.	02/02/88
n.a.	n.a.	43.2	6.21	52.3	46	105	n.a.	n.a.	02/09/88
n.a.	n.a.	49.8	6.43	56.3	56	102	n.a.	n.a.	02/16/88
n.a.	n.a.	46.5	6.59	46	42	101	n.a.	n.a.	02/23/88
n.a.	n.a.	49.7	6.56	41.8	50	100	n.a.	n.a.	03/01/88
n.a.	n.a.	50.9	6.76	45.2	48	99	n.a.	n.a.	03/08/88
n.a.	n.a.	49.8	6.42	42.6	49	99	n.a.	n.a.	03/15/88
n.a.	n.a.	50.2	6.6	43.6	49	103	n.a.	n.a.	03/22/88
n.a.	n.a.	50.3	5.35	44.8	53	107	n.a.	n.a.	03/29/88
n.a.	n.a.	40.2	5.05	44.8	57	100	n.a.	n.a.	04/05/88
n.a.	n.a.	47.3	4.22	48.2	50	100	n.a.	n.a.	04/12/88
n.a.	n.a.	38.5	5.62	55.7	44	102	n.a.	n.a.	04/19/88
n.a.	n.a.	39	4.05	40.8	54	101	n.a.	n.a.	04/26/88

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units) Field	pH (units) Laboratory	Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
05/03/88	1030	13.3	11	17	6.34	6.67	26.9	49.5	45.2	23.5
05/10/88	1015	34	13	18	6.46	6.56	28.8	40.2	48.7	26.6
05/17/88	1030	28.3	13	17	6.22	6.53	28.7	42.1	40.7	19.6
05/24/88	1530	110	13	17	5.88	5.93	26.4	37.6	39.4	24.2
05/31/88	1330	44.9	15	16	5.68	6.26	21.4	40.2	41.7	21.5
06/07/88	1000	26	15	16	5.84	6.43	27.9	40.8	45.2	22.5
06/14/88	1000	16.1	15	15	6.05	6.76	25.2	42.4	45.2	20.5
06/21/88	1015	12.2	18	16	6.06	6.47	33.1	39.5	43.5	20.5
06/27/88	1245	9.63	17	15	6.05	7.01	24.5	39.8	43.5	17.4
07/06/88	1300	6.51	18	16	6.02	6.91	17.9	28.6	44	17.1
07/12/88	1015	7.36	19	25	5.55	6.49	44.1	64.1	46.1	33.8
07/19/88	1130	5.66	20	19	5.89	6.58	32.4	45.4	43.9	24.2
07/28/88	1100	5.1	20	16	5.82	6.47	25.8	38.3	40.6	17.8
08/02/88	1015	4.53	21	17	5.79	6.5	26.9	38.2	40	16.6
08/09/88	1000	3.68	20	17	5.84	6.52	27.4	41	44.4	17.1
08/16/88	1030	2.26	22	17	6.04	6.63	26.8	36	41.2	15.8
08/23/88	1345	3.11	19	15	5.89	6.56	25.1	36.8	37.6	16.3
08/30/88	1045	3.68	20	17	6.06	6.46	30.7	42.3	40	18.6
09/06/88	1515	3.11	17	16	5.95	7.19	32.3	38.4	39.4	17.5
09/13/88	945	3.11	18	16	5.91	6.71	26.2	37.7	40.4	15.8
09/19/88	1300	3.11	18	16	5.76	6.4	30.9	37.5	40.2	16.5
09/27/88	1000	3.68	15	16	5.79	6.39	26.4	36.3	39.2	15.9
10/04/88	945	3.68	16	16	5.99	6.94	26.2	36.5	42.7	16.3
10/11/88	1530	1.7	12	15	6.36	6.79	24.2	35	41.8	15.9
10/18/88	1000	2.55	13	18	5.71	6.64	32.8	46.7	44.8	20.9
10/25/88	1030	2.26	10	16	5.71	6.62	28.1	42	40.8	19.8
11/01/88	930	3.11	8.5	17	5.68	6.51	28.3	42.7	41.9	21.4
11/08/88	1030	2.55	9	18	5.92	6.41	32.2	48.7	43.4	24
11/15/88	1100	2.55	9	19	5.64	6.45	32.7	51.4	47	24.1
11/22/88	1015	3.11	7	23	5.53	6.09	42.2	64.8	43.4	27.4
11/29/88	1330	3.68	7.5	19	5.74	6.12	32.2	48.4	42.4	23.7
12/06/88	1015	3.11	5.5	16	5.69	6.31	26.2	39.8	40.8	20.5
12/13/88	1400	3.11	2	16	5.81	6.28	24.4	37.6	41.5	19.1
12/20/88	1315	3.11	3.5	16	5.65	6.08	25.2	38.4	41.9	19.5
12/27/88	1045	3.68	3.5	20	5.74	6.63	33.2	53.4	43.9	24.7

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	48.1	4.1	40.5	50	98	n.a.	n.a.	05/03/88
n.a.	n.a.	48.6	3.11	44	50	109	n.a.	n.a.	05/10/88
n.a.	n.a.	48	4.83	40.8	55	109	n.a.	n.a.	05/17/88
n.a.	n.a.	40.6	11.1	54.3	1	105	n.a.	n.a.	05/24/88
n.a.	n.a.	44.2	7.26	35.3	67	122	n.a.	n.a.	05/31/88
n.a.	n.a.	42.4	5.92	33.2	70	124	n.a.	n.a.	06/07/88
n.a.	n.a.	41.2	4.51	32.2	65	127	n.a.	n.a.	06/14/88
n.a.	n.a.	41	6.33	35.6	55	130	n.a.	n.a.	06/21/88
n.a.	n.a.	41.1	7.14	38.2	52	132	n.a.	n.a.	06/27/88
n.a.	n.a.	34.1	6.24	32.9	47	120	n.a.	n.a.	07/06/88
n.a.	n.a.	33.5	8.35	91.2	42	101	n.a.	n.a.	07/12/88
n.a.	n.a.	31.4	5.58	52.2	48	112	n.a.	n.a.	07/19/88
n.a.	n.a.	37.7	4.06	31.9	57	119	n.a.	n.a.	07/28/88
n.a.	n.a.	36.1	5.45	31.2	55	123	n.a.	n.a.	08/02/88
n.a.	n.a.	37	5.19	29.7	58	125	n.a.	n.a.	08/09/88
n.a.	n.a.	35.3	3.8	28.4	50	130	n.a.	n.a.	08/16/88
n.a.	n.a.	35.8	3.87	31.3	56	120	n.a.	n.a.	08/23/88
n.a.	n.a.	33.9	1.47	41.3	49	120	n.a.	n.a.	08/30/88
n.a.	n.a.	34.2	5.06	38.9	32	121	n.a.	n.a.	09/06/88
n.a.	n.a.	34.9	6.33	33.3	45	124	n.a.	n.a.	09/13/88
n.a.	n.a.	35.8	4.04	33.5	47	121	n.a.	n.a.	09/19/88
n.a.	n.a.	34	5.12	35.7	44	123	n.a.	n.a.	09/27/88
n.a.	n.a.	34.4	3.61	34.4	49	122	n.a.	n.a.	10/04/88
n.a.	n.a.	32	<.45	33.8	50	121	n.a.	n.a.	10/11/88
n.a.	n.a.	35.7	8.71	44	52	115	n.a.	n.a.	10/18/88
n.a.	n.a.	36.8	<.45	44.5	49	118	n.a.	n.a.	10/25/88
n.a.	n.a.	39.1	<.45	44.4	48	115	n.a.	n.a.	11/01/88
n.a.	n.a.	42.2	<.45	53.8	46	116	n.a.	n.a.	11/08/88
n.a.	n.a.	42.8	<.45	59.7	43	118	n.a.	n.a.	11/15/88
n.a.	n.a.	47.8	<.45	93.4	41	120	n.a.	n.a.	11/22/88
n.a.	n.a.	39.8	<.45	67.2	39	124	n.a.	n.a.	11/29/88
n.a.	n.a.	35.3	1.93	47.5	42	122	n.a.	n.a.	12/06/88
n.a.	n.a.	33.6	5.08	45.3	39	122	n.a.	n.a.	12/13/88
n.a.	n.a.	34.3	4.55	44.5	45	122	n.a.	n.a.	12/20/88
n.a.	n.a.	51	4.44	75.4	41	119	n.a.	n.a.	12/27/88

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units) Field	pH (units) Laboratory	Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
01/03/89	1015	3.68	3.5	20	5.96	6.17	31	49.6	43.4	23.4
01/10/89	1045	5.1	3.5	22	6.22	5.63	36.2	58.6	43.5	25.1
01/17/89	1530	9.63	5	20	6.26	5.11	31.9	51.9	40.8	23.5
01/24/89	1015	7.36	3	19	6.27	5.84	25.1	42.1	42.4	22.1
01/31/89	915	6.51	5.5	18	6.41	5.99	27	44	43.4	23.4
02/07/89	1200	6.51	4.5	18	6.35	5.72	26.6	44.4	43.5	23.3
02/14/89	945	8.5	3.5	23	6.31	6.45	41.7	66.4	45.2	28.9
02/21/89	1000	8.5	4.5	20	6.37	6.4	30.1	49	41.5	25
02/28/89	1000	8.5	3	17	6.3	6.28	26.2	43	39.2	21.9
03/09/89	1030	9.63	2.5	19	6.26	6.21	26.6	45.2	39.7	22.4
03/16/89	1400	12.2	7	18	6.37	6.35	32.7	43.9	37.1	22.3
03/21/89	1045	14.7	6	19	6.29	6.31	30	49.2	38.6	23.6
03/29/89	1100	23.8	11.5	17	6.33	6.42	25.8	40.4	41.7	23
04/04/89	945	19.5	10.5	17	6.29	6.37	24.1	39.2	37.3	21.1
04/11/89	1000	16.1	7	16	6.39	6.97	22.9	37.5	38.8	20.2
04/18/89	1500	14.7	13.5	17	6.35	6.48	24.6	38.3	39.7	22.2
04/24/89	1115	13.3	10	17	6.4	6.47	24.4	38.8	39	20.9
05/02/89	1030	34	12	25	5.82	6.28	45.1	68.8	32.2	29.4
05/09/89	1100	68	10	17	6.03	6.29	24.1	40.9	37.8	26.8
05/16/89	1445	116	11	20	5.8	6.06	32.9	53.1	34	25.4
05/23/89	1545	53.8	12	16	6.2	6.63	26.2	44.6	39.6	21.4
05/30/89	1330	28.3	13	15	6.34	6.55	26.4	43.2	40.5	20.8
06/06/89	1045	21.5	14	16	6.27	6.2	25.6	44.2	38.8	19.6
06/13/89	1100	16.1	14	16	6.33	6.31	24.5	40.5	39.2	19.1
06/20/89	1100	16.1	15	16	6.29	6.13	20.2	36.9	39.1	18.2
06/27/89	1000	17.8	17	16	6.21	5.49	23.2	35.2	38.8	18.8
07/05/89	1600	16.1	16	17	6.15	5.73	29.1	42.9	37.4	18.7
07/11/89	915	12.2	17	16	6.3	6.21	24.2	36.4	41.4	19.1
07/18/89	1015	12.2	15.5	17	6.34	6.1	25.8	38.7	40.8	19
07/25/89	1030	12.2	19.5	19	6.42	6.85	27.8	41.1	42.6	18.3
08/01/89	1015	10.8	17.5	19	6.38	6.66	28.8	44	41.3	18.3
08/08/89	1015	8.5	17	18	6.46	6.47	24.4	37.3	40.8	16.7
08/15/89	1115	7.36	18.5	16	6.35	6.62	27.7	40.9	43.9	18.1
08/22/89	1300	5.66	18	16	6.37	7.54	25.6	37.5	41.8	17.8
08/29/89	1030	5.66	17.5	16	6.23	6.91	27.4	39.4	43.9	18

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	35	4.24	66.9	36	118	n.a.	n.a.	01/03/89
n.a.	n.a.	37.2	3.55	84.4	36	113	n.a.	n.a.	01/10/89
n.a.	n.a.	35.4	3.52	74.7	33	108	n.a.	n.a.	01/17/89
n.a.	n.a.	33.5	8.5	52.5	38	111	n.a.	n.a.	01/24/89
n.a.	n.a.	34	6.97	56.9	41	112	n.a.	n.a.	01/31/89
n.a.	n.a.	35.2	6.66	58.8	38	111	n.a.	n.a.	02/07/89
n.a.	n.a.	34.9	14.7	91.4	33	103	n.a.	n.a.	02/14/89
n.a.	n.a.	33.8	9.06	63.7	40	105	n.a.	n.a.	02/21/89
n.a.	n.a.	33.6	8.13	56.7	39	111	n.a.	n.a.	02/28/89
n.a.	n.a.	32.6	7.72	58.5	31	109	n.a.	n.a.	03/09/89
n.a.	n.a.	35.4	6.63	56.9	33	106	n.a.	n.a.	03/16/89
n.a.	n.a.	34.8	8	64.4	32	105	n.a.	n.a.	03/21/89
n.a.	n.a.	36.4	6.22	49	38	105	n.a.	n.a.	03/29/89
n.a.	n.a.	35.6	7.49	47.9	35	100	n.a.	n.a.	04/04/89
n.a.	n.a.	34.6	8.75	43.1	36	95	n.a.	n.a.	04/11/89
n.a.	n.a.	34.7	4.55	43.1	42	95	n.a.	n.a.	04/18/89
n.a.	n.a.	34.5	5.8	41.8	42	95	n.a.	n.a.	04/24/89
n.a.	n.a.	30.9	4.68	120	13	85	n.a.	n.a.	05/02/89
n.a.	n.a.	36.1	12.2	55.9	24	101	n.a.	n.a.	05/09/89
n.a.	n.a.	31.5	10.2	83.8	12	82	n.a.	n.a.	05/16/89
n.a.	n.a.	38.8	12.4	39.9	37	104	n.a.	n.a.	05/23/89
n.a.	n.a.	36	8.61	34.5	40	106	n.a.	n.a.	05/30/89
n.a.	n.a.	35.4	6.46	34.6	49	102	n.a.	n.a.	06/06/89
n.a.	n.a.	34.6	4.62	33.2	50	110	n.a.	n.a.	06/13/89
n.a.	n.a.	36.4	4.88	33.9	52	112	n.a.	n.a.	06/20/89
n.a.	n.a.	36.2	9.63	34.7	33	112	n.a.	n.a.	06/27/89
n.a.	n.a.	35.2	9.01	40.5	37	111	n.a.	n.a.	07/05/89
n.a.	n.a.	35.7	8.21	31.9	46	114	n.a.	n.a.	07/11/89
n.a.	n.a.	35	8.73	34.5	48	115	n.a.	n.a.	07/18/89
n.a.	n.a.	34.5	7.88	31.6	53	116	n.a.	n.a.	07/25/89
n.a.	n.a.	33.6	7.33	35.2	55	115	n.a.	n.a.	08/01/89
n.a.	n.a.	34.4	5.21	30.4	47	121	n.a.	n.a.	08/08/89
n.a.	n.a.	34.1	7.09	30	55	120	n.a.	n.a.	08/15/89
n.a.	n.a.	33.3	8.17	30.9	51	128	n.a.	n.a.	08/22/89
n.a.	n.a.	33	8.02	30.2	57	127	n.a.	n.a.	08/29/89

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
09/05/89	1700	5.1	16	15	6.38	6.82	26.2	37.9	43.9	16.7
09/12/89	945	4.53	18	16	6.46	6.69	26.2	36.9	43.3	16.3
09/14/89	1130	5.1	18	15	6.33	6.3	26.6	38.5	44.4	16.5
09/19/89	1045	5.1	16	16	6.31	6.2	26.8	36.2	42.4	17.5
09/26/89	1500	5.1	14.5	20	6.38	6.15	35.9	47.3	44.8	21.5
10/03/89	1030	5.1	15	19	6.24	6.31	35.3	46.8	41.3	20.9
10/10/89	1115	4.53	10	15	6.32	6.41	24.2	36.4	39.4	16.6
10/18/89	1245	6.51	14.5	21	6.32	6.62	35	54.4	41.8	30.2
10/24/89	1215	5.1	11	17	6.29	6.43	26.7	41.4	39.2	21
10/31/89	1500	5.1	14	18	6.4	6.45	31.2	45.6	40.9	24.2
11/07/89	945	4.53	10	17	6.34	6.42	26.6	40	38.8	19.7
11/14/89	1000	4.53	10	17	6.38	6.46	27.3	41.4	41.9	23.5
11/21/89	1315	6.51	6	18	6.3	6.35	25.6	40	40	24.2
11/29/89	1145	5.66	6	19	6.29	6.74	29.9	47.6	44.4	25.6
12/04/89	1545	5.66	3	17	6.3	6.71	25.3	41	42.8	22.2
12/18/89	1530	5.66	2	17	6.34	6.63	24.8	40.6	41.5	20.7
12/27/89	1430	5.1	1	17	6.4	6.33	24.2	40.2	42.9	21.2
01/02/90	1345	8.5	2	22	6.2	6.2	36.8	60.8	43.5	28.4
01/09/90	1415	8.5	3	23	6.04	6.1	34.6	57.7	42.6	27.6
01/16/90	920	6.51	3.5	19	6.36	6.13	27.9	46.6	43.2	24.6
01/23/90	1315	6.51	5.5	18	6.37	6.44	27.9	45.8	41.5	24.3
01/30/90	1100	21.5	5.5	27	5.82	5.96	47.5	77.1	34.2	30.4
02/06/90	1415	16.1	7	18	6.3	6.39	25.6	41	39.3	23.2
02/13/90	1130	16.1	6.5	18	6.3	6.34	24.7	41.5	39.8	21.8
02/20/90	1400	16.1	6	17	6.42	6.38	23.4	39.1	41.1	21.8
02/27/90	945	17.8	4	17	6.24	6.33	24.9	41.2	39.2	21
03/06/90	1215	16.1	6	16	6.36	6.4	23.6	39.7	39.9	21.5
03/13/90	1130	14.7	11.5	18	6.5	6.42	25.4	41.5	40.7	23.4
03/21/90	1100	16.1	7	18	6.34	6.39	28.2	45.2	39.3	23
03/27/90	1000	14.7	6.5	17	6.35	6.46	25.7	42.1	41.6	22.8
04/03/90	1050	26	8.5	23	6.2	6.33	37.9	62	36.9	27.6
04/10/90	1130	26	9.5	17	6.4	6.48	26.2	42.7	40.1	22.2
04/17/90	1015	23.8	11	18	6.44	6.42	27.2	44.5	40.2	22.8
04/25/90	1115	17.8	12.5	17	6.45	6.5	26.2	43.3	40	22.4
04/30/90	1315	17.8	13	19	6.39	6.41	30.9	50.1	41.2	24.8

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	32.9	8.15	30.7	51	129	n.a.	n.a.	09/05/89
n.a.	n.a.	32.8	7.44	30.3	53	130	n.a.	n.a.	09/12/89
n.a.	n.a.	34	5.85	31.6	53	130	n.a.	n.a.	09/14/89
n.a.	n.a.	33.9	5.52	32.4	44	129	n.a.	n.a.	09/19/89
n.a.	n.a.	36.7	4.62	55.1	43	126	n.a.	n.a.	09/26/89
n.a.	n.a.	36.5	4.12	56.9	48	124	n.a.	n.a.	10/03/89
n.a.	n.a.	30.8	5.49	36.3	44	127	n.a.	n.a.	10/10/89
n.a.	n.a.	44	2.52	60.8	49	123	n.a.	n.a.	10/18/89
n.a.	n.a.	32.5	1.33	45.6	42	124	n.a.	n.a.	10/24/89
n.a.	n.a.	40.2	<.45	43.1	55	126	n.a.	n.a.	10/31/89
n.a.	n.a.	34.5	1.65	37.8	49	129	n.a.	n.a.	11/07/89
n.a.	n.a.	37.4	2.16	42.8	54	127	n.a.	n.a.	11/14/89
n.a.	n.a.	38.3	2.62	48	42	123	n.a.	n.a.	11/21/89
n.a.	n.a.	34	4.36	56.7	45	124	n.a.	n.a.	11/29/89
n.a.	n.a.	31.1	7.74	43.9	48	124	n.a.	n.a.	12/04/89
n.a.	n.a.	35.2	8.77	44.8	47	122	n.a.	n.a.	12/18/89
1.44	<.38	34.7	11.1	41.5	43	125	n.a.	n.a.	12/27/89
3.56	<.38	40.7	12.5	81.9	33	121	n.a.	n.a.	01/02/90
4	<.38	37.1	8.89	79	34	114	n.a.	n.a.	01/09/90
2.44	<.38	35.7	10.1	55.7	43	118	n.a.	n.a.	01/16/90
2.56	<.38	35.5	9.43	54.2	44	118	n.a.	n.a.	01/23/90
9.56	<.38	36.5	12	121	16	95.1	n.a.	n.a.	01/30/90
2.78	<.38	38	13	47.4	34	112	n.a.	n.a.	02/06/90
2.34	<.38	35.9	12.5	44.6	37	111	n.a.	n.a.	02/13/90
1.89	<.38	36	12.2	40.5	43	112	n.a.	n.a.	02/20/90
2	<.38	35.7	12.6	45.4	39	109	n.a.	n.a.	02/27/90
1.89	<.38	35.6	14.1	39.8	40	104	n.a.	n.a.	03/06/90
<.22	2.11	39.4	12.4	39.8	44	106	n.a.	n.a.	03/13/90
<.22	3.22	39	11.2	49.7	39	109	n.a.	n.a.	03/21/90
<.22	2.22	38.6	11.7	42	43	104	n.a.	n.a.	03/27/90
<.22	6.34	37.3	8.61	88.4	27	97.5	n.a.	n.a.	04/03/90
<.22	2.22	39.2	13.6	42.6	40	104	n.a.	n.a.	04/10/90
<.22	2.22	39.9	12.8	41.5	48	99.7	n.a.	n.a.	04/17/90
<.22	2	40	12.7	38.3	47	97.5	n.a.	n.a.	04/25/90
4.67	<.38	35.9	12.6	46.4	49	103	n.a.	n.a.	04/30/90

