



Water Resources Data for Michigan

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-79-1

WATER YEAR 1979

Prepared in cooperation with the State of
Michigan and with other agencies

CALENDAR FOR WATER YEAR 1979

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Prepared in cooperation with the State of
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UNITED STATES DEPARTMENT OF THE INTERIOR

Cecil D. Andrus, Secretary

GEOLOGICAL SURVEY

H. W. Menard, Director

For information on the water program in Michigan write to
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1980

PREFACE

This report was prepared by personnel of the Michigan district of the Water Resources Division of the U.S. Geological Survey under the supervision of T. R. Cummings, District Chief, and J. E. Biesecker, Regional Hydrologist, Northeastern Region. It was done in cooperation with other agencies.

This report is one of a series issued by State. General direction for the series is by J. S. Cragwall, Jr., Chief Hydrologist, U.S. Geological Survey, and Phil H. Cohen, Assistant Chief Hydrologist for Scientific Publications and Data Management.

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[Letter after station name designates type of data: (d) discharge, (c) chemical, (b) biological, (g) gage height, (m) microbiological, (p) pesticide, (r) radio-chemical, (t) water temperature, (s) sediment]

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WATER RESOURCES DATA FOR MICHIGAN, 1979

INTRODUCTION

Water resources data for the 1979 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground-water wells. This volume contains records for water discharge at 175 gaging stations; stage only at 1 gaging station; stage and contents at 5 lakes and reservoirs; water quality at 62 gaging stations; and water levels at 46 observations wells. Locations of these sites are shown on figures 4-9. Also included are data for 94 crest-stage partial-record stations and 45 low-flow partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

Records of discharge and stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, "Ground Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202.

For water years 1961 through 1974, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1975 have been released by the Geological Survey in annual reports on a State-boundary basis.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published in official Survey reports on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-79-1." For archiving and general distribution, the reports for water years 1971-74 are also identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone (517) 377-1608.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, H.A. Tanner, director, through Water Management Division, L.N. Witte, chief, and Geological Survey Division, A.E. Slaughter, chief.

State Department of State Highways, J.P. Woodford, director.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 29 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, Soil Conservation Service, U.S. Department of Agriculture, Environmental Protection Agency, and the National Park Service.

The following organizations aided in collecting records:

Dickinson County Road Commission; Kalamazoo County Board of Supervisors; Macomb County Board of Supervisors; Macomb County Road Commission; Oakland County Department of Public Works; Oakland County Drain Commission; Genesee County Drain Commission; Tri-County Planning Commission; Washtenaw County Drain Commission; Washtenaw County Planning Commission; Huron-Clinton Metropolitan Authority; Ypsilanti Community Utilities Authority; Cities of Ann Arbor, Battle Creek, Coldwater, Inlay City, Ironwood, Jackson, Lansing, and Ypsilanti; Village of Clarkston; Allied Paper Inc.; American Aggregate Corp.; Consumers Power Co.; Cleveland-Cliffs Iron Co.; Detroit Edison Co.; Fisher Body Division of General Motors Corp.; Hanna Mining Co.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Michigan Power Co.

Organizations that supplied data are acknowledged in station descriptions.

ACKNOWLEDGMENT

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HYDROLOGIC CONDITIONS

Streamflow during the 1979 water year was above median in the Upper Peninsula and in the northern part of the Lower Peninsula. In the southern part of the Lower Peninsula streamflow at Red Cedar River at East Lansing was deficient for the third consecutive water year.

Above normal snow accumulation accompanied by light rain caused excessive runoff at the three index stations (fig. 1) during March. The monthly mean discharge for March at Muskegon River at Evart was the 4th highest in 47 years of record, and the May mean discharge was the 5th highest. At Sturgeon River near Sidnaw in the Upper Peninsula, monthly discharges were well above median during October and March through June.

In figure 1, the monthly and annual mean discharge is compared with the median discharge for the period 1941-70 at the three index stations.

Ground-water levels were below normal in the southcentral and southeastern part of the Lower Peninsula. Elsewhere levels were above normal with some monthly record highs occurring in the western part of the Upper Peninsula.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the table for converting English units to International System of units (SI) on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

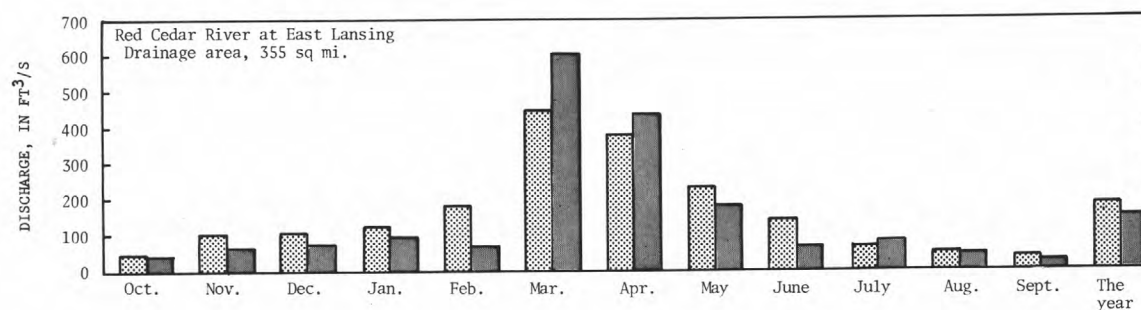
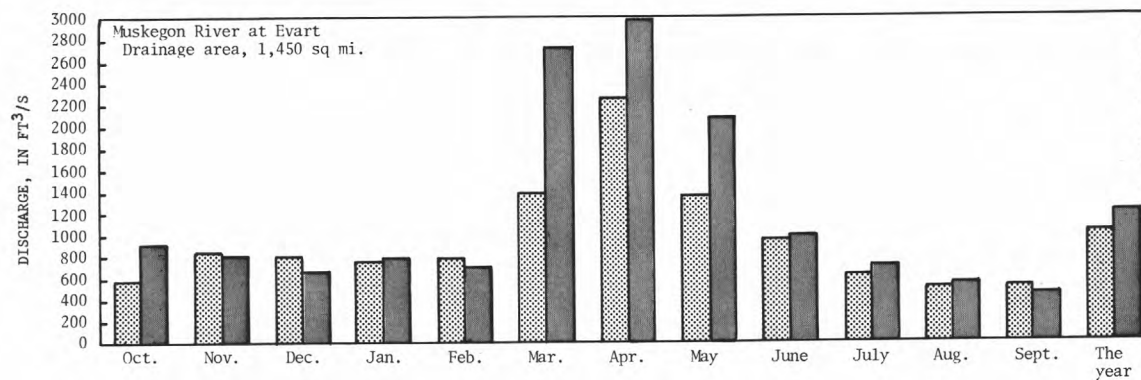
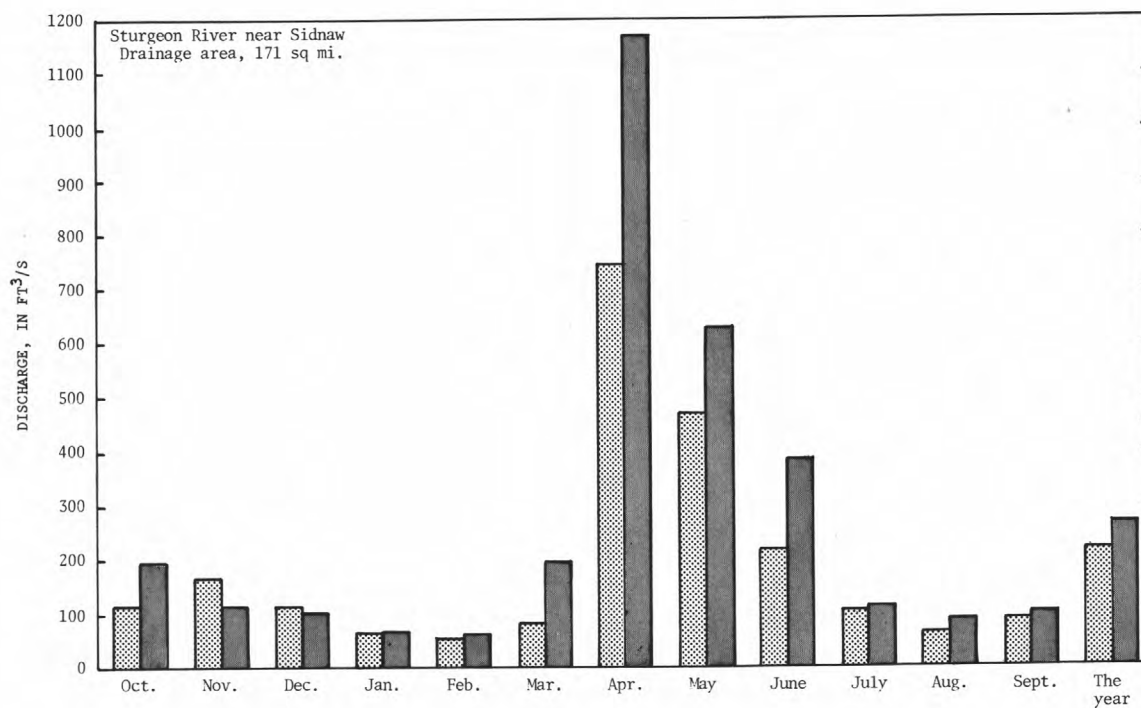
Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer, tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and thread-like in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies within 24 hours when incubated at 35°C ± 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.



