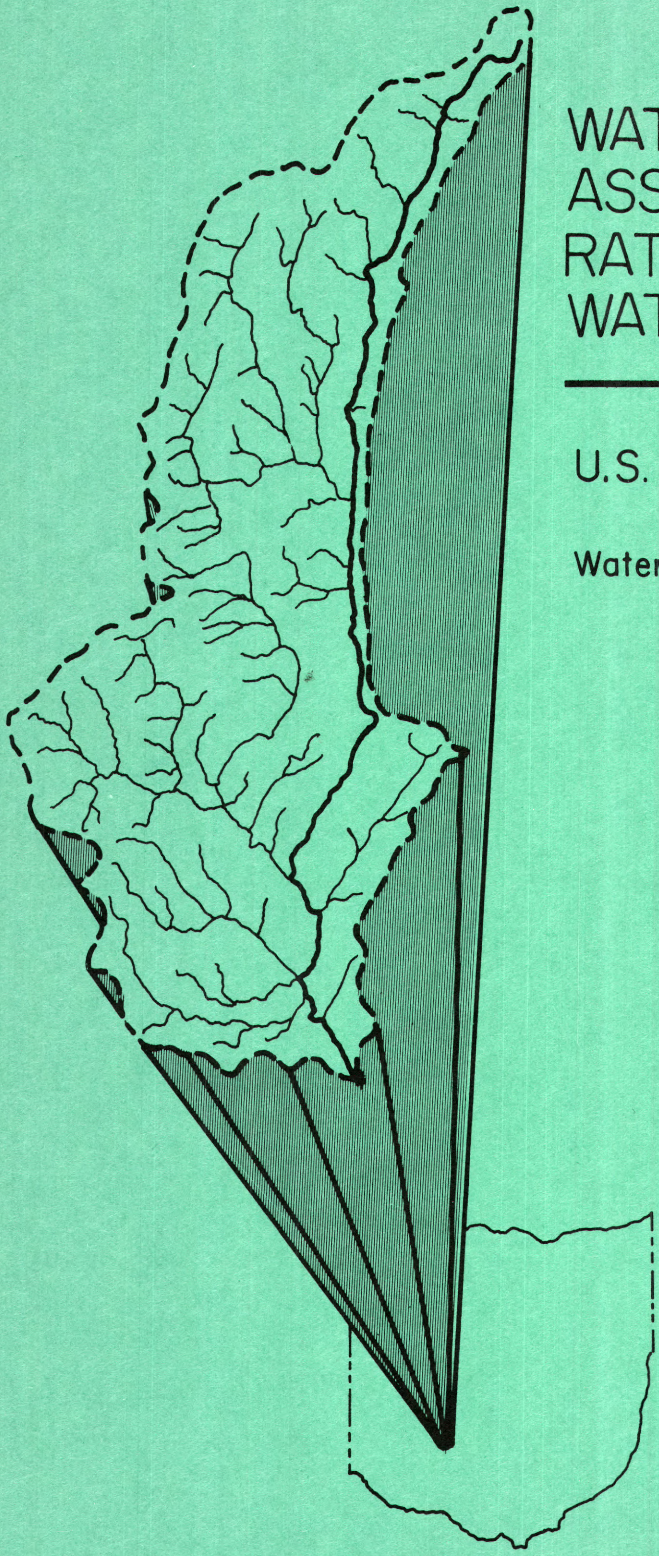

WATER-QUALITY ASSESSMENT OF RATTLESNAKE CREEK WATERSHED, OHIO

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 79-17

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER-QUALITY ASSESSMENT OF RATTLESNAKE CREEK WATERSHED, OHIO

by Kenneth F. Evans and Robert L. Tobin

Water-Resources Investigations 79-17

Prepared in cooperation with U.S. Department of Agriculture, Soil Conservation Service

Open-File Report

Columbus, Ohio

April, 1979

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

Open-File Report

For additional information write to:

U.S. Geological Survey
Water Resources Division
975 West Third Avenue
Columbus, Ohio 43212

CONTENTS

	Page
Abstract	1
Purpose and scope	1
Environmental setting and conditions	2
Hydrology	4
Site descriptions	4
Hydrologic data	4
Water quality	8
Major constituents	8
Nutrients	9
Dissolved oxygen and pH	10
Iron	11
Pesticides and heavy metals	12
Stream biology	12
Summary and conclusions	13
References	15

ILLUSTRATIONS

		Page
Figure 1	Map showing sampling sites for the Rattlesnake Creek basin, Ohio, 1976-77	3
2	Hydrograph showing daily discharge for Rattlesnake Creek at Centerfield, Ohio (site 5), 1976-77	5

ILLUSTRATIONS

Page

Figure 3 Flow duration curve for Rattlesnake Creek at Centerfield (site 5), Ohio, 1972-77 -------- 6

4 Graph showing mean monthly discharge (1972-77) and monthly mean discharge (1976-77) for Rattlesnake Creek at Centerfield, Ohio (site 5) ---------------- 7

TABLES

Page

Table 1-8 Physical, chemical, and bacteria data for:

1 Rattlesnake Creek at site 1, Ohio, 1976-77 ------------------------------------ 18

2 Rattlesnake Creek at site 2, Ohio, 1976-77 ------------------------------------ 19

3 Wilson Creek at site 3, Ohio, 1976-77 ------------------------------------ 20

4 Rattlesnake Creek at site, 4, Ohio, 1976-77 ------------------------------------ 21

5 Rattlesnake Creek at Centerfield (site 5), Ohio, 1976-77 ---------------------------- 22

6 West Branch Rattlesnake Creek at site 6, Ohio, 1976-77 ---------------------------- 23

7 Lees Creek at site 7, Ohio, 1976-77 -------- 24

8 Hardin Creek at site 8, Ohio, 1976-77 ------ 25

9 Pesticide and heavy metals data for sites 1, 3, and 4 in Rattlesnake Creek basin, Ohio, 1976 ------------------------------------- 26

TABLES

Page

Table 10 Benthic invertebrate data for Rattlesnake Creek, Ohio, 1976 ---------------------------- 27

11 Benthic invertebrate data for West Branch Rattlesnake Creek basin, Ohio, 1976 --------- 28

METRIC CONVERSION FACTORS

The following factors may be used to convert the U.S. inch-pound units published herein to the International System of Units (SI):

Inch-pound units	Multiplied by	To obtain SI units
inch (in)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square foot (ft^2)	0.0929	square meter (m^2)
square mile (mi^2)	2.590	square kilometer (km^2)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

WATER-QUALITY ASSESSMENT OF RATTLESNAKE CREEK WATERSHED, OHIO

by Kenneth F. Evans and Robert L. Tobin

ABSTRACT

Chemical and biological water quality in Rattlesnake Creek basin, Ohio, are evaluated. The data include field and laboratory data for eight sites during August 1976-August 1977 and summaries of earlier (1972-76) data.

Streamflow was below normal during the study period. Basin waters types were calcium bicarbonate or calcium magnesium bicarbonate. Specific conductance ranged from 405 to 1,300 micromhos per centimeter. High concentrations of sodium (110-140 milligrams per liter), nitrogen (24 milligrams per liter as N), and phosphorus (7.8 milligrams per liter as P) were observed during low flows downstream from domestic sewage facilities. Nonpoint sources contributed high concentrations of nitrate-nitrogen to all streams during the high flows of winter and spring.

Dissolved-oxygen concentrations in the upper basin ranged from 3.2 to 18.4 milligrams per liter. Mean saturation values of dissolved oxygen were at or near 100 percent in the lower basin. Stream pH exceeded 8.4 when dissolved-oxygen saturation was above 120 percent. Bacteria and invertebrate data suggest that moderate pollution from cultural sources may exist in the upper basin.

Water quality was poorest in the sluggish flows of the upper basin but improved downstream. Increases in flow velocity and stream aeration rates, dilution, and biological activity contributed to the downstream recovery. Except for high nitrogen concentrations, water quality was best in the lower basin.

PURPOSE AND SCOPE

From August 1976 to August 1977, the U.S. Geological Survey, in cooperation with the U.S. Department of

Agriculture, Soil Conservation Service, conducted a study to assess the chemical and biological quality of Rattlesnake Creek and its tributaries. Particular emphasis was placed on those reaches where an effect on water quality from flood-control and drainage measures and channel improvements might be expected (U.S. Department of Agriculture, Soil Conservation Service, 1975). The purpose of this report is to provide basic data useful in preparing an environmental impact statement.

Eight stream sites (fig. 1) were sampled eight times each during August 1976 to August 1977. Field measurements of temperature, pH, dissolved oxygen, specific conductance, alkalinity, bacteria, and stream discharge were determined. Representative water samples were collected for laboratory analysis of selected inorganic constituents and nutrients. Bottom material for the analysis of pesticides at sites 1, 3, and 4, and of heavy metals at site 4, were collected in August 1976. Benthic communities were sampled at sites 1, 3, 4, and 6 in August and September 1976.

ENVIRONMENTAL SETTING AND CONDITIONS

Rattlesnake Creek basin, approximately 45 miles southwest of Columbus, Ohio, is an area of 277 mi^2 that includes parts of Madison, Greene, Fayette, Clinton, and Highland Counties. The drainage basin is part of the till plains of late Wisconsin age. The upper basin is rather flat, with a slope of 2 percent or less, but downstream the land merges into gently rolling hills, and streams flow over limestone bedrock in places (U.S. Department of Agriculture, Soil Conservation Service, 1975).