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
05/04/90	1015	16.1	11.5	17	6.4	6.45	27.2	44.4	38.9	20.8
05/08/90	945	16.1	12	17	6.42	6.44	26.8	42.7	40.4	21.4
05/15/90	1500	62.3	12.5	18	6.11	6.06	26.8	42.7	38.2	22.5
05/23/90	1315	31.1	12	16	6.68	6.45	25.2	39.7	42.2	20.2
05/29/90	1100	76.4	11.5	21	5.88	5.89	42.2	63.6	34.4	24.6
06/01/90	1000	31.1	12	18	6.42	6.46	26.5	41.2	38.3	19.5
06/05/90	1000	28.3	12	17	6.27	6.41	27.2	39.7	39.2	18.7
06/12/90	930	19.5	13.5	17	6.3	6.51	25.6	40	39.2	17.7
06/19/90	1215	16.1	15.5	17	6.37	6.62	26.8	40.8	38.8	18.8
06/26/90	1245	10.8	15	16	6.42	6.54	26.4	39.8	39.8	17.2
07/03/90	1035	9.63	16	17	6.32	6.44	28.7	39.6	40.1	17.3
07/10/90	1300	7.36	18.5	16	6.39	6.52	26.5	39.4	43.9	18.2
07/17/90	1315	7.36	17.5	17	6.31	6.45	37.1	43.9	42.5	21.4
07/24/90	1330	6.51	18	16	6.36	6.65	28.8	41.4	43.4	19.2
07/31/90	1400	3.68	18.5	15	6.36	6.64	27	38.7	42.4	16.6
08/07/90	1445	5.1	18.5	17	6.39	6.53	30.5	43.4	41.3	19.5
08/14/90	1400	3.11	18.5	16	6.26	6.58	28.6	41	42.8	18.8
08/21/90	1315	5.1	16.5	18	6.21	6.45	31.4	42.8	38.9	20.1
08/28/90	1300	3.11	19.5	15	6.35	6.54	27.4	38.6	39.4	19.2
09/04/90	1130	3.11	18	15	6.56	6.52	27.6	38.6	41.6	17.1
09/11/90	1230	3.11	18	15	6.52	6.63	27.4	38.6	44.4	17
09/18/90	1245	3.68	13.5	15	6.55	6.58	26.1	37.2	42.6	16.4
09/25/90	1330	2.55	13.5	15	6.31	6.56	26.8	38.2	42.9	16.7
10/02/90	1300	1.98	14	15	6.36	6.56	26.8	38	44.8	17.2
10/05/90	1400	1.98	15	24	6.12	6.44	47.2	58.6	46.1	37.6
10/09/90	1400	2.55	15.5	17	6.43	6.59	30.1	40.5	44.4	19.5
10/16/90	1350	3.4	14.5	17	6.23	6.52	30.2	42.8	44.4	23.2
10/23/90	1100	77.6	14	30	5.34	5.55	66.9	94.6	40	37.1
10/24/90	1000	11.3	13.5	21	6.14	5.97	42.9	55.8	40.9	25.1
10/30/90	1130	11.3	10.5	16	6.37	6.36	26.4	36	42.2	19.7
11/06/90	1045	9.91	11	21	6.35	6.41	35.4	46.7	45.7	29.4
11/13/90	1200	11.6	8.5	16	6.46	6.24	28.4	41	43.9	24.6
11/20/90	1115	8.5	8	15	6.5	6.5	28.9	38.2	45.7	23.3
11/27/90	1100	7.36	9.5	n.a.	6.48	6.63	32.4	42.3	46.1	24.6
12/04/90	1330	16.7	8.5	31	6.36	6.21	55.4	83.9	46.5	38.6

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
2.34	<.38	35.6	12	37.2	51	107	n.a.	n.a.	05/04/90
2.56	<.38	36.1	11.1	37.6	53	111	n.a.	n.a.	05/08/90
3.34	<.38	37.6	14.5	50.6	34	114	n.a.	n.a.	05/15/90
2.01	<.38	39.9	16.7	37.2	41	114	n.a.	n.a.	05/23/90
19	3.01	26.1	8.09	73	20	84.4	n.a.	n.a.	05/29/90
2.22	<.38	37.2	13	39	53	115	n.a.	n.a.	06/01/90
1.78	<.38	36.6	15.1	34.8	45	117	-47.5	n.a.	06/05/90
1.45	<.38	35.6	13.5	33.2	46	120	-49.5	n.a.	06/12/90
2.11	<.38	35.3	10.9	34.7	46	119	-48.5	n.a.	06/19/90
1.89	<.38	34.2	10.9	30.7	53	125	-48	n.a.	06/26/90
2.56	<.38	33.9	7.5	31.1	51	125	-49.5	n.a.	07/03/90
2.89	1.83	33.7	8.84	29.4	47	131	-48.5	n.a.	07/10/90
5.67	1.86	33	7.11	34	55	126	-49.5	n.a.	07/17/90
3.34	<.38	32.8	7.64	30.4	52	132	-49	n.a.	07/24/90
3.11	<.38	35	8.43	29.1	49	126	-49	n.a.	07/31/90
3.56	1.83	34.3	7.23	36	52	127	-47.5	n.a.	08/07/90
3.22	<.38	34.7	7.38	29.2	62	132	-48	n.a.	08/14/90
3.56	<.38	32.4	5.66	42.4	49	122	-48	n.a.	08/21/90
3.45	2.29	33.8	11.3	35.4	45	132	-50	n.a.	08/28/90
2.89	1.83	33	5.51	29	50	131	-49	-8.2	09/04/90
2.67	2.01	35	6	30.8	53	130	-48	-8.25	09/11/90
2.22	<.38	35	5.55	32.7	45	126	-48.5	-8.1	09/18/90
2.11	<.38	34.6	5.49	34.1	47	132	-48	-8.1	09/25/90
2.67	<.38	35.4	3.98	33.1	48	129	-48.5	-8.15	10/02/90
3.67	<.38	48.2	11.5	46.2	42	118	-44	-7.8	10/05/90
2.78	<.38	36	0.16	33.8	63	130	-48.5	-8.2	10/09/90
3.89	<.38	39.8	0.91	37.3	50	127	-47	-7.75	10/16/90
30.9	3.94	48.2	0.22	130	<4	65.9	-21	-5.3	10/23/90
6.12	2.15	43	1.06	80.9	34	114	-39	-6.9	10/24/90
2.28	<.38	34.9	9.48	34.5	41	122	-47.5	-7.85	10/30/90
3.88	<.38	45	2.83	50.4	47	116	-43.5	-7.55	11/06/90
2.91	<.38	37.6	2.12	42.2	45	118	-47.5	-7.8	11/13/90
2.22	1.79	36.7	7.3	40.7	47	123	-48	-8.05	11/20/90
2.56	<.38	36.1	7.97	41	54	124	-47.5	-8.1	11/27/90
9.67	1.9	50.6	1.45	121	21	105	-34	-6.6	12/04/90

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
12/11/90	1130	11.3	7	16	6.41	6.52	29.9	38.9	42.2	22.2
12/18/90	1200	15	7.5	22	6.23	6.34	44.4	64	44.4	29.4
12/26/90	1045	21	4	17	6.28	6.45	32.9	42.9	39.6	22.2
01/02/91	1200	34	6	18	6.21	6.28	26	42.1	38.1	21
01/08/91	1330	34	6.5	18	6.37	6.35	27	42	40.9	22.5
01/15/91	1130	28.3	6.5	17	6.19	6.34	29.9	47.1	44.4	24.6
01/22/91	1200	51	6	18	6.18	6.5	25.4	41	40.4	21.5
01/29/91	1200	31.1	7	16	6.33	6.19	26.4	38.9	40.4	22
02/05/91	1130	25.8	8	17	6.24	6.28	26.4	40.1	41.3	22.5
02/12/91	1130	21	5	17	6.4	6.44	27	40.2	40.4	21.5
02/19/91	1200	21	6.5	18	6.33	6.26	27.9	42.9	40.9	22.5
02/26/91	1230	19	7	17	6.36	6.55	27	40.7	40	22
03/05/91	1145	21	8.5	18	6.37	5.46	30.9	44.2	40.9	24
03/12/91	1100	19	6.5	17	6.44	6.45	27.9	41.6	42.2	23.5
03/19/91	1100	21	8	18	6.46	6.36	28.4	44	41.8	24.3
03/26/91	1145	31.1	9	18	6.35	6.44	28.4	43.2	41.8	24.3
04/02/91	1130	28.3	9	17	6.37	6.36	27	40.9	43.1	24.3
04/09/91	1200	23.5	14.5	17	6.43	6.56	30.4	42.3	42.6	24
04/16/91	1530	25.8	12.5	18	6.5	6.26	28.9	44.2	42.2	24.8
04/23/91	1130	25.8	10.5	17	6.42	6.34	30.9	43	42.6	23.3
04/29/91	1200	25.8	12.5	18	6.48	6.6	30.4	42.1	43.1	22.8
05/07/91	1430	21	12.5	17	6.36	6.35	29.9	43.6	41.1	21.7
05/14/91	1400	15	15	17	6.46	6.56	34.4	43.7	43.9	21
05/21/91	1345	13	13.5	16	6.38	6.56	29.4	41	42.2	19.9
05/28/91	1240	8.5	17.5	16	6.45	6.7	31.4	43.9	43.9	19.9
06/04/91	1205	8.5	17	16	6.35	6.45	28.4	39.8	43.1	17.6
06/11/91	1225	7.36	16.5	15	6.46	6.58	28.9	39.7	43.5	15.8
06/18/91	1530	13	17.5	20	6.06	6.22	42.4	56.7	37.8	26.3
06/25/91	1325	5.95	16.5	15	6.4	6.05	27.9	37.9	44.8	18.7
07/02/91	1340	5.95	19	16	6.43	6.34	28.9	39.7	45.7	17.1
07/09/91	1345	5.1	19	15	6.51	6.35	28.4	37.2	45.2	18.4
07/17/91	1330	3.96	18.5	17	6.38	6.51	28.9	37.7	44.4	15.3
07/23/91	1130	3.4	21	16	6.48	4.74	25.5	37.8	42.6	12.5
07/30/91	1235	3.4	19	16	6.36	6.01	28.1	40.7	42.7	15.2
08/06/91	1130	2.55	19	14	6.58	6.39	26.2	38.8	42.5	12.9

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
2.45	<.38	37.1	11.1	42.9	45	121	-45	-7.9	12/11/90
8.67	2.51	39.8	7.46	82.1	33	107	-43.5	-7.7	12/18/90
3	<.38	40.2	11.1	51.4	41	126	-45	-7.8	12/26/90
2.78	<.38	38.1	14.9	48.2	37	122	-46	-7.8	01/02/91
2.89	<.38	38.2	14	46.1	39	121	-46.5	-7.9	01/08/91
<.22	<.38	38.6	14.4	46.2	40	122	-46	-7.9	01/15/91
2.34	<.38	39.9	19.6	46.5	30	110	-46	-7.8	01/22/91
1.56	<.38	36.3	17.6	37.3	32	110	-46.5	-7.95	01/29/91
1.45	<.38	36.1	15.2	36.9	44	109	-46.5	-7.95	02/05/91
1.45	<.38	38.4	16.1	38.8	43	111	-47	-7.95	02/12/91
2.22	<.38	35.8	15.6	42.9	38	110	-46.5	-7.95	02/19/91
1.56	<.38	36.2	14.8	38.9	38	106	-46.5	-7.95	02/26/91
2.78	<.38	35.9	13.4	51.8	41	107	-45.5	-7.85	03/05/91
<.22	<.38	36.7	15.8	38.3	45	110	-45.5	-7.9	03/12/91
2.56	<.38	36.8	14.7	45.5	42	106	-48	-7.95	03/19/91
2.11	<.38	36.9	14.5	44.3	46	110	-46.5	-7.85	03/26/91
1.89	<.38	36.3	14.3	37.8	38	104	-43.5	-7.85	04/02/91
2.11	<.38	33.8	10.4	34.2	51	98.9	-47	-7.9	04/09/91
2.56	<.38	36.2	9.95	47.4	41	108	-45.5	-7.8	04/16/91
2.11	<.38	37.1	12.7	42.3	43	103	-45.5	-7.9	04/23/91
1.67	<.38	37.9	14.6	39	48	102	-47.5	-7.85	04/29/91
2.56	<.38	38	11.1	41.2	49	107	-45	-7.85	05/07/91
2	<.38	37.7	14.4	35.4	54	114	-45.5	-8	05/14/91
2.22	<.38	36	12.4	33	51	114	-47.5	-8	05/21/91
2.56	<.38	36.1	11.4	31.5	59	118	-48	-8.05	05/28/91
2.34	<.38	35.5	12	31.5	49	111	-46	-8.2	06/04/91
2.11	1.79	35.6	12	31	53	114	-45	-8.05	06/11/91
7.89	2.86	29.4	12.7	68.6	25	87.7	-40	-7.35	06/18/91
2.45	<.38	36	9.75	32.7	52	123	-50.5	-8.05	06/25/91
2.67	<.38	36	10.4	31	49	127	-47.5	-8.1	07/02/91
2.67	<.38	35.8	8.67	30.8	55	127	-48	-7.95	07/09/91
3.11	<.38	36.5	8.75	31.4	49	129	-49	-8.05	07/17/91
1.45	1.58	38.1	9.52	32.1	47	98	-47	-8	07/23/91
1.22	1.68	37.1	7.5	36	59	129	-48	-8.1	07/30/91
1.22	1.68	38	8.75	36.4	52	135	-48	-8.05	08/06/91

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
08/13/91	1430	1.98	19.5	16	6.63	6.33	26.6	37.7	42.9	13.2
08/20/91	1515	3.4	20	20	6.34	5.98	37.7	53.4	41.9	17.3
08/27/91	1000	2.55	19.5	16	6.34	6.17	32.1	42.1	43.6	14
09/03/91	1130	1.98	18	15	6.52	5.63	28.3	40.6	44.3	13.1
09/10/91	1300	1.98	18.5	15	6.25	5.58	27.5	39.8	43.4	17
09/12/91	1540	1.7	18	15	6.53	5.76	26.4	39.2	44.4	16.3
09/17/91	1240	1.7	20.5	15	6.43	5.36	26.4	37	45.2	13.4
09/24/91	1245	1.98	15.5	14	6.49	5.37	26	36.8	44.1	13.4
10/01/91	1125	1.42	14.5	15	6.52	5.51	27.9	38.4	43.6	14
10/08/91	1235	2.55	12.5	14	6.5	6.08	27.3	38.4	45.8	12.8
10/15/91	1120	2.55	12	15	6.58	5.54	25	37.3	41.7	13.2
10/22/91	1205	3.96	10.5	15	6.62	6.21	24.7	36.8	40.5	12.8
10/29/91	1040	3.96	12.5	16	6.53	6.11	28	38.8	43.8	16.9
11/05/91	1040	3.4	8	15	6.55	6.2	26.6	37.1	43.4	17.3
11/12/91	1130	3.4	8	21	6.52	5.68	38.3	55.4	48.6	28
11/19/91	1225	3.4	9.5	17	6.47	5.88	29	41	45.8	20.1
11/26/91	1000	2.55	6.5	19	6.33	5.79	34.9	46.8	44.3	27
12/03/91	915	9.91	9	29	6.04	5.39	68	91	46.8	35.8
12/10/91	1335	3.96	8.5	24	6.26	5.67	51.2	76.2	49.1	35.9
12/17/91	1100	n.d.	5	19	6.35	6.51	33.7	47.3	45.3	24.2
12/23/91	1345	n.d.	5	20	6.32	5.82	34	50.4	43.8	23.5
12/30/91	1300	n.d.	5.5	23	6.21	5.87	40.8	63.9	46.8	29.6
01/07/92	930	3.4	5	19	6.45	6.07	35.9	47.2	45.8	25.5
01/14/92	1120	9.91	7.5	23	6.18	5.81	42.9	59.8	45.5	32.7
01/21/92	1100	3.96	1.5	18	6.22	6.53	29.3	48.6	43.5	23.2
01/28/92	935	3.4	3	19	6.22	6.66	33.2	41.6	44.2	24.5
02/04/92	1105	2.55	4	18	6.27	5.97	27.8	42.9	42.8	23.4
02/11/92	1045	2.55	2	18	6.35	6.46	28.6	42.9	43.2	23.1
02/18/92	1150	8.5	5	22	6.28	6.45	42.3	68.5	44.7	30.7
02/25/92	1300	5.1	6	23	6.33	6.67	42.7	66.7	44.9	32
03/03/92	1105	7.36	7	18	6.45	5.95	30.8	48.8	45	25.8
03/10/92	1155	15	9.5	19	6.21	6.19	32.4	51.3	42.4	27.6
03/17/92	1025	17.4	5	17	6.24	6.1	31.9	42.5	42	24.1
03/24/92	1125	17.4	6	18	6.41	6.39	25.8	39.1	35.5	29.9
03/31/92	1430	23.5	10	17	6.21	6.16	24.9	40.4	42.1	24.9

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
1.22	2.33	35.5	4.91	30.4	55	133	-47	-8.1	08/13/91
2	1.75	35.4	7.84	62.8	36	109	-45.5	-7.85	08/20/91
2	2.08	59.2	4.51	27.6	45	118	-47	-8.1	08/27/91
2.56	2.36	47.5	5.13	28.1	36	121	-47	-8.15	09/03/91
2.6	1.1	35.4	5.84	31.2	54	137	-47	-8.05	09/10/91
2.45	1.6	37.2	6.39	33.1	58	138	-47	-8.05	09/12/91
1.7	2.47	37.7	5.41	31.4	62	130	-47.5	-8	09/17/91
1.33	1.67	34.6	5.49	34.6	50	126	-47	-8	09/24/91
2.34	1.54	35.4	5.03	33	51	128	-47.5	-8.1	10/01/91
2.11	1.15	35.4	3.53	34.4	40	121	-47	-8.05	10/08/91
0.78	1.97	35.9	3.04	35.3	48	114	-46.5	-8.15	10/15/91
1	2.01	37.3	8.08	40.1	17	116	-49	-8.05	10/22/91
2.56	1.61	37.4	<.45	37.1	49	136	-48	-8.1	10/29/91
2	0.93	37.4	<.45	39.5	52	130	-47.5	-8.05	11/05/91
2.34	1.18	55.4	<.45	64.4	47	126	-48.5	-8.15	11/12/91
1.22	0.68	38.3	<.45	38.5	56	126	-49	-8.05	11/19/91
3.22	1.32	43.4	<.45	55.3	44	127	-46	-7.75	11/26/91
15.6	3.29	50.3	<.45	132	15	98.3	-53	-8.6	12/03/91
9.56	2.65	46.5	<.45	108	42	118	-52	-8.35	12/10/91
3.45	1.15	42.6	0.11	53.2	53	125	-48.5	-8.15	12/17/91
4.11	2.08	36.7	3.05	53.1	45	118	-50	-8.15	12/23/91
5.45	1.68	39.3	<.45	85.4	27	118	-50.5	-8.15	12/30/91
3.22	1	36.8	1.74	58.2	39	119	-48.5	-8.05	01/07/92
9.79	0.14	125	13.1	86.2	49	107	n.a.	n.a.	01/14/92
1.67	<.38	37.6	11.2	51.3	45	123	n.a.	n.a.	01/21/92
2	0.65	32.5	8.56	46.5	52	123	n.a.	n.a.	01/28/92
1.67	0.9	36.7	10.1	51.6	46	125	n.a.	n.a.	02/04/92
1.45	1.61	37	11.6	48.6	54	125	n.a.	n.a.	02/11/92
5.67	1.72	36.3	9.14	81.2	33	114	-53	-8.7	02/18/92
4.89	1.54	37.3	8.84	84.1	38	116	n.a.	n.a.	02/25/92
1.89	1.22	37.6	10.8	52.5	45	119	n.a.	n.a.	03/03/92
3.11	0.5	38.5	9.93	61.8	53	121	-48	-8.05	03/10/92
2.34	0.14	36.8	9.6	47.5	62	117	-48	-8	03/17/92
2.11	0.43	36.9	9.73	51.9	50.7	98	n.a.	n.a.	03/24/92
2.78	0.29	35.6	6.28	47.1	46.4	110	n.a.	n.a.	03/31/92

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
04/06/92	820	19	7	17	6.41	6	31.2	38.6	40.7	21.7
04/13/92	1015	16.7	9	17	6.5	5.63	25.2	36.7	39.8	21.5
04/21/92	1044	12.4	12	18	6.42	6.3	32.3	45	41.2	23.2
04/23/92	1000	70.8	12	20	5.79	5.92	38	44.3	37.1	26.9
04/28/92	1130	39.6	11	16	6.31	5.94	23.7	36.9	38.5	21.3
05/03/92	1000	28.3	14	16	6.38	n.a.	n.a.	n.a.	n.a.	n.a.
05/12/92	1035	20.4	13	16	6.28	6.24	26.9	38.6	40.9	21.6
05/19/92	1300	17.8	14	17	6.34	n.a.	n.a.	n.a.	n.a.	n.a.
05/26/92	1410	25.9	12	20	6.15	5.59	40.7	61.6	43.2	21.6
06/02/92	1345	20.4	13	16	6.62	n.a.	n.a.	n.a.	n.a.	n.a.
06/09/92	1045	28.3	14.5	16	6.23	6.01	28.4	44.8	42.6	19.8
06/16/92	1115	20.4	14.5	16	6.37	6.31	25.7	39.4	42.1	17.7
06/23/92	1205	15.3	14	16	6.43	n.a.	n.a.	n.a.	n.a.	n.a.
06/30/92	1145	11	16	15	6.31	6.08	25.6	40.8	45	17.6
07/07/92	1125	9.06	16.5	16	6.39	n.a.	n.a.	n.a.	n.a.	n.a.
07/14/92	950	7.93	18.5	15	6.41	6.43	29.7	38.1	44.5	16.6
07/21/92	1125	7.64	18.5	15	6.36	n.a.	n.a.	n.a.	n.a.	n.a.
07/28/92	1525	25.5	17	15	6.15	5.99	24.9	38.2	42.6	20
08/04/92	1100	22.1	17	16	6.23	n.a.	n.a.	n.a.	n.a.	n.a.
08/11/92	955	14.7	18	15	6.24	6.5	25.3	36.7	39.9	17.3
08/18/92	1205	13	16	16	6.34	n.a.	n.a.	n.a.	n.a.	n.a.
08/25/92	1150	9.06	18	16	6.36	6.23	25	38.1	41.5	16.6
09/01/92	1135	7.93	16.5	15	6.41	n.a.	n.a.	n.a.	n.a.	n.a.
09/08/92	1505	8.5	18	16	6.33	6.69	25.4	38.8	38.5	18.5
09/15/92	1140	8.5	16	15	6.37	6.47	25.7	36.3	39.5	16.4
09/22/92	1045	7.64	16	15	6.31	6.04	28.8	39.3	43.7	14.6
09/29/92	1340	7.08	15	15	6.29	n.a.	n.a.	n.a.	n.a.	n.a.
10/06/92	1030	6.8	11	15	6.35	5.99	25.1	41	44.5	14.4
10/13/92	1215	7.08	12	16	6.35	n.a.	n.a.	n.a.	n.a.	n.a.
10/20/92	1130	7.64	8.5	16	6.39	5.95	26	40.4	41.9	15.7
10/27/92	1130	7.08	9	16	6.36	n.a.	n.a.	n.a.	n.a.	n.a.
11/03/92	1655	23.8	11.5	25	5.89	5.57	55.2	80.3	37.4	29.9
11/10/92	1435	16.7	9	17	6.46	n.a.	n.a.	n.a.	n.a.	n.a.
11/17/92	1500	17	8	17	6.23	6.1	24	41.5	43.9	22
11/24/92	1445	51	11	19	6.02	n.a.	n.a.	n.a.	n.a.	n.a.