Median of monthly and yearly mean discharge for period 1941-70.

Monthly and yearly mean discharge during 1979 water year.

Figure 1. Discharge during 1979 water year compared with median discharge for period 1941-70 for three representative stations.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at $35^{\circ}\text{C} \pm 1.0^{\circ}\text{C}$ on M-enterococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area of volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (ft^3/s , ft^3/s) 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.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (colloidal) suspended particles. Analyses are performed on filtered samples.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = - \sum_{i=1}^s \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

Where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontribution areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate (CaCO_3).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (UG/L, ug/L) 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.

Milligrams per liter (MG/L, mg/L) 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. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle-size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	0.00024 - 0.004	Sedimentation
Silt004 - .062	Sedimentation
Sand062 - 2.0	Sedimentation or sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC, pCi) is one trillionth (1×10^{12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radio activity that yields 3.7×10^{10} radio active disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [$\text{mg C}/(\text{m}^2 \cdot \text{time})$] for periphyton and macrophytes and [$\text{mg C}/(\text{m}^3 \cdot \text{time})$] for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [$\text{mg O}_2/(\text{m}^2 \cdot \text{time})$] for periphyton and macrophytes and [$\text{mg O}_2/(\text{m}^3 \cdot \text{time})$] for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the rate at which dry weight of sediment passes a section of a stream or is the quantity of sediment, as measured by dry weight or volume, that passes a section in a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Suspended-sediment load is quantity of suspended sediment passing a section in a specified period.

Total sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom.....Animal
Phylum.....Arthropoda
Class.....Insecta
Order.....Ephemeroptera
Family.....Ephemeridae
Genus.....Hexagenia
Species.....Hexagenia limbata

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report: in reference to published reports beginning in 1975.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary that enters between two main-stream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indentation in a list of stations in the front of the report. Each indentation represents one rank. This downstream order and system of indentation show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 04058500, which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility, latitude and longitude numbers are determined to seconds. The first six digits denote degrees, minutes, and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last two numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.

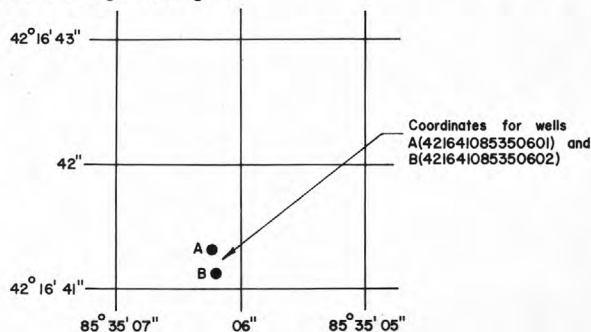


Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A thru D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be located within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter designations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

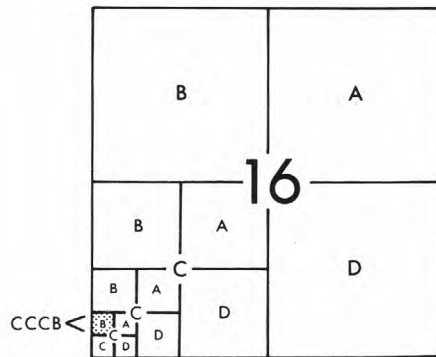


Figure 3. Well numbering system in Michigan.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designed by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning and management. Both accounting and broad-scale monitoring objectives have been incorporated in the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF STAGE AND WATER-DISCHARGE

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard textbooks, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologist, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year which begins on October 1 and ends on September 30.

The description of the gaging stations gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD."

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of

all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water October 1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS" on page 5.

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS." For reservoir stations information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir is given under "REMARKS."

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations peak discharges are listed with "EXTREMES FOR THE CURRENT YEAR"; if they are, all independent peaks, including the maximum for the year, above the selected base with the time of occurrence and corresponding gage heights are published in tabular format. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for most reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

Accuracy of data

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other data available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the district office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

EXPLANATION OF WATER QUALITY RECORDS

Collection and examination of data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature, sediment discharge, etc.); extremes for the period of daily record; extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and/or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water analysis

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the district office.

Water temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small daily temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

Only ground-water level data from a basic national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) that the most significant data are obtained from the fewest wells in the most important aquifers.

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude, and (2) a local number that is provided for local needs. See figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of different temperatures, hence neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will insure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (eom).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Thirty-four manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) is on surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises. The reports listed below are for sale by the U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

- 1-D1. *Water temperature--influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.
- 1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W. W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.
- 2-D1. *Application of surface geophysics to ground-water investigations*, by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.
- 2-E1. *Application of borehole geophysics to water-resources investigations*, by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.
- 3-A1. *General field and office procedures for indirect discharge measurements*, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.
- 3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M. A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.
- 3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.
- 3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.
- 3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.
- 3-A6. *General procedure for gaging streams*, by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.
- 3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.
- 3-A8. *Discharge measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.
- 3-A11. *Measurement of discharge by moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.
- 3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.
- 3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.
- 3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.
- 3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.
- 3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.
- 4-A1. *Some statistical tools in hydrology*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.
- 4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.
- 4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.
- 4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.
- 4-B3. *Regional analyses of streamflow characteristics*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.
- 4-D1. *Computation of rate and volume of stream depletion by wells*, by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.
- 5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 pages.
- 5-A2. *Determination of minor elements in water by emission spectroscopy*, by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.
- 5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.
- 5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages.
- 5-A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L. L. Thatcher, V. J. Janzer, and K. W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.
- 5-C1. *Laboratory theory and methods for sediment analysis*, by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.
- 7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.
- 7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L. F. Konikow and J. D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.
- 8-A1. *Methods of measuring water levels in deep wells*, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.
- 8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