Rattlesnake Creek is tributary to Paint Creek in the Scioto River basin. Approximately 4 miles downstream from the confluence of Paint and Rattlesnake Creeks, the U.S. Army Corps of Engineers has constructed Paint Creek dam, primarily a flood control structure. Backwater from the dam may extend 6 miles upstream on Rattlesnake Creek.

Land use in the watershed consists of 85 percent agriculture, 5 percent pasture, 5 percent woodland, and 5 percent other. Land use and soil characteristics produce a moderately high direct runoff potential. The land requires

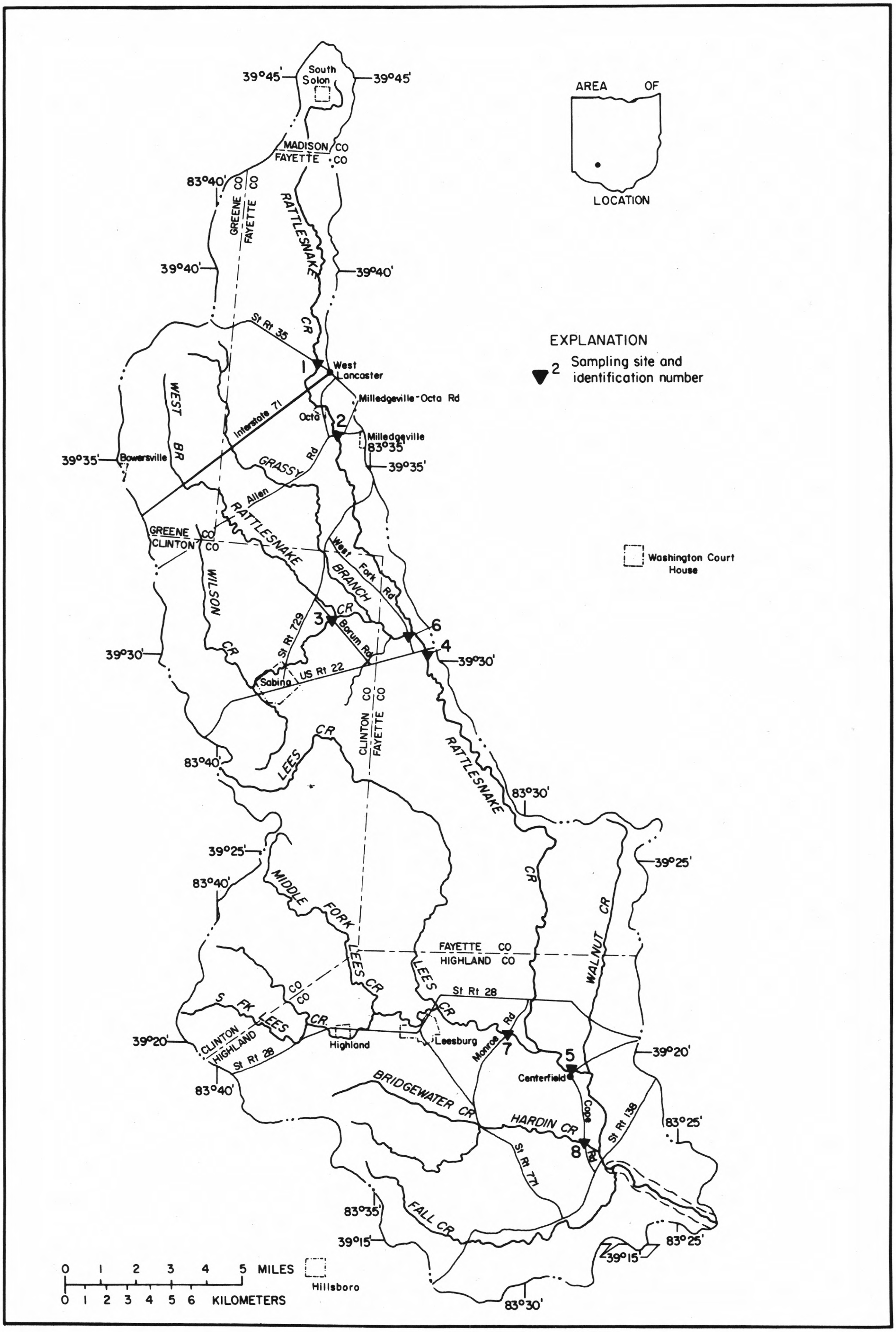

Figure 1.--Sampling sites for the Rattlesnake Creek basin, Ohio (1976-77).

artificial drainage for efficient agricultural production, and many of the main channels have been modified by individual or groups of landowners. Small channels have been replaced with drains, which are generally old and in need of repair. Channel enlargement is currently underway on an 8-mile reach of Grassy Branch. Approximately 30 miles of Rattlesnake Creek is under petition for modification through current Ohio drainage laws. Modifications may include channel clearing and snag removal, channel enlargement, construction of new open channels, accelerated conservation land treatment, and flood protection (U.S. Department of Agriculture, Soil Conservation Service, 1975).

HYDROLOGY

Site Descriptions

Flow velocity at sites 1, 2, 3, 4, and 6, (fig. 1) in the upper parts of the watershed was generally sluggish and water-depth was shallow. Channel vegetation was abundant during the growing season. Bottom material consisted mainly of fine sand, silt, and organic debris.

Flow velocity was much greater at sites 5, 7, and 8. Stream channels were more "V" shaped, and bed materials were mainly sand, gravel, and large rocks. The channel had been widened at site 8, causing the stream depth to be very shallow.

Hydrologic Data

Discharge measurements were made at the time water samples were collected. In addition, the U.S. Geological Survey maintains a stream discharge gage on Rattlesnake Creek at Centerfield, Ohio (site 5). The gage was established in October 1971 and has provided continuous daily discharge records from that time to the present.

The hydrograph of site 5 for the study period is shown in fig. 2. A flow duration curve (fig. 3) and mean monthly discharges (fig. 4) were derived from station records. Because of the short period of record at the Rattlesnake Creek gage, the 7-day 10-year low flow of 0.1 ft^3/s was determined by correlating records from Rattlesnake Creek

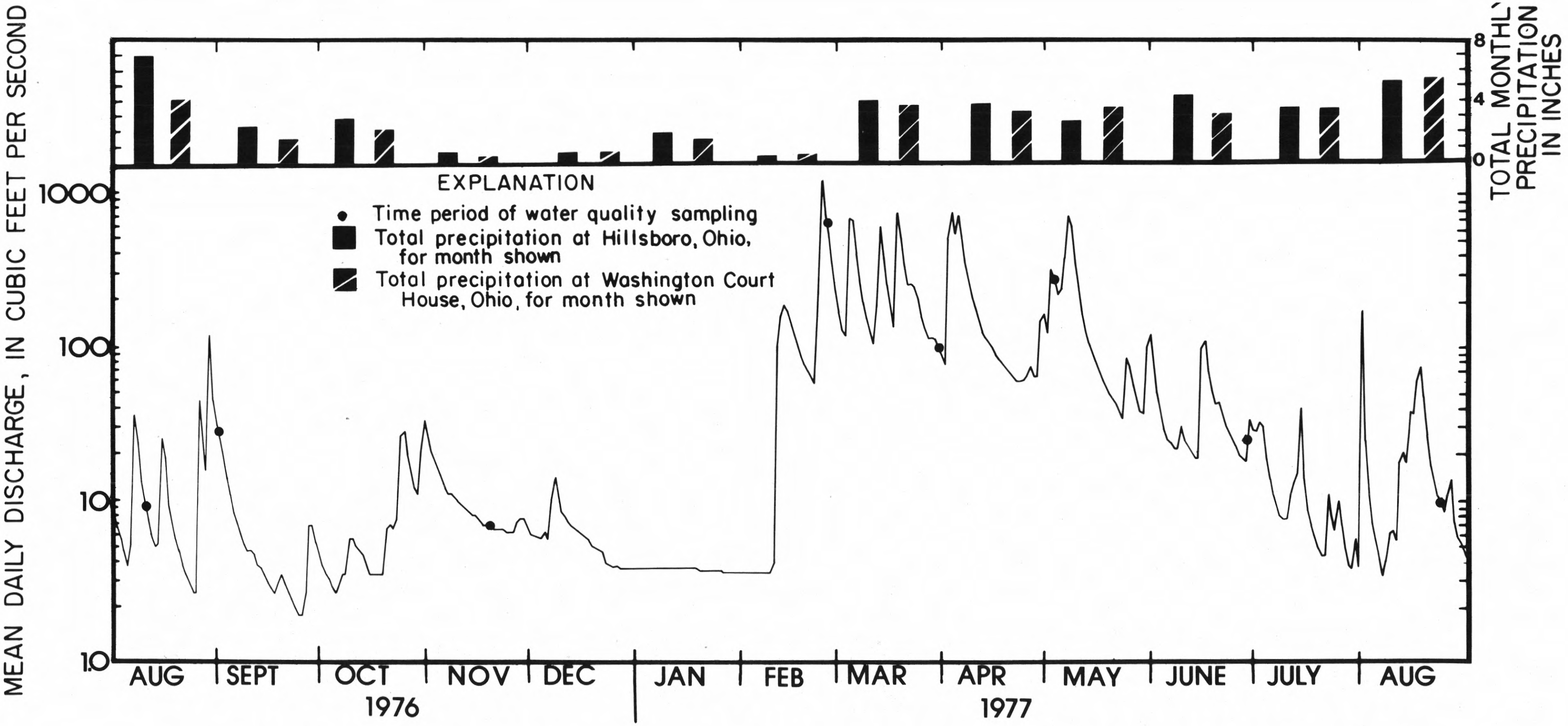

Figure 2.--Hydrograph showing daily discharge for Rattlesnake Creek at Centerfield, Ohio (site 5), 1976-77.