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
1.45	1.54	37.4	9.77	40.8	59	111	n.a.	n.a.	04/06/92
1.89	0.57	36.3	10.1	39.2	49	109	n.a.	n.a.	04/13/92
1.78	1.11	37.1	8.39	41.6	61.1	109	n.a.	n.a.	04/21/92
4.67	0.93	36.5	13.3	72.4	27.6	105	-45.5	-7.7	04/23/92
1.89	0.57	37.2	12.2	40.5	36.6	108	n.a.	n.a.	04/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/03/92
1.67	<.38	33.7	8.71	36.6	49.9	100	n.a.	n.a.	05/12/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/19/92
9.23	2.18	31.3	10.3	61	42.7	100	n.a.	n.a.	05/26/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/02/92
2.22	0.36	52.2	<.45	36.2	54.8	120	n.a.	n.a.	06/09/92
1	1.58	37.2	12	33	52.1	116	n.a.	n.a.	06/16/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/23/92
2	0.36	33.6	3.56	31.7	56	122	n.a.	n.a.	06/30/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/07/92
2.45	0.61	34.6	4.02	28.8	57.4	131	n.a.	n.a.	07/14/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/21/92
3.34	0.5	35.4	9.45	39.5	35.8	121	n.a.	n.a.	07/28/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/04/92
1.78	1.45	34.8	3.21	30	46	123	n.a.	n.a.	08/11/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/18/92
0.56	1.88	35.3	6.37	30.2	44	120	n.a.	n.a.	08/25/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/01/92
2.78	2.79	35.1	0.82	34.7	52.2	117	n.a.	n.a.	09/08/92
2.33	2.63	35.5	1.19	33.1	58.1	126	n.a.	n.a.	09/15/92
1.02	7.23	34	0.45	29.6	60.5	132	n.a.	n.a.	09/22/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/29/92
1.56	0.43	34.5	4	30.7	46	130	n.a.	n.a.	10/06/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/13/92
6.45	2.04	32	2	33.4	55.4	133	n.a.	n.a.	10/20/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/27/92
18.5	3.28	38.9	<.45	117	12	103	-37.7	-6.83	11/03/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/10/92
1	<.38	33.3	9.72	40.9	44.6	121	-45.9	-7.44	11/17/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/24/92

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
12/01/92	1230	36.8	8	17	6.18	6.28	25.9	40.1	39.8	21.7
12/08/92	1255	24.6	7	17	6.43	n.a.	n.a.	n.a.	n.a.	n.a.
12/15/92	1530	87.8	8	18	6.15	5.78	26	41.9	42.2	25.1
12/21/92	1540	53.8	8.5	18	6.38	n.a.	n.a.	n.a.	n.a.	n.a.
12/29/92	1310	36.8	8	18	6.18	6.33	25	43.6	43.1	23.8
01/05/93	950	31.1	11	20	6.4	n.a.	n.a.	n.a.	n.a.	n.a.
01/12/93	1045	24.6	7	19	6.51	6.03	28	48.3	42.2	23.5
01/19/93	1200	25.5	7	18	6.43	n.a.	n.a.	n.a.	n.a.	n.a.
01/26/93	1230	23.8	6	18	6.6	6.23	27	45.1	42.6	22.5
02/02/93	845	22.1	4.5	18	6.45	n.a.	n.a.	n.a.	n.a.	n.a.
02/09/93	1000	17.8	3.5	18	6.5	6.35	26	45	43.9	23.3
02/18/93	1230	15.3	4	20	6.56	n.a.	n.a.	n.a.	n.a.	n.a.
02/23/93	1630	14.7	3	19	6.21	6.1	28	47.6	40.7	23.3
03/02/93	1500	17.8	5	20	6.36	n.a.	n.a.	n.a.	n.a.	n.a.
03/08/93	1530	79.3	8	18	6.09	6.09	33.9	54.6	38.1	25.6
03/17/93	1400	82.1	6	20	6.19	n.a.	n.a.	n.a.	n.a.	n.a.
03/23/93	1350	82.1	7	20	6.15	6.05	31.4	53.6	39.7	24.3
03/24/93	1135	156	8	22	5.93	5.97	36.4	55.7	34.7	27.4
03/29/93	1220	139	10	20	5.94	n.a.	n.a.	n.a.	n.a.	n.a.
03/30/93	1500	127	11.5	n.a.	6.31	n.a.	n.a.	n.a.	n.a.	n.a.
04/06/93	1233	90.6	10	18	5.98	6.06	24.5	42.1	41.3	23.5
04/13/93	1215	53.8	11	17	6.2	n.a.	n.a.	n.a.	n.a.	n.a.
04/20/93	1255	77.4	14	18	6.22	6.34	26.5	45.3	42.2	25.1
04/27/93	844	73.8	9	17	5.68	n.a.	n.a.	n.a.	n.a.	n.a.
05/04/93	1115	39.6	12	18	6.19	6.03	29.9	43	41.2	21.2
05/11/93	1000	26.6	14	17	6.36	n.a.	n.a.	n.a.	n.a.	n.a.
05/18/93	1145	21.2	12	17	6.17	5.94	27	40.8	40.8	18.4
05/25/93	1145	13	14	17	6.38	n.a.	n.a.	n.a.	n.a.	n.a.
06/01/93	1527	10.2	13	16	6.37	6.32	27	37.1	40.2	18.4
06/08/93	1220	9.06	14	17	5.98	n.a.	n.a.	n.a.	n.a.	n.a.
06/15/93	1221	6.8	16	16	6.36	6.23	27	36	42.6	15.6
06/22/93	825	7.08	16	17	6.18	n.a.	n.a.	n.a.	n.a.	n.a.
06/29/93	835	5.85	12	16	6.2	6.03	27.5	43	41.2	15.4
07/06/93	955	n.d.	15	16	6.21	n.a.	n.a.	n.a.	n.a.	n.a.
07/13/93	1105	4.53	19	16	6.3	6.47	25.5	39.1	44.4	16.9

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
0.89	<.38	31.6	8.34	41.6	42.3	114	-43	-7.38	12/01/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/08/92
2.56	<.38	33	14.7	51.7	29.3	110	-44.5	-7.27	12/15/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/21/92
2.33	<.38	32.6	14.6	42.2	41.5	113	n.a.	n.a.	12/29/92
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	01/05/93
3.54	<.38	36.8	15.1	43.9	41.6	113	n.a.	n.a.	01/12/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	01/19/93
1.25	<.38	35.9	16.6	43.1	44.7	117	n.a.	n.a.	01/26/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/02/93
0.76	<.38	35.5	17.2	39.9	48.9	118	n.a.	n.a.	02/09/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	02/18/93
2.28	<.38	34.5	7.8	40.6	52.2	108	n.a.	n.a.	02/23/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/02/93
4.11	<.38	34.6	11.1	61.7	30.4	102	n.a.	n.a.	03/08/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/17/93
3.54	<.38	35.4	17.7	61.5	38.3	91.8	n.a.	n.a.	03/23/93
6.23	<.38	29.7	18.2	84.1	18.3	82.6	n.a.	n.a.	03/24/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/29/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	03/30/93
1.66	<.38	37.4	15.3	44.1	37.4	99.3	n.a.	n.a.	04/06/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/13/93
1.56	<.38	37.6	13.7	44.6	43.8	94.7	n.a.	n.a.	04/20/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	04/27/93
1.33	<.38	36.8	14.2	35.3	60	97.9	n.a.	n.a.	05/04/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/11/93
1.56	<.38	34.7	9.09	33.4	57.4	109	n.a.	n.a.	05/18/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	05/25/93
1.89	<.38	36.2	9.23	34.2	52.8	117	n.a.	n.a.	06/01/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/08/93
1.67	<.38	34.3	6.32	30.5	56.5	121	n.a.	n.a.	06/15/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	06/22/93
2.38	<.38	32.6	9.32	32.1	37.4	120	n.a.	n.a.	06/29/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/06/93
2.54	<.38	33.7	10.7	29.5	52	134	n.a.	n.a.	07/13/93

Table 16. Chemical analyses of streamwater collected weekly and biweekly from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
					Field	Laboratory				
07/20/93	756	4.53	18.5	15	6.29	n.a.	n.a.	n.a.	n.a.	n.a.
07/27/93	850	4.53	19	16	6.09	6.41	25	38.3	40.1	14.6
08/03/93	810	3.68	19	16	6.17	n.a.	n.a.	n.a.	n.a.	n.a.
08/10/93	835	4.81	18	16	6.26	6.3	22.5	38.4	43.5	17.4
08/17/93	910	3.68	19	16	6.45	n.a.	n.a.	n.a.	n.a.	n.a.
08/24/93	900	3.11	18.5	16	5.99	6.45	27.9	40.2	43.9	15.6
08/31/93	945	3.11	20	15	6.87	n.a.	n.a.	n.a.	n.a.	n.a.
09/07/93	1240	3.11	20	16	5.71	6.05	27.9	38.8	40.3	17.1
09/14/93	1221	3	17.5	16	6.11	n.a.	n.a.	n.a.	n.a.	n.a.
09/15/93	1009	2.83	18	15	6.04	6.53	27.9	38.2	43.5	16.2
09/21/93	1430	3.4	15	16	5.8	6.31	27.5	38.6	41.9	16.9
09/28/93	845	3.68	14	17	5.73	n.a.	n.a.	n.a.	n.a.	n.a.
10/05/93	1147	2.83	13	15	5.29	5.36	24.5	37.6	43.9	16.1
10/12/93	1300	4.53	12	23	6	n.a.	n.a.	n.a.	n.a.	n.a.
10/19/93	1233	3.11	17	16	5.61	6.38	25.4	40.2	47	19.2
10/26/93	937	3.11	11	17	5.73	n.a.	n.a.	n.a.	n.a.	n.a.
11/02/93	1115	3.68	8	21	5.75	6.08	35.4	57.6	41.3	26.1
11/09/93	1550	3.85	7.5	18	6.3	n.a.	n.a.	n.a.	n.a.	n.a.
11/16/93	1515	3.11	11	19	6.23	6.28	27.9	46.6	43.1	24.3
11/23/93	1328	3.68	8	18	6.39	n.a.	n.a.	n.a.	n.a.	n.a.
11/30/93	1620	11.6	7	18	5.91	5.64	27	43.4	42.1	26.1
12/07/93	1449	36.8	9	18	5.46	n.a.	n.a.	n.a.	n.a.	n.a.
12/14/93	938	19.5	6	17	5.96	6.06	22	37	42.1	22.8
12/21/93	1140	20.4	6	19	6.01	n.a.	n.a.	n.a.	n.a.	n.a.
12/29/93	1230	11.6	3	19	5.97	6.06	24	40.7	41.6	22.3

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	Bicarbonate, dissolved (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	07/20/93
2.67	<.38	32.2	7.73	31.3	38.7	127	n.a.	n.a.	07/27/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/03/93
2.46	2.2	32.9	1.99	32.4	59.7	130	n.a.	n.a.	08/10/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/17/93
2.86	<.38	37.2	3.83	28.6	63.8	136	n.a.	n.a.	08/24/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	08/31/93
3.68	1.8	32.8	0.93	29.7	55.7	133	n.a.	n.a.	09/07/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/14/93
2.74	2	35.7	4.04	29.1	57	136	n.a.	n.a.	09/15/93
2.77	1.9	33.2	0.65	33.1	53	128	n.a.	n.a.	09/21/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	09/28/93
2.1	<.38	34.8	0.46	34.4	49.2	132	n.a.	n.a.	10/05/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/12/93
2.03	<.38	35.9	<.45	35.8	56.8	132	n.a.	n.a.	10/19/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10/26/93
3.18	<.38	47.7	0.6	72.7	43.6	125	n.a.	n.a.	11/02/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/09/93
2.9	<.38	39.6	<.45	53.1	53.4	131	n.a.	n.a.	11/16/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	11/23/93
4.88	<.38	37.1	1.63	60.8	26.6	115	n.a.	n.a.	11/30/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/07/93
2.81	<.38	37.4	13.6	43	32.1	112	n.a.	n.a.	12/14/93
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12/21/93
1.9	<.38	36.4	16.8	41.9	35.3	116	n.a.	n.a.	12/29/93

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93

[L/s, liters per second; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; n.a., not analyzed; ANC, acid-neutralizing capacity]

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
12/26/87	1030	15.3	17	5.6	7.07	49	44.8	26.1	27.6
12/26/87	1130	15.3	16	6.15	6.57	29.9	46.4	29.6	28.6
12/26/87	1230	13.6	16	6.03	6.68	32	47.4	24.4	24.6
12/26/87	1330	13.6	17	6.07	6.65	28.2	44.8	24.4	24.6
12/26/87	1430	13.6	16	6.12	6.62	28	50.4	26.1	26.6
12/26/87	1530	13	17	6.08	6.88	33.9	50.7	26.1	27.6
12/26/87	1630	12.2	17	6.16	6.83	22	54.3	26.1	27.6
12/26/87	1830	12.2	17	6.19	6.57	24	53.3	26.1	27.6
12/26/87	2030	12.2	18	6.16	6.76	39.9	48.4	26.1	28.6
12/26/87	2230	12.2	12	6.1	6.36	n.a.	n.a.	n.a.	n.a.
12/27/87	30	12.2	17	6.11	6.34	49.9	50	31.3	26.6
12/27/87	230	12.2	18	5.93	6.3	47.9	57.9	24.4	29.7
12/27/87	330	10.8	18	6.15	6.34	35.9	48	24.4	26.6
12/27/87	530	10.8	19	6.04	6.25	35.2	47.4	24.4	25.6
12/27/87	730	10.8	18	6.01	6.14	35.9	48	29.6	27.6
01/01/88	1530	13.6	18	6.26	6.4	25.8	46.1	53	34.8
01/01/88	1630	13.6	18	6.3	6.37	25.6	45.7	50.4	25.6
01/01/88	1830	13.6	17	6.27	n.a.	25.4	46.4	47.4	29.7
01/01/88	1930	13.6	18	6.2	6.56	30.6	43.1	45.6	27.6
01/01/88	2030	12.2	17	6.27	n.a.	29.4	47.4	43.9	27.6
01/01/88	2230	12.2	17	6.2	n.a.	24.9	43.8	52.2	25.6
01/02/88	30	12.2	17	6.19	n.a.	23.6	43.1	50.4	25.6
01/02/88	230	12.2	19	6.21	6.68	28.8	46.4	53.9	26.6
01/02/88	430	12.2	18	6.06	n.a.	25.5	46.7	43.5	22.5
01/02/88	630	12.2	18	6.35	6.42	25.8	42.8	45.2	24.6
01/02/88	830	12.2	18	6.2	6.44	30.2	51	49.1	27.7
01/02/88	1030	12.2	18	6.25	6.42	26.4	46.4	50.4	27.6
01/19/88	2230	13.6	12	6.15	n.a.	50.4	65.5	53.9	37.8
01/19/88	2330	21	20	6.06	n.a.	53.9	67.1	45.2	34.8
01/20/88	30	34	22	5.98	n.a.	54.4	73.7	41.7	34.8
01/20/88	130	39.6	23	5.88	n.a.	64.9	79.4	41.7	35.8
01/20/88	230	45.3	24	5.75	n.a.	56.9	80	41.7	38.9

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	51.6	6.1	48.8	39	115	n.a.	n.a.	12/26/87
n.a.	n.a.	41.8	5.91	47.8	38	114	n.a.	n.a.	12/26/87
n.a.	n.a.	49.4	6.4	49.6	39	113	n.a.	n.a.	12/26/87
n.a.	n.a.	37.6	6.36	44.6	40	112	n.a.	n.a.	12/26/87
n.a.	n.a.	45.7	6.96	49	40	115	n.a.	n.a.	12/26/87
n.a.	n.a.	44.6	7.43	49.4	42	112	n.a.	n.a.	12/26/87
n.a.	n.a.	45.1	6.51	48.4	43	110	n.a.	n.a.	12/26/87
n.a.	n.a.	43.2	6.58	49.9	44	110	n.a.	n.a.	12/26/87
n.a.	n.a.	44.6	8.2	51.4	40	110	n.a.	n.a.	12/26/87
n.a.	n.a.	45.3	6.33	54.3	29	n.a.	n.a.	n.a.	12/26/87
n.a.	n.a.	43.5	6.42	52	45	108	n.a.	n.a.	12/27/87
n.a.	n.a.	43.6	6.2	52.8	44	110	n.a.	n.a.	12/27/87
n.a.	n.a.	43.8	6.55	53.9	45	111	n.a.	n.a.	12/27/87
n.a.	n.a.	44	6.21	52.2	46	112	n.a.	n.a.	12/27/87
n.a.	n.a.	43.8	6.28	53.1	45	116	n.a.	n.a.	12/27/87
n.a.	n.a.	50.7	9.42	53.5	48	110	n.a.	n.a.	01/01/88
n.a.	n.a.	48.2	6.73	50.4	48	107	n.a.	n.a.	01/01/88
n.a.	n.a.	51.8	6.28	50.1	46	107	n.a.	n.a.	01/01/88
n.a.	n.a.	52.1	7.15	51.9	44	106	n.a.	n.a.	01/01/88
n.a.	n.a.	50.5	6.77	51.4	43	114	n.a.	n.a.	01/01/88
n.a.	n.a.	49.9	7.53	52.1	50	76	n.a.	n.a.	01/01/88
n.a.	n.a.	48	7.07	52.4	43	100	n.a.	n.a.	01/02/88
n.a.	n.a.	51	6.8	52.2	43	109	n.a.	n.a.	01/02/88
n.a.	n.a.	51.4	6.76	54.1	40	102	n.a.	n.a.	01/02/88
n.a.	n.a.	51.4	5.94	55.5	46	92	n.a.	n.a.	01/02/88
n.a.	n.a.	50.5	5.89	57.6	42	103	n.a.	n.a.	01/02/88
n.a.	n.a.	54.6	6.3	64	46	88	n.a.	n.a.	01/02/88
n.a.	n.a.	50.2	7.88	85.7	40	91	n.a.	n.a.	01/19/88
n.a.	n.a.	46.2	9.67	97.9	20	84	n.a.	n.a.	01/19/88
n.a.	n.a.	43	9.75	111	20	77	n.a.	n.a.	01/20/88
n.a.	n.a.	41	9.84	122	20	71	n.a.	n.a.	01/20/88
n.a.	n.a.	40.1	9.45	131	18	65	n.a.	n.a.	01/20/88

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
01/20/88	330	62.3	25	5.73	n.a.	57.9	85.5	45.2	43
01/20/88	430	62.3	29	5.72	n.a.	65.4	88	57.4	48.1
01/20/88	530	62.3	28	5.74	n.a.	57.9	85.5	48.7	41.9
01/20/88	630	59.5	28	5.78	n.a.	53.4	80.1	40	35.8
01/20/88	730	51	28	5.85	n.a.	54.9	82.2	40	34.8
01/20/88	830	45.3	28	5.87	n.a.	50.9	77.2	41.7	34.8
01/20/88	930	39.6	26	5.9	n.a.	51.4	71.3	43.5	34.8
01/20/88	1030	36.8	25	6.02	n.a.	56.4	79.7	53.9	40.9
01/20/88	1130	34	26	5.98	n.a.	47	72.5	40	32.7
01/20/88	1230	31.1	25	6.04	n.a.	46.3	71	45.2	33.8
01/20/88	1330	31.1	25	6.05	n.a.	46.3	71.8	45.2	33.8
01/20/88	1430	28.3	25	6.07	n.a.	44.9	68.8	47	33.8
01/20/88	1530	28.3	23	6.1	n.a.	45.4	70.2	47	33.8
01/20/88	1630	28.3	24	6.14	n.a.	48	70.9	47	33.8
01/20/88	1730	26	24	6.11	n.a.	50.4	68.3	41.7	30.7
01/20/88	1830	26	23	6.13	n.a.	42.1	65.5	48.7	33.8
01/20/88	1930	26	23	6.13	n.a.	42.5	64.9	43.5	30.7
01/20/88	2030	23.8	22	6.19	n.a.	40.6	62.5	48.7	33.8
01/20/88	2130	23.8	22	6.19	n.a.	39.6	60.9	40	27.6
02/02/88	1815	19.5	19	6.29	6.48	31.6	43.9	41.6	24
02/02/88	1915	19.5	22	6.33	6.4	32	48.1	44.8	27.1
02/02/88	2115	19.5	20	6.27	6.34	31.2	46.3	40.1	24.3
02/02/88	2215	17.8	20	6.32	6.43	35.1	48.9	42.5	25.5
02/03/88	15	17.8	20	6.27	6.3	33.7	49.9	43.5	25.8
02/03/88	215	17.8	19	6.28	6.45	32.5	46.4	38.6	24.2
02/03/88	415	17.8	18	6.33	6.29	31.2	46.4	39.8	24.6
02/03/88	615	17.8	19	6.35	6.16	29.9	43.9	36.8	23.1
02/03/88	815	17.8	19	6.33	6.33	30.8	46	39.9	24.4
02/03/88	1015	17.8	21	6.31	6.29	38.5	50.4	44.4	26.1
02/03/88	1215	17.8	21	6.36	6.23	36.7	55.3	49.6	28.9
03/26/88	345	25.6	24	5.96	6.03	n.a.	n.a.	n.a.	n.a.
03/26/88	445	34	24	6.03	6.35	n.a.	n.a.	n.a.	n.a.
03/26/88	545	31.1	24	6.09	6.25	n.a.	n.a.	n.a.	n.a.
03/26/88	645	31.1	24	6.17	6.25	n.a.	n.a.	n.a.	n.a.
03/26/88	745	28.3	24	6.23	6.24	n.a.	n.a.	n.a.	n.a.