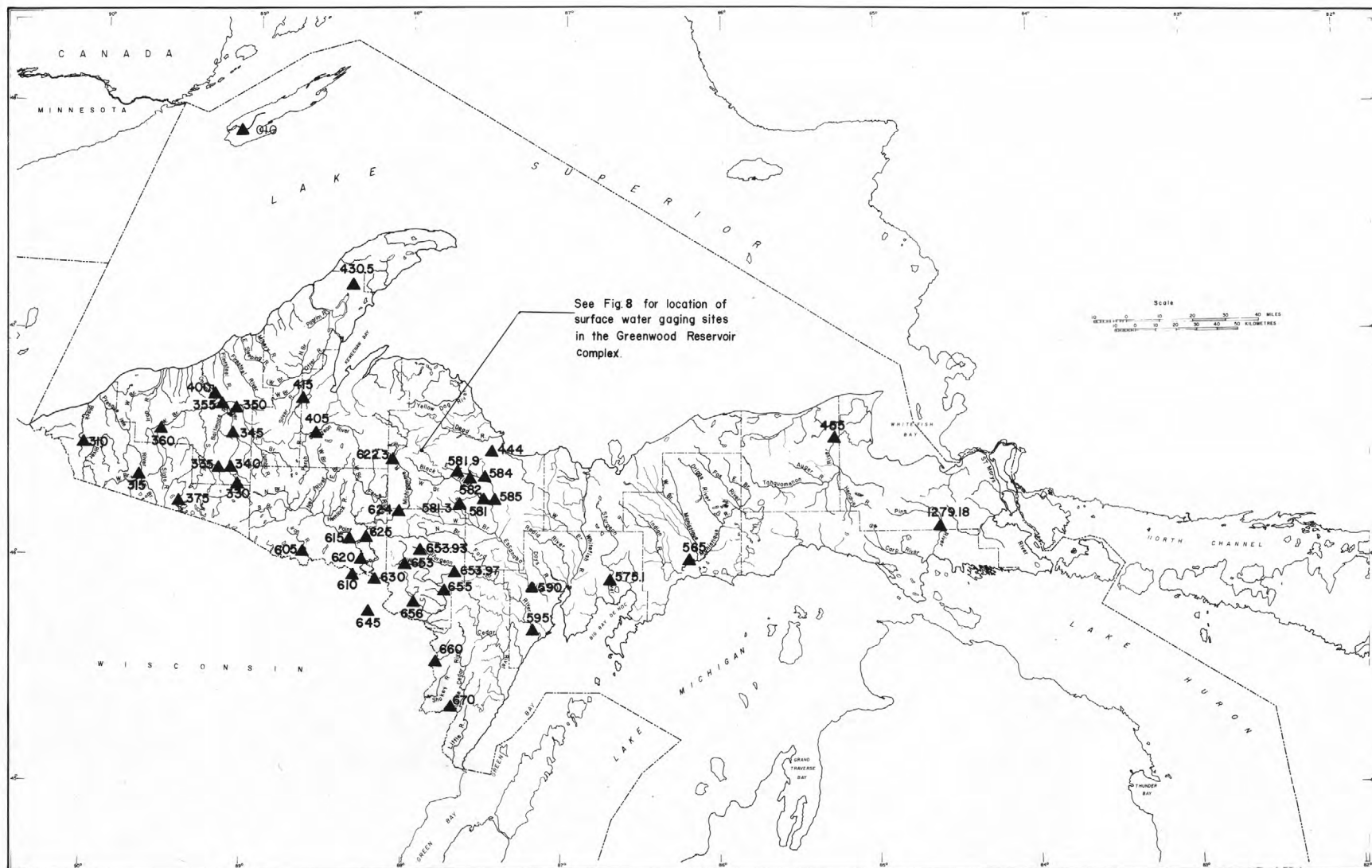
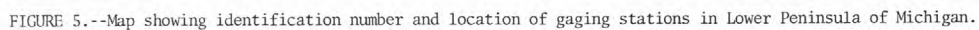


FIGURE 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan.



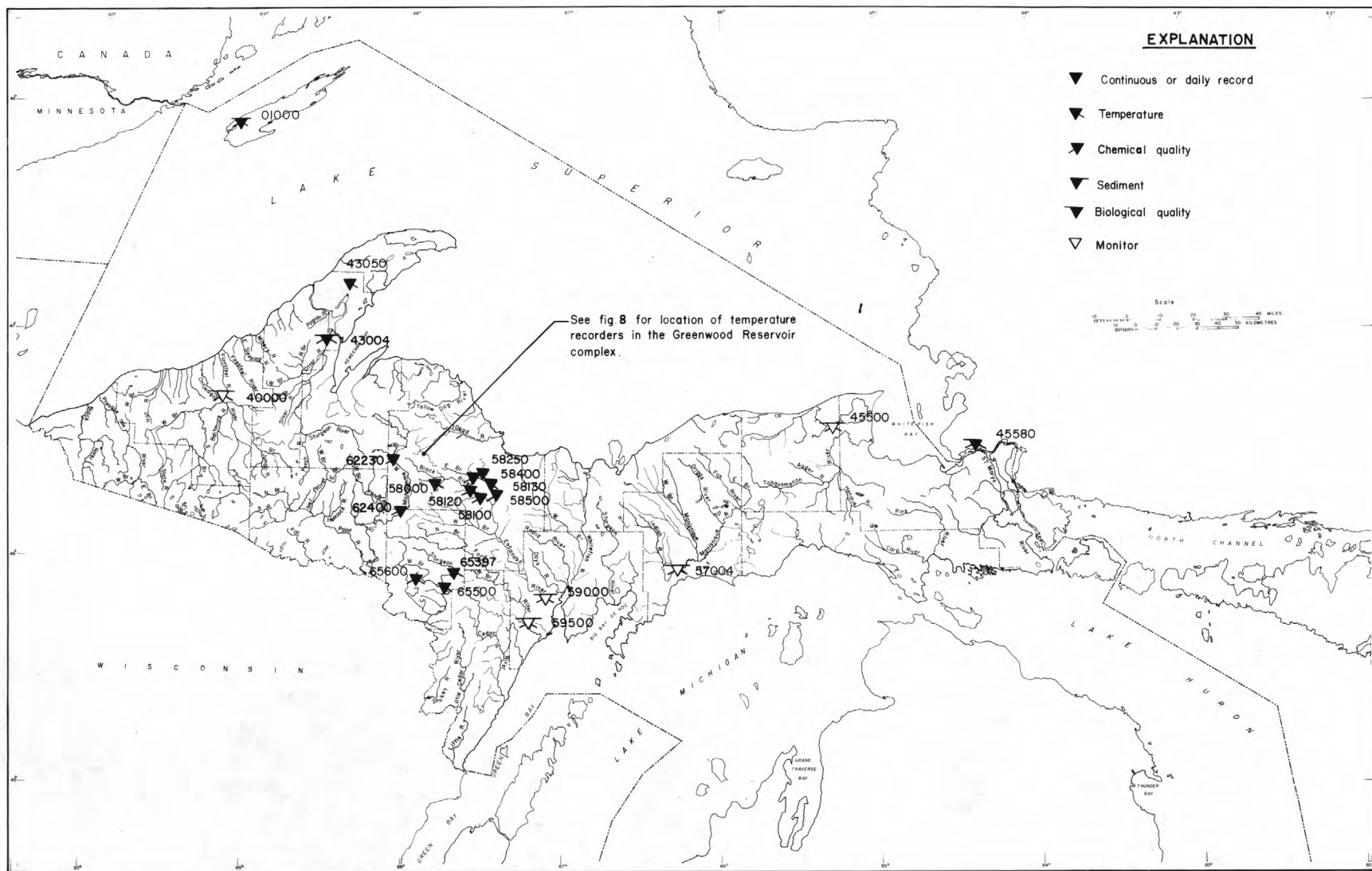


FIGURE 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan.



FIGURE 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW¼ sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi (1.3 km) northeast of Windigo, and 35 mi (56 km) southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi² (34.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft (184 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records fair. No gage-height record Dec. 30 to Mar. 6. ERTS satellite telemeter and recording rain gage at station. Capacity rain gage located near mouth. Hydrologic bench-mark stations are installed in specially selected areas where water resources have not yet been affected by works of man. Continuous records of natural hydrologic conditions, such as streamflow and water quality, will make possible assessment of changes which occur as a result of changes in climate and other natural factors. These data will provide a frame of reference against which hydrologic changes wrought by man may be evaluated.