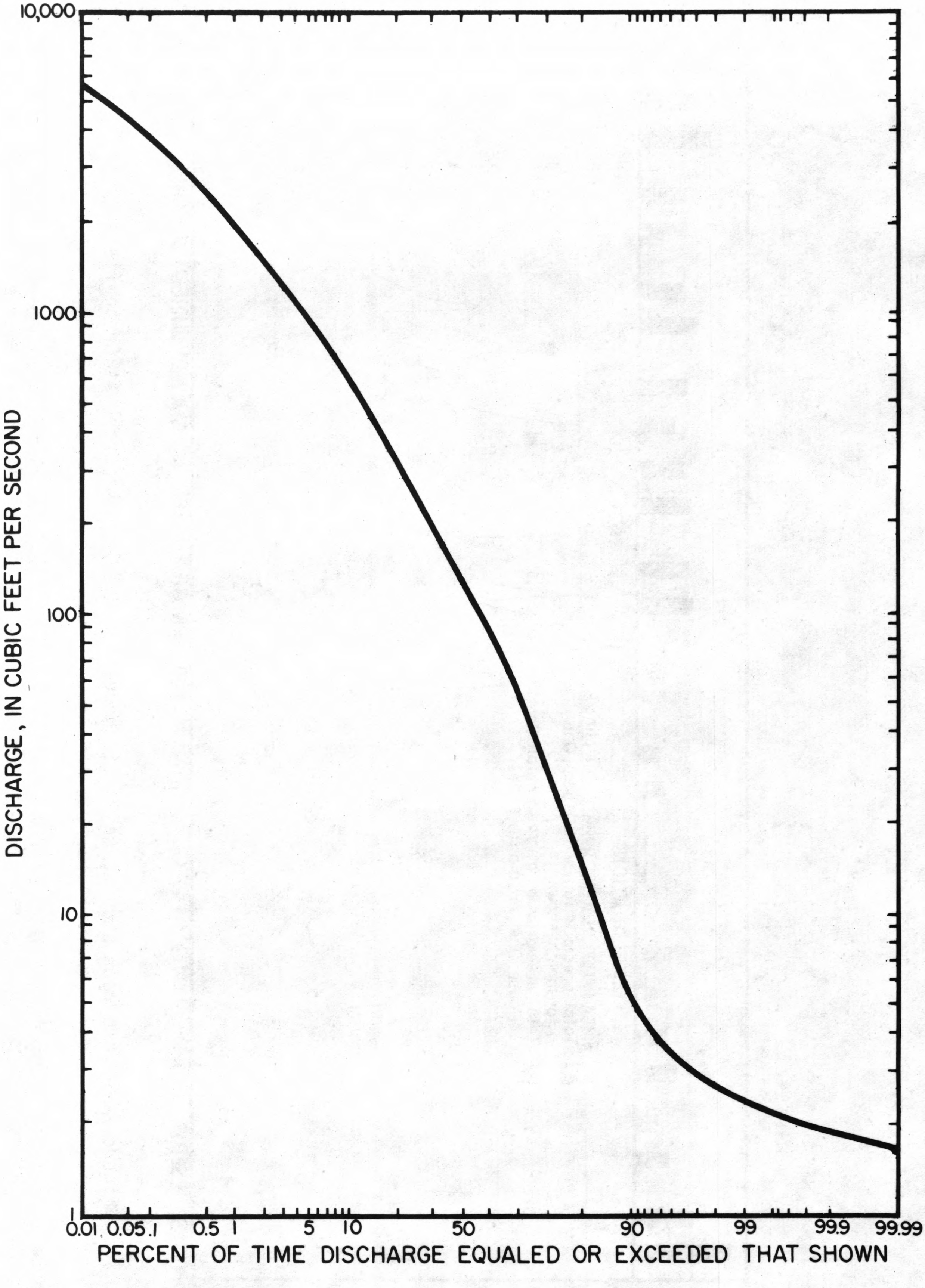

Figure 3.--Flow-duration curve for Rattlesnake Creek at Centerfield (site 5), Ohio, 1972-77.

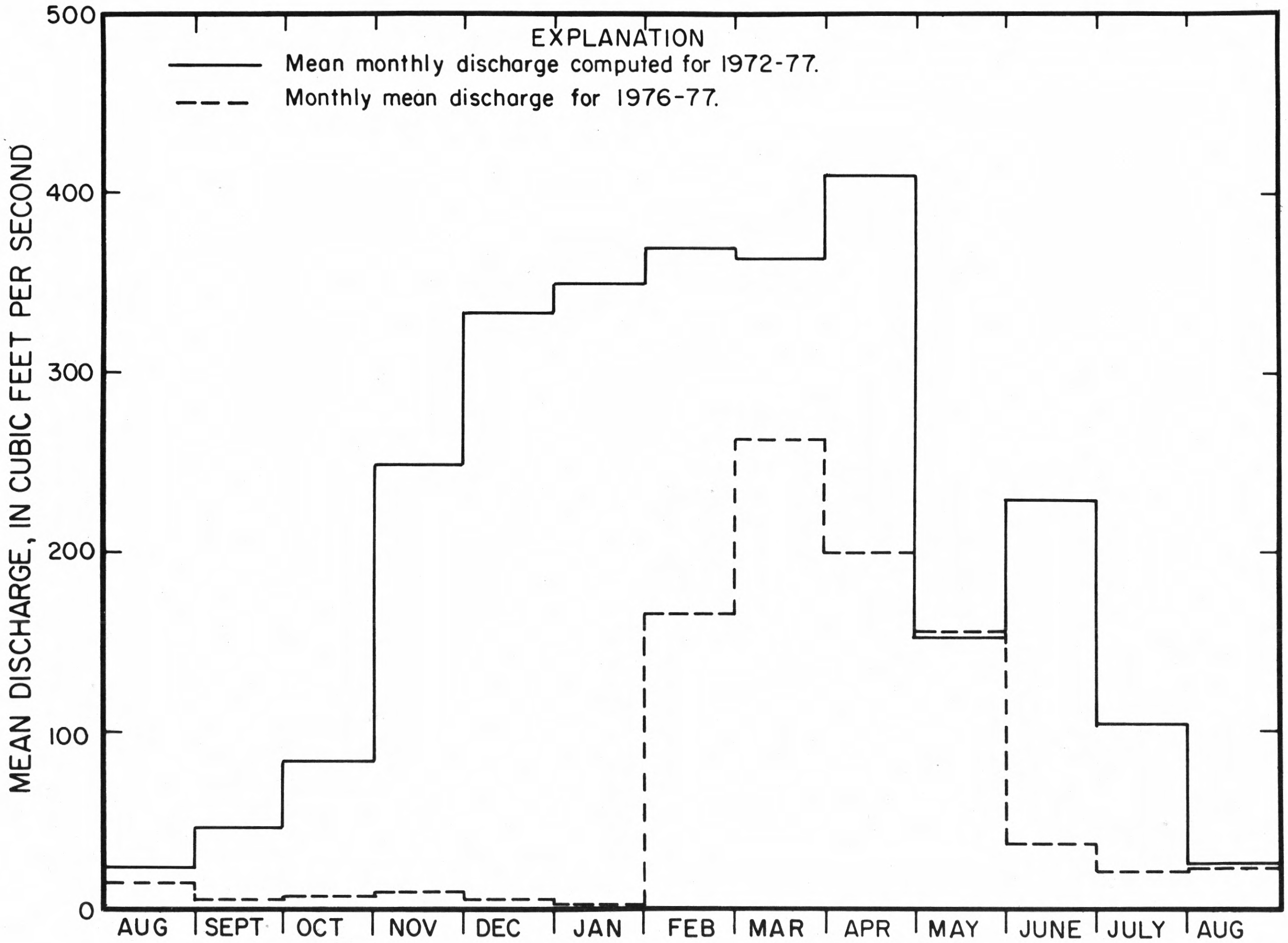

Figure 4.--Mean monthly discharge (1972-77) and monthly mean discharge (1976-77) for Rattlesnake Creek at Centerfield, Ohio (site 5).

(1972-77) with those from Paint Creek near Greenfield (1928-77). The 7-day 10-year low flow values at all other sites would be 0.

October 1976 through February 1977 was one of the coldest and driest periods on record. Extremely low temperatures caused heavy ice conditions. In many places the stream was frozen down to the bed, and sampling was impossible. Precipitation, which averages about 40 inches per year, was below normal during 10 of the 13 months and was almost 6 inches below normal for the entire period. Monthly precipitation data for Washington Court House and Hillsboro, Ohio are included in figure 2.