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	39.2	7.22	137	14	65	n.a.	n.a.	01/20/88
n.a.	n.a.	39.2	6.4	139	10	66	n.a.	n.a.	01/20/88
n.a.	n.a.	39.4	5.94	143	9	63	n.a.	n.a.	01/20/88
n.a.	n.a.	40.3	5.9	143	9	60	n.a.	n.a.	01/20/88
n.a.	n.a.	40.3	5.46	144	10	65	n.a.	n.a.	01/20/88
n.a.	n.a.	40.6	5.11	142	11	68	n.a.	n.a.	01/20/88
n.a.	n.a.	39.6	4.85	128	10	71	n.a.	n.a.	01/20/88
n.a.	n.a.	42.2	4.82	137	16	95	n.a.	n.a.	01/20/88
n.a.	n.a.	41.3	4.32	131	18	88	n.a.	n.a.	01/20/88
n.a.	n.a.	41.6	5.04	128	18	89	n.a.	n.a.	01/20/88
n.a.	n.a.	44.9	4.46	122	16	80	n.a.	n.a.	01/20/88
n.a.	n.a.	40.9	4.07	119	20	81	n.a.	n.a.	01/20/88
n.a.	n.a.	45.2	5.21	124	29	86	n.a.	n.a.	01/20/88
n.a.	n.a.	49.7	5.47	120	23	82	n.a.	n.a.	01/20/88
n.a.	n.a.	46.9	5.2	113	21	88	n.a.	n.a.	01/20/88
n.a.	n.a.	49.2	5.2	112	26	89	n.a.	n.a.	01/20/88
n.a.	n.a.	49.2	5.41	110	30	90	n.a.	n.a.	01/20/88
n.a.	n.a.	49	5.21	107	25	89	n.a.	n.a.	01/20/88
n.a.	n.a.	47.4	5.23	104	23	90	n.a.	n.a.	01/20/88
n.a.	n.a.	35.3	6.83	59.6	42	109	n.a.	n.a.	02/02/88
n.a.	n.a.	42	8.17	67.4	46	119	n.a.	n.a.	02/02/88
n.a.	n.a.	39.9	7.19	64.8	38	94	n.a.	n.a.	02/02/88
n.a.	n.a.	38.5	7.32	66.4	43	100	n.a.	n.a.	02/02/88
n.a.	n.a.	40.7	7.22	68.3	41	106	n.a.	n.a.	02/03/88
n.a.	n.a.	36.9	6.32	65.5	35	97	n.a.	n.a.	02/03/88
n.a.	n.a.	37.9	6.22	66	35	106	n.a.	n.a.	02/03/88
n.a.	n.a.	35.9	5.43	63.4	31	93	n.a.	n.a.	02/03/88
n.a.	n.a.	51.6	5.87	67.3	37	106	n.a.	n.a.	02/03/88
n.a.	n.a.	55.3	6.61	72.5	40	111	n.a.	n.a.	02/03/88
n.a.	n.a.	58.1	7.27	73.3	43	119	n.a.	n.a.	02/03/88
n.a.	n.a.	42.4	51.7	102	16	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	38.9	19	66.2	34	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	28.4	23	72.1	37	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	39.2	22.5	75.8	37	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	27.7	18.6	81.3	37	n.a.	n.a.	n.a.	03/26/88

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93–Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
03/26/88	845	26	23	6.43	6.27	n.a.	n.a.	n.a.	n.a.
03/26/88	945	21.5	23	6.38	6.33	n.a.	n.a.	n.a.	n.a.
03/26/88	1045	19.5	22	6.59	6.35	n.a.	n.a.	n.a.	n.a.
03/26/88	1145	19.5	21	6.64	6.36	n.a.	n.a.	n.a.	n.a.
03/26/88	1245	17.8	21	6.6	6.38	n.a.	n.a.	n.a.	n.a.
03/26/88	1345	17.8	20	6.58	6.41	n.a.	n.a.	n.a.	n.a.
03/26/88	1445	17.8	19	6.52	6.29	n.a.	n.a.	n.a.	n.a.
03/26/88	1545	16.1	19	6.48	6.42	n.a.	n.a.	n.a.	n.a.
03/26/88	1645	16.1	19	6.41	6.36	n.a.	n.a.	n.a.	n.a.
07/11/88	1815	13.4	33	5.27	5.97	88.8	115	47.8	46.6
07/11/88	1830	14.7	32	5.49	5.95	79.6	102	49.2	51.9
07/11/88	1845	14.7	32	5.62	5.94	71.6	98.3	45.2	51.9
07/11/88	1900	14.7	31	5.67	6	74.1	91.7	46.1	48.1
07/11/88	1915	14.1	31	5.72	5.93	73.6	95	46.1	50.6
07/11/88	1930	12.8	32	5.73	6.12	65.4	95.4	48.3	52.2
07/11/88	1945	11.5	31	5.82	6.01	65.9	90.5	49.6	51.2
07/11/88	2000	10.8	30	5.79	5.95	65.9	90.5	49.6	51.2
07/11/88	2015	10.2	30	5.78	5.99	61.4	86.4	50	47.3
07/11/88	2030	9.63	29	5.8	6.01	70	101	47.4	44.2
07/11/88	2045	9.1	28	5.78	5.99	68	97.7	49.6	43.7
07/11/88	2100	8.5	28	5.86	6.02	64	92.2	48.7	42.7
07/11/88	2115	7.97	27	5.86	6.02	60.7	89.5	52.6	44
07/11/88	2130	7.36	28	5.9	6.04	56.4	80.5	47	38.9
07/11/88	2200	7.36	26	5.95	6.09	61.9	82.2	44.4	37.1
07/11/88	2245	7.36	27	5.93	6.17	44	65	43.9	35.3
07/11/88	2300	6.96	26	5.97	6.19	49.9	74.5	44.4	34.5
07/11/88	2315	6.51	25	5.97	6.14	43	63.4	43.5	33.8
07/11/88	2345	6.51	25	5.98	6.19	53.4	74.5	46.5	35.6
05/16/89	1400	110	20	5.8	6.06	32.9	53.1	34	25.4
05/16/89	1430	116	25	5.65	5.73	47.5	69.6	38.8	25.8
05/16/89	1515	124	20	5.85	5.94	28.3	41.4	28.8	21
05/16/89	1600	124	20	5.86	5.87	33.2	51.4	33.6	25.5
05/16/89	1645	116	20	5.86	5.9	32.9	52.5	35.8	26.6
05/16/89	1730	116	20	5.92	5.92	33.2	53.6	36.6	27.1
05/16/89	1815	110	20	5.97	5.95	33	53.2	35.8	27.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	38	15.9	75.3	40	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	38.6	14.1	74.3	43	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	37.3	12.4	72.1	47	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	37.4	10.8	68.6	44	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	37.2	9.19	68.6	44	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	32.7	8.11	64.3	45	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	39.4	7.85	63.6	47	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	37.4	7	61.9	49	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	38.4	6.96	59.8	49	n.a.	n.a.	n.a.	03/26/88
n.a.	n.a.	38.7	22	110	31	94	n.a.	n.a.	07/11/88
n.a.	n.a.	34	20	124	18	86	n.a.	n.a.	07/11/88
n.a.	n.a.	36.9	23.8	124	15	86	n.a.	n.a.	07/11/88
n.a.	n.a.	32.8	22.9	120	15	86	n.a.	n.a.	07/11/88
n.a.	n.a.	32.8	20.5	121	55	84	n.a.	n.a.	07/11/88
n.a.	n.a.	31.8	20.6	121	13	83	n.a.	n.a.	07/11/88
n.a.	n.a.	33.7	19.3	125	29	85	n.a.	n.a.	07/11/88
n.a.	n.a.	32.5	20.2	121	15	87	n.a.	n.a.	07/11/88
n.a.	n.a.	33.6	20.3	123	26	88	n.a.	n.a.	07/11/88
n.a.	n.a.	46.5	17.2	112	25	91	n.a.	n.a.	07/11/88
n.a.	n.a.	33.5	17.3	117	36	91	n.a.	n.a.	07/11/88
n.a.	n.a.	32.5	16.3	111	36	92	n.a.	n.a.	07/11/88
n.a.	n.a.	34.9	15.6	112	37	94	n.a.	n.a.	07/11/88
n.a.	n.a.	32.5	14.1	107	36	94	n.a.	n.a.	07/11/88
n.a.	n.a.	33.7	12.8	106	41	96	n.a.	n.a.	07/11/88
n.a.	n.a.	34.7	9.28	102	42	99	n.a.	n.a.	07/11/88
n.a.	n.a.	33.9	10.2	98.5	40	100	n.a.	n.a.	07/11/88
n.a.	n.a.	33	8.84	97.7	40	100	n.a.	n.a.	07/11/88
n.a.	n.a.	33.6	9.36	94.9	40	102	n.a.	n.a.	07/11/88
n.a.	n.a.	31.5	10.2	83.8	12	82	n.a.	n.a.	05/16/89
n.a.	n.a.	46	14.6	64.5	14	94	n.a.	n.a.	05/16/89
n.a.	n.a.	28	10.2	64.6	6	73	n.a.	n.a.	05/16/89
n.a.	n.a.	31.6	11	80	14	89	n.a.	n.a.	05/16/89
n.a.	n.a.	32.4	11.6	81.3	12	90	n.a.	n.a.	05/16/89
n.a.	n.a.	33	15.8	84.2	15	90	n.a.	n.a.	05/16/89
n.a.	n.a.	33.7	12.4	83.5	17	91	n.a.	n.a.	05/16/89

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
05/16/89	1900	110	20	5.92	6.01	32.6	52.5	35.6	26.3
05/16/89	1945	110	20	5.96	5.96	32.9	52.4	34.2	25.5
06/14/89	1930	23.8	n.a.	5.43	5.79	24.7	39	38.4	19.5
06/14/89	1945	23.8	n.a.	5.41	5.9	22.8	37.9	37.6	19.2
06/14/89	2000	21.5	n.a.	5.39	5.83	25.6	41.5	38.4	19.9
06/14/89	2015	21.5	n.a.	5.37	5.77	31.1	49.4	39.5	21.5
06/14/89	2115	21.5	n.a.	5.42	6.31	30.3	47.2	38.3	20.7
06/23/89	1830	42.5	n.a.	5.69	5.28	35.2	45.8	35.2	22.6
06/23/89	1845	99.1	n.a.	5.56	5.96	34.2	46.3	32.5	24
06/23/89	1900	130	n.a.	5.43	6.02	36.4	50.7	34.1	24.6
06/23/89	1915	116	n.a.	5.42	5.99	37.2	52.6	32.5	24
06/23/89	1930	116	n.a.	5.5	6.03	39.4	55.1	31.9	24.1
06/23/89	1945	105	n.a.	5.43	6.01	40.7	54.7	32.4	25
06/23/89	2000	82.1	n.a.	5.48	6.02	37	52.7	33.4	22.9
06/23/89	2015	70.8	n.a.	5.43	6.06	35.2	50.5	34.5	23
06/23/89	2030	62.3	n.a.	5.46	6.11	36	49.8	33.6	22.2
06/23/89	2045	53.8	n.a.	5.56	6.1	35.1	50	35.6	22.7
06/23/89	2100	51	n.a.	5.48	6.04	36.3	51.3	35.6	22.1
06/23/89	2115	45.3	n.a.	5.53	6.19	36.6	51.2	37.1	23
06/23/89	2130	42.5	n.a.	5.47	6.18	35.1	51.2	36.9	22.4
06/23/89	2145	42.5	n.a.	5.55	6.17	33.6	50.1	36.1	21.9
06/23/89	2200	39.6	n.a.	5.58	6.19	34.2	49.8	41.1	22.9
06/23/89	2215	36.8	n.a.	5.6	6.15	33.7	50.4	38.9	21.9
06/23/89	2230	36.8	n.a.	5.68	6.23	35	49.1	40.4	22.4
06/23/89	2245	36.8	n.a.	5.59	6.4	34.2	49.9	39.5	22.1
06/23/89	2300	34	n.a.	5.58	6.13	33.6	48.5	39.6	22.1
06/23/89	2315	34	n.a.	5.6	6.3	33.6	49.6	38.9	21.6
06/23/89	2330	34	n.a.	5.54	6.26	33.8	49.8	38.9	21.8
06/23/89	2345	31.1	n.a.	5.58	6.38	32.9	49	39.9	22.1
06/23/89	2400	31.1	n.a.	5.55	6.35	34.3	50.1	40.3	22.2
06/24/89	15	31.1	n.a.	5.57	6.37	35.7	50.7	39.1	21.8
07/04/89	2245	16.1	n.a.	5.67	5.78	37	50.3	39	20.8
07/04/89	2300	28.3	n.a.	5.59	5.99	34.1	47.4	36.4	21.1
07/04/89	2315	31.1	n.a.	5.44	6.01	35.6	49.7	35.6	21.7
07/04/89	2330	42.5	n.a.	5.57	6.05	36.2	50.2	34.6	21.5

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	32.2	12.2	78.7	15	93	n.a.	n.a.	05/16/89
n.a.	n.a.	32.4	16.4	78.2	14	94	n.a.	n.a.	05/16/89
n.a.	n.a.	34.2	3.82	38.3	46	110	n.a.	n.a.	06/14/89
n.a.	n.a.	31.4	3.88	35.1	41	108	n.a.	n.a.	06/14/89
n.a.	n.a.	33.8	6.21	37.5	44	109	n.a.	n.a.	06/14/89
n.a.	n.a.	34.4	6.28	37.4	43	108	n.a.	n.a.	06/14/89
n.a.	n.a.	33.6	6.52	38	45	109	n.a.	n.a.	06/14/89
n.a.	n.a.	36	10.6	48.1	32	107	n.a.	n.a.	06/23/89
n.a.	n.a.	32.1	13.3	60.5	27	96	n.a.	n.a.	06/23/89
n.a.	n.a.	31	14.6	62	26	95	n.a.	n.a.	06/23/89
n.a.	n.a.	39.6	16.8	68	20	91	n.a.	n.a.	06/23/89
n.a.	n.a.	29.8	17.2	70.9	18	90	n.a.	n.a.	06/23/89
n.a.	n.a.	29.6	16.4	69.2	22	92	n.a.	n.a.	06/23/89
n.a.	n.a.	31.1	15.8	68.1	24	93	n.a.	n.a.	06/23/89
n.a.	n.a.	30.4	15	65.6	27	95	n.a.	n.a.	06/23/89
n.a.	n.a.	30.3	13.6	60	26	95	n.a.	n.a.	06/23/89
n.a.	n.a.	30.7	16.4	62.4	28	97	n.a.	n.a.	06/23/89
n.a.	n.a.	31.9	14	62.3	28	97	n.a.	n.a.	06/23/89
n.a.	n.a.	32.1	14.2	62	29	97	n.a.	n.a.	06/23/89
n.a.	n.a.	37.4	13.1	58.8	32	95	n.a.	n.a.	06/23/89
n.a.	n.a.	32.2	12.8	59.6	33	98	n.a.	n.a.	06/23/89
n.a.	n.a.	32.6	12.5	57.3	35	99	n.a.	n.a.	06/23/89
n.a.	n.a.	32.2	12	55	35	102	n.a.	n.a.	06/23/89
n.a.	n.a.	32.7	11.9	55.4	32	102	n.a.	n.a.	06/23/89
n.a.	n.a.	32	11.9	55.1	31	101	n.a.	n.a.	06/23/89
n.a.	n.a.	31.9	12.4	55.2	32	100	n.a.	n.a.	06/23/89
n.a.	n.a.	32.4	11.9	54.7	35	102	n.a.	n.a.	06/23/89
n.a.	n.a.	32.8	12	55	35	104	n.a.	n.a.	06/23/89
n.a.	n.a.	31.5	12.2	53.1	31	104	n.a.	n.a.	06/23/89
n.a.	n.a.	32.4	12	54.7	38	102	n.a.	n.a.	06/23/89
n.a.	n.a.	32	14	53.6	34	104	n.a.	n.a.	06/24/89
n.a.	n.a.	35.9	7.84	41	40	106	n.a.	n.a.	07/04/89
n.a.	n.a.	33	9.28	45.4	35	97.5	n.a.	n.a.	07/04/89
n.a.	n.a.	31.8	10.1	49.3	29	95.4	n.a.	n.a.	07/04/89
n.a.	n.a.	31.3	10.6	52.9	26	91.8	n.a.	n.a.	07/04/89

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
07/04/89	2345	45.3	n.a.	5.5	6.08	38	53.8	35.1	22.2
07/04/89	2400	45.3	n.a.	5.47	6.09	40.3	55.7	34.3	22.1
07/05/89	15	45.3	n.a.	5.44	6.03	40.2	55.8	34.2	21.6
07/05/89	30	42.5	n.a.	5.49	6.09	40.6	56.2	34.4	21.7
07/05/89	45	42.5	n.a.	5.44	6.08	40.5	56.7	34.5	21.9
07/05/89	100	42.5	n.a.	5.42	6.18	43.1	58.6	34.1	22.1
07/05/89	115	42.5	n.a.	5.37	6.04	44	60.4	33.3	21.6
07/05/89	130	45.3	n.a.	5.39	6.12	43.6	61.8	38.8	24.8
07/05/89	145	45.3	n.a.	5.4	6.2	45.5	63.2	38.4	24.5
07/05/89	200	42.5	n.a.	5.43	6.18	43.7	63.8	38.4	24.1
07/05/89	215	39.6	n.a.	5.49	6.2	43.5	63.5	38.3	23.7
07/05/89	230	34	n.a.	5.4	6.22	42.9	63.6	38.8	23.2
07/05/89	245	31.1	n.a.	5.44	6.21	43.9	61.8	38.5	23.6
07/05/89	300	28.3	n.a.	5.48	6.24	42.9	61	38.2	23.1
07/05/89	315	26	n.a.	5.42	6.26	42.4	60.5	37.6	22.4
07/05/89	330	23.8	n.a.	5.45	6.27	40.5	59.4	38.2	23.2
07/05/89	345	23.8	n.a.	5.45	6.21	41.1	58.3	38.2	21.9
07/05/89	400	23.8	n.a.	5.43	6.28	38.9	57.8	37.9	21.9
07/05/89	415	21.5	n.a.	5.42	6.23	39.6	57	37.6	22.1
07/13/89	700	16.1	n.a.	5.58	6.06	40.6	58.6	40.8	24.4
07/13/89	715	16.1	n.a.	5.58	6.09	38.2	54.8	37.5	25
07/13/89	730	28.3	n.a.	5.54	6.09	38.8	57.1	39	25.5
07/13/89	745	36.8	n.a.	5.49	6.1	41.7	61.2	37	25.2
07/13/89	800	45.3	n.a.	5.44	6.01	42	62.6	37.4	25.5
07/13/89	815	51	n.a.	5.49	6.1	42.8	62.2	37.3	25.6
07/13/89	830	45.3	n.a.	5.48	6.08	42.6	62.8	37.6	24.9
07/13/89	845	42.5	n.a.	5.5	6.18	42.3	62.1	36.9	24.2
07/13/89	900	36.8	n.a.	5.51	6.17	41.2	60.8	38.4	24.3
07/13/89	915	34	n.a.	5.48	6.23	40.4	61	40.6	25.2
07/13/89	930	28.3	n.a.	5.49	6.2	42.5	62.7	40.4	26.1
07/13/89	945	26	n.a.	5.54	6.41	40.4	60.7	38.8	24.6
07/13/89	1000	23.8	n.a.	5.58	6.28	39.4	59.3	39	25
07/13/89	1015	21.5	n.a.	5.54	6.4	40	59.6	40	25.1
07/13/89	1030	19.5	n.a.	5.54	6.41	39.5	58.9	40.7	25.3
07/13/89	1045	19.5	n.a.	5.57	6.36	39.5	58.5	39.8	24.4

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	31	10.9	57.9	24	90.4	n.a.	n.a.	07/04/89
n.a.	n.a.	30.4	10.5	58	22	89	n.a.	n.a.	07/04/89
n.a.	n.a.	31.2	10.3	59.5	22	89.7	n.a.	n.a.	07/05/89
n.a.	n.a.	31.2	10.6	64.8	27	89.7	n.a.	n.a.	07/05/89
n.a.	n.a.	29.5	10.5	63	25	90.1	n.a.	n.a.	07/05/89
n.a.	n.a.	33.9	10.7	66.3	22	90.8	n.a.	n.a.	07/05/89
n.a.	n.a.	29.9	11.4	66.6	21	89	n.a.	n.a.	07/05/89
n.a.	n.a.	30.3	11	64.9	24	88.6	n.a.	n.a.	07/05/89
n.a.	n.a.	29.3	9.74	66.3	22	87.9	n.a.	n.a.	07/05/89
n.a.	n.a.	29.9	9.32	66.7	21	87.9	n.a.	n.a.	07/05/89
n.a.	n.a.	28.5	8.85	63.9	25	88.3	n.a.	n.a.	07/05/89
n.a.	n.a.	29.9	9.08	65.7	28	91.5	n.a.	n.a.	07/05/89
n.a.	n.a.	30	8.89	65	27	91.5	n.a.	n.a.	07/05/89
n.a.	n.a.	30	8.61	63.3	29	93.6	n.a.	n.a.	07/05/89
n.a.	n.a.	30.7	9.23	64.3	29	97.2	n.a.	n.a.	07/05/89
n.a.	n.a.	31.3	8.62	61.9	33	91.8	n.a.	n.a.	07/05/89
n.a.	n.a.	31.2	8.56	61.6	31	90.4	n.a.	n.a.	07/05/89
n.a.	n.a.	31	8.41	61	31	90.1	n.a.	n.a.	07/05/89
n.a.	n.a.	31.4	8.48	60.7	35	87.6	n.a.	n.a.	07/05/89
n.a.	n.a.	31.8	19.2	52.1	32	95.4	n.a.	n.a.	07/13/89
n.a.	n.a.	30.3	20.5	57.9	27	91.1	n.a.	n.a.	07/13/89
n.a.	n.a.	29.6	21.8	62.9	23	88.6	n.a.	n.a.	07/13/89
n.a.	n.a.	28.8	22.5	67.6	21	84	n.a.	n.a.	07/13/89
n.a.	n.a.	29.2	21.7	68.3	21	82.2	n.a.	n.a.	07/13/89
n.a.	n.a.	29.5	21.1	67.9	22	82.9	n.a.	n.a.	07/13/89
n.a.	n.a.	28.7	19.8	66.2	24	85.8	n.a.	n.a.	07/13/89
n.a.	n.a.	29.4	19.3	66	25	87.9	n.a.	n.a.	07/13/89
n.a.	n.a.	29.7	18.6	65.4	26	89.7	n.a.	n.a.	07/13/89
n.a.	n.a.	29.7	17.8	63.7	26	90.8	n.a.	n.a.	07/13/89
n.a.	n.a.	30.7	16.3	68.4	27	90.8	n.a.	n.a.	07/13/89
n.a.	n.a.	30	15.4	67.7	27	91.1	n.a.	n.a.	07/13/89
n.a.	n.a.	29.1	14.6	67.3	26	90.1	n.a.	n.a.	07/13/89
n.a.	n.a.	29.5	14.3	68	25	89.7	n.a.	n.a.	07/13/89
n.a.	n.a.	27.8	13.2	67.1	27	89.7	n.a.	n.a.	07/13/89
n.a.	n.a.	30.4	12.8	66.6	25	90.8	n.a.	n.a.	07/13/89