AVERAGE DISCHARGE.--15 years, 18.2 ft³/s (0.515 m³/s), 18.72 in/yr (475 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft³/s (13.6 m³/s) May 1, 1972, gage height, 6.82 ft (2.079 m), from rating curve extended above 160 ft³/s (4.53 m³/s) based on runoff characteristics of nearby stations; maximum gage height, 6.88 ft (2.097 m) Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft³/s (0.012 m³/s) Aug. 25, 1977; minimum gage height, 2.55 ft (0.777 m) Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 110 ft³/s (3.12 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Apr. 22	2100	194 5.49	5.66 1.725	May 10	1500	*390 11.0	*6.68 2.036
Apr. 25	2300	308 8.72	6.31 1.923				

Minimum discharge, 0.89 ft³/s (0.025 m³/s) Aug. 22, gage height, 2.64 ft (0.805 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.5	2.7	5.6	2.2	1.9	1.8	17	61	19	4.8	2.3	5.1
2	6.2	2.8	5.5	2.2	1.9	1.9	15	57	17	4.3	1.8	6.3
3	7.2	2.7	5.2	2.1	1.9	2.0	14	52	15	4.0	1.6	5.2
4	6.1	2.7	5.3	2.1	1.9	2.0	14	50	14	3.5	1.8	4.2
5	5.6	2.7	5.2	2.1	1.9	2.0	15	45	13	3.0	1.8	3.4
6	5.3	2.6	4.9	2.0	1.9	2.0	13	45	13	2.7	1.5	2.8
7	4.9	2.5	4.4	2.0	1.9	2.0	12	44	27	2.5	1.3	2.3
8	4.6	2.5	4.2	2.0	1.8	2.0	11	49	23	2.4	1.2	2.0
9	4.5	2.5	3.8	2.0	1.8	2.0	10	50	19	2.3	1.1	1.7
10	4.4	2.6	3.5	2.0	1.7	2.0	9.8	261	39	2.3	1.4	2.2
11	4.6	2.9	3.3	2.0	1.7	1.8	10	180	39	2.2	1.2	4.4
12	5.5	2.7	3.2	2.0	1.6	1.8	16	130	30	1.9	1.1	8.8
13	5.1	6.5	3.1	2.0	1.6	1.8	22	75	25	1.8	1.7	7.3
14	4.6	20	3.0	2.0	1.6	1.8	25	55	19	1.8	1.4	6.2
15	4.4	15	2.9	2.0	1.5	1.9	32	45	16	1.6	1.2	4.9
16	4.4	11	2.8	1.9	1.5	1.8	45	35	14	1.5	1.1	4.0
17	4.3	10	2.8	1.9	1.5	2.0	62	30	17	1.4	1.1	3.3
18	4.2	12	2.7	1.9	1.5	2.4	88	27	14	1.4	1.1	2.8
19	4.0	11	2.7	1.9	1.4	4.2	94	27	12	1.7	1.0	2.3
20	4.0	10	2.6	1.9	1.4	15	98	30	12	1.5	1.0	2.7
21	4.0	9.4	2.6	1.9	1.4	18	130	34	16	1.4	.95	2.7
22	3.9	9.0	2.5	1.9	1.4	20	152	28	14	1.4	.94	2.3
23	3.8	8.6	2.5	1.9	1.4	21	155	25	12	1.4	1.4	2.1
24	3.4	7.0	2.5	1.9	1.4	21	147	22	10	1.9	1.4	2.0
25	3.0	7.2	2.5	1.9	1.4	21	257	19	8.7	2.2	1.3	1.8
26	2.9	6.5	2.4	1.9	1.5	19	245	16	8.0	1.6	1.2	1.7
27	3.0	6.3	2.4	1.9	1.6	18	180	15	7.2	1.4	1.1	1.6
28	2.9	6.2	2.4	1.9	1.7	16	131	15	6.5	1.3	1.0	1.7
29	2.9	6.0	2.3	1.9	---	15	95	14	6.0	1.2	4.0	1.7
30	2.9	5.8	2.3	1.9	---	16	71	13	5.3	2.6	2.5	1.7
31	2.8	---	2.3	1.9	---	19	---	15	---	3.6	3.2	---
TOTAL	133.9	199.4	103.4	61.1	45.7	258.2	2185.8	1564	490.7	68.6	46.69	101.2
MEAN	4.32	6.65	3.34	1.97	1.63	8.33	72.9	50.5	16.4	2.21	1.51	3.37
MAX	7.2	20	5.6	2.2	1.9	21	257	261	39	4.8	4.0	8.8
MIN	2.8	2.5	2.3	1.9	1.4	1.8	9.8	13	5.3	1.2	.94	1.6
CFSM	.33	.50	.25	.15	.12	.63	5.52	3.83	1.24	.17	.11	.26
IN.	.38	.56	.29	.17	.13	.73	6.16	4.41	1.38	.19	.13	.29

CAL YR 1978 TOTAL 4709.20 MEAN 12.9 MAX 100 MIN 1.9 CFSM .98 IN 13.27
WTR YR 1979 TOTAL 5258.69 MEAN 14.4 MAX 261 MIN .94 CFSM 1.09 IN 14.82

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1965 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--In addition to the temperature recorder record, samples were collected approximately bimonthly. Temperature recorder clock stopped Nov. 22 to Jan. 30 (range in temperature 0.0 to 0.5°C), May 9-28 (range in temperature 3.5 to 12.5°C). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 22.0°C July 26, 30, 31, 1970, July 18, Aug. 1, 1975, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 21.0°C July 14; minimum, 0.0°C on many days during November to April.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (MG/L)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)
OCT 25...	1300	3.2	160	7.4	6.5	10.4	86	K4	K38	77
JAN 30...	1345	2.0	160	7.4	.0	13.1	92	K1	K2	78
MAR 06...	1330	2.0	165	7.5	.0	12.7	89	<1	<1	79
MAY 29...	1515	15	86	7.1	13.5	9.5	93	K3	K6	41
JUL 12...	1130	1.9	161	7.3	17.5	8.1	86	86	54	73
SEP 13...	1315	7.1	132	7.3	12.5	9.8	93	76	110	65

DATE	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT 25...	15	21	5.9	3.8	.2	10	.6	62	--	4.0
JAN 30...	7	21	6.2	4.1	.2	10	.5	71	--	4.3
MAR 06...	3	21	6.5	4.3	.2	10	.7	76	--	4.4
MAY 29...	11	11	3.2	2.0	.1	10	.4	30	--	6.2
JUL 12...	5	20	5.5	3.8	.2	10	.5	68	--	4.8
SEP 13...	16	19	4.2	2.7	.1	8	.5	52	5.1	4.7

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)
OCT 25...	4.0	.0	12	110	88	.96	.01	.05	--
JAN 30...	4.6	.1	15	116	98	.63	.14	.01	--
MAR 06...	4.2	.0	15	121	102	.65	.15	.01	--
MAY 29...	1.7	.0	7.4	70	50	2.89	.04	.01	.03
JUL 12...	4.6	.0	10	129	90	.66	.04	.01	.03
SEP 13...	2.0	.0	12	109	77	2.09	.02	.01	.03

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE SUPERIOR
04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)
OCT 25...	1300	1	100	2	10	4	530
MAY 29...	1515	0	0	1	20	4	300

DATE	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)
OCT 25...	11	0	<.5	0	0	10
MAY 29...	5	20	<.5	0	0	20

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90)	RADIUM 226, DIS- SOLVED, RADON METHOD (PCI/L)	URANIUM DIS- SOLVED, EXTRAC- TION (UG/L)
OCT 25...	1300	<1.5	<.4	1.8	<.4	1.6	<.4	.04	.07