WATER QUALITY

Major Constituents

The major constituents in natural waters are derived mainly from the action of water containing atmospheric and (or) biologically produced CO_2 (carbon dioxide) on minerals and rocks (Hem, 1970). As such, chemical distributions in streams generally reflect the mineralogy of the soil and rock types in the drainage basins. Exceptions would be those streams having significant cultural inputs such as calcium or sodium chloride salts used for snow and ice control, fertilizers and pesticides, and industrial and domestic wastes.

The most common major constituents in natural waters are: the cations, Ca (calcium), Mg (magnesium), Na (sodium), and K (potassium); and the anions, HCO_3 (bicarbonate), CO_3 (carbonate), SO_4 (sulfate), and Cl (chloride). Comparisons of these ions are based on their respective concentrations in me/L (milliequivalents per liter).

Analytical data from this study are shown in tables 1-11. Data taken prior to August 1976 at site 5 are listed in the U.S. Geological Survey's Water Resources Data for Ohio (1972-76). The cation, K, was considered to be present at low concentrations and was not determined. The anion, Cl, was also not analyzed, but it can be estimated by assuming that Cl, in me/L, would account for most of the difference between the cation total and anion total.

Analysis of data in tables 1-8 indicates that the high flows (greater than 120 ft^3/s at site 5) of February, March, and May and the low flows (less than 20 ft^3/s at site 5) of fall 1976 and summer 1977 in the Rattlesnake Creek basin were mostly of calcium-bicarbonate or calcium-magnesium-bicarbonate type. Low flow data analysis also shows that Na concentrations increased significantly between sites 1 and 2. Similar increases in Na characterized the tributary data at sites 3 and 6 in the upper part of the Rattlesnake Creek basin. Sewage entering the stream above site 3, and between sites 1 and 2, probably contributed to the high Na concentrations during low flows. The me/L ratios of the major constituents at sites 7 and 8, in the lower basin tributaries, varied little with changes in flow.

Specific conductance in the basin ranged from 405 µmhos/cm (micromhos per centimeter at 25° Celsius) during high flow to 1,300 µmhos/cm during low flow. The average ratio of dissolved solids to specific conductance is 0.62. Specific conductance and dissolved solids correlated poorly with stream discharge, but they were generally greatest in the upper basin (sites 1-4, and 6) during low flow and least during high flows. Values in the lower basin (sites 5, 7, and 8) seemed to be independent of flow. Although the data suggest a general downstream dilution of the major constituents, total loads tended to increase due to the increase in water discharge.

Nutrients

Nutrients in a stream environment are part of a dynamic and complex system. Land use, stream morphology, flow characteristics, season, and stream biology affect both the form and concentration of nutrients (Hynes, 1970; Odum, 1971). Nutrient requirements of aquatic flora will vary with species and time (Likens, 1972; Britton and others, 1975). Sawyer (1947) indicated that nuisance algal conditions can occur in lakes when inorganic nitrogen (NH_3 $+NO_2$ $+NO_3$) and phosphorus levels exceed 0.3 and 0.01 mg/L, respectively.

Nitrogen and phosphorus concentrations in Rattlesnake Creek are shown in tables 1, 2, 4, 5. Large increases in nitrogen (especially NH_3) and phorphorus occurred between sites 1 and 2 during low flows. These increases are likely due to stream augmentation from sewage wastes and (or) agricultural sources. Stream recovery processes such as, aeration, dilution, and biological uptake, occurring below site 2 probably accounted for the downstream decreases in nitrogen and phosphorus concentrations at sites 4 and 5. The high concentrations of nitrate plus nitrite during the high flows in winter and early spring likely resulted from nonpoint source contributions (such as agriculture).

Nutrient data for the tributaries to Rattlesnake Creek are shown in tables 3, 6-8. The highest concentrations of total nitrogen (24 mg/L at site 3) and phosphorus (7.8 mg/L at site 6) were recorded in the West Branch Rattlesnake Creek basin in November. In contrast, nitrogen and phosphorus concentrations were low at Lees Creek (site 7) and Harden Creek (site 8). The latter two streams, especially Hardin Creek, seemed to have the lowest nutrients of the waters sampled in the Rattlesnake Creek basin.

Dissolved Oxygen and pH

Dissolved oxygen and pH are useful indirect measures of a stream's metabolism rates. Dissolved oxygen is produced during photosynthesis and consumed during respiration. Increases in pH can result from the uptake of CO_2 and conversion of HCO_3 to CO_3 during photosynthesis, and decreases in pH occur when CO_2 , produced from respiration, accumulates in the water. Diurnal (diel) cycles, sometimes having large day-night shifts in dissolved oxygen and pH, are common in many biologically active streams. Sampling results, therefore, are time-related and interpretation of randomly collected samples may be difficult and can be misleading.

Dissolved-oxygen data indicate a generally undersaturated system in the upper reach of Rattlesnake Creek and recovery downstream between sites 4 and 5. The sharp decrease in dissolved-oxygen concentrations between sites 1 and 2 during low flow likely resulted from local inputs having low dissolved-oxygen concentrations and (or) significant oxygen demands. Gradual stream reaeration downstream from site 2 is indicated, and dissolved-oxygen saturation values were near 100 percent at site 5.

Dissolved-oxygen saturations generally were less than 100 percent for both low and high flows at site 3 in Wilson Creek. These oxygen deficits may have resulted from inputs similar to those above site 2. The high dissolved-oxygen saturations (up to 250 percent at 18.4 mg/L concentration) and correspondingly high pH (as high as 9.3) at site 6 indicate that high photosynthetic rates were characteristic of that reach of West Branch Rattlesnake Creek. Dissolved-oxygen values in the lower basin tributaries at sites 7 and 8 were at or near 100 percent saturation for all flow ranges.

The pH values for Rattlesnake Creek basin ranged from 7.4 at site 4 to 9.3 at site 6. Changes in pH coincided closely with changes in dissolved-oxygen saturation and reflect the uptake and release of CO_2 by the stream biota. Sample pH exceeded 8.4, with corresponding increases in CO_3, only when dissolved oxygen was 120 percent saturation or greater. This relationship is particularly evident at site 6. The comparatively low pH at site 3, and the decrease in pH between sites 1 and 2, followed by a gradual increase in pH downstream, correlates well with changes in other data (major constituents, nutrients, dissolved oxygen).

Iron

Concentrations of total iron (tables 1-8) ranged from 20 µg/L (micrograms per liter) at several sites to 6,700 µg/L at site 7 on May 2, 1977. Previous data from site 5 (U.S. Geological Survey, 1972-76) indicate that dissolved iron concentrations were less than 50 µg/L and independent of flow. Statistical analyses of total iron versus discharge, specific conductance, turbidity, and nonfiltrable residue (correlation coefficients of 0.28, 0.23, 0.71, and 0.67, respectively) suggest that total iron is associated with suspended matter in the water.

Pesticides and Heavy Metals

Results of pesticide residue analysis of streambed samples taken at sites 1, 3, and 4 in August 1976, are shown in table 9. The data show a downstream increase in the concentration of several pesticides residues, especially chlordane (3 to 12 µg/kg, sites 1 and 4) and dieldrin (0 to 1.6 µg/kg, sites 1 and 4). Residues of chlordane, DDD, DDE, and dieldrin were also detected in Wilson Creek at site 3. All these compounds have a potential for accumulation in the biological flood chain. Source interpretation of these compounds is difficult because only three samples were taken.

A single streambed sample for heavy metals examination was taken at site 4, in August 1976. The data are included in table 9 and show that concentrations of zinc, nickel lead, and chromium were present in the stream sediments.

Stream Biology

Coliform and streptococci bacteria are natural inhabitants of the intestinal tracts of warm-blooded animals. The presence of large numbers of these bacteria in water suggests the potential presence of pathogenic organisms (Federal Water Quality Administration, 1971).

The ratio of fecal coliform to fecal streptococci (FC/FS) is sometimes used as an aid in interpreting the source of contamination. A ratio greater than 4.0 strongly suggests human waste; a ratio less than 1.0 indicates a predominately livestock and (or) poultry source (Federal Water Quality Administration, 1971). Interpretation of these ratios becomes difficult, however, as distance from input source and (or) time of exposure increase.

Bacteria counts (tables 1, 3, 4) were higher at sites 1 and 3 than at site 4. Fecal coliform counts ranged from 76 to 11,000 col/100 mL (colonies per 100 milliliters) at site 1 and 80 to 8,800 col/100 mL at site 3, to 4 to 1,200 col/100 mL at site 4. Fecal coliform counts at site 4 exceeded 1,000 col/100 mL only during the high runoff conditions in February, 1977. The means of the FC/FS ratio for sites 1, 3, and 4 were 2.1, 1.1, and 0.8, respectively, which suggest a mixed human and livestock source.

The biological assemblage that inhabits a stream section tends to integrate the water-quality characteristics of that stream (Ingram and others, 1966). Organisms are collected, identified, and grouped according to their tolerance levels, or they may be used in developing a diversity index. The index presented in this report was proposed by Wilhm and Dorris (1968) and discussed in Slack and others (1973).

The diversity index is a measure of community structure that makes intersite and intrasite comparisons possible. Repeated indices, at the species level, of less than 1 indicate heavy pollution stress; between 1 and 3, moderate stress; and greater than 3, a well-balanced benthic community (clean water type).