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93–Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
07/20/89	130	16.1	n.a.	5.53	6.06	35.5	49.3	37.7	21.7
07/20/89	145	21.5	n.a.	5.51	6.14	34.4	48.2	37.4	22.8
07/20/89	200	31.1	n.a.	5.48	6.33	34.9	48.8	36.2	22.4
07/20/89	215	36.8	n.a.	5.47	6.36	36.2	50.7	34.6	22.5
07/20/89	230	42.5	n.a.	5.43	6.35	37.3	53	34.3	22
07/20/89	245	42.5	n.a.	5.42	6.38	37.7	53.6	34.1	22.2
07/20/89	300	39.6	n.a.	5.43	6.33	41	56.5	35.3	22.4
07/20/89	315	36.8	n.a.	5.44	6.3	42.3	58.3	34.6	22.3
07/20/89	330	34	n.a.	5.47	6.3	41.2	60	38.2	23.7
07/20/89	345	34	n.a.	5.43	6.33	41	60.1	37.7	23.3
07/20/89	400	31.1	n.a.	5.41	6.29	42.7	60.9	37.9	23.6
07/20/89	415	28.3	n.a.	5.44	6.26	43.1	61.6	38.8	24.2
07/20/89	430	28.3	n.a.	5.44	6.29	42.4	60.6	39.7	24
07/20/89	445	26	n.a.	5.44	6.3	42.7	60.3	40	24.6
07/20/89	500	23.8	n.a.	5.37	6.26	42.5	60.2	39.6	24.1
07/20/89	515	23.8	n.a.	5.39	6.28	42.4	60.2	39.9	24.1
07/20/89	530	21.5	n.a.	5.39	6.21	42.2	60.1	40.2	23.2
07/20/89	545	21.5	n.a.	5.38	6.26	42	60	39.2	22.9
07/30/89	2030	13.3	n.a.	5.7	6.37	44	63	40.3	22.6
07/30/89	2045	14.7	n.a.	5.6	6.32	42.2	61.7	38.6	22.6
07/30/89	2100	17.8	n.a.	5.47	6.26	45	66	40.9	24
07/30/89	2115	21.5	n.a.	5.54	6.29	45.7	67	39.9	23.4
07/30/89	2130	26	n.a.	5.51	6.34	45.5	66.9	39.5	23.3
07/30/89	2145	28.3	n.a.	5.48	6.28	46.3	67.9	39.1	22.9
07/30/89	2200	31.1	n.a.	5.52	6.36	45.4	67.4	40.1	23
07/30/89	2215	31.1	n.a.	5.5	6.33	46.4	67.3	40.8	23
12/31/89	945	5.66	n.a.	5.93	5.93	59.9	94.6	48.7	40.4
12/31/89	1000	5.66	36	5.98	6	56.4	92.9	48.3	44.5
12/31/89	1015	5.66	35	5.92	5.94	62.4	99.5	47	46.6
12/31/89	1030	6.51	36	5.95	6.05	64.9	104	48.3	47.6
12/31/89	1045	7.36	36	5.91	5.85	63.9	104	47	48.6
12/31/89	1100	8.5	36	5.9	5.92	63.9	103	45.2	48.3
12/31/89	1115	12.2	36	5.88	5.93	61.9	100	47	48.1
12/31/89	1130	13.3	36	5.87	5.98	62.9	101	47	47.6
12/31/89	1145	34	36	5.85	5.94	64.9	105	47.8	48.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
n.a.	n.a.	29.8	8.5	45.3	37	95.4	n.a.	n.a.	07/20/89
n.a.	n.a.	29.2	8.47	50.1	30	91.1	n.a.	n.a.	07/20/89
n.a.	n.a.	28.4	8.61	53	29	89.7	n.a.	n.a.	07/20/89
n.a.	n.a.	27.1	8.5	55.9	27	85.8	n.a.	n.a.	07/20/89
n.a.	n.a.	27.4	7.94	57.7	27	82.9	n.a.	n.a.	07/20/89
n.a.	n.a.	27.2	8.69	59.3	21	84	n.a.	n.a.	07/20/89
n.a.	n.a.	27.2	7.86	62.3	25	84.7	n.a.	n.a.	07/20/89
n.a.	n.a.	26.6	7.75	63.5	27	87.2	n.a.	n.a.	07/20/89
n.a.	n.a.	26.8	7.96	63.5	23	87.2	n.a.	n.a.	07/20/89
n.a.	n.a.	27.6	8	65.4	28	89	n.a.	n.a.	07/20/89
n.a.	n.a.	28.6	8.31	66	27	89	n.a.	n.a.	07/20/89
n.a.	n.a.	27.8	7.73	66.4	34	91.1	n.a.	n.a.	07/20/89
n.a.	n.a.	27.3	7.56	65.6	28	90.4	n.a.	n.a.	07/20/89
n.a.	n.a.	27.7	7.43	66.1	34	91.1	n.a.	n.a.	07/20/89
n.a.	n.a.	27.9	6.93	66.1	31	94.3	n.a.	n.a.	07/20/89
n.a.	n.a.	28.6	7.68	65.8	29	93.6	n.a.	n.a.	07/20/89
n.a.	n.a.	29.1	10.7	64.1	35	96.1	n.a.	n.a.	07/20/89
n.a.	n.a.	29	6.53	63.5	33	97.5	n.a.	n.a.	07/20/89
n.a.	n.a.	30.1	13.3	60.3	39	97.9	n.a.	n.a.	07/30/89
n.a.	n.a.	30.1	17.4	66.9	29	96.1	n.a.	n.a.	07/30/89
n.a.	n.a.	30.6	17.7	71.1	25	94.3	n.a.	n.a.	07/30/89
n.a.	n.a.	30.1	17.8	73.3	23	92.9	n.a.	n.a.	07/30/89
n.a.	n.a.	31.6	17.1	73	29	93.3	n.a.	n.a.	07/30/89
n.a.	n.a.	29.8	16.9	72.7	24	96.5	n.a.	n.a.	07/30/89
n.a.	n.a.	29.7	16.6	71.9	23	95.8	n.a.	n.a.	07/30/89
n.a.	n.a.	30.1	15.7	69.1	27	96.5	n.a.	n.a.	07/30/89
4.89	n.a.	56.1	48.3	93.8	28	102	n.a.	n.a.	12/31/89
5.78	n.a.	49.7	51.4	103	22	99	n.a.	n.a.	12/31/89
6.56	n.a.	52.3	54.8	116	27	97.5	n.a.	n.a.	12/31/89
8.01	2.15	51.2	57.9	120	22	95.4	n.a.	n.a.	12/31/89
8.23	1.93	54.4	58.2	128	22	94	n.a.	n.a.	12/31/89
8.23	2.08	53.4	58.6	124	22	94.7	n.a.	n.a.	12/31/89
7.78	n.a.	52.3	58.1	124	20	95.1	n.a.	n.a.	12/31/89
8.45	1.79	50.4	52.4	126	16	95.8	n.a.	n.a.	12/31/89
9.34	1.86	51.1	52.4	127	13	95.4	n.a.	n.a.	12/31/89

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
12/31/89	1200	34	36	5.83	5.78	65.9	109	47.8	48.6
12/31/89	1215	36.8	36	5.81	5.89	67.9	111	47.8	49.4
12/31/89	1230	39.6	38	5.8	5.83	68.4	114	49.2	50.1
12/31/89	1330	39.6	40	5.81	5.87	75.4	124	48.3	51.7
12/31/89	1430	39.6	40	5.8	5.86	78.3	128	49.6	49.6
12/31/89	1530	39.6	39	5.86	5.9	73.8	123	50	48.1
05/10/90	245	16.1	20	6.2	6.37	36.5	54.7	39.4	25.4
05/10/90	300	16.1	18	6.38	6.35	30.7	48.3	37.9	22.9
05/10/90	315	17	19	6.42	6.45	30.5	47.9	38.2	22.8
05/10/90	330	17.8	19	6.47	6.42	31	48.6	37.1	22
05/10/90	345	17.8	19	6.49	6.38	31.8	49.3	37.6	22.5
05/10/90	400	18.7	19	6.55	6.43	31.2	48.6	35.8	24.5
05/10/90	415	19.5	19	6.48	6.44	31.3	48.1	37.2	22.7
05/10/90	430	20.7	20	6.48	6.36	31.9	49.7	36.9	22
05/10/90	445	21.5	19	6.5	6.37	32.2	48.4	37.8	22.6
05/10/90	545	21.5	19	6.38	6.24	31.6	49.7	38.2	23
05/10/90	645	21.5	20	6.54	6.17	33.2	50.8	39.5	23.9
05/10/90	745	21.5	20	6.37	6.26	37.5	57	38.8	25.8
05/10/90	800	21.5	21	6.4	6.29	38.5	58.3	39	26.6
05/10/90	815	22.6	22	6.34	6.29	40.3	61.7	39.4	27.1
05/10/90	830	24.9	21	6.35	6.35	39.4	61	39	27.4
05/29/90	1100	76.4	21	5.88	5.89	42.2	63.6	34.4	24.6
05/29/90	1200	76.4	21	5.81	6.15	43.7	65.5	32.4	23.6
05/29/90	1230	70.8	22	6.14	6.27	60.4	73.7	37.7	25.1
05/29/90	1300	70.8	19	6.23	6.48	68.4	62.3	37.8	25
05/29/90	1330	70.8	20	6.18	6.57	68.9	60.3	37.1	23.8
05/29/90	1400	68	20	6.26	6.31	55.4	63.7	39.7	27.4
05/29/90	1430	68	20	6.25	6.46	62.9	62	37.8	25.6
05/29/90	1500	62.3	20	6.32	6.39	56.9	61.3	37	24.9
05/29/90	1530	62.3	20	6.41	6.48	54.9	58.1	36.5	24.6
05/29/90	1600	62.3	19	6.39	6.33	47.8	59.7	36.7	26.8
05/29/90	1630	62.3	20	6.28	6.32	52.4	59	36.3	23.8
05/29/90	1730	59.5	21	6.4	6.63	56.9	55.3	36.3	22.4
05/29/90	1830	59.5	20	6.32	6.31	44.7	58.4	36.5	24.5
05/29/90	1930	53.8	19	6.26	6.27	40.4	57.6	35.8	24.2

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
9.78	1.97	51.9	52.7	132	11	95.8	n.a.	n.a.	12/31/89
10.2	2.36	50.6	52.3	133	17	96.1	n.a.	n.a.	12/31/89
10.4	2.11	51.1	53.3	142	14	92.9	n.a.	n.a.	12/31/89
11.9	2.61	52.9	53.7	152	8	93.3	n.a.	n.a.	12/31/89
11.1	2.15	52.4	51.1	154	14	95.4	n.a.	n.a.	12/31/89
10	1.97	51.1	47.6	150	18	96.8	n.a.	n.a.	12/31/89
4.78	<0.38	34.5	12.4	40.1	44	104	-47	-7.75	05/10/90
4.45	<0.38	30.3	13.4	37.5	37	102	-45	-7.8	05/10/90
4.45	<0.38	29.3	12.2	38.2	45	102	-46.5	-7.8	05/10/90
4.45	<0.38	27.7	13.9	35.4	33	103	-46.5	-7.8	05/10/90
4.89	1.93	33.6	15	43.2	37	105	-47	-7.85	05/10/90
4.45	1.86	36.8	15	43.1	38	104	-47.5	-7.85	05/10/90
4.78	<0.38	32	13.4	42.4	39	102	-46.5	-7.85	05/10/90
5	<0.38	31.7	16.8	43.2	33	103	-45	-7.75	05/10/90
5.45	<0.38	32.6	16.1	45.2	36	102	-45.5	-7.75	05/10/90
5.56	<0.38	33.3	22.1	47.3	29	102	-46	-7.7	05/10/90
6.34	1.79	32.5	13.7	49.2	37	101	-46	-7.7	05/10/90
8.56	2.44	30.8	13.6	57.3	31	94.7	-42	-7.4	05/10/90
9.9	2.11	29.7	11.3	59.1	31	94.7	-42.5	-7.35	05/10/90
11	2.9	29.6	11.3	60.3	31	94.7	-42.5	-7.35	05/10/90
11	2.4	29.6	10.9	62	30	94.3	-43.5	-7.35	05/10/90
19	3.01	26.1	8.09	73	20	84.4	n.a.	n.a.	05/29/90
19.2	2.58	25	7.16	76.6	17	83.7	n.a.	n.a.	05/29/90
16.9	3.22	28.2	7.51	73.1	23	88.6	-45.5	-7.7	05/29/90
15.6	3.04	30.6	8.39	72.4	35	84.7	n.a.	n.a.	05/29/90
14.3	1.79	n.a.	n.a.	n.a.	46	85.4	-45.5	-7.6	05/29/90
14.6	3.04	32	8.64	79.6	28	89.4	n.a.	n.a.	05/29/90
12.7	2.36	n.a.	n.a.	n.a.	45	86.9	-45.5	-7.6	05/29/90
12	<0.38	30.3	8.04	78.8	33	90.4	n.a.	n.a.	05/29/90
11.7	2.15	30.9	7.66	77.6	36	90.4	-46	-7.7	05/29/90
11.2	1.97	32	7.37	81.1	26	91.5	n.a.	n.a.	05/29/90
10.6	<0.38	29.2	7.42	77.4	38	89	-47	-7.7	05/29/90
9.56	<0.38	29.6	7.67	74.6	41	90.8	-47	-7.7	05/29/90
9.9	<0.38	32.1	8.64	78.7	28	97.5	-47	-7.65	05/29/90
8.78	<0.38	31.1	7.71	77.9	29	101	-46	-7.7	05/29/90

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
05/29/90	2030	53.8	19	6.43	6.54	51.9	56.8	36.9	22.5
05/29/90	2130	45.3	19	6.45	6.51	43.2	56.2	36.9	23.1
05/29/90	2230	45.3	19	6.44	6.5	44.4	55.5	38.3	23.1
05/29/90	2330	42.5	19	6.47	6.58	51.4	51.6	38.4	22.2
08/05/90	2031	5.72	32	6.09	6.62	61.9	79.1	44.8	69.6
08/05/90	2102	8.52	26	6.04	6.4	53.9	75	44.4	40.9
08/06/90	1529	12.1	22	6.08	6.18	47.6	63.3	39.7	28.4
08/06/90	1901	7.42	21	5.26	6.35	41.2	57.3	41.9	26.6
08/20/90	335	9.63	136	5.78	6.13	104	119	50.9	606
08/20/90	352	13.4	41	5.78	6.19	54.9	75.7	45.2	124
08/20/90	432	17.8	29	5.82	6.07	50.9	69.9	42.4	46.3
08/20/90	441	23.7	25	5.83	6.06	50.9	68.7	41.4	36.6
08/20/90	448	33.8	25	5.72	5.67	47.8	63.4	31	30.4
08/20/90	639	21.5	26	5.67	5.9	51.4	69.9	33	32.2
08/20/90	741	14.7	25	5.8	5.99	49.8	69.1	34	29.9
10/11/90	450	7.22	27	6.31	6.57	48.7	63.5	55.7	57
10/11/90	517	9.91	27	6.35	6.64	49.6	66.8	59.6	53.7
10/11/90	546	13.1	28	6.32	6.72	52.4	73.8	62.2	51.2
10/11/90	617	16.8	30	6.28	6.64	54.9	78.8	65.7	53.7
10/11/90	651	21	33	6.25	6.54	58.4	83	77	55
10/11/90	725	25.8	35	6.19	6.6	62.4	88.8	67.8	56.3
10/11/90	749	31.2	35	6.14	6.49	66.4	94.6	70	57.5
10/11/90	1132	25.8	38	6.04	6.3	76.3	108	67.8	52.9
10/11/90	1201	21	36	6.02	6.01	75.3	107	70.9	52.7
10/11/90	1232	16.8	36	6.15	6.33	73.4	104	72.6	52.4
10/11/90	1317	13.1	34	6.25	6.36	67.9	98.7	66.1	46
10/11/90	1447	8.52	33	6.25	6.41	64.4	94.6	62.2	43.7
10/12/90	2314	6.06	52	6.31	6.6	66.4	86.4	54.8	193
10/12/90	2317	8.52	28	6.25	6.56	47.8	65.5	48.3	70.6
10/12/90	2323	11.4	25	6.26	6.59	47	65.7	48.3	45.3
10/12/90	2328	14.9	25	6.25	6.44	50.4	69	49.2	41.7
10/12/90	2342	18.8	27	6.25	6.37	55.4	76.7	48.7	43.2
10/12/90	2356	25.8	28	6.03	6.38	57.9	81.6	50.9	43.2
10/12/90	2400	31.2	28	6.1	6.34	57.4	81.2	50.4	44
10/13/90	101	37.2	28	5.94	6.03	59.4	82.2	51.3	40.7

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
7.89	<0.38	32.8	8.94	74.8	40	101	-47	-7.7	05/29/90
7.45	<0.38	31.6	6.88	74.6	35	103	-46.5	-7.7	05/29/90
6.78	<0.38	32.8	8.52	71.7	36	104	-47	-7.8	05/29/90
6	<0.38	34.2	9.07	69.6	48	106	-47.5	-7.75	05/29/90
4.89	<0.38	91	11.9	49.3	n.a.	104	-43.5	n.a.	08/05/90
6.78	<0.38	55.1	20.5	65.3	41	102	-41	n.a.	08/05/90
8.12	2.18	26.5	8.67	44.9	27	99.3	-46.5	n.a.	08/06/90
6	<0.38	22.4	7.02	34.8	28	105	-45	n.a.	08/06/90
7.56	3.94	721	11.1	75.8	58	102	-44.5	n.a.	08/20/90
8.12	2.15	103	12.2	56.6	18	92.6	-40.5	n.a.	08/20/90
9.12	1.97	28.7	13.7	62.7	15	84.7	-42.5	n.a.	08/20/90
10.1	1.83	21.5	14.2	68.7	13	74.8	-40.5	n.a.	08/20/90
9.78	2.61	18.8	13	62.9	14	65.9	-41	n.a.	08/20/90
11	2.76	22.5	13.7	75.4	13	72.6	-41.5	n.a.	08/20/90
10.2	2.58	20.8	10.9	69.8	14	78.3	-40	n.a.	08/20/90
4	2	90.1	1.03	46.1	74	123	-44	-7.55	10/11/90
5	2.18	85.4	1.14	54	67	119	-43	-7.25	10/11/90
5.78	2.18	96.4	0.63	63.6	60	116	-40.5	-7.15	10/11/90
5.89	<0.38	104	0.73	69.6	57	112	-39	-6.9	10/11/90
6.67	2.11	110	0.66	77	54	108	-37	-6.65	10/11/90
7.23	1.83	123	1.37	83.2	45	102	-34.5	-6.3	10/11/90
8.45	1.79	126	0.99	87.5	45	98.6	-33	-6.15	10/11/90
9.67	2.26	134	2.77	103	26	88.6	-28	-5.4	10/11/90
9.9	2.68	127	1.79	101	32	90.1	-28.5	-5.45	10/11/90
9.12	2.65	126	2.72	103	24	91.5	-28.5	-5.65	10/11/90
7.45	3.44	124	1.67	99.1	32	93.3	-30	-5.8	10/11/90
6.23	2.65	119	<0.45	96.3	33	99.7	-29.5	-5.95	10/11/90
4.19	<0.38	222	<0.45	57.8	85	105	-37	-6.75	10/12/90
5.45	3.15	116	<0.45	56.6	68	102	-39	-6.6	10/12/90
6.78	2.58	72.9	<0.45	54	63	99	-36.5	-6.35	10/12/90
8.56	3.54	64.6	<0.45	64.1	57	95.8	-35	-6.2	10/12/90
11.1	3.65	69.8	<0.45	68.4	44	90.4	-32.5	-6.05	10/12/90
13	3.29	76.8	<0.45	75.4	47	88.6	-31	-5.85	10/12/90
12.7	3.33	77	<0.45	77.4	37	88.6	-32.5	-5.8	10/12/90
14.6	4.33	72.2	<0.45	78.4	33	85.1	-32.5	-5.8	10/13/90

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
10/13/90	136	47.3	27	5.94	6.08	59.4	81.8	47	43.7
10/13/90	139	54.9	29	5.94	6.09	60.9	83	46.5	44.8
10/13/90	157	67.4	28	5.79	5.96	63.4	86.3	46.5	44.5
10/13/90	207	76.6	29	5.71	5.97	63.4	85.5	46.5	44.2
10/18/90	1456	6.06	23	6.04	6.44	46.4	63	49.6	43
10/18/90	1507	8.52	22	6.25	6.39	41.9	58.3	47.8	39.6
10/18/90	1515	11.4	22	6.22	6.46	40.9	59.4	46.5	37.6
10/18/90	1520	14.9	22	6.17	6.31	44.4	61.8	44.4	38.4
10/18/90	1527	18.8	23	6.17	6.26	48.4	69.4	47	41.4
10/18/90	1558	23.4	25	6.13	5.81	53.9	74.8	47.4	40.9
10/18/90	1637	28.4	23	6.07	6.04	51.9	71.9	47	39.6
10/18/90	1842	23.4	26	6.07	5.99	59.4	81.4	51.3	37.8
10/18/90	1912	18.8	27	6.14	6.04	57.9	80.6	52.2	36.3
10/18/90	2001	14.9	26	6.2	6.01	54.4	75.6	54.8	36.1
10/19/90	216	11.4	23	6.36	6.36	45.9	64.5	60.9	34.8
10/23/90	348	14.9	21	6.3	6.44	44.4	60.8	53.1	36.1
10/23/90	405	18.8	22	6.32	6.13	40.9	57.2	54.8	32.5
10/23/90	415	23.4	21	6.3	6.26	42.4	60.6	50	32
10/23/90	435	28.4	22	6.29	6.16	48.4	68.3	50.4	35.3
10/23/90	446	34.2	24	6.18	6.08	51.9	73.2	51.8	36.1
10/23/90	456	40.4	25	6.06	6.03	53.4	76.5	50.4	37.6
10/23/90	506	51	26	6.09	6.03	54.4	76.5	47.8	37.3
10/23/90	520	58.9	24	6.05	5.85	55.9	78.9	43.5	36.3
10/23/90	537	67.4	26	6.05	5.91	57.4	82.2	50.9	38.1
10/23/90	544	76.6	28	6	5.92	58.4	83	51.3	39.1
10/23/90	556	86.5	27	5.94	5.86	60.9	85.5	51.3	38.9
10/23/90	747	76.6	29	5.89	5.7	64.9	92.1	46.1	36.6
10/23/90	813	67.4	29	5.91	5.74	55.9	81.4	45.7	32.2
10/23/90	1130	76.6	30	5.39	5.54	70.8	97.9	39.6	36.1
10/23/90	1137	67.4	29	5.4	5.58	70.8	99.5	40.4	36.8
10/23/90	1222	58.9	31	5.29	5.6	70.8	99.5	41.8	37.8
10/23/90	1400	47.3	30	5.44	5.7	70.8	99.5	41.3	36.3
10/23/90	1530	40.4	29	5.51	5.84	67.9	95.4	43.1	35.8
10/23/90	1730	34.2	28	5.7	6.26	61.4	88	43.1	34.5
10/23/90	1900	28.4	27	5.74	6.01	59.4	84.7	42.6	33.5

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
16	4.44	70	<0.45	83.9	21	71.2	-28	-5.05	10/13/90
16.6	4.48	67.6	<0.45	76.7	18	69.4	-26	-4.85	10/13/90
19.5	4.58	69.7	<0.45	87.5	14	63	-23.5	-4.6	10/13/90
19.1	4.87	71.6	<0.45	93.7	27	61.6	-23.5	-4.6	10/13/90
5.58	2.15	65.1	0.54	51.4	57	112	-43	-7.3	10/18/90
5.76	2.51	56.4	<0.45	48.6	51	107	-43.5	-7.45	10/18/90
6.45	2.15	52.9	<0.45	56.1	47	101	-43.5	-7.45	10/18/90
8.67	2.86	54.3	0.51	60.7	44	95.8	-44	-7.35	10/18/90
11	2.51	57	<0.45	64.5	47	90.4	-43	-7.35	10/18/90
13.1	2.86	48.2	1.92	127	15	88.6	-42.5	-7.3	10/18/90
14.7	2.86	61	1.37	71.2	27	85.8	-43	-7.25	10/18/90
15.1	2.86	64	<0.45	82.7	14	89.7	-40.5	-7.15	10/18/90
13.7	2.86	64.3	<0.45	78.4	26	90.8	-40	-7.1	10/18/90
12.3	3.22	64.4	<0.45	83.1	28	95.8	-41	-7.1	10/18/90
7.56	<0.38	60.7	<0.45	70.2	39	111	-42	-7.35	10/19/90
6.89	2.86	53.8	<0.45	56.6	54	115	-40.5	-7.35	10/23/90
7.78	<0.38	47.5	<0.45	59.6	54	108	-39.5	-7.25	10/23/90
9.01	<0.38	47	<0.45	63.8	44	104	-38.5	-7.05	10/23/90
12.4	2.15	48.2	<0.45	71.3	44	100	-36.5	-6.75	10/23/90
14.6	3.22	50.2	<0.45	78	40	94.3	-33.5	-6.65	10/23/90
16.7	3.58	52.3	<0.45	82.9	32	90.8	-33	-6.55	10/23/90
17.6	3.94	51	<0.45	82.8	32	87.2	-31.5	-6.45	10/23/90
18.7	4.3	52.6	1.51	88.3	22	82.2	-31	-6.35	10/23/90
21.9	5.01	52	<0.45	90.9	21	78	-30.5	-6.25	10/23/90
22.8	3.94	52.6	<0.45	92.2	29	76.2	-30.5	-6.1	10/23/90
24.2	4.3	51.8	<0.45	94.2	27	73	-29.5	-6.05	10/23/90
26.9	5.01	48.6	<0.45	102	15	69.1	-26	-5.8	10/23/90
23.6	4.3	50.4	<0.45	109	14	65.9	-25.5	-5.75	10/23/90
27	2.86	46.6	3.34	125	11	71.2	-24	-5.3	10/23/90
28.1	3.58	51.4	3.29	140	13	73.7	-23	-5.25	10/23/90
25.9	3.22	51.4	5.13	143	12	75.1	-24	-5.35	10/23/90
20.9	2.51	51.5	5.73	142	12	80.5	-24.5	-5.4	10/23/90
17.6	<0.38	51.6	4.52	147	14	85.1	-25	-5.55	10/23/90
14.8	<0.38	66.5	0.93	71.9	21	89.4	-28	-5.7	10/23/90
13.1	<0.38	51.2	<0.45	130	16	93.3	-29.5	-5.85	10/23/90