PESTICIDE ANALYSIS

DATE	TOX-APHENE, TOTAL (UG/L)	TOXA-PHENE, TOTAL IN BOT-TOM MA- TERIAL (UG/KG)	TOTAL TRI- THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	MIREX, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	PER- THANE TOTAL (UG/L)	NAPH- THA-LFNES, POLY- CHLOR. TOTAL (UG/L)
OCT 25...	0	0	.00	.00	.00	.00	.00	.00	.00

STREAMS TRIBUTARY TO LAKE SUPERIOR
04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		
1	10.0	9.0	4.5	4.0			---	---	.0	.0	.0	.0
2	10.0	9.5	4.0	4.0			---	---	.0	.0	.0	.0
3	10.0	10.0	4.0	4.0			---	---	.0	.0	.0	.0
4	10.0	9.5	4.0	4.0			---	---	.0	.0	.0	.0
5	10.0	10.0	4.5	4.0			---	---	.0	.0	.0	.0
6	10.0	9.0	4.5	3.5			---	---	.0	.0	.0	.0
7	9.5	8.0	3.5	2.5			---	---	.0	.0	.0	.0
8	8.0	7.0	3.0	2.5			---	---	.0	.0	.0	.0
9	8.5	7.5	3.5	3.5			---	---	.0	.0	.0	.0
10	8.5	7.5	3.5	1.5			---	---	.0	.0	.0	.0
11	9.5	8.5	1.5	1.0			---	---	.0	.0	.0	.0
12	9.5	8.0	1.0	1.0			---	---	.0	.0	.0	.0
13	8.0	7.0	1.0	1.0			---	---	.0	.0	.0	.0
14	7.0	6.5	1.0	.5			---	---	.0	.0	.0	.0
15	6.5	5.5	.5	.0			---	---	.0	.0	.0	.0
16	6.0	6.0	.0	.0			---	---	.0	.0	.0	.0
17	6.0	6.0	.0	.0			---	---	.0	.0	.0	.0
18	6.0	6.0	.0	.0			---	---	.0	.0	.0	.0
19	7.0	6.0	.0	.0			---	---	.0	.0	.0	.0
20	7.0	6.5	.0	.0			---	---	.0	.0	.0	.0
21	7.5	7.0	.5	.0			---	---	.0	.0	.0	.0
22	7.5	7.5	---	---			---	---	.0	.0	.0	.0
23	7.5	6.5	---	---			---	---	.0	.0	.0	.0
24	6.5	6.5	---	---			---	---	.0	.0	.0	.0
25	7.0	6.5	---	---			---	---	.0	.0	.0	.0
26	7.0	6.0	---	---			---	---	.0	.0	.0	.0
27	6.0	6.0	---	---			---	---	.0	.0	.0	.0
28	6.0	4.0	---	---			---	---	.0	.0	.0	.0
29	4.0	4.0	---	---			---	---	---	---	.0	.0
30	5.0	4.0	---	---			---	---	---	---	.0	.0
31	5.0	4.5	---	---			.0	.0	---	---	.0	.0
MONTH	10.0	4.0							.0	.0	.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		
1	.0	.0	3.5	3.0	14.0	11.0	18.5	15.5	17.5	14.5	16.5	14.0
2	.0	.0	3.5	3.0	13.5	11.0	17.0	14.5	18.5	15.0	16.5	15.0
3	.0	.0	3.5	3.0	12.5	11.0	17.0	14.0	18.5	16.5	16.0	14.5
4	.0	.0	3.5	3.5	15.0	11.0	17.5	14.5	18.0	16.5	15.5	13.0
5	.0	.0	4.0	3.5	15.0	11.5	17.0	13.5	18.5	15.5	17.5	15.5
6	.0	.0	4.0	3.5	14.0	11.5	17.5	14.5	17.5	14.5	17.0	15.0
7	.0	.0	3.5	3.5	13.0	11.5	17.5	15.0	20.0	16.5	15.0	13.5
8	.0	.0	3.5	3.5	14.0	11.5	19.0	15.0	19.5	16.5	13.5	11.5
9	.0	---	---	---	15.0	12.0	18.5	17.0	17.5	14.5	14.0	12.5
10	.0	---	---	---	14.5	12.5	19.5	16.5	17.5	15.5	14.0	13.5
11	.0	---	---	---	14.5	11.5	20.0	17.0	17.5	13.5	13.5	12.5
12	.0	---	---	---	15.0	12.0	20.5	17.0	15.5	13.5	12.5	12.5
13	.0	---	---	---	15.5	13.0	20.0	19.5	16.5	15.0	12.5	12.0
14	.0	---	---	---	16.5	14.5	21.0	18.0	15.5	13.5	12.5	12.0
15	.0	---	---	---	17.5	15.5	19.5	16.5	15.5	12.0	13.0	12.0
16	.0	---	---	---	17.0	14.5	19.0	15.5	15.5	11.5	13.0	11.5
17	.0	.0	---	---	17.0	14.0	18.5	14.0	15.0	14.0	14.0	13.0
18	.0	.0	---	---	17.5	13.5	18.0	14.5	17.5	14.5	14.0	11.5
19	.0	.0	---	---	16.5	14.5	17.5	15.5	19.0	16.5	11.5	9.5
20	.0	.0	---	---	18.0	15.0	19.0	15.5	19.5	15.5	11.0	10.5
21	.0	.0	---	---	17.0	14.5	20.0	16.5	19.0	15.5	11.0	10.5
22	.0	.0	---	---	14.5	13.0	18.5	17.5	17.5	16.5	10.5	9.0
23	.0	.0	---	---	14.0	11.0	20.5	16.5	17.0	16.5	11.0	9.5
24	.0	.0	---	---	14.5	11.0	19.5	18.5	16.5	16.0	11.0	10.0
25	.0	.0	---	---	15.5	12.5	20.0	17.0	17.0	15.0	10.5	9.0
26	1.0	.0	---	---	17.0	14.5	18.5	17.5	16.5	15.0	10.0	8.5
27	2.0	1.0	---	---	17.5	15.0	18.5	15.5	17.0	14.5	10.5	9.5
28	2.5	1.5	---	---	16.5	14.5	19.5	15.5	16.0	13.5	10.5	10.0
29	2.5	1.5	14.5	10.0	17.5	14.0	19.5	15.5	16.0	14.5	10.0	9.5
30	3.0	2.0	15.0	11.0	18.5	15.5	17.5	16.0	16.0	14.5	10.0	9.0
31	---	---	14.5	12.0	---	---	17.5	15.5	15.0	14.0	---	---
MONTH	3.0				18.5	11.0	21.0	13.5	20.0	11.5	17.5	8.5

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04031000 BLACK RIVER NEAR BESSEMER, MI

LOCATION.--Lat 46°30'41", long 90°04'28", in NE¼ SE¼ sec.32, T.48 N., R.46 W., Gogebic County, Hydrologic Unit 04020101, on right bank 450 ft (137 m) downstream from bridge on county highway, 500 ft (152 m) downstream from Powder Mill Creek, and 2.5 mi (4.0 km) northwest of Bessemer.

DRAINAGE AREA.--200 mi² (518 km²).

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,154.3 ft (351.83 m) National Geodetic Vertical Datum of 1929 (levels by registered surveyor).