The benthic (bottom dwelling) communities were sampled on August 10 and 11, 1976 at sites 1, 3, 4, and 6. A Surber sampler was used and artificial substrate (multiplate-type) samplers were installed. The substrates were retrieved from all 4 sites on September 1 and 2, 1976. The two methods were employed to obtain the best possible results and to minimize the effects of inherent bias in each sampling technique. Further discussions of the relative merits of the various types of samplers are presented in Slack and other, 1973; Beak and others, 1973; and Slack and others, 1976.

Results of both sampling methods are presented in table 10 and 11. Midges generally dominated the counts, and the diversity indices (Insecta) for all samples were less than 2.0. These data could indicate that moderate pollution from cultural sources may exist in the upper part of the watershed.

SUMMARY AND CONCLUSIONS

Rattlesnake Creek and tributies were sampled for water quality characteristics eight times over a 13-month period (August 1976-77). Sites 1-4 and 6, in the upper basin, were characterized by muddy streambeds and sluggish flows. Lower basin sites (5, 7, and 8) had streambeds of coarse-grained sediments or bedrock. Precipitation was 6 inches below normal, and monthly mean discharges during 10 of the 13 months were well below normal during the study period. Discharges at site 5 (Rattlesnake Creek at Centerfield) ranged from 1.8 ft^3/s in September 1976 to 1,200 ft^3/s in February 1977.

Basin streams are of a calcium bicarbonate or calcium magnesium bicarbonate type; specific conductance ranged from 405-1,300 µmhos/cm. Concentrations of Na, most likely originating from sewage effluents, increased greatly between sites 1 and 2 during low flows and were high (110-140 mg/L) in the West Branch Rattlesnake Creek basin (sites 6 and 3).

Basinwide nutrient concentrations of nitrogen and phosphorus were high. Total nitrogen as N ranged from 1.1 to 24 mg/L in the upper basin to 0.39 to 13 mg/L in the lower basin. Total phosphorus as P ranged between 0.05 and 7.8 mg/L at the upper basin sites to a comparatively low 0.01 to 0.24 mg/L at downstream sites 5, 7, and 8. High nutrient loads (particularly NO_2+NO_3) were transported from basinwide sources during high flow conditions. Significant increases in nitrogen (especially NH_3 as N) and phosphorus were observed between sites 1 and 2 during low flows. Concentrations of ammonia (as much as 23 mg/L as N) were also high at site 3 (Wilson Creek). These high concentrations may be related to sewage plants upstream from sites 2 and 3.

Total iron concentrations varied throughout the watershed, ranging from 20 to 6,700 µg/L.

Several pesticides were detected in streambed samples from sites 1, 3, and 4. Concentrations of chlordane (3-12 µg/kg), dieldrin (0-3.2 µg/kg), DDD (0.4-1.5 µg/kg), and DDE (0.2-1.0 µg/kg) were highest at sites 3 and 4.

Additional chemical and biological data demonstrate that water quality during low-flow conditions was poorest in the upper watershed. Agricultural and (or) domestic wastes that entered the sluggish flows in this area tended to reduce dissolved oxygen and alter the general water quality. Sites 2 and 3, immediately downstream from domestic sewage facilities, showed the greatest effects.

Water quality steadily improved downstream. Increased flow velocity and aeration, dilution, and biological activities were the chief factors in the stream recovery. Mean dissolved-oxygen saturations, regardless of discharge, were at or near the 100 percent level at the lower basin sites 5, 7, and 8. Large quantities of nitrogen, originating from both point and nonpoint sources throughout the basin, were discharged into Paint Creek from the Rattlesnake Creek basin.

REFERENCES

Beak, T. W., Griffing, T. C., and Appleby, A. G., 1973, Use of artificial substrate samplers to assess water pollution: Am. Soc. Testing and Materials Spec. Tech. Pub. 528, p. 227-241.

Britton, L. J., Averett, R. C., and Ferreira, R. F., 1975, An introduction to the processes, problems, and management of urban lakes: U.S. Geol. Survey Circ. 601-K, 22 p.

Brown, Eugene, Skougsted, M. W., and Fishman, M. J., 1970, Methods for collection and analysis of water samples for dissolved minerals and gases: U.S. Geol. Survey Techniques Water-Resources Inv., book 5, chap. A, 160 p.

Federal Water Quality Administration, 1971, Current practice in water microbiology: U.S. Dept. Interior Training Manual, Federal Water Quality Adm., 32-12 p.

Hem, J. D., 1970, Study and interpretation of chemical characteristics of natural water (2d ed): U.S. Geol. Survey Water-Supply Paper 1473, 363 p.

Hynes, H. B. N., 1970, The ecology of running waters: Toronto Univ. Press, 555 p.

Ingram, W. M., MacKenthun, J. M., and Bartsch, A. F., 1966, Biological field investigative data for water pollution surveys: U.S. Dept. Interior, Federal Water Pollution Control Adm., 139 p.

REFERENCES

Likens, G. E., (ed), 1972, Proceedings of the symposium on nutrients and eutrophication: The limiting-nutrient controversy: Oceanogr. Limnol., v. 1, 328 p.

Odum, E. P., 1971, Fundamentals of ecology (3rd ed): Philadelphia, W. B. Saunders Co., 574 p.

Slack, K. V., Averett, R. C., Greeson, P. E., and Lipscomb, R. G., 1973, Methods for collection and analysis of aquatic biological and microbiological samples: U.S. Geol. Survey Techniques Water-Resources Inv., book 5, chap. A-4, 165 p.

Slack, K. V., Nauman, J. W., and Tilley, L. J., 1976, Evaluation of three collecting methods for a reconnaissance of stream benthic invertebrates: U.S. Geol. Survey Jour. Research, v. 4, no. 4, July-Aug., 1976, p. 491-495.

Sawyer, C. N., 1947, Fertilization of lakes by agricultural and urban drainage: New England Water Works Assoc., v. 61, p. 2-11.

U.S. Department of Agriculture, Soil Conservation Service, 1975, Professional services specification, water quality study and evaluation, for Rattlesnake Creek watershed, Appendix 1, Field Examination Report: U.S. Dept. Agriculture, Soil Conserv. Service, Columbus, Ohio 3 p,

U.S. Geological Survey, 1976, Water resources data for Ohio, v. 1., Columbus, Ohio.

_____1975, Water resources data for Ohio, v. 1., Columbus, Ohio.

_____1974, Water resources data for Ohio, pt 2., Columbus, Ohio.

_____1973, Water resources data for Ohio, pt 2., Columbus, Ohio.

REFERENCES

U.S. Geological Survey, 1976, Water resources data for Ohio, pt 2., Columbus, Ohio.

Wilhm, J. L., and Dorris, T. C., 1968, Biological parameters for water quality criteria: Bioscience, v. 18, p. 477-481.

TABLE 1.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR RATTLESNAKE CREEK AT SITE 1, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity unit) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

393724083370000 - RATTLESNAKE C RT 35 SITE 1 AT WEST LANCASTER OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976 10...	0930	.08	18.5	10	6.5	69	600	8.1	3.9	70000	460	730
SEP 01...	1000	2.1	19.0	25	7.6	76	560	8.2	3.3	68000	11000	2600
NOV 17...	0845	.39	1.0	5	11.6	82	705	8.0	5.8	1600	76	240
FEB , 1977 25...	0930	95	.0	25	9.8	67	410	7.8	3.6	14000	1000	1300
MAR 31...	1125	13	9.5	4	12.2	110	645	8.2	2.9	480	120	56
MAY 04...	0850	10	15.5	9	7.4	74	650	7.9	6.4	8500	1400	240
JUN 29...	1430	1.0	26.5	20	12.8	160	610	8.6	1.1	12000	5900	3600
AUG 23...	1000	.22	20.5	15	8.6	94	610	8.0	4.4	1100	580	420

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976 10...	59	39	13	306	0	48	190	310	251	392	47	.08
SEP 01...	78	36	11	327	0	63	1200	340	268	438	104	2.48
NOV 17...	86	46	17	361	0	87	210	400	296	482	38	.51
FEB , 1977 25...	45	21	5.6	140	0	40	1800	200	115	302	60	77.5
MAR 31...	77	37	7.8	284	0	56	300	340	233	380	33	13.3
MAY 04...	82	36	8.5	318	0	56	640	350	261	412	69	11.1
JUN 29...	63	34	9.7	286	9	48	1000	300	250	374	58	1.01
AUG 23...	63	35	15	273	0	49	1300	300	224	399	37	.24

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976 10...	.01	.01	.02	.17	.93	1.1	1.1	.11	.20	57	.3
SEP 01...	.14	2.8	2.9	.12	.68	.80	3.7	.15	.25	75	.3
NOV 17...	.01	.74	.75	.02	.33	.35	1.1	.16	.20	110	.4
FEB , 1977 25...	.05	6.7	6.7	.48	1.4	1.9	8.6	.21	.29	84	.2
MAR 31...	.05	5.0	5.0	.02	.47	.49	5.5	.03	.05	110	.2
MAY 04...	.08	5.4	5.5	.09	.56	.65	6.2	.06	.10	92	.2
JUN 29...	.07	.93	1.0	.07	.93	1.0	2.0	.10	.13	50	.2
AUG 23...	.02	.14	.16	.06	.88	.94	1.1	.05	.21	78	.4

Table 2.--Physical, chemical, and bacteria data for Rattlesnake Creek at site 2, Ohio, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity unit) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