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
10/23/90	2102	23.4	26	5.73	6.1	55.9	79.8	43.5	33.2
10/24/90	1	18.8	26	5.8	6.17	50.9	74	43.1	32
11/05/90	2249	14.9	21	5.93	6.43	37.9	52.7	44.4	31.4
11/05/90	2326	18.8	22	6.17	6.43	37.4	54.7	44.4	33.8
11/05/90	2354	23.4	24	6.18	6.34	38.9	58.3	44.4	36.6
11/06/90	6	28.4	24	6.19	6.34	41.9	60.7	43.1	37.3
11/06/90	27	34.2	24	6.18	6.41	40.4	60.8	44.4	38.4
11/06/90	327	28.4	23	6.13	6.32	40.9	61.6	47	34.3
11/06/90	622	23.4	21	6.18	6.41	35.4	55.1	44.4	30.2
12/03/90	1945	37.2	30	5.84	6.74	63.4	92.1	49.2	44
12/04/90	316	34.2	29	6	6.21	58.9	88	47.8	43.7
12/04/90	335	43.8	29	6.05	6.17	58.9	86.4	45.2	45.5
12/04/90	358	51	30	6.01	5.99	60.4	89.6	45.2	45.8
12/04/90	445	58.9	30	5.95	5.95	62.4	92.9	45.2	46.6
12/04/90	729	51	30	6.01	6.11	59.9	92.1	47	46.6
12/04/90	944	43.8	29	6.09	6.19	55.9	84.7	44.8	41.7
12/30/90	1037	25.8	21	6.18	6.24	34.4	41.7	42.6	24.8
12/30/90	1206	31.2	18	6.31	6.39	30.4	45.3	39.1	24.8
12/30/90	1251	37.2	19	6.26	6.32	34.4	48.9	38.3	25.3
12/30/90	1342	47.3	19	6.28	6.28	34.9	51.2	36.6	25.6
12/30/90	1413	54.9	19	6.21	6.21	35.7	52.8	35.6	26.1
12/30/90	1612	63.1	19	6.15	6.17	36.9	57.9	37.3	28.4
12/31/90	947	54.9	21	6.21	6.3	36.9	57.2	37.5	25.6
01/16/91	608	40.4	18	6.19	6.43	35.4	49.9	40	24.3
01/16/91	644	47.3	19	6.18	6.25	35.4	52.6	38.5	25.1
01/16/91	915	54.9	19	6.11	6.18	38.9	59.7	37.8	27.4
03/04/91	325	34.2	22	5.99	6.33	44.4	62.7	43.1	30.2
03/04/91	355	40.4	22	6.17	6.4	45.4	64.3	40.9	30.9
03/04/91	420	47.3	23	6.16	6.36	49.4	69.5	40	32.2
03/04/91	440	54.9	24	6.12	6.28	53.4	73.2	40.4	33.5
03/04/91	829	47.3	24	6.13	6.16	50.9	72.4	40.4	32.5
03/04/91	1217	40.4	22	6.19	6.35	41.4	62.7	40.9	29.4
03/23/91	918	37.2	22	6.15	6.26	42.9	63.1	41.2	29.9
03/23/91	947	43.8	22	6.27	6.22	41.4	60.9	39.8	30.2
03/23/91	1023	51	22	6.24	6.23	44.9	64.3	37.3	31.5

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
11	<0.38	52.8	<0.45	128	9	99	-31.5	-6.05	10/23/90
9.12	<0.38	52	<0.45	116	20	103	-32.5	-6.3	10/24/90
3.42	<0.38	42.7	12.6	42.8	52	116	-44.5	-7.65	11/05/90
4.27	<0.38	44.6	15.7	49.2	45	110	-42	-7.6	11/05/90
5.1	2.51	47.1	18.5	55.3	41	107	-40	-7.35	11/05/90
5.59	2.51	49.5	22.2	59.4	41	106	-39.5	-7.2	11/06/90
6.34	2.51	50.4	19.1	62.7	38	104	-40.5	-7.15	11/06/90
5.33	<0.38	52.1	16	63.4	33	110	-40	-7.3	11/06/90
4.11	<0.38	49.4	8.53	60.3	39	104	-40.5	-7.4	11/06/90
13.1	2.04	52.3	12.1	112	34	103	-34.5	-6.75	12/03/90
12.8	2.36	51.9	2.96	116	31	97.9	-32.5	-6.55	12/04/90
13.7	2.51	50.3	3.45	113	29	96.1	-31.5	-6.4	12/04/90
16	2.36	49.6	4.38	117	22	95.8	-29.5	-6.1	12/04/90
17.8	<0.38	52.9	3.48	128	0	94	-29.5	-6.2	12/04/90
15.1	<0.38	56.1	1.71	134	21	97.5	-30	-6.1	12/04/90
11.8	<0.38	56.6	2.37	143	19	102	-30.5	-6.3	12/04/90
4.45	<0.38	35.7	10.7	44.1	43	112	-49.5	-8.2	12/30/90
6.45	<0.38	36.4	11.1	51.6	38	112	-50	-8.4	12/30/90
8.23	<0.38	34.7	10.3	55.7	30	104	-52.5	-8.7	12/30/90
9.9	<0.38	34.1	9.78	58.8	30	99.7	-53.5	-8.8	12/30/90
10.9	<0.38	33.5	8.94	61.3	24	98.6	-55	-9	12/30/90
13.3	<0.38	32.8	7.49	70.8	22	93.3	-54.5	-9.05	12/30/90
5.89	<0.38	37.9	9.42	78.6	36	110	-45.5	-7.85	12/31/90
7.34	<0.38	37.3	19.8	56.8	30	94.2	-46.5	-8	01/16/91
9.78	<0.38	35.5	16.7	61.4	22	90.9	-46	-8	01/16/91
13.2	<0.38	33.2	12.7	75.4	13	82.8	-47.5	-8.05	01/16/91
9.23	1.79	35.6	20.1	60.1	43	90.6	-47	-7.8	03/04/91
12.1	2.51	35.5	15.8	68.6	32	85.8	-46.5	-7.8	03/04/91
15	3.58	34.4	14.8	74.3	33	83.9	-46	-7.85	03/04/91
17.1	3.58	33.6	13.6	78.8	31	82.3	-47	-7.75	03/04/91
14.2	2.15	35.1	13.2	88.6	33	86.3	-46	-7.85	03/04/91
8.67	<0.38	35.4	9.69	82.6	36	93.1	-46.5	-7.9	03/04/91
9.01	<0.38	32.7	15.2	66.2	32	91.9	-45	-7.8	03/23/91
10.8	<0.38	30.6	15.2	67.8	30	89.3	-45.5	-7.65	03/23/91
14.2	2.15	28.1	13.7	73	24	81.1	-45	-7.65	03/23/91

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93–Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
03/23/91	1045	58.9	22	6.19	6.13	46.9	69	36	32
03/23/91	1612	51	24	6.26	6.23	46.9	72.3	39.3	32
03/23/91	2239	43.8	22	6.37	6.33	39.9	61.9	40.6	28.9
05/06/91	1029	23.5	21	6.14	6.31	43.4	59	40.3	26.3
05/06/91	1625	39.6	19	6.09	6.37	37.4	51.4	38.5	28.9
05/06/91	1634	39.6	20	6.07	6.39	45.9	52.4	39.2	33
05/06/91	1651	39.6	21	6.11	6.21	49.4	60.9	38.7	33.5
05/06/91	1703	38.5	21	6.18	6.46	46.9	60.5	38.7	31.5
05/06/91	1828	26.1	22	6.3	6.48	49.4	63.4	41.1	29.9
05/06/91	1929	25.8	22	6.28	6.09	47.9	63.4	43.5	29.4
05/07/91	313	21	19	6.32	6.45	33.9	49.5	41.8	24.8
05/17/91	1400	23.4	22	6.09	6.43	65.9	58.5	40.9	32.5
05/17/91	1403	28.4	24	6.12	6.36	48.4	50.7	32.6	26.3
05/17/91	1407	34.2	25	6.04	6.36	61.4	71	37.6	37.1
05/17/91	1433	43.8	23	6.02	6.54	64.9	64.8	40.4	35.5
05/17/91	1542	37.2	23	6.23	6.56	51.9	72.2	43.5	31.4
05/17/91	1612	31.2	22	6.24	6.62	48.4	70.6	43.5	29.2
05/17/91	1700	25.8	22	6.55	6.66	43.9	65.7	43.9	27.1
06/18/91	322	8.52	30	6	6.15	72.8	87.2	45.2	30.7
06/18/91	325	13.1	34	5.83	6.15	72.4	92.1	41.8	55.5
06/18/91	327	21	36	5.76	5.91	78.8	100	40	61.1
06/18/91	329	25.8	37	5.67	5.67	84.8	107	38.4	68.8
06/18/91	331	31.2	38	5.65	5.67	85.8	108	37.4	68
06/18/91	334	40.4	38	5.7	5.79	85.3	108	35.9	70.8
06/18/91	336	51	40	5.65	5.67	84.8	108	34.3	69.8
06/18/91	343	58.9	38	5.61	5.66	85.3	107	33.9	69.8
06/18/91	348	71.9	36	5.62	5.66	79.8	100	32	64.2
06/18/91	350	86.5	35	5.62	5.71	77.8	96.2	32.3	62.6
06/18/91	352	102	34	5.65	5.68	76.3	93.8	31.7	59.1
06/18/91	354	114	34	5.65	5.77	77.3	94.6	33.1	60.4
06/18/91	357	133	35	5.58	5.69	76.8	93.8	32.1	59.1
06/18/91	403	146	36	5.54	5.55	79.8	97	31.1	60.4
06/18/91	406	168	36	5.5	5.58	79.8	97	32	60.6
06/18/91	413	184	34	5.42	5.51	81.8	101	32.9	61.9
06/18/91	421	208	36	5.43	5.49	83.3	101	31.9	60.4

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
17.2	3.94	26.8	13.3	78.2	19	76	-45.5	-7.6	03/23/91
11.3	2.15	30	9.07	95.8	31	87.4	-46	-7.85	03/23/91
5.78	2.15	32.4	9.65	79.3	36	98	-46.5	-7.85	03/23/91
3.89	<0.38	33.3	14.2	41	51	95	-44	-7.7	05/06/91
4.45	<0.38	32.1	11.3	39.9	59	93.9	-44.5	-7.75	05/06/91
6.78	<0.38	29.8	11.9	40.4	59	85.9	-43.5	-7.8	05/06/91
11.9	2.86	28.9	12.7	52.2	47	83.6	-44	-7.7	05/06/91
11.7	2.51	28.7	12	49.2	50	85.4	-44.5	-7.65	05/06/91
11.3	3.22	29	12.6	48.7	50	87	-42.5	-7.7	05/06/91
9.45	2.51	33.2	14.4	56.3	46	92.2	-44	-7.65	05/06/91
3.67	<0.38	36.8	12	49.2	51	105	-45	-7.75	05/07/91
4.22	2.51	34	<0.45	46.1	101	93.2	-44.5	-7.6	05/17/91
4.45	3.58	27.9	<0.45	45.3	80	67.3	-43	-7.45	05/17/91
6.23	3.58	25.2	<0.45	46.9	68	81.5	-41.5	-7.25	05/17/91
8.56	<0.38	29.7	3.32	61.5	76	81.4	-42.5	-7.4	05/17/91
7.34	<0.38	29.6	8.43	57.3	58	85.2	-43	-7.4	05/17/91
5.89	<0.38	26.6	11.6	49.4	48	91.1	-43.5	-7.45	05/17/91
5	<0.38	28	15.6	49.4	49	94.2	-46	-7.6	05/17/91
4.78	6.8	34.2	42.6	63.5	56	n.a.	-43.5	-7.55	06/18/91
7.89	5.37	35.4	60.9	89.4	44	88.8	-40.5	-7.3	06/18/91
9.34	5.01	34.9	68	101	34	83.1	-39.5	-7.2	06/18/91
10.8	4.66	31.8	68.4	102	33	75.3	-38	-6.95	06/18/91
11.1	5.01	35.8	75.5	112	38	74	-37.5	-6.8	06/18/91
12.4	5.01	32	75.3	116	24	66.3	-37	-6.75	06/18/91
13.1	4.66	28.9	70.8	110	24	61.9	-35	-6.6	06/18/91
14.9	4.3	28.5	72.2	117	24	55.5	-34.5	-6.55	06/18/91
14.4	3.94	25.9	63.4	108	20	52.5	-33.5	-6.5	06/18/91
14.1	3.58	26	63.3	108	16	53.5	-32	-6.55	06/18/91
13.1	3.94	25.8	62.5	108	19	52.8	-35	-6.55	06/18/91
13.2	4.3	26.4	62.1	108	15	52.2	-34.5	-6.5	06/18/91
13.6	4.66	26.1	62.4	110	15	51.9	-34.5	-6.45	06/18/91
15.3	5.73	25.1	61.5	110	12	55.3	-34	-6.4	06/18/91
16.6	5.37	26.5	63.6	117	17	54.1	-33.5	-6.5	06/18/91
18.7	5.73	26.3	63.3	119	12	53.2	-34.5	-6.35	06/18/91
18.9	5.01	24.7	62	121	16	52.5	-32.5	-6.4	06/18/91

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
06/18/91	459	192	36	5.24	5.19	82.3	103	30.8	51.2
06/18/91	524	168	34	5.24	5.27	79.8	100	31	49.4
06/18/91	533	154	34	5.26	5.32	78.8	98.7	30.7	49.6
06/18/91	556	140	32	5.28	5.33	74.4	93.8	29.7	45.5
06/18/91	613	127	31	5.33	5.41	70.8	89.6	29	43.7
06/18/91	627	114	30	5.36	5.41	70.4	91.3	30.9	44.2
06/18/91	645	102	29	5.42	5.49	67.9	88.8	30.9	43
08/19/91	1713	1.92	27	6.15	5.84	54.2	56.8	43.1	20.1
08/19/91	1757	3.26	23	6.25	5.96	41.3	53.9	43.2	18.3
08/19/91	1913	6.06	30	6.13	5.81	54.2	66.6	38	26.1
08/19/91	1915	11.4	30	6.11	5.77	65	77.3	34.7	31.6
08/19/91	1917	14.9	32	6.11	5.79	70.5	87.7	34	36.6
08/19/91	1920	18.8	32	6.1	5.82	71.9	91.2	34.6	36.3
08/19/91	2001	23.4	34	6.14	5.74	69.6	89.7	41.3	30.7
08/19/91	2043	18.8	31	6.18	5.42	67.3	86.1	44.3	28.9
08/19/91	2110	14.9	30	6.21	5.69	59	79.6	42.6	26.3
08/19/91	2143	11.4	28	6.22	5.69	57.3	75.5	45.2	25.1
08/19/91	2229	7.22	27	6.26	5.84	50.5	68.6	47.4	23.6
08/20/91	58	5.01	24	6.3	5.73	41	59.6	45	19.1
09/04/91	1453	2.55	32	5.91	5.3	83.6	80	45.4	30.3
09/04/91	1456	4.08	33	6.01	6	84	86.5	45.2	38.3
09/04/91	1501	7.22	38	6.09	5.69	87	102	46.8	44
09/04/91	1504	9.91	38	6.12	6	93.3	109	47.2	46.4
09/04/91	1509	13.1	40	6.13	5.79	91.6	113	45.4	47.6
09/04/91	1516	16.8	40	6.14	5.97	95.3	118	45.9	49.7
09/04/91	1654	13.1	33	6.23	5.78	76.8	101	49.9	33.1
09/04/91	1718	9.91	32	6.28	5.99	74.2	98.6	49.3	30
09/04/91	1758	7.22	30	6.29	5.92	68.3	92.6	49.7	27.8
09/04/91	1849	5.01	28	6.33	6.22	64.2	86.4	50.1	25.5
09/04/91	2205	7.22	29	6.3	5.95	66.2	88.7	46	30.2
09/04/91	2218	9.91	28	6.15	6.13	70.3	91	44.1	32.3
09/04/91	2232	13.1	29	6.15	5.86	68.3	89.1	42	33.1
09/04/91	2248	18.8	28	6.1	5.99	69	90.6	41.5	32.8
09/04/91	2301	23.4	28	6.06	5.89	68.4	87.7	38.8	33.4
09/04/91	2309	28.4	27	6.02	5.91	67.5	87.2	37	33.6

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
22.7	3.94	22.5	54.7	118	9	51	-33.5	-6.35	06/18/91
22.5	4.3	22.7	53.3	122	8	48.4	-33.5	-6.35	06/18/91
22.2	3.94	22	50.6	120	7	48.5	-33.5	-6.5	06/18/91
20.7	3.22	21.3	45	116	7	47.2	-33	-6.5	06/18/91
20	3.94	20.9	39.3	109	7	47.8	-35	-6.6	06/18/91
20.6	3.22	21.7	40.2	113	7	50.3	-35	-6.55	06/18/91
19.6	5.01	22.3	37.4	111	6	47.8	-35	-6.65	06/18/91
2	1.9	35.4	15.5	57.8	42	110	-46	-7.65	08/19/91
1.89	3.7	33.1	21.4	58.9	34	105	-45	-7.7	08/19/91
3.45	5	28.7	29.2	87.7	33	83.4	-42	-7.25	08/19/91
4.67	4.7	25.9	29.1	104	26	74.1	-39.5	-7	08/19/91
6	4.9	24.8	31.2	115	26	6	-40	-6.9	08/19/91
6	3.5	25.8	30.8	118	18	69.2	-39.5	-6.75	08/19/91
5.67	3.6	28.3	30.1	117	14	78.2	-39	-7	08/19/91
6.89	5.6	28.5	28.8	113	12	82	-40.5	-6.9	08/19/91
4.11	3.2	29.1	27	108	23	86.5	-41	-7.1	08/19/91
5	4.8	30.5	25.1	105	27	91.7	-41.5	-7.1	08/19/91
3.34	4.7	30.8	21.9	96.4	27	95.4	-41.5	-7.2	08/19/91
<0.22	2.3	32.4	15.3	82.1	29	102	-43	-7.45	08/20/91
1.8	1.8	39.7	38.4	110	41	97	-38	-6.8	09/04/91
2.11	1.6	41	47	119	36	95.6	-38	-6.65	09/04/91
2.22	1.5	49.4	53.4	138	32	89.2	-35	-6.35	09/04/91
2.7	2	50.5	57.8	147	26	87	-34	-6.15	09/04/91
3.22	2.8	52.6	59.8	155	26	82	-32	-6.1	09/04/91
3.6	2.9	50.4	57.4	158	22	76.8	-30.5	-5.8	09/04/91
2.89	2.1	46.1	43.7	128	26	89.6	-35.5	-6.4	09/04/91
2.7	2.7	46	43	120	19	95.2	-35.5	-6.5	09/04/91
2.22	2.1	43.2	40.3	112	15	101	-36.5	-6.6	09/04/91
1.89	1.7	42.7	35.7	104	21	108	-36.5	-6.7	09/04/91
3	2	37	24.7	109	29	100	-37.5	-6.8	09/04/91
3.89	3.1	33.7	24.1	108	15	94.9	-36.5	-6.7	09/04/91
4.23	2.6	34.7	24.5	118	16	88.5	-36	-6.65	09/04/91
4.6	3.2	33.2	23.3	116	12	86.5	-37	-6.6	09/04/91
4.78	2.9	32.4	22.6	116	13	79.7	-37	-6.65	09/04/91
5.23	3.4	29.6	20.4	111	13	74.8	-38	-6.85	09/04/91

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
09/04/91	2319	34.2	27	6	5.89	67.9	87	36	34.1
09/05/91	31	28.4	28	6.03	6.12	67	89.3	36.3	33.1
09/05/91	44	23.4	28	6.01	5.8	65.6	86.2	38.6	32.8
09/05/91	103	18.8	27	6.01	5.32	66.9	86.3	39.7	32.8
09/05/91	119	14.9	27	6.05	5.33	65.3	84.7	40	32
09/05/91	151	11.4	26	6.1	5.48	60.8	80.3	40.1	29.6
09/05/91	249	7.22	25	6.12	5.67	57.2	77	41.9	28.3
09/05/91	433	5.01	24	6.27	6.1	52.6	72.2	44.3	26.4
09/18/91	1808	2.55	22	6.01	5.51	47.4	54.8	37.1	21
09/18/91	1810	5.01	23	6.02	5.45	52.7	59.3	33.5	25.7
09/18/91	1812	9.91	25	5.99	5.25	57.4	67.6	32.8	29.2
09/18/91	1814	14.9	26	5.99	5.53	62.5	74.4	32.5	33
09/18/91	1819	25.8	28	5.95	5.67	66.3	77.7	32.4	36.2
09/18/91	1842	40.4	26	5.85	5.55	64.9	78.4	34.8	31.6
09/18/91	1940	25.8	26	5.92	5.09	61	77.2	34.7	27.8
09/18/91	2020	13.1	25	6.06	5.42	46.1	59.2	33.8	19.7
09/18/91	2309	5.01	22	6.31	5.62	42.9	57.9	33.1	20.4
02/15/92	1108	4.08	25	6.04	6.06	57.8	78	46.8	31.9
02/15/92	1129	6.06	26	6.14	5.46	52.8	81.1	45.9	34.1
02/15/92	1151	8.52	26	6.11	6.2	56.8	85.7	45.6	37.9
02/15/92	1243	11.4	27	6.06	5.69	59	91.4	45.7	38.8
02/15/92	1335	14.9	28	6.01	6.08	61.4	95	45.7	40.2
02/16/92	127	9.91	28	6.05	6.28	62	99.6	47.5	37.7
02/16/92	706	7.22	27	6.13	6.24	57.6	91.7	48.5	35.6
03/06/92	1512	5.01	23	6.44	6.22	50	67.4	44	34.1
03/06/92	2028	7.22	26	6.31	6.17	57.2	81.3	46.2	37.1
03/06/92	2058	11.4	27	6.24	6.13	58	86.6	44.8	40.3
03/06/92	2127	14.9	29	6.17	6.07	63.7	92.4	43.2	43.2
03/07/92	341	18.8	30	6.09	5.94	69.1	103	42.5	45.3
03/07/92	538	23.4	30	5.96	5.86	68.4	103	39.5	47.3
03/07/92	611	28.4	30	5.89	5.89	69.4	105	38.1	46.6
03/07/92	727	34.2	30	5.76	5.56	71.6	109	37.6	47.4
03/07/92	1135	28.4	30	5.91	5.93	70.8	110	38.2	44.2
03/07/92	1341	23.4	30	6.04	5.98	66.4	104	38.9	41.3
03/07/92	1812	18.8	28	6.16	6.18	60.4	94.4	42.3	38.6