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1967, flow included some ground water pumped from mines at Bessemer. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 234 ft³/s (6.627 m³/s), 15.89 in/yr (404 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft³/s (419 m³/s) Apr. 24, 1960, gage height, 14.27 ft (4.349 m), from flood-mark, from rating curve extended above 5,300 ft³/s (150 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 6.8 ft³/s (0.19 m³/s) Sept. 25, Oct. 1-3, 1976; minimum gage height, 0.36 ft (0.110 m) Sept. 9, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,660 ft³/s (104 m³/s) Apr. 22, gage height, 8.10 ft (2.469 m), only peak above base of 1,500 ft³/s (42.5 m³/s); minimum, 17 ft³/s (0.48 m³/s) July 24, gage height, 0.59 ft (0.180 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	37	40	30	30	40	500	500	123	132	43	33
2	44	37	40	30	32	42	490	427	154	110	38	54
3	47	36	38	30	30	42	470	367	163	95	34	40
4	47	36	38	30	30	42	450	324	171	90	73	34
5	53	38	36	30	30	42	430	308	158	77	80	31
6	94	37	36	30	30	42	410	353	217	66	68	29
7	114	34	36	30	30	40	390	400	1030	56	63	29
8	107	35	36	30	30	40	380	477	587	53	52	27
9	100	34	36	30	30	40	360	793	416	49	46	25
10	95	33	36	30	30	40	348	795	633	42	44	24
11	91	36	34	30	30	38	342	791	690	38	38	109
12	92	35	34	30	30	38	436	702	450	35	36	278
13	90	48	34	30	32	38	842	593	316	38	40	351
14	87	66	32	30	32	38	838	527	239	35	36	323
15	83	61	32	30	32	38	1060	442	199	30	36	294
16	89	64	32	30	34	48	1400	368	295	27	31	239
17	89	67	32	30	34	70	1760	317	982	25	32	185
18	80	78	32	30	34	100	2360	271	706	24	31	142
19	73	72	30	30	36	150	2340	248	492	23	28	113
20	70	68	30	30	36	200	2920	242	369	23	27	98
21	68	64	30	30	38	300	3540	219	292	22	23	82
22	63	60	30	30	38	400	3390	217	236	23	24	71
23	60	56	30	30	38	500	2930	296	196	21	28	61
24	59	52	30	30	40	540	2500	260	159	21	28	54
25	57	50	30	30	40	550	2100	215	134	34	26	47
26	52	48	30	30	40	560	1670	183	136	28	27	40
27	51	46	30	30	40	560	1250	155	166	34	42	37
28	48	44	30	30	40	560	933	135	128	36	33	35
29	43	42	30	30	---	550	726	125	142	36	33	31
30	46	42	30	30	---	540	612	108	184	43	30	31
31	41	---	30	30	---	520	---	100	---	47	28	---
TOTAL	2174	1456	1024	930	946	6748	38177	11258	10163	1413	1198	2947
MEAN	70.1	48.5	33.0	30.0	33.8	218	1273	363	339	45.6	38.6	98.2
MAX	114	78	40	30	40	560	3540	795	1030	132	80	351
MIN	41	33	30	30	30	38	342	100	123	21	23	24
CFSM	.35	.24	.17	.15	.17	1.09	6.37	1.82	1.70	.23	.19	.49
IN.	.40	.27	.19	.17	.18	1.26	7.10	2.09	1.89	.26	.22	.55
CAL YR 1978	TOTAL	68399	MEAN 187	MAX 1740	MIN 24	CFSM .94	IN 12.72					
WTR YR 1979	TOTAL	78434	MEAN 215	MAX 3540	MIN 21	CFSM 1.08	IN 14.59					

STREAMS TRIBUTARY TO LAKE SUPERIOR

04031500 PRESQUE ISLE RIVER AT MARENISCO, MI

LOCATION.--Lat 46°22'20", long 89°41'32", in SE¼ NW¼ sec.21, T.46 N., R.43 W., Gogebic County, Hydrologic Unit 04020101, on left bank 0.3 mi (0.5 km) upstream from highway bridge in Marenisco, and 1.5 mi (2.4 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--February 1945 to current year.

REVISED RECORDS.--WSP 1707: 1954. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,489.30 ft (453.939 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 27, 1949, nonrecording gage at site 0.3 mi (0.5 km) downstream at different datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Nov. 8 to Dec. 10, which are fair. Occasional regulation for lake or pond level control at several locations in the headwaters. Since 1959, occasional regulation by Presque Isle Flooding Reservoir, usable capacity, about 3,000 acre-ft (3.7 hm³), 2.5 mi (4.0 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 177 ft³/s (5.013 m³/s), 14.06 in/yr (357 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,520 ft³/s (99.7 m³/s) Apr. 25, 1960, gage height, 11.25 ft (3.429 m); minimum observed, 13 ft³/s (0.37 m³/s) Sept. 30, 1948, gage height, 2.25 ft (0.686 m), site and datum then is use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,620 ft³/s (45.9 m³/s) Apr. 23, gage height, 8.37 ft (2.551 m); minimum, 36 ft³/s (1.02 m³/s) Sept. 25, 26, gage height, 3.32 ft (1.012 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	66	90	76	78	92	200	614	221	114	93	148
2	95	63	90	76	76	92	200	574	248	109	81	199
3	105	65	88	76	76	92	195	535	243	111	67	174
4	146	64	88	76	74	92	195	466	234	107	142	151
5	150	67	86	78	74	92	190	422	216	103	237	135
6	180	63	86	78	74	90	190	428	209	98	222	119
7	171	63	84	78	74	88	185	458	209	92	177	108
8	157	62	82	78	74	88	180	496	195	87	141	98
9	145	62	82	78	74	86	175	592	182	84	105	88
10	135	62	80	78	74	84	170	656	226	82	77	70
11	138	64	80	78	74	82	170	712	269	79	73	278
12	129	68	80	78	74	80	220	688	237	75	70	535
13	115	80	78	78	74	78	350	634	216	72	78	576
14	106	110	78	78	74	76	400	577	189	72	78	495
15	104	100	78	78	74	74	430	514	165	68	75	378
16	106	86	76	78	76	78	480	466	189	60	71	295
17	107	110	76	80	78	84	560	408	409	55	67	235
18	105	140	76	80	80	92	640	377	422	56	65	175
19	96	130	76	80	82	115	756	375	358	54	61	148
20	92	125	76	80	84	130	930	374	304	54	64	125
21	88	120	74	80	86	155	1220	354	279	56	66	110
22	85	115	74	82	86	185	1500	342	245	53	69	102
23	73	110	74	82	88	205	1590	351	220	54	98	98
24	69	105	74	82	88	205	1550	333	195	68	109	65
25	68	105	74	82	90	210	1470	335	179	81	103	37
26	69	100	74	80	90	210	1320	298	169	97	93	40
27	69	98	76	80	90	210	1140	263	153	174	119	48
28	68	96	76	80	92	210	965	254	124	150	120	47
29	68	96	76	78	---	205	824	187	114	121	127	49
30	71	94	76	78	---	205	692	155	117	99	136	52
31	65	---	76	78	---	200	---	180	---	86	124	---
TOTAL	3271	2689	2454	2442	2228	3985	19087	13418	6736	2671	3208	5178
MEAN	106	89.6	79.2	78.8	79.6	129	636	433	225	86.2	103	173
MAX	180	140	90	82	92	210	1590	712	422	174	237	576
MIN	65	62	74	76	74	74	170	155	114	53	61	37
CFSM	.62	.52	.46	.46	.47	.75	3.72	2.53	1.32	.50	.60	1.01
IN.	.71	.58	.53	.53	.48	.87	4.15	2.92	1.47	.58	.70	1.13
CAL YR 1978	TOTAL	63982	MEAN 175	MAX 1150	MIN 62	CFSM 1.02	IN 13.92					
WTR YR 1979	TOTAL	67367	MEAN 185	MAX 1590	MIN 37	CFSM 1.08	IN 14.66					

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'25", long 89°04'38", in SE¼ NE¼ sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, Ottawa National Forest, on right bank 25 ft (8 m) downstream from bridge on Forest Service Road 172, 2.4 mi (3.9 km) upstream from Bond Falls Reservoir, and 5.7 mi (9.2 km) southeast of Paulding.