393553083362500 - RATTLESNAKE C SITE 2 AT MILLEDGEVILLE OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
10...	1330	.18	22.0	25	4.2	48	1140	8.0	6.0	--	--	--
SEP												
01...	1200	2.3	19.0	40	4.9	52	785	7.9	6.3	--	--	--
NOV												
17...	1230	.54	3.0	5	13.7	100	1000	8.2	4.1	--	--	--
FEB , 1977												
25...	1130	--	.5	25	9.8	68	430	7.7	4.5	--	--	--
MAR												
31...	0920	20	9.5	4	9.7	84	675	7.7	8.8	--	--	--
MAY												
04...	1040	18	15.0	6	6.9	68	710	7.8	7.5	--	--	--
JUN												
29...	1630	2.3	24.5	15	5.5	65	760	7.9	6.8	--	--	--
AUG												
23...	1315	.59	20.5	25	3.2	35	895	7.7	11	--	--	--

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
10...	70	37	110	373	0	69	20	330	306	665	51	.32
SEP												
01...	74	36	27	315	0	63	3000	330	258	451	138	2.80
NOV												
17...	85	45	78	403	0	57	240	400	331	667	46	.97
FEB , 1977												
25...	45	21	9.4	140	0	40	1800	200	115	298	92	--
MAR												
31...	73	36	13	275	0	57	290	330	226	393	33	21.2
MAY												
04...	78	34	15	296	0	57	500	330	243	419	40	20.4
JUN												
29...	72	34	32	336	0	50	690	320	276	453	53	2.81
AUG												
23...	74	35	52	358	0	60	1400	330	294	522	49	.83

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
10...	.19	.81	1.0	6.3	2.2	8.5	9.5	2.8	3.0	21	2.6
SEP											
01...	.21	2.6	2.8	.88	1.0	1.9	4.7	.52	.71	75	.6
NOV											
17...	.05	.87	.92	2.4	1.8	4.2	5.1	1.6	1.8	67	1.7
FEB , 1977											
25...	.06	6.3	6.4	.48	1.4	1.9	8.3	.20	.31	84	.3
MAR											
31...	.05	4.4	4.4	.14	.43	.57	5.0	.13	.15	110	.3
MAY											
04...	.09	5.4	5.5	.26	.54	.80	6.3	.11	.14	92	.4
JUN											
29...	.18	1.4	1.6	1.5	1.0	2.5	4.1	.80	.84	44	.8
AUG											
23...	.26	.56	.82	5.0	.00	5.0	5.8	1.5	1.8	35	1.2

TABLE 3.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR WILSON CREEK AT SITE 3, OHIO, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

393103083361700 - WILSON C AT BORUM RD SITE 3 NR SABINA OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
11...	1230	.35	21.0	2	12.2	140	825	8.2	3.2	72000	200	150
SEP												
02...	1200	.57	18.0	5	6.9	73	790	8.0	4.7	14000	320	150
NOV												
18...	0845	.33	1.5	5	9.3	66	1300	7.8	15	10000	80	1700
FEB , 1977												
25...	1310	43	2.0	25	10.0	72	520	7.7	4.8	20000	550	1500
MAR												
30...	0815	7.8	13.5	2	8.3	79	695	7.9	4.9	19000	340	360
MAY												
03...	1130	24	14.5	6	9.5	92	690	7.9	4.8	42000	4600	1700
JUN												
29...	1115	6.4	22.0	10	4.1	46	690	7.7	8.7	24000	2600	4200
AUG												
24...	0820	.99	19.5	20	4.0	43	855	7.8	9.2	16000	8800	10000

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
11...	60	33	58	320	0	61	20	290	263	493	40	.47
SEP												
02...	60	26	45	295	0	66	2200	260	242	435	49	.67
NOV												
18...	85	39	140	576	0	120	440	370	472	838	48	.75
FEB , 1977												
25...	51	24	13	150	0	94	1700	230	123	349	85	40.5
MAR												
30...	68	34	19	244	0	63	180	310	200	406	30	8.55
MAY												
03...	75	32	11	240	0	56	670	320	197	395	64	25.6
JUN												
29...	75	30	17	274	0	49	300	310	225	434	52	7.50
AUG												
24...	78	32	43	363	0	60	1100	330	298	507	32	1.36

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
11...	1.3	.40	1.7	2.2	1.3	3.5	5.2	3.7	3.8	23	1.5
SEP											
02...	.14	.11	.25	4.2	1.3	5.5	5.8	3.5	3.9	15	1.2
NOV											
18...	.10	.59	.69	23	.00	23	24	6.6	7.3	0	3.2
FEB , 1977											
25...	.06	7.5	7.6	.46	1.2	1.7	9.3	.19	.30	100	.4
MAR											
30...	.20	5.8	6.0	3.2	2.5	5.7	12	.38	.45	110	.5
MAY											
03...	.15	11	11	.22	.61	.83	12	.13	.16	120	.3
JUN											
29...	.58	7.3	7.9	.99	1.0	2.0	9.9	.74	.75	86	.4
AUG											
24...	.30	.45	.75	4.6	.80	5.4	6.2	1.8	2.0	32	1.0

TABLE 4.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR RATTLESNAKE CREEK AT SITE 4, OHIO, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

393020083331800 - RATTLESNAKE C AT RT 22 SITE 4 NR SABINA OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
11...	0900	.49	24.0	60	4.8	56	740	8.1	4.3	60000	390	250
SEP												
02...	0900	3.7	18.0	55	4.9	52	570	7.9	4.3	22000	960	880
NOV												
18...	1345	.59	6.5	6	16.8	140	850	9.0	.5	190	4	72
FEB , 1977												
25...	1615	440	1.0	25	9.7	68	445	7.7	3.8	11000	1200	3000
MAR												
30...	1120	48	15.5	3	10.6	110	630	8.4	1.6	340	20	12
MAY												
03...	0900	98	16.5	7	6.3	64	620	7.5	12	22000	820	1000
JUN												
29...	0800	19	22.0	25	4.2	47	585	7.4	16	3400	550	1600
AUG												
23...	1515	2.2	24.5	15	9.2	110	700	8.2	3.0	190	110	130

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
11...	64	34	57	337	0	47	20	300	276	505	153	.67
SEP												
02...	50	25	18	215	0	54	2400	230	176	308	173	3.08
NOV												
18...	71	40	65	268	32	99	300	340	273	597	29	.95
FEB , 1977												
25...	40	18	14	120	0	34	2300	170	98	277	68	329
MAR												
30...	66	34	14	234	7	58	260	300	204	356	43	46.1
MAY												
03...	72	30	12	230	0	51	400	300	189	377	57	99.8
JUN												
29...	61	28	13	245	0	50	500	270	201	362	79	18.6
AUG												
23...	70	32	25	296	0	56	800	310	243	445	35	2.64

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
11...	.01	.04	.05	.23	2.0	2.2	2.3	.25	.52	23	1.4
SEP											
02...	.28	1.7	2.0	1.1	1.3	2.4	4.4	.40	.66	51	.5
NOV											
18...	.06	.36	.42	.54	1.1	1.6	2.0	.63	.79	69	1.5
FEB , 1977											
25...	.07	5.8	5.9	.74	1.5	2.2	8.1	.22	.33	76	.5
MAR											
30...	.08	4.2	4.3	.06	.59	.65	5.0	.10	.11	100	.3
MAY											
03...	.14	8.8	8.9	.12	.98	1.1	10	.07	.10	110	.3
JUN											
29...	.17	5.3	5.5	.14	.80	.94	6.4	.25	.26	67	.3
AUG											
23...	.47	.93	1.4	.23	.97	1.2	2.6	.21	.29	64	.6

TABLE 5.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR RATTLESNAKE CREEK AT CENTERFIELD (SITE 5), OHIO, 1976-77

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

03232300 - RATTLESNAKE C AT CENTERFIELD OH (SITE 5)

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
05...	1145	3.7	20.5	--	8.9	98	565	8.1	3.6	--	--	--
12...	1030	5.8	22.0	20	8.9	100	520	8.0	4.1	--	--	--
SEP												
03...	1100	14	18.0	35	9.2	97	710	8.2	2.9	--	--	--
NOV												
19...	1000	7.1	4.5	2	12.0	92	610	8.2	3.2	--	--	--
FEB , 1977												
26...	1215	535	1.5	30	12.1	86	480	8.1	1.9	--	--	--
MAR												
15...	1300	250	11.0	--	11.8	106	655	8.3	2.1	--	--	--
29...	1350	122	15.0	5	12.8	120	605	8.5	1.3	--	--	--
MAY												
03...	1630	236	17.0	25	9.5	98	645	8.4	1.8	--	--	--
JUN												
28...	1445	18	25.0	10	8.3	99	605	8.2	2.9	--	--	--
JUL												
07...	1200	8.7	28.0	--	8.1	100	620	8.2	2.8	--	--	--
AUG												
25...	1135	9.4	20.5	20	9.5	100	565	8.2	2.7	--	--	--