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
5.89	3.5	29.7	20.4	112	15	69.7	-39.5	-7	09/04/91
6.23	3.3	28.9	19.3	110	13	69.3	-41	-7.2	09/05/91
6.45	3.5	29.2	20.5	112	12	72.3	-42	-7.1	09/05/91
6.12	4.01	27.4	18.7	105	14	74.2	-41.5	-7.2	09/05/91
5.78	3.5	28.7	18.2	104	15	76.6	-42	-7.2	09/05/91
4.89	5.6	29.7	17.2	104	17	82.7	-40	-7.1	09/05/91
4.11	2.8	31	14.7	100	19	88	-41.5	-7.25	09/05/91
3.11	2	32.4	11.4	93.6	27	96.5	-41.5	-7.25	09/05/91
1.89	2.18	28.7	17.3	70.2	31	97.1	-37	-6.85	09/18/91
2.7	2.44	27.8	24.9	87.3	23	87	-34	-6.5	09/18/91
3	2.58	25.4	25.5	87.7	29	76.7	-32	-6.05	09/18/91
3.6	2.33	24.9	26.6	93.9	22	72.6	-29	-5.8	09/18/91
4	2.61	26	28.2	108	21	66.9	-28.5	-5.55	09/18/91
4.67	3.01	26.2	23.5	95.2	17	69.3	-28	-5.65	09/18/91
2.11	3.1	26	23	92.1	16	77.5	-30.5	-5.85	09/18/91
2.8	2.29	24.6	20	78.8	<4	70.1	-32	-6.2	09/18/91
2.22	2.97	25.5	22	65.6	19	99.9	-37	-6.55	09/18/91
4.67	2.83	35.6	23.8	74.3	36	103	-56	-8.95	02/15/92
6.34	2.15	37	29.8	88.2	32	99.5	-55	-9	02/15/92
7.12	2.29	37.6	31.2	94.2	26	99	-56.5	-9.3	02/15/92
8.78	2.47	37.3	31.7	100	20	95.2	-57.5	-9.35	02/15/92
10.2	2.51	37.6	31.4	108	22	95.2	-57.5	-9.35	02/15/92
8.9	2.86	39	17.2	118	24	104	-57	-9.15	02/16/92
7.23	2.15	39.3	13.3	114	23	112	-55	-9.05	02/16/92
4.78	1.29	34.2	16	70	41	107	-47	-7.9	03/06/92
8.12	2.26	37.9	18	97.3	36	103	-47.5	-7.8	03/06/92
11	2.18	36.8	18.7	109	28	100	-47	-7.8	03/06/92
13.3	2.72	36.6	17.7	117	33	97.4	-45.5	-7.75	03/06/92
16.9	3.01	36.4	11	134	24	93.1	-47	-7.8	03/07/92
18.5	3.19	33.8	8.78	136	15	87	-46.5	-7.85	03/07/92
21.3	3.47	33.7	8.63	141	27	81.6	-47.5	-7.8	03/07/92
24.1	3.62	33	7.65	145	22	77.9	-48	-7.85	03/07/92
17.1	2.15	36.2	5.76	159	19	86.2	-50	-8.05	03/07/92
13.5	1.58	36.3	5.13	152	18	92.8	-50.5	-8.1	03/07/92
9.45	1.36	37	5.3	134	29	102	-49	-8.15	03/07/92

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
03/08/92	212	13.1	25	6.24	6.18	48.8	77.4	41.9	32.8
03/08/92	431	9.91	21	6.27	6.25	38.8	62.5	42.5	29.5
04/21/92	1053	13.1	21	6.29	5.83	38.7	55.6	43.7	27.4
04/21/92	1156	18.7	21	6.35	6.19	43.4	64.7	43.8	27.7
04/21/92	1428	23.9	23	6.26	5.97	55.3	80.1	44.5	32.7
04/21/92	1459	29.4	24	6.15	6.06	59.1	84.9	42.6	34.7
04/21/92	1506	36.5	25	6.1	5.92	58.9	85	40.3	35.5
04/21/92	1513	46.4	25	6.04	5.89	61.8	88.5	39.8	37.7
04/21/92	1522	56.2	25	5.96	5.88	63.5	89.8	38.8	37
04/21/92	1532	73.7	26	5.86	5.83	64	89.8	37.2	37.6
04/21/92	1537	89.8	26	5.84	5.88	65.4	91.5	37.7	38
05/30/92	1558	21.3	21	6.15	6.45	51.7	63.4	42.9	22
05/30/92	1958	21.3	18	6.13	5.82	36.9	52.7	41.2	21.2
05/30/92	2009	23	18	6.1	5.95	34.4	50.8	40.3	21.6
05/30/92	2012	24.7	18	6.1	6.28	35	52	39.8	21.8
05/30/92	2015	26.5	18	6.11	6.24	35.2	51.6	38.2	21.7
05/30/92	2020	29.4	18	6.02	6.3	36.9	54.7	38.3	22.3
05/30/92	2028	31.4	19	6.01	6.23	39.4	56.2	38.1	22.5
05/30/92	2041	33.4	20	6.16	6.24	42.4	61.9	39.7	23.4
05/30/92	2047	35.5	19	6.01	6.27	42.7	61.4	38.8	23.1
05/30/92	2053	37.6	20	6.02	6.19	43.2	61.5	38.8	22.7
05/30/92	2253	36.5	20	6.01	6.21	45.9	65.7	38.8	23
05/31/92	12	38.7	21	5.95	6.18	47.4	68.9	39.4	24.7
05/31/92	28	42.4	21	5.93	6.15	48.1	69.2	37.8	24.1
05/31/92	40	45	21	5.89	6.14	47.9	70.3	38.1	24.8
05/31/92	107	47.8	20	5.84	6.05	48.6	68.9	37.3	24.6
05/31/92	126	50.9	21	5.85	6.06	48.2	69.1	35.8	24.3
05/31/92	133	56.2	20	5.82	6.15	47.6	68.8	35	24.5
05/31/92	136	62.1	21	5.78	5.99	48.5	68.2	33.9	24.8
05/31/92	139	66.3	21	5.74	6.01	46.7	68.5	34.3	25
11/02/92	1031	11	23	n.a.	6.23	65.9	81.4	46.8	33.2
11/02/92	1149	12.3	23	n.a.	6.29	54.3	82.7	45.8	31.7
11/02/92	1349	13.1	24	n.a.	6.3	55.4	86	44.8	39.4
11/02/92	1549	13.1	24	n.a.	6.35	56	89.9	44.6	34.5
11/02/92	1731	14.6	26	n.a.	6.31	59.7	96.2	43.7	40.6

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
5.89	1.04	37.2	6.47	110	34	108	-48.5	-8	03/08/92
3.56	0.97	38.6	8.29	80.8	38	119	-48.5	-8.05	03/08/92
4.45	1.54	35.5	11.5	51.6	54.4	105	-46.5	-7.8	04/21/92
6.89	1.72	37.5	12.2	63.2	56.3	103	-45	-7.7	04/21/92
13	2.86	35.9	11.9	79.8	50	99	-44.5	-7.5	04/21/92
16	3.47	33.9	10.5	89.4	46.2	91.2	-43	-7.2	04/21/92
17.2	3.44	32.2	9.95	91.9	44.8	87.1	-40.5	-7	04/21/92
19.6	3.83	30.2	8.37	84.6	42.4	83.8	-40	-6.9	04/21/92
22.1	4.23	30.1	8.37	96	40.6	81.8	-40	-6.8	04/21/92
21.6	4.23	29.6	8.06	96.5	39.9	80.6	-40	-6.7	04/21/92
22.3	4.08	26.7	7.22	88.7	35.6	78.2	-39	-6.6	04/21/92
4.67	8.42	33.2	7.82	42.4	93.7	105	-46.5	-7.55	05/30/92
5.67	2.72	32.1	8.19	49.2	54.5	103	-44	-7.45	05/30/92
6.45	1.43	29.8	7.94	49	45.8	99.6	-43	-7.25	05/30/92
7.01	1.79	29.3	7.6	50.1	46.7	95.7	-42.5	-7	05/30/92
7.45	1.47	27.8	6.34	49.6	44.7	92.1	-42.5	-7.15	05/30/92
8.45	1.86	29.1	7.27	54.5	46.3	93	-42	-7.25	05/30/92
9.9	2.65	27.9	8.01	56.3	45.8	88.9	-42	-7.15	05/30/92
12.2	3.33	27.7	7.6	60.2	45.9	91	-41	-6.95	05/30/92
13	1.15	28.2	7.6	63	48.7	91.2	-40	-7.05	05/30/92
13	<0.38	28.7	8	62.4	44.7	88.2	-41	-7.1	05/30/92
13.8	2.07	27.8	6.75	65.6	47.3	89.9	-40.5	-7.1	05/30/92
15.7	1.58	25.5	5.87	67.4	43.5	84.1	-38.5	-6.85	05/31/92
16.7	2.47	24.8	5.96	70.4	42.8	81.5	-39.5	-6.85	05/31/92
17.7	1.83	25.4	6.14	72	43.1	80.2	-39.5	-6.9	05/31/92
18	2.15	24.8	5.89	71.3	36.2	79.2	-37.5	-6.85	05/31/92
18.7	2.61	24	4.85	73.4	37.4	77.5	-37.5	-6.6	05/31/92
20.2	2.4	23	5.21	73.9	35.2	74.2	-38.5	-6.65	05/31/92
19.1	1.29	22.4	5.18	73.1	35	72.2	-39.5	-6.7	05/31/92
19.8	2.18	22.4	5.14	74.6	36	69.8	-38.5	-6.65	05/31/92
0.67	2.04	39.6	0.75	67.2	58	115	-45.2	-7.66	11/02/92
2.33	2.2	43.4	0.3	85.7	43	119	n.a.	n.a.	11/02/92
4.34	2.42	44.4	0.1	88.8	43	118	-44.9	-7.66	11/02/92
4.67	1.83	46.9	<0.45	93	41	112	n.a.	n.a.	11/02/92
7.45	2.26	48.2	0.38	103	38	110	-43.8	-7.47	11/02/92

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
11/02/92	1901	17	27	n.a.	6.27	63.9	104	43.4	44.2
11/02/92	2001	18.7	28	n.a.	6.22	68.2	109	46.5	46.8
11/02/92	2144	20.4	28	n.a.	6.18	72.8	121	45.8	47.5
11/02/92	2156	22.2	29	n.a.	6.15	73.6	121	44.7	48.1
11/02/92	2206	23.9	30	n.a.	6.11	78.3	128	44.8	47.6
11/02/92	2215	25.6	31	n.a.	6.09	76.2	119	42.2	50.8
11/02/92	2222	27.5	31	n.a.	6.06	76.6	122	42.6	51.2
11/02/92	2229	29.4	31	n.a.	6.01	76.6	121	42.2	42.6
11/02/92	2235	32.4	31	n.a.	6	76.8	124	41.9	51.4
11/02/92	2241	34.4	31	n.a.	6	77.7	122	41.5	52.1
11/02/92	2247	36.5	31	n.a.	5.96	78.2	123	41	50.2
11/02/92	2255	38.7	31	n.a.	5.94	82.9	133	44.2	52.1
11/02/92	2303	41	31	n.a.	5.93	81.6	131	42.8	53.2
11/02/92	2311	43.7	31	n.a.	5.88	81.3	130	41.5	50.1
11/02/92	2317	47.8	32	n.a.	5.86	78.4	123	41.3	58.1
11/02/92	2324	50.9	31	n.a.	5.82	79.4	126	40	56.8
11/02/92	2331	54.4	32	n.a.	5.79	77.4	122	40.8	57.8
11/02/92	2339	58	32	n.a.	5.76	78.9	123	38.6	55.8
11/02/92	2346	62.1	32	n.a.	5.73	79.8	124	37.3	55.5
11/21/92	2039	19.5	22	6.26	6.3	38.4	59.8	47	30.4
11/21/92	2119	21.3	22	6.34	6.31	36.4	59.6	46.1	31.2
11/21/92	2319	22.2	23	6.27	6.17	41.9	66.8	47	31.4
11/22/92	119	20.4	23	6.31	6.19	42.4	66.5	45.7	29.9
11/22/92	320	19.5	22	6.39	6.25	38.9	62	45.2	29.2
11/22/92	2040	19.5	21	6.29	6.27	36.4	58	43.1	32.2
11/22/92	2059	24.7	23	6.25	6.16	43.4	68.2	39.3	38.9
11/22/92	2111	32.4	24	6.15	6.04	49.4	77.4	38.5	41.4
11/22/92	2121	39.9	25	6.05	5.93	52.4	78.3	37	42.2
11/22/92	2133	49.3	25	6	5.86	52.9	78.2	37.4	41.4
11/22/92	2158	60	28	5.92	5.82	60.4	90.5	38.7	45.3
11/23/92	7	76.7	29	5.74	5.67	63.9	95.4	33.7	47.6
12/10/92	1732	27.5	21	5.99	6.56	38.9	57.8	40.5	25.6
12/10/92	1747	29.4	19	6.24	6.37	28.4	46.3	40.6	25.6
12/10/92	1800	31.4	20	6.17	6.56	27.9	47.4	38.9	25.3
12/10/92	1813	33.4	19	6.09	6.33	28.4	47.9	39	25.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
8.12	2.63	49.4	0.27	109	33	107	n.a.	n.a.	11/02/92
11.8	3.6	51.7	1.13	116	30	105	-43.6	-7.34	11/02/92
7.67	2.74	51.6	<0.45	120	27	99.6	n.a.	n.a.	11/02/92
15.2	4.03	53.4	0.37	129	28	98.1	-38.3	-7.11	11/02/92
15.1	3.76	53.4	<0.45	132	29	98.8	n.a.	n.a.	11/02/92
19.5	4.46	54.8	<0.45	133	30	96.3	-36.1	-6.95	11/02/92
17.7	4.78	52.8	<0.45	129	22	94.7	n.a.	n.a.	11/02/92
19	4.46	53	0.77	133	18	95	-36.6	-6.93	11/02/92
18.9	4.62	53.4	<0.45	134	26	96.9	n.a.	n.a.	11/02/92
21.5	5.16	54.7	<0.45	135	25	94.9	-35.7	-6.95	11/02/92
21.8	5.21	52.1	1.73	135	22	90.8	n.a.	n.a.	11/02/92
18.8	4.03	54.3	1.79	134	18	93.2	-36	-6.83	11/02/92
18	6.3	53.1	1.93	137	20	89.2	n.a.	n.a.	11/02/92
17.6	3.7	56.2	0.59	133	14	84.1	-35.5	-6.76	11/02/92
22.7	2.9	60.2	1.44	136	20	82.6	n.a.	n.a.	11/02/92
23.7	4.3	58.6	1.26	135	19	82	-34.4	-6.64	11/02/92
25.9	3.2	56.4	1.66	136	7	80.4	n.a.	n.a.	11/02/92
24.9	2.9	57.6	2.02	137	14	78.4	-33.5	-6.58	11/02/92
27.1	3.6	60.8	1.58	134	12	78.1	n.a.	n.a.	11/02/92
4	<0.38	44.3	6.08	54.2	55.8	112	n.a.	n.a.	11/21/92
4.45	<0.38	42.7	7.25	58.4	45.8	117	n.a.	n.a.	11/21/92
6.34	<0.38	44.6	6.35	62.2	47.5	114	n.a.	n.a.	11/21/92
5.67	<0.38	43.1	5.97	61.8	48.9	118	n.a.	n.a.	11/22/92
4.34	<0.38	40	5.81	58.6	51.3	118	n.a.	n.a.	11/22/92
4.45	<0.38	35.8	3.33	56.6	55.5	113	n.a.	n.a.	11/22/92
10.4	1.9	36	1.45	67.4	37.2	96.1	n.a.	n.a.	11/22/92
15.2	2.58	36.8	4.26	71.5	32.1	90.4	n.a.	n.a.	11/22/92
17.2	2.9	40.8	1.8	79	26.4	91.1	n.a.	n.a.	11/22/92
18.3	3.65	39.6	5.11	78.1	29.4	90.8	n.a.	n.a.	11/22/92
22.8	4.4	44.4	2.7	88.1	24.7	90.6	n.a.	n.a.	11/22/92
28	5.12	42	<0.45	102	25.8	76.1	n.a.	n.a.	11/23/92
3.56	<0.38	35.6	15.2	44.8	54.7	98.6	-46.3	-7.74	12/10/92
2.89	<0.38	35.1	18.7	45.3	34.8	100	-48.8	-8.39	12/10/92
3.11	<0.38	34.8	18.9	46.6	33.2	96.1	-48.9	-8.09	12/10/92
3.67	<0.38	34.5	19.2	47.5	33.6	95.4	-50.8	-8.35	12/10/92

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
12/10/92	1825	35.5	20	6.11	6.25	28.4	48.5	39.5	25.8
12/10/92	1838	37.6	20	6.18	6.43	29.4	49.1	38.4	25.6
12/10/92	1853	39.9	20	6.21	6.34	30.4	50.4	38.8	25.8
12/10/92	2032	42.4	20	6.18	6.19	32.4	54.1	39.1	26.8
12/10/92	2232	41	20	6.22	6.32	31.9	54.6	42.6	28.4
12/10/92	2313	43.7	19	6.18	6.34	28.9	48.5	35.2	26.6
12/10/92	2318	46.4	18	6.12	6.27	29.4	47.9	33.3	26.6
12/10/92	2322	50.9	18	6.11	6.14	29.9	47.9	32.4	27.1
12/10/92	2326	54.4	18	6.04	6.16	29.4	45.8	31.9	27.1
12/10/92	2329	58	18	6	6.13	31.4	48.5	28.8	26.1
12/10/92	2333	62.1	18	5.99	6.15	29.9	48.7	28.9	27.6
12/10/92	2337	68.5	17	5.93	6.05	29.9	48.7	28.8	27.6
12/10/92	2341	73.7	18	5.9	6.01	30.9	49.3	27.7	27.9
12/10/92	2345	79.8	18	5.88	5.98	31.4	49.4	28.1	27.6
12/10/92	2349	86.4	18	5.84	6.05	30.4	48.7	29.2	27.9
12/10/92	2353	97.1	18	5.82	5.98	30.9	49	25.5	27.9
12/10/92	2357	105	18	5.78	5.97	31.9	49.8	26	28.4
12/11/92	1	113	18	5.77	5.94	32.4	49.5	25.2	28.6
12/11/92	6	122	19	5.73	5.87	33.4	49.7	25.2	29.4
12/11/92	11	130	18	5.67	5.72	33.4	50	24.2	28.6
03/04/93	327	20.4	22	5.96	6.07	43.4	51.8	43.5	29.9
03/04/93	349	22.2	22	6.05	6.04	42.9	58.7	40.3	28.7
03/04/93	411	23.9	23	6.03	6.1	44.9	62.5	39.4	29.7
03/04/93	430	25.6	24	6.03	6.05	43.4	65.2	39.9	30.4
03/04/93	633	29.4	24	6.05	6.1	47.9	73.7	39.2	32.2
03/04/93	834	33.4	26	6.09	5.92	50.9	79	39.8	35.3
03/04/93	907	38.7	26	6.07	5.98	50.9	79.8	36.8	35.8
03/04/93	925	43.7	27	6.07	5.8	51.9	80.6	34.9	36.1
03/04/93	941	49.3	27	5.92	5.88	49.9	78.2	34.1	36.6
03/04/93	957	58	27	5.95	5.95	53.9	82.3	34.8	39.1
03/04/93	1015	66.3	27	5.87	5.19	52.4	80.6	32.5	37.3
03/04/93	1037	76.7	27	5.86	5.73	53.4	80.6	31	37.1
03/04/93	1102	89.8	27	5.81	5.83	54.4	82.3	30.3	38.1
03/04/93	1149	109	28	5.8	5.74	52.9	79.8	29.2	37.6
03/24/93	1207	145	22	5.67	5.89	35.4	54.9	35.1	28.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
4.11	<0.38	34.4	19.7	49	32.8	94.3	-51.3	-8.55	12/10/92
4.34	<0.38	34	19.3	48.6	30.8	94.7	-51.3	-8.38	12/10/92
5	<0.38	34.8	19.7	50.2	31.7	92.6	-50.7	-8.37	12/10/92
6.56	<0.38	34.2	18.5	54.6	30.7	91.1	-51.8	-8.66	12/10/92
7.23	<0.38	34	14.9	54.6	32.1	94.3	-52.1	-8.37	12/10/92
6.78	<0.38	29.8	13.2	53.2	25.8	78.3	-53.3	-8.87	12/10/92
7.23	1.79	28.7	12.6	53.4	25.3	72.6	-55.3	-8.97	12/10/92
8.12	<0.38	27.2	12	52.4	24	69.8	-53.9	-9.05	12/10/92
8.89	<0.38	26.6	11.7	51.4	21.5	65.5	-53.7	-9.18	12/10/92
9.45	<0.38	26.9	11.9	55.1	21.2	64	-53.8	-9.25	12/10/92
10.1	<0.38	27.2	11.6	55.2	20.2	65.8	-53.8	-8.96	12/10/92
10.7	2.11	26.9	11.8	56.1	20.7	63.7	-53.9	-8.88	12/10/92
11.1	2.33	26.5	11.3	56.8	19.6	63.4	-55	-9.1	12/10/92
12	1.93	25.8	11.2	57.2	18.2	61.6	-53.9	-9.36	12/10/92
12.4	<0.38	26	10.8	58.4	17.2	60.2	-55.3	-9.32	12/10/92
13	2.11	31.5	10.7	60.2	16.7	58	-56	-9.4	12/10/92
13.9	2	24.8	9.81	58.7	14.5	56.2	-55.6	-9.44	12/10/92
14.1	<0.38	24.8	9.35	58.8	15.1	55.2	-54.9	-9.17	12/11/92
15.1	2.11	29.2	8.68	57.6	13.5	53.4	-54.4	-9.08	12/11/92
15.9	2.36	27.7	7.57	53.4	12.1	52.3	-54.1	-9.02	12/11/92
4	6.37	31.4	7.78	47.8	58.9	79.7	-49.6	-7.95	03/04/93
6.12	4.76	25.6	20.8	54.2	26.2	86.9	-54.3	-8.51	03/04/93
7	3.69	30.6	30.7	67.6	31.4	86.2	-53.6	-8.37	03/04/93
8.12	2.97	30.1	30.6	68.7	28	83.7	-54.5	-8.51	03/04/93
10.6	2.65	28.4	30.1	79.7	27.5	79.4	-57.7	-8.62	03/04/93
11.7	3.04	25	24.4	83.8	17.4	75.5	-60.6	-9.27	03/04/93
12.2	2.69	23.8	26.2	87.7	16	65.5	-62.5	-9.25	03/04/93
12.9	1.79	21.7	26.1	85.8	14.1	64.4	-65.7	-9.87	03/04/93
13.6	2.11	19.1	23	80.4	13.8	59.8	-65.3	-9.29	03/04/93
15.5	2.26	22.8	28.1	99.7	19.7	60.2	-67.6	-9.75	03/04/93
15.5	2.54	30	36.2	132	-7.1	56.3	-67.8	-9.44	03/04/93
16.3	2.76	19.2	23	89.8	11.7	51.6	-68.8	-9.59	03/04/93
18.2	2.86	21.4	28	104	14.8	49.5	-73.8	-10.98	03/04/93
19.1	2.47	18.6	21.3	97.6	10.1	47.7	-75.9	-11.1	03/04/93
5.34	<0.38	32	20.3	88.6	17.3	81.9	n.a.	n.a.	03/24/93