DRAINAGE AREA.--164 mi² (425 km²).

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft (452.829 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Nov. 9 to Dec. 10, Dec. 15 to Mar. 4, July 27 to Sept. 3, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 173 ft³/s (4.899 m³/s), 14.33 in/yr (364 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft³/s (58.1 m³/s) Apr. 30, 1951, gage height, 10.0 ft (3.05 m), from high-water mark; minimum, 27 ft³/s (0.76 m³/s) Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft (0.902 m) Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,340 ft³/s (37.9 m³/s) Apr. 25, 26, gage height, 8.90 ft (2.713 m); minimum, 70 ft³/s (1.98 m³/s) Apr. 6, gage height, 3.31 ft (1.009 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	119	115	105	105	100	421	591	192	157	140	150
2	142	117	115	105	100	98	374	521	201	149	130	170
3	146	115	115	105	100	96	304	455	198	145	120	155
4	166	114	110	105	100	94	262	402	196	139	130	145
5	174	114	110	105	98	92	196	369	186	133	150	143
6	185	113	110	100	98	90	168	360	179	127	170	149
7	182	112	110	100	96	90	155	379	205	125	150	142
8	168	111	110	100	96	90	150	416	280	122	130	135
9	159	110	105	100	96	88	145	587	271	118	120	128
10	156	110	105	100	94	86	150	614	276	123	115	124
11	152	110	105	100	94	86	160	609	352	121	115	186
12	156	115	105	100	94	86	176	593	326	116	110	305
13	153	120	105	100	94	84	205	529	277	114	110	337
14	146	125	105	100	94	84	227	467	241	114	115	308
15	142	140	105	100	92	84	224	413	217	111	110	258
16	140	100	105	100	92	86	242	364	213	107	110	216
17	138	130	105	100	92	88	302	323	495	105	110	190
18	135	150	105	100	94	94	367	300	571	103	115	172
19	132	145	105	100	94	100	463	308	492	107	115	165
20	130	140	105	100	94	115	620	329	369	107	115	161
21	128	135	105	105	94	130	834	317	328	104	110	158
22	126	130	105	105	96	150	1050	288	311	102	110	150
23	125	130	105	105	98	180	1170	283	280	102	115	141
24	127	125	105	105	98	210	1250	273	245	103	130	140
25	127	125	105	105	98	250	1310	251	220	108	170	132
26	127	120	105	105	100	300	1300	232	203	125	150	126
27	129	120	105	105	100	400	1200	215	197	180	145	125
28	130	120	105	105	100	450	1020	205	184	220	135	123
29	127	120	105	105	---	488	833	196	173	180	135	120
30	124	115	105	105	---	490	695	183	163	160	130	118
31	121	---	105	105	---	472	---	176	---	150	140	---
TOTAL	4439	3650	3310	3180	2701	5351	15973	11548	8041	3977	3950	5072
MEAN	143	122	107	103	96.5	173	532	373	268	128	127	169
MAX	185	150	115	105	105	490	1310	614	571	220	170	337
MIN	121	100	105	100	92	84	145	176	163	102	110	118
CFSM	.87	.74	.65	.63	.59	1.06	3.24	2.27	1.63	.78	.77	1.03
IN.	1.01	.83	.75	.72	.61	1.21	3.62	2.62	1.82	.90	.90	1.15

CAL YR 1978 TOTAL 58201 MEAN 159 MAX 661 MIN 96 CFSM .97 IN 13.20
WTH YR 1979 TOTAL 71192 MEAN 195 MAX 1310 MIN 84 CFSM 1.19 IN 16.15

STREAMS TRIBUTARY TO LAKE SUPERIOR

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW¼ NE¼ sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft (12 m) upstream from intake to pipeline No. 2, 0.8 mi (1.3 km) downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi (2.6 km) east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft (439.397 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft (0.914 m) higher.

REMARKS.--Records good except those below 10 ft³/s (0.28 m³/s), which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 139 ft³/s (3.936 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 368 ft³/s (10.4 m³/s) May 5, 1960; no flow at times each year since 1961; minimum gage height observed, -0.03 ft (-0.009 m) Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	280	159	149	144	167	249	10	2.1	301	299	1.4	301
2	280	159	149	142	167	289	9.5	81	300	297	1.2	293
3	279	159	149	142	167	293	7.7	271	299	296	1.2	299
4	278	159	148	170	166	290	7.2	275	299	295	2.0	299
5	277	158	148	190	166	285	7.0	235	298	293	1.5	297
6	240	158	148	193	166	287	6.8	235	297	292	1.5	296
7	181	158	148	192	176	289	6.8	236	139	292	1.5	295
8	153	156	148	189	212	285	6.6	271	8.3	291	1.5	293
9	153	155	148	190	210	281	6.4	302	106	289	1.7	292
10	152	155	148	193	207	277	6.4	303	185	288	1.8	299
11	152	155	148	191	206	273	6.5	302	86	298	1.8	305
12	152	155	148	190	205	269	7.2	301	4.8	305	1.9	305
13	119	154	148	191	209	265	7.6	301	3.1	304	1.9	163
14	93	154	148	189	208	261	7.7	301	6.2	302	1.8	37
15	93	153	148	187	206	256	7.6	301	98	300	4.1	30
16	93	153	147	210	204	252	7.8	302	253	193	6.6	30
17	127	154	148	235	202	249	7.4	302	253	94	18	30
18	153	153	148	240	199	245	7.6	302	287	176	28	180
19	158	153	147	240	197	163	7.8	303	311	286	29	305
20	163	152	147	240	201	51	8.1	303	306	285	29	306
21	163	152	145	235	204	9.7	7.9	303	304	155	183	305
22	162	152	145	210	203	9.5	7.6	306	303	56	314	304
23	162	152	145	173	203	10	7.6	305	303	42	313	303
24	162	152	145	172	202	9.7	7.7	304	303	11	311	302
25	162	152	145	170	201	10	6.4	302	302	5.8	301	243
26	161	152	145	170	117	10	5.1	304	303	2.3	294	222
27	161	151	145	170	5.8	10	4.6	304	302	2.0	293	243
28	160	151	145	170	83	10	3.8	304	301	1.5	292	242
29	160	151	145	170	---	10	2.2	303	301	1.5	291	241
30	160	150	145	170	---	10	1.9	302	300	1.6	297	240
31	160	---	144	168	---	10	---	302	---	1.5	302	---
TOTAL	5349	4627	4554	5836	5059.8	5217.9	204.5	8568.1	6862.4	5755.2	3328.4	7300
MEAN	173	154	147	188	181	168	6.82	276	229	186	107	243
MAX	280	159	149	240	212	293	10	306	311	305	314	306
MIN	93	150	144	142	5.8	9.5	1.9	2.1	3.1	1.5	1.2	30

CAL YR 1978 TOTAL 55749.60 MEAN 153 MAX 301 MIN .02
WTR YR 1979 TOTAL 62662.30 MEAN 172 MAX 314 MIN 1.2

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW¼ sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi (4.0 km) east of Paulding.

DRAINAGE AREA.--190 mi² (492 km²).

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft (407.088 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 39,720 acre-ft (49.0 km³) between gage heights of 120 ft (36.6 m) (maximum drawdown) and 141 ft (43.0 m) (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft (53.0 hm³) July 3, 1953, gage height, 141.7 ft (43.19 m), of which 1,680 acre-ft (2.07 hm³) was uncontrolled storage; minimum, no usable storage at times; minimum gage height observed, 116.0 ft (35.36 m) Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 39,620 acre-ft (48.9 hm³) May 10, June 18, 19, gage height, 140.3 ft (42.76 m); no usable storage Mar. 12-24; minimum gage height, 118.2 ft (36.03 m) Mar. 19.