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
05...	59	32	9.9	282	0	45	--	280	231	--	--	3.14
12...	56	28	8.8	257	0	40	40	260	211	299	71	4.68
SEP												
03...	63	32	32	288	0	50	1300	290	236	404	104	15.3
NOV												
19...	69	39	17	316	0	60	130	330	259	392	28	7.51
FEB , 1977												
26...	48	21	11	152	0	38	2200	210	125	309	98	446
MAR												
15...	74	32	9.6	251	3	54	--	320	211	--	--	229
29...	70	34	9.7	238	11	56	390	310	214	373	36	123
MAY												
03...	73	31	8.1	280	4	53	1200	310	236	384	91	245
JUN												
28...	68	32	11	288	0	48	490	300	236	374	59	18.2
JUL												
07...	64	32	12	278	0	45	--	290	228	--	--	7.73
AUG												
25...	64	29	11	266	0	43	900	280	218	365	46	9.26

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
05...	.01	.49	.50	.01	--	--	--	--	.06	48	.3
12...	.01	.42	.43	.06	.47	.53	.96	.03	.09	44	.2
SEP											
03...	.01	1.1	1.1	.05	.63	.68	1.8	.07	.14	53	.8
NOV											
19...	.01	.26	.27	.01	.24	.25	.52	.01	.03	74	.4
FEB , 1977											
26...	.06	5.8	5.9	.48	1.2	1.7	7.6	.15	.24	82	.3
MAR											
15...	.03	7.1	7.1	.01	--	--	--	--	.08	110	.2
29...	.04	4.7	4.7	.03	.36	.39	5.1	.01	.05	100	.2
MAY											
03...	.12	9.6	9.7	.09	.63	.72	10	.07	.11	74	.2
JUN											
28...	.01	1.7	1.7	.04	.60	.64	2.3	.04	.07	64	.3
JUL											
07...	.01	1.5	1.5	.03	--	--	--	--	.08	64	.3
AUG											
25...	.01	1.6	1.6	.06	.54	.60	2.2	.04	.08	61	.3

TABLE 6.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR WEST BRANCH RATTLESNAKE CREEK AT SITE 6, OHIO, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

393040083335400 - W B RATTLESNAKE C ST 6 AT W FORK RD NR SABINA OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DIS-CHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
11...	1500	.37	33.0	10	18.4	250	840	9.3	.3	--	--	--
SEP												
02...	1330	1.1	23.5	15	16.4	190	495	8.5	1.0	--	--	--
NOV												
18...	1115	.24	4.0	9	17.8	140	945	9.2	.3	--	--	--
FEB , 1977												
25...	1500	162	.0	25	8.9	61	480	7.6	4.9	--	--	--
MAR												
30...	1455	21	18.5	2	12.1	130	620	8.6	.9	--	--	--
MAY												
03...	1430	61	16.5	10	9.2	94	655	8.0	3.8	--	--	--
JUN												
29...	1000	12	22.5	15	6.9	78	585	7.9	4.8	--	--	--
AUG												
26...	1040	1.6	22.5	15	9.5	110	750	8.0	5.1	--	--	--

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
11...	63	40	78	217	74	58	20	320	301	529	54	.53
SEP												
02...	43	24	19	176	10	45	3300	210	161	284	67	.84
NOV												
18...	66	34	110	240	52	91	470	300	283	649	62	.42
FEB , 1977												
25...	43	19	17	122	0	38	1700	190	100	313	63	137
MAR												
30...	62	32	15	194	12	58	180	290	179	332	73	18.8
MAY												
03...	78	32	9.8	237	0	54	460	330	194	380	47	62.6
JUN												
29...	62	29	12	240	0	42	200	270	197	377	48	12.2
AUG												
26...	75	33	30	318	0	58	700	320	261	475	40	2.05

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
11...	.03	.02	.05	.23	1.6	1.8	1.9	.56	.72	21	1.9
SEP											
02...	.16	.34	.50	.41	1.1	1.5	2.0	.82	1.2	45	.6
NOV											
18...	.21	1.2	1.4	3.1	3.8	6.9	8.3	2.3	7.8	21	2.7
FEB , 1977											
25...	.07	6.3	6.4	.49	1.1	1.6	8.0	.16	.24	86	.5
MAR											
30...	.15	6.2	6.3	1.3	3.2	4.5	11	.15	.18	110	.4
MAY											
03...	.12	9.9	10	.09	.50	.59	11	.07	.10	130	.2
JUN											
29...	.14	4.2	4.3	.06	.93	.99	5.3	.15	.28	77	.3
AUG											
26...	.73	.97	1.7	.36	.94	1.3	3.0	.40	.51	62	.7

TABLE 7.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR LEES CREEK AT SITE 7, OHIO, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time period (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

392039083303400 - LEES C AT MONROE RD SITE 7 NR LEESBURG OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
12...	0900	2.7	21.5	10	8.8	100	510	8.1	3.2	--	--	--
SEP												
03...	0930	5.7	17.0	20	9.6	99	605	8.2	2.9	--	--	--
NOV												
17...	1430	3.6	4.0	5	16.6	130	590	8.6	1.3	--	--	--
FEB , 1977												
26...	1000	122	2.0	15	11.8	86	510	8.1	2.6	--	--	--
MAR												
29...	1035	44	13.5	3	13.6	130	598	8.5	1.4	--	--	--
MAY												
02...	1520	180	18.0	80	9.0	95	550	8.1	2.7	--	--	--
JUN												
28...	1330	4.0	24.5	10	8.7	100	565	8.2	2.8	--	--	--
AUG												
25...	0900	4.9	19.0	10	9.7	100	590	8.4	1.8	--	--	--

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
12...	55	29	8.8	250	0	44	40	260	205	300	44	2.19
SEP												
03...	68	33	8.9	286	0	48	700	310	235	346	106	5.32
NOV												
17...	70	40	12	281	18	63	110	340	260	378	38	3.67
FEB , 1977												
26...	60	26	6.1	204	0	44	800	260	167	331	48	109
MAR												
29...	73	34	7.4	251	11	53	270	320	224	355	38	42.2
MAY												
02...	65	27	6.3	211	0	43	6700	270	173	357	202	174
JUN												
28...	61	32	9.7	282	0	44	310	280	231	367	40	3.95
AUG												
25...	66	32	9.9	272	4	44	320	300	230	381	43	5.04

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
12...	.02	.55	.57	.04	.31	.35	.92	.08	.11	52	.2
SEP											
03...	.01	1.6	1.6	.03	.40	.43	2.0	.09	.14	71	.2
NOV											
17...	.01	.48	.49	.04	.21	.25	.74	.03	.04	79	.3
FEB , 1977											
26...	.04	6.1	6.1	.15	.73	.88	7.0	.09	.13	90	.2
MAR											
29...	.03	5.2	5.2	.01	.37	.38	5.6	.01	.01	98	.2
MAY											
02...	.16	11	11	.38	1.8	2.2	13	.06	.22	100	.2
JUN											
28...	.01	1.3	1.3	.05	.57	.62	1.9	.04	.04	53	.3
AUG											
25...	.01	1.9	1.9	.03	.41	.44	2.3	.05	.07	67	.3

TABLE 8.--PHYSICAL, CHEMICAL, AND BACTERIA DATA FOR HARDIN CREEK AT SITE 8, OHIO, 1976-77.

CFS - (cubic foot per second) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

DEG C - (degrees Celsius) degrees centigrade.

JTU - (Jackson turbidity) is a standard measure of the capability to pass candle light through water samples.

MG/L - (milligrams per liter) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Results are in mg/L except as indicated.

COL PER 100 ML - (colonies per 100 mL) is the number of colonies per 100 mL of sample after incubation for a specific time during (24 or 48 hours) at a specific temperature (35°C or 44.5°C) on specific bacterial growth medium. Incubation time, temperature, and growth medium is dependent on bacterial type, i.e. either coliform or streptococcal bacteria.

UG/L - (micrograms per liter) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

391755083275100 - HARDIN C AT COPE RD SITE 8 NR CENTERFIELD OH

WATER QUALITY DATA

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	CARBON DIOXIDE (CO2) (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM (COL. PER 100 ML)	STREPTOCOCCI (COLONIES PER 100 ML)
AUG , 1976												
10...	1530	1.3	26.5	10	10.2	120	510	8.2	2.6	--	--	--
SEP												
01...	1430	3.2	19.0	10	9.8	100	615	8.2	3.1	--	--	--
NOV												
19...	1215	2.4	4.5	2	12.9	99	570	8.2	3.3	--	--	--
FEB , 1977												
26...	1115	26	4.0	10	11.3	86	540	8.2	2.6	--	--	--
MAR												
29...	1530	13	17.5	3	11.1	120	595	8.4	1.9	--	--	--
MAY												
02...	1745	27	21.0	30	9.0	100	530	8.1	3.3	--	--	--
JUN												
28...	1130	1.8	23.0	10	8.0	92	560	8.0	5.0	--	--	--
AUG												
24...	1440	1.1	22.0	10	8.5	96	540	8.0	4.6	--	--	--

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	TOTAL IRON (FE) (UG/L)	HARDNESS (CA,MG) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)
AUG , 1976												
10...	57	33	5.0	262	0	38	20	280	215	273	47	.96
SEP												
01...	70	30	5.6	310	0	46	400	300	254	344	74	2.97
NOV												
19...	73	36	7.1	325	0	52	80	330	267	380	10	2.46
FEB , 1977												
26...	68	28	6.2	260	0	46	430	290	213	321	60	22.5
MAR												
29...	74	33	6.2	285	8	49	220	320	247	350	6	12.3
MAY												
02...	68	26	5.9	262	0	41	1400	280	215	322	58	23.5
JUN												
28...	69	29	5.9	313	0	40	300	290	257	350	19	1.70
AUG												
24...	67	29	5.9	288	0	46	400	290	236	347	18	1.03

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	NONCARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO
AUG , 1976											
10...	.01	.20	.21	.03	.25	.28	.49	.02	.04	63	.1
SEP											
01...	.01	.72	.73	.02	.23	.25	.98	.04	.05	44	.1
NOV											
19...	.01	.23	.24	.02	.13	.15	.39	.08	.08	64	.2
FEB , 1977											
26...	.03	2.5	2.5	.08	.48	.56	3.1	.04	.06	72	.2
MAR											
29...	.01	2.0	2.0	.01	.35	.36	2.4	.00	.01	74	.2
MAY											
02...	.06	3.5	3.6	.06	1.1	1.2	4.8	.02	.06	62	.2
JUN											
28...	.01	.40	.41	.05	.35	.40	.81	.02	.02	35	.2
AUG											
24...	.00	.11	.11	.03	.30	.33	.44	.02	.02	50	.2

TABLE 9.--PESTICIDE AND HEAVY METALS DATA FOR SITES 1, 3, AND 4 IN RATTLESNAKE CREEK BASIN, OHIO, 1976.