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
03/24/93	1248	145	23	5.95	5.97	36.4	55.6	35.5	28.9
03/24/93	1448	145	23	5.69	6.03	39.4	59.4	34	28.4
03/24/93	1648	145	24	5.99	5.81	39.9	58.3	34.8	29.4
03/24/93	2049	145	23	5.94	6.07	36.9	58.1	35.6	29.2
03/24/93	2249	145	24	6.07	6.04	38.4	57.9	35.5	27.9
03/25/93	49	145	23	6.06	6.2	36.9	57.3	35.4	27.6
03/25/93	650	145	23	6.1	6	37.9	58.4	36.2	27.1
03/25/93	850	145	23	6.13	6.18	36.9	57.9	35.9	26.6
03/25/93	1051	140	23	6.06	6.16	36.4	56.5	35.3	26.1
03/25/93	1651	140	22	6.15	6.26	34.4	54.8	37.7	27.6
03/25/93	2052	140	22	6.17	5.89	33.4	53.7	36.9	26.1
03/26/93	52	135	21	6.15	6.21	33.4	54	38.5	26.3
03/26/93	453	135	21	6.18	6.32	31.4	51.4	38.6	26.1
04/16/93	844	50.9	19	6.35	6.39	30.4	49	40.5	23.8
04/16/93	858	56.2	19	6.31	6.44	30.4	50.5	42.2	25.1
04/16/93	909	62.1	20	6.24	6.49	30.4	51	41.3	25.1
04/16/93	923	68.5	19	6.31	6.45	31.4	51.4	40.9	25.1
04/16/93	934	76.7	19	6.3	6.35	32.4	54	40.5	25.8
04/16/93	948	89.8	19	6.39	6.23	34.4	54.6	39.6	26.9
04/16/93	1013	101	20	6.32	6.24	36.9	57.4	38.3	27.4
04/16/93	1133	113	20	6.31	6.22	38.4	59.4	36	28.1
04/16/93	1333	117	20	6.2	6.23	37.4	58.8	34.4	27.6
04/16/93	1533	109	20	6.27	6.33	36.9	58.3	35.7	28.1
04/16/93	1703	101	21	6.36	6.32	36.4	57.5	37.9	27.1
04/16/93	1848	89.8	20	6.5	6.43	34.4	55.9	38.5	27.1
04/16/93	2048	86.4	19	6.31	6.4	30.9	50.9	37.2	25.8
04/16/93	2107	97.1	19	6.3	6.33	32.4	51.4	33.9	26.1
04/16/93	2120	109	18	6.2	6.16	34.4	53.6	34.5	27.1
04/16/93	2138	122	19	6.14	6.04	33.4	51.4	31.4	25.6
04/16/93	2338	135	21	6.2	6.22	38.4	59.1	32.1	27.4
04/17/93	138	130	21	6.17	6.27	37.4	58.6	33.2	26.9
04/17/93	739	113	20	6.34	6.37	31.4	50.9	36.3	24.6
04/17/93	1340	101	19	6.42	6.48	28.4	47	37.2	24.3
11/27/93	1455	3.82	32	6.24	6.3	51.9	82.3	57.9	42.5
11/27/93	1517	4.81	32	6.21	6.19	61.4	96.3	56.1	46

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
5.78	<0.38	30.4	9.52	85.9	17.3	83.3	n.a.	n.a.	03/24/93
6.34	<0.38	31.2	21	91	16.8	80.5	n.a.	n.a.	03/24/93
6.23	<0.38	28.3	20.4	83.5	13.2	81.5	n.a.	n.a.	03/24/93
5.34	<0.38	32.9	21.9	88.8	19.5	85.4	n.a.	n.a.	03/24/93
5	<0.38	33.9	22.6	86.5	21.1	87.6	n.a.	n.a.	03/24/93
4.67	<0.38	34.6	23.5	86.2	19.8	87.6	n.a.	n.a.	03/25/93
3.96	<0.38	34.5	24.8	78.3	21.9	89.7	n.a.	n.a.	03/25/93
3.82	<0.38	34.8	23.1	77.4	19.9	92.6	n.a.	n.a.	03/25/93
3.58	<0.38	34.7	22.9	75.1	21.6	89.7	n.a.	n.a.	03/25/93
3.32	<0.38	36.7	23.9	74.9	24.3	92.9	n.a.	n.a.	03/25/93
2.91	<0.38	32.4	21.3	64.5	21.6	93.6	n.a.	n.a.	03/25/93
2.86	<0.38	36.4	21.2	67.5	28.6	97.2	n.a.	n.a.	03/26/93
2.54	<0.38	37.8	23	68.5	29.4	101	n.a.	n.a.	03/26/93
3.89	<0.38	38.3	18.5	44.4	44	83	n.a.	n.a.	04/16/93
4.11	<0.38	38.4	18.3	46.1	41.1	82.6	n.a.	n.a.	04/16/93
4.89	<0.38	38.9	18.7	47.8	40.4	79.7	n.a.	n.a.	04/16/93
6.67	<0.38	38.1	18.1	48.5	38.9	74.4	n.a.	n.a.	04/16/93
8.33	<0.38	37.5	17.6	49.7	37.3	73.7	n.a.	n.a.	04/16/93
10.8	1.97	36	17.7	50.6	35.4	71.2	n.a.	n.a.	04/16/93
13.3	2.18	35.3	16.5	52.6	35.7	68.7	n.a.	n.a.	04/16/93
17.7	2.33	30.5	13.2	56.4	35.7	67.3	n.a.	n.a.	04/16/93
15.7	1.83	29	11	62.1	32.9	70.5	n.a.	n.a.	04/16/93
10	<0.38	33.1	14.6	71.3	34.5	77.3	n.a.	n.a.	04/16/93
7.78	<0.38	31.3	13.9	66.8	31.1	81.9	n.a.	n.a.	04/16/93
6	<0.38	33.1	12.4	65.9	37.3	85.8	n.a.	n.a.	04/16/93
4.89	<0.38	31.6	13	60.4	32.7	83	n.a.	n.a.	04/16/93
9.12	<0.38	29.2	14.2	60	29.3	73.3	n.a.	n.a.	04/16/93
11.2	<0.38	28	12.8	60.9	27.2	70.1	n.a.	n.a.	04/16/93
13.5	1.97	25.6	14.3	58.4	22.2	65.5	n.a.	n.a.	04/16/93
14.2	<0.38	28	10	75.3	27.9	70.8	n.a.	n.a.	04/16/93
10.2	<0.38	28.8	12.8	77	27.7	78.3	n.a.	n.a.	04/17/93
4.56	<0.38	32.8	11.3	66.8	31.3	92.6	n.a.	n.a.	04/17/93
3.11	<0.38	34.9	11.9	59.9	34.6	96.5	n.a.	n.a.	04/17/93
7.12	<0.38	65.1	4.99	81.6	46.8	111	n.a.	n.a.	11/27/93
10.6	2.22	78.1	9.66	110	46.3	107	n.a.	n.a.	11/27/93

Table 17. Chemical analyses of streamwater collected during stormflow from the Fishing Creek tributary watershed, Catoctin Mountain, Maryland, 1987-93--Continued

Sample-collection date	Time	Discharge (L/s)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
11/27/93	1536	6.2	36	5.99	6.16	66.9	105	55.2	47.6
11/27/93	1553	7.53	38	5.99	5.93	69.9	110	57	53
11/27/93	1603	9.63	39	5.97	5.94	72.9	114	54.8	52.4
11/27/93	1613	12.3	39	5.98	5.91	72.4	114	53.5	51.9
11/27/93	1625	15.4	39	5.94	5.95	72.4	114	55.7	54
11/27/93	1637	18.7	40	5.89	5.89	75.4	118	53.5	53
11/27/93	1652	23	40	5.88	5.79	80.3	126	55.2	56.8
11/27/93	1711	26.5	43	5.85	5.72	85.3	132	55.7	60.1
11/27/93	1740	30.4	44	5.81	5.73	87.8	136	54.8	59.4
11/27/93	1940	33.4	41	5.78	5.52	83.8	132	49.2	54.7
11/27/93	2056	37.6	38	5.76	5.66	79.8	124	45.7	51.9
11/27/93	2126	42.4	38	5.71	5.64	79.3	122	44.8	51.4
11/27/93	2213	49.3	36	5.71	5.65	76.4	119	44.4	51.2
11/27/93	2238	56.2	35	5.7	5.56	71.4	111	41.9	49.6
11/27/93	2255	64.2	35	5.67	5.46	69.4	108	39.5	48.1
11/27/93	2312	73.7	34	5.6	5.53	69.9	108	38.8	47.8
11/27/93	2332	86.4	34	5.54	5.5	69.9	107	38.6	46.6
11/28/93	3	101	34	5.48	5.41	68.9	105	37.5	45.5
11/28/93	54	117	34	5.42	5.31	67.4	101	34.4	44.3
11/28/93	131	135	34	5.3	5.32	67.4	95.5	30.9	47.3
11/28/93	158	155	34	5.3	5.26	65.9	92.2	32.3	51.4
11/28/93	239	177	33	5.12	5.03	67.4	89.7	27.9	49.4

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Sample-collection date
13.2	2.61	80.7	7.46	119	39.1	105	n.a.	n.a.	11/27/93
15.9	2.9	77.5	7.26	120	36.9	96.5	n.a.	n.a.	11/27/93
16.9	3.04	81.4	7.4	132	37	95.4	n.a.	n.a.	11/27/93
17.9	3.15	81.8	7.25	134	34.6	97.5	n.a.	n.a.	11/27/93
19.4	3.58	79.6	7.27	129	33.6	95	n.a.	n.a.	11/27/93
20.5	4.19	80.3	7.64	132	30	94	n.a.	n.a.	11/27/93
22.5	4.48	84.2	7.64	132	31.6	94.3	n.a.	n.a.	11/27/93
24.6	4.69	83.9	6.56	150	31.4	90.8	n.a.	n.a.	11/27/93
24.7	4.15	81.6	7.14	153	30.6	91.1	n.a.	n.a.	11/27/93
25.9	4.05	68	4.7	148	25.2	87.6	n.a.	n.a.	11/27/93
26.8	4.3	57.2	2.66	135	24.4	81.2	n.a.	n.a.	11/27/93
28.2	4.15	55	3.5	136	24.7	79	n.a.	n.a.	11/27/93
28.6	4.12	52.8	0.99	138	24.9	76.5	n.a.	n.a.	11/27/93
28.9	4.33	47.8	<0.45	130	23	68.4	n.a.	n.a.	11/27/93
29.4	4.48	45.1	<0.45	126	22	65.8	n.a.	n.a.	11/27/93
30.5	4.83	42.4	<0.45	122	20.9	63	n.a.	n.a.	11/27/93
32.1	4.91	42.8	<0.45	132	18.3	63.4	n.a.	n.a.	11/27/93
33.8	4.69	42.2	<0.45	135	19.4	63	n.a.	n.a.	11/28/93
34.4	4.55	41.4	1.11	140	16.5	58.4	n.a.	n.a.	11/28/93
34.8	5.48	37.6	<0.45	133	16.6	54.8	n.a.	n.a.	11/28/93
39.9	6.55	28.8	2.31	103	16.5	53.8	n.a.	n.a.	11/28/93
39.4	5.59	32.8	7.54	127	6.99	50.9	n.a.	n.a.	11/28/93

Table 18. Chemical analyses of other surface and ground waters collected during biannual synoptic surveys from the Bear Branch and Fishing Creek tributary watersheds, Catoctin Mountain, Maryland, 1991-93

[°C, degrees Celsius; µS/cm, microsiemens per centimeter; µeq/L, microequivalents per liter; µmol/L, micromoles per liter; <, less than; n.a., not analyzed; ANC, acid-neutralizing capacity; SS, synoptic site; SP, seep; SPG, spring]

Site	Sample-collection date	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
Bear Branch Watershed									
SS5	09/12/91	16	26	4.86	5.16	41.9	62.9	28.8	16
SS6	09/12/91	16	38	5.16	5.35	96.4	114	34.8	28
SS7	09/12/91	17	30	4.84	5.07	40.3	65	32.9	11.7
SS8	09/12/91	16	15	5.48	5.57	25.6	32.2	30.3	11.3
GAGE	09/12/91	16	15	5.26	5.18	22.6	30	30.6	8.8
SS3	03/17/92	10	33	4.66	4.98	33.3	62.9	24.7	26.2
SS4	03/17/92	10	33	4.66	4.87	37.5	65.2	25.3	23.8
SS5	03/17/92	9	36	4.77	4.9	56.1	82.8	26.1	25.2
SS6	03/17/92	8	38	4.83	5.04	78	100	28.7	27.4
SS7	03/17/92	8	38	4.85	4.96	79.8	99.4	28.2	27
SS8	03/17/92	6	28	5.33	5.26	62.2	77.3	29.8	26.2
GAGE	03/17/92	5	27	5.54	5.3	61.4	75.9	31.1	27.3
SS3	09/17/92	14	30	4.54	4.84	33.7	48.5	21.7	12.9
SS4	09/17/92	13	33	4.65	4.8	32.1	61.1	22.4	24.2
SS5	09/17/92	14	29	4.82	4.99	39	65.3	24.3	18.4
SS6	09/17/92	15	32	4.79	4.89	53.7	73.9	25.7	15.9
SS7	09/17/92	16	32	4.72	4.82	50.6	72.9	32.8	12.7
SS8	09/17/92	16	21	5.22	5.36	37.8	50.4	27	11
GAGE	09/17/92	16	20	5.25	5.9	34.6	46.2	27.9	10.7
SS2	03/29/93	8	38	4.78	4.96	71.4	73.2	23.9	27.6
SS3	03/29/93	8	37	4.65	4.83	70.4	61.4	22.7	26.3
SS4	03/29/93	8	38	4.75	4.85	81.8	64.8	21.6	25.8
SS5	03/29/93	8	41	4.66	4.74	74.9	64.9	22.1	29.2
SS6	03/29/93	8	43	4.7	4.74	86.3	79	22.2	29.4
SS7	03/29/93	8	42	4.68	4.75	90.8	82.3	22.6	29.9
SS8	03/29/93	9	27	5.15	5.09	52.4	52.2	29.4	26.6
GAGE	03/29/93	9	31	4.98	4.94	57.4	58.9	28	28.9
SS5	09/15/93	16	30	4.54	4.95	45.9	62.6	27.3	17.1
SS6	09/15/93	18	36	4.58	4.93	75.4	81.5	29.8	16.9
SS7	09/15/93	18	31	4.39	4.81	44.4	61.4	28.9	10.4
SS8	09/15/93	16	16	5.14	5.64	28.4	32.8	30.2	9.62
GAGE	09/15/93	18	17	4.53	5.48	26.5	29.9	31	10.1

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Site
16.3	<0.38	47.8	12.2	123	<4	91.8	-47	-7.7	SS5
7.67	0.1	62.2	68.2	182	<4	91.3	-44.5	-7.5	SS6
18.6	1	48.8	13	142	<4	107	-42	-7.45	SS7
2	0.3	34.8	12.1	53.9	<4	110	-47.5	-8.05	SS8
4.45	<0.38	34.4	7.01	57.3	<4	109	-46	-8	GAGE
50.6	0.11	44.7	29.7	145	-8	71.8	-42.5	-7.4	SS3
51	0.04	42.6	31.4	146	-10	71.5	-41.5	-7.4	SS4
38.3	0.47	46	56.8	148	-1	72.9	-42	-7.5	SS5
29.2	0.5	44.1	68.5	158	-9	73.4	-42.5	-7.45	SS6
23.6	0.72	44.9	66.7	160	-9	74.6	-43	-7.45	SS7
9.9	0.11	40.5	45.5	121	2	80	-44	-7.6	SS8
5.11	<0.38	38.3	36.4	112	8	80	-44	-7.65	GAGE
44.9	<0.38	44	9.47	138	-13.6	75.4	-45.5	-7.65	SS3
37.4	<0.38	38.2	35.7	132	-15.5	75.9	-43.5	-7.55	SS4
20.2	<0.38	38.9	22.4	124	-9.8	80.4	-45.5	-7.55	SS5
19.7	<0.38	59.6	34	140	-15.4	82.4	-45.5	-7.7	SS6
18	<0.38	41.4	27.8	140	-17.4	84.7	-44	-7.7	SS7
6.12	<0.38	37.7	15.6	91.2	-2.4	94	-44.5	-7.7	SS8
3.89	<0.38	35.7	9.98	84	-1.8	94.8	n.a.	n.a.	GAGE
26.8	<0.38	31.3	47.7	163	-5.75	64.1	-49.5	-7.8	SS2
34.4	<0.38	29.9	32.6	169	-9.43	59.8	-51.9	-8.13	SS3
36.8	<0.38	29	37.2	177	-12.7	57.3	-52.9	-8.09	SS4
42.8	<0.38	30.2	46.5	183	-17.3	58.7	-53.1	-8.18	SS5
39	<0.38	30.2	50.6	197	-16.7	61.6	-51.7	-8.2	SS6
39.1	<0.38	29.9	50.1	196	-17.1	61.2	-53.7	-8.26	SS7
14.3	<0.38	29.8	24.8	118	-2.59	76.5	-51.9	-8.37	SS8
18.6	<0.38	29.6	28.3	137	-6.41	68.7	n.a.	n.a.	GAGE
18.4	<0.38	38.2	13	135	0.59	93.6	n.a.	n.a.	SS5
16.1	<0.38	39.7	23.9	176	-5.3	95.8	n.a.	n.a.	SS6
20.1	<0.38	39.5	4.95	147	-10.2	104	n.a.	n.a.	SS7
3.47	<0.38	32.2	7.29	58.8	8.52	109	n.a.	n.a.	SS8
5.3	<0.38	34.3	2.86	66.2	2.4	107	n.a.	n.a.	GAGE

Table 18. Chemical analyses of other surface and ground waters collected during biannual synoptic surveys from the Bear Branch and Fishing Creek tributary watersheds, Catoctin Mountain, Maryland, 1991-93–Continued

Site	Sample-collection date	Temperature (°C)	Specific conductance (µS/cm)	pH (units)		Calcium, dissolved (µeq/L)	Magnesium, dissolved (µeq/L)	Sodium, dissolved (µeq/L)	Potassium, dissolved (µeq/L)
				Field	Laboratory				
Fishing Creek tributary Watershed									
SS1	09/12/91	17	20	5.78	5.63	33.2	54.3	44.8	28.2
SS2	09/12/91	17	14	6.17	5.87	23.3	34.4	42.8	12.8
SS3	09/12/91	18	15	6.34	5.95	25.7	35.6	41.9	13.2
SP1	09/12/91	14	14	5.96	5.95	17.5	35.7	42	16
SP2	09/12/91	16	15	5.73	5.79	11.6	44.6	37.2	22.3
SPG	09/12/91	12	20	5.65	5.96	30.1	54.6	46.7	30.2
GAGE	09/12/91	18	15	6.53	5.76	26.4	39.2	44.4	16.3
SS1	03/17/92	9	18	5.7	5.78	30.9	52.1	42.3	17.1
SS2	03/17/92	6	18	6.24	5.86	30.3	46.4	40.7	23.4
SS3	03/17/92	6	18	6.27	6.42	29	45.3	41.5	23.7
SP1	03/17/92	11	17	5.68	5.88	28.4	42.6	45.3	23.9
SP2	03/17/92	11	17	5.49	6.17	19.6	52.8	35.7	20.8
SPG	03/17/92	11	24	5.38	6.02	37.4	62.5	49.4	31.3
GAGE	03/17/92	5	17	6.24	6.1	31.9	42.5	42	24.1
SS1	09/15/92	15	18	5.93	6.59	28.8	47.1	38.6	19.7
SS2	09/15/92	15	16	6.34	6.6	25.3	39.3	38.2	17.4
SS3	09/15/92	16	16	6.36	6.45	23.6	37.4	37.6	16.3
SP1	09/15/92	13	16	6.18	6.59	24.8	38.8	40.8	17
SP2	09/15/92	16	18	5.43	6.49	20.9	48.2	35.1	18
SPG	09/15/92	12	22	5.63	6.69	34.4	56.4	47	28.9
GAGE	09/15/92	16	15	6.37	6.47	25.7	36.3	39.5	16.4
SS1	03/29/93	9	26	5.83	5.91	41.4	63.4	39.6	29.2
SS2	03/29/93	10	18	6.01	5.94	26	43	36	23.8
SS3	03/29/93	10	21	6.21	6.11	32.9	52	36.4	26.1
SP1	03/29/93	10	17	5.67	5.89	26	38.6	39.6	23.3
SP2	03/29/93	12	16	5.37	5.6	14	42.8	32.1	17.1
SPG	03/29/93	11	28	5.47	6.33	35.4	71.3	44.8	36.3
GAGE	03/29/93	10	20	5.94	5.85	n.a.	n.a.	n.a.	n.a.
SS1	09/15/93	17	20	5.52	6.06	34.4	49.4	42.6	20
SS2	09/15/93	17	16	6.03	6.35	25	36	41.3	16
SS3	09/15/93	18	15	6.08	6.26	26	36.3	41.7	16.6
SP1	09/15/93	12	17	5.56	6.08	25.5	42.2	41.4	19.2
SP2	09/15/93	16	18	5.19	5.78	17	48.6	37.5	22
SPG	09/15/93	12	22	5.16	5.77	31.4	53	45.2	29.7
GAGE	09/15/93	18	15	6.04	6.53	27.9	38.2	43.5	16.2

Aluminum, total, dissolved (µeq/L)	Iron, total, dissolved (µeq/L)	Chloride, dissolved (µeq/L)	Nitrate, dissolved (µeq/L)	Sulfate, dissolved (µeq/L)	ANC (µeq/L)	Silica, dissolved (µmol/L)	Delta D (per mil)	Delta ^{18}O (per mil)	Site
<0.22	3.7	39	13.7	35	39	122	-47.5	-7.9	SS1
0.78	<0.38	37.4	8.53	33.3	41	126	-48	-8.2	SS2
2.11	0.4	35.6	7.91	31.3	40	128	-48.5	-8.15	SS3
<0.22	0.9	37.4	8.85	30.9	30	123	-48	-8.05	SP1
<0.22	0.3	36.1	2.04	44	26	117	-46	-7.9	SP2
<0.22	0.11	39.9	30.2	31.8	64	117	-49.5	-8.1	SPG
2.45	1.6	37.2	6.39	33.1	58	138	-47	-8.05	GAGE
1	0.39	39.2	11.9	45.8	65	113	-48.5	-8.15	SS1
1.56	<0.38	38.4	25.1	43.4	54	113	-47	-8.1	SS2
1.78	0.43	35.9	20.7	44.4	42.1	113	-47.5	-8	SS3
<0.22	0.04	33.2	8.24	27.9	82	131	-47	-8.1	SP1
1.22	<0.38	37.3	3.3	35.9	76	100	-45	-7.65	SP2
0.22	<0.38	43.4	29.5	50.7	81	109	-47.5	-7.95	SPG
2.34	0.14	36.8	9.6	47.5	62	117	-48	-8	GAGE
1.11	0.91	24.8	42.2	103	57.2	119	-46	-7.9	SS1
0.56	1.34	35	15	31.3	46.7	119	-48	-7.85	SS2
0.33	1.13	20.7	8.77	18.8	41.8	116	-47.5	-7.85	SS3
0.67	0.86	35.2	6.29	26.4	70.1	122	-45.5	-7.8	SP1
3.22	0.43	35.9	16.3	32.6	38.6	102	-46	-7.5	SP2
<0.22	0.91	42	24.1	33.6	76.3	116	-47	-7.8	SPG
2.33	2.63	35.5	1.19	33.1	58.1	126	n.a.	n.a.	GAGE
7	<0.38	40.5	50.3	71.9	19.5	86.5	-47.7	-7.77	SS1
2.18	<0.38	34.8	20.5	50.2	26.1	89.7	-48.6	-7.92	SS2
3.7	<0.38	38.1	30.2	67.5	20.2	85.1	-49	-7.97	SS3
4.67	<0.38	33.5	1.35	36.6	55.4	115	-44.9	-7.11	SP1
3.17	<0.38	34.5	<0.45	37.8	41	85.1	-47	-7.69	SP2
0.71	<0.38	47.2	3.29	91.8	45.3	91.9	-46.1	-7.68	SPG
n.a.	n.a.	34.6	14.3	61.9	24.6	n.a.	n.a.	n.a.	GAGE
0.57	2.4	38.5	11.6	34.2	73.1	124	n.a.	n.a.	SS1
0.89	<0.38	35.5	8.44	30.5	48.8	126	n.a.	n.a.	SS2
2.3	<0.38	35.4	5.08	28.6	51.4	127	n.a.	n.a.	SS3
<0.22	<0.38	36.2	11.7	32.8	70	121	n.a.	n.a.	SP1
2.31	<0.38	35.5	<0.45	48.3	52.9	120	n.a.	n.a.	SP2
0.3	<0.38	40.2	31.2	32.3	68.4	118	n.a.	n.a.	SPG
2.74	1.97	35.7	4.04	29.1	57	136	n.a.	n.a.	GAGE