UG/KG - (micrograms per kilogram) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (kilogram) of bottom material.

UG/G - (micrograms per gram) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

ANALYSES OF MISCELLANEOUS STATIONS

DATE	TIME	ALDRIN IN BOTTOM MA- TERIAL (UG/KG)	LINDANE IN BOTTOM MA- TERIAL (UG/KG)	CHLOR- DANE IN BOTTOM MA- TERIAL (UG/KG)	DDD IN BOTTOM MA- TERIAL (UG/KG)	DDE IN BOTTOM MA- TERIAL (UG/KG)	DDT IN BOTTOM MA- TERIAL (UG/KG)	DI- ELDRIN IN BOTTOM MA- TERIAL (UG/KG)	ENDRIN IN BOTTOM MA- TERIAL (UG/KG)	TOX- APHENE IN BOTTOM MA- TERIAL (UG/KG)	HEPTA- CHLOR IN BOTTOM MA- TERIAL (UG/KG)	HEPTA- CHLOR EPOXIDE IN BOT- TOM MA- TERIAL (UG/KG)
393724083370000 - RATTLESNAKE C RT 35 SITE 1 AT WEST LANCASTER OH (LAT 39 37 24 LONG 083 37 00)												
AUG , 1976												
10...	0930	.0	.0	3	.4	.2	.0	.0	.0	0	.0	.0
393103083361700 - WILSON C AT BORUM RD SITE 3 NR SABINA OH (LAT 39 31 03 LONG 083 36 17)												
AUG , 1976												
11...	1230	.0	.0	10	.5	.5	.0	3.2	.0	0	.0	.0
393020083331800 - RATTLESNAKE C AT RT 22 SITE 4 NR SABINA OH (LAT 39 30 20 LONG 083 33 18)												
AUG , 1976												
11...	0900	.0	.0	12	1.5	1.0	.3	1.6	.0	0	.0	.0

ANALYSES OF MISCELLANEOUS STATIONS

DATE	ETHION IN BOTTOM MA- TERIAL (UG/KG)	MALA- THION IN BOTTOM MA- TERIAL (UG/KG)	PARA- THION IN BOTTOM MA- TERIAL (UG/KG)	DI- AZINON IN BOTTOM MA- TERIAL (UG/KG)	METHYL PARA- THION IN BOT- TOM MA- TERIAL (UG/KG)	TRI- THION IN BOTTOM MA- TERIAL (UG/KG)	METHYL TRI- THION IN BOT- TOM MA- TERIAL (UG/KG)	PCB IN BOTTOM MA- TERIAL (UG/KG)	2,4-D IN BOTTOM MA- TERIAL (UG/KG)	2,4,5-T IN BOTTOM MA- TERIAL (UG/KG)	SILVEX IN BOTTOM MA- TERIAL (UG/KG)
393724083370000 - RATTLESNAKE C RT 35 SITE 1 AT WEST LANCASTER OH (LAT 39 37 24 LONG 083 37 00)											
AUG , 1976											
10...	.0	.0	.0	.0	.0	.0	.0	0	0	0	0
393103083361700 - WILSON C AT BORUM RD SITE 3 NR SABINA OH (LAT 39 31 03 LONG 083 36 17)											
AUG , 1976											
11...	.0	.0	.0	.0	.0	.0	.0	0	0	0	0
393020083331800 - RATTLESNAKE C AT RT 22 SITE 4 NR SABINA OH (LAT 39 30 20 LONG 083 33 18)											
AUG , 1976											
11...	.0	.0	.0	.0	.0	.0	.0	3	0	0	0

ANALYSES OF MISCELLANEOUS STATIONS

DATE	TIME	TOTAL CADMIUM IN BOTTOM MA- TERIAL (UG/G)	TOTAL CHRO- MIUM IN BOTTOM MA- TERIAL (UG/G)	TOTAL LEAD IN BOTTOM MA- TERIAL (UG/G)	TOTAL NICKEL IN BOTTOM MA- TERIAL (UG/G)	TOTAL ZINC IN BOTTOM MA- TERIAL (UG/G)	TOTAL MERCURY IN BOTTOM MA- TERIAL (UG/G)
393020083331800 - RATTLESNAKE C AT RT 22 SITE 4 NR SABINA OH (LAT 39 30 20 LONG 083 33 18)							
AUG , 1976							
11...	0900	2	24	33	35	40	.0

TABLE 10.--BENTHIC INVERTABRATE DATA FOR RATTLESNAKE CREEK, 1976.

Organism	Site 1		Site 4	
	Sample count			
	Surber (8-10-76)	Artificial substrate plate (9-1-76)	Surber (8-11-76)	Artificial substrate plate (9-2-76)
Annelida				
Hirudinae (leeches)	1	--	--	2
Oligochaeta (aquatic earthworms)	--	1	--	1
Arthropoda				
Crustacea				
Amphipoda (scuds)	--	--	--	1
Decapoda	1	--	2	48
Podocopa (seed shrimps)				
Insecta				
Coleoptera (beetles)				
Dytiscidae (predaceous diving)	1	--	--	--
Elmidae (riffle)	5	17	--	4
Diptera				
Chironomidae (midges)	87	18	41	241
Ephlemeroptera (may flies)	12	9	2	3
Hemiptera	66	--	3	--
Odonata (dragonflies)				
Agrionidae	--	11	1	52
Calopterygidae	1	--	--	--
Trichoptera (caddis flies)	--	--	--	1
Cnidaria (cnidarians)				
Hydrozoa	--	--	--	1
Mollusca				
Bivalvia (bivalves)				
Nuculoidae				
Sphaeriidae (fingernail clams)	1	--	--	--
Nematoda (nematodes)	--	--	1	--
Platyhelminthes (flatworms)				
Turbellaria	--	--	--	45
Total count	216	56	50	399
Diversity index	1.92	1.94	0.74	0.87
Total biomass (Insecta) wet weight (grams)	0.6	0.3	0.2	0.5
Area sampled (square meters)	0.19	0.32	0.09	0.48

TABLE 11.--BENTHIC INVERTABRATE DATA FOR WEST BRANCH RATTLESNAKE CREEK BASIN, 1976.

Organism	Site 3 Sample count: Surber (8-11-76)	Site 3 Sample count: Artificial substrate plate (9-1-76)	Site 6 Sample count: Surber (8-11-76)	Site 6 Sample count: Artificial substrate plate (9-2-76)
Annelida				
Hirudinae (leeches)	--	6	--	3
Oligochaeta (aquatic earthworms)	5	--	--	--
Arthropoda				
Crustacea				
Amphipoda (scuds)	23	14	--	285
Podocopa (seed shrimps)	--	15	--	960
Insecta				
Coleoptera (beetles)				
Dytiscidae (predaceous diving)	1	1	--	--
Elmidae (riffle)	--	1	23	9
Hydrophilidae (water scavenger)	--	1	--	6
Diptera				
Chironomidae (midges)	372	187	350	951
Culicidae (mosquitoes)	1	6	--	--
Simuliidae (black flies)	--	--	1	--
Ephemeroptera (may flies)	1	2	19	--
Hemiptera	2	--	--	--
Belostomatidae (giant water bugs)	--	1	--	--
Corixidae (water boatmen)	--	1	9	6
Mesovelidae (water treaders)	--	--	2	--
Odonata (dragonflies)				
Agrionidae	--	3	2	--
Calopterygidae	--	--	1	--
Trichoptera (caddis flies)	--	--	465	39
Mollusca				
Bivalvia (Bivalves)				
Nuculoidae				
Sphaeriidae (fingernails clams)	--	--	19	--
Gastropoda (snails)				
Basommatophora				
Ancylidae (freshwater limpets)	1	--	--	--
Physidae (pond snails)	--	--	1	1
Planorbidae (orb snails)	1	--	--	--
Total count	407	238	892	2261
Diversity index	0.10	0.38	1.38	0.41
Total biomass (Insecta) wet weight (grams)	1.4	0.9	3.8	7.5
Diversity index	0.10	0.38	1.38	0.41
Area sampled (square meters)	0.09	0.48	0.09	0.32

☆ U. S. GOVERNMENT PRINTING OFFICE: 1979-J658-909/36 Region No. 5-11