MONTHEND GAGE HEIGHT AND CONTENTS AT 0930, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet) (equivalent in ft³/s)	
Sept. 30	134.6	26760	--	--
Oct. 31	132.8	23100	-3660	-59.5
Nov. 30	131.0	19500	-3600	-60.5
Dec. 31	129.2	16080	-3420	-55.6
CAL YR 1978	--	--	-7820	-10.8
Jan. 31	125.5	9100	-6980	-114
Feb. 28	122.4	3640	-5460	-98.3
Mar. 31	121.7	2550	-1090	-17.7
Apr. 30	138.2	34760	+32210	+541
May 31	139.3	37290	+2530	+41.1
June 30	139.3	37290	0	0
July 31	136.2	30240	-7050	-115
Aug. 31	136.1	30020	-220	-3.6
Sept. 30	133.8	25100	-4920	-82.7
WTR YR 1979	--	--	-1660	-2.3

STREAMS TRIBUTARY TO LAKE SUPERIOR

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW $\frac{1}{4}$ sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi (0.2 km) upstream from State Highway 28, 3.8 mi (6.1 km) west of village of Trout Creek, and 7.5 mi (12.1 km) downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi² (526 km²).

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft (345.043 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Nov. 9 to Dec. 10 and July 11 to Sept. 3, which are fair. Flow regulated by Bond Falls Reservoir 7.5 mi (12.1 km) upstream (station 04034000). Diversion to South Branch Ontonagon River 8.5 mi (13.7 km) upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 68.3 ft³/s (1.934 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Nov. 7, 1951, gage height, 5.05 ft (1.539 m); minimum, 14 ft³/s (0.40 m³/s) sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft (0.347 m), from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 762 ft³/s (21.6 m³/s) May 11, gage height, 3.72 ft (1.134 m); minimum, 26 ft³/s (0.74 m³/s) Apr. 10, gage height, 1.39 ft (0.424 m), result of freezeup; minimum daily, 44 ft³/s (1.25 m³/s) Oct. 14, 20, Nov. 3-5, Jan. 23, Mar. 6, May 27-30, Sept. 4-6, 8-10, 22-30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	45	45	45	48	50	51	50	53	53	50	56
2	47	45	45	45	48	50	50	50	58	53	50	58
3	48	44	45	45	48	50	50	50	58	53	50	52
4	53	44	45	45	48	48	50	48	58	53	52	44
5	70	44	45	45	48	45	50	50	55	51	56	44
6	66	45	45	45	48	44	53	53	57	51	54	44
7	48	45	45	45	48	46	50	53	65	51	50	45
8	46	45	45	45	48	45	48	57	62	51	50	44
9	45	45	45	45	48	45	48	137	57	51	50	44
10	45	45	45	45	48	45	50	375	74	52	50	44
11	45	45	45	45	48	45	50	742	71	52	50	67
12	45	45	45	45	48	45	53	478	60	52	50	58
13	45	45	45	45	48	45	58	209	57	52	52	57
14	44	45	46	45	48	45	60	211	55	54	52	48
15	45	45	46	45	48	46	60	139	53	58	50	46
16	45	45	46	45	48	48	69	48	86	52	50	45
17	45	45	46	45	48	46	80	46	120	52	50	45
18	45	45	45	45	48	48	89	46	137	54	50	45
19	45	45	45	45	48	57	103	51	279	52	50	45
20	44	45	46	45	48	57	118	50	348	50	50	45
21	45	45	45	45	48	53	126	46	177	52	50	45
22	45	45	45	45	50	51	103	48	62	56	50	44
23	45	45	45	44	50	52	93	48	58	52	50	44
24	45	45	45	45	50	53	86	46	55	52	56	44
25	45	45	45	45	50	52	84	45	55	56	50	44
26	45	45	45	48	50	50	78	45	74	52	50	44
27	45	45	45	48	50	50	64	44	76	58	52	44
28	45	45	45	48	50	51	57	44	58	52	50	44
29	45	45	45	48	---	50	51	44	57	50	54	44
30	45	45	45	48	---	51	50	44	55	50	50	44
31	45	---	45	48	---	51	---	45	---	50	50	---
TOTAL	1459	1347	1400	1412	1358	1514	2032	3442	2590	1627	1578	1417
MEAN	47.1	44.9	45.2	45.5	48.5	48.8	67.7	111	86.3	52.5	50.9	47.2
MAX	70	45	46	48	50	57	126	742	348	58	56	67
MIN	44	44	45	44	48	44	48	44	53	50	50	44

CAL YR 1978 TOTAL 18667 MEAN 51.1 MAX 125 MIN 42
WTR YR 1979 TOTAL 21176 MEAN 58.0 MAX 742 MIN 44

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LOCATION.--Lat 46°41'24", long 89°04'24", in SW₄ NW₄ sec.33, T.50 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 700 ft (213 m) downstream from abandoned highway bridge, 1,000 ft (305 m) downstream from Adventure Creek, 5.0 mi (8.0 km) south of Mells, and 7.5 mi (12.1 km) upstream from mouth.

PERIOD OF RECORD.--July 1942 to September 1979 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 873.55 ft (266.258 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1949, nonrecording gage at site 700 ft (213 m) upstream at same datum.

AVERAGE DISCHARGE.--37 years, 258 ft³/s (7.307 m³/s), 12.88 in/yr (327 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,590 ft³/s (130 m³/s) July 1, 1953, gage height, 10.57 ft (3.222 m); maximum gage height, 10.65 ft (3.246 m) Apr. 24, 1960; minimum discharge, 60 ft³/s (1.70 m³/s) Aug. 25, 1948, gage height, 3.55 ft (1.082 m), site then in use; minimum gage height, 3.28 ft (1.000 m) Sept. 13, 1976.

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Apr. 21	0700	*2,920 82.7	*8.95 2.728	June 17	1600	1,680 47.6	7.25 2.210

Minimum daily discharge, 110 ft³/s (3.12 m³/s) Feb. 11-18.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	173	130	135	115	125	155	600	482	220	176	181	173
2	166	129	135	115	125	160	530	431	265	164	161	200
3	177	128	130	115	120	160	480	386	266	155	146	176
4	185	128	130	115	115	160	440	347	278	148	148	162
5	172	129	130	115	115	165	400	327	246	141	188	149
6	180	128	130	115	115	165	370	370	211	137	203	159
7	219	125	130	115	115	160	340	407	386	133	170	176
8	200	124	130	115	115	160	310	439	548	131	146	157
9	176	125	125	115	115	155	290	967	400	130	135	145
10	162	126	125	115	115	150	280	868	746	129	135	137
11	153	132	125	115	110	150	290	951	829	130	129	185
12	152	135	125	115	110	150	400	768	503	127	124	356
13	151	170	125	115	110	145	791	590	352	128	135	414
14	144	195	125	115	110	140	998	563	265	132	134	363
15	140	178	125	115	110	140	857	470	227	136	127	272
16	142	150	120	115	110	140	972	350	242	131	124	217
17	142	135	120	115	110	150	1460	292	1440	125	130	181
18	139	154	120	115	110	170	1630	265	894	123	130	158
19	138	178	120	115	115	250	1880	285	567	125	128	146
20	136	173	120	115	115	500	2120	364	408	133	124	143
21	134	160	120	120	120	1200	2720	339	364	132	122	140
22	133	155	120	120	130	1100	2230	302	375	130	119	134
23	134	150	120	125	135	1000	1990	393	342	133	123	130
24	132	145	120	125	140	900	1860	338	273	130	147	129
25	131	145	115	130	145	750	1870	269	229	151	196	127
26	131	140	115	130	150	660	1650	228	240	160	172	125
27	133	140	115	130	150	600	1260	205	311	237	166	123
28	135	140	115	130	155	540	910	198	276	279	160	122
29	135	140	115	130	---	480	704	188	224	212	155	122
30	134	135	115	130	---	450	574	176	196	181	154	122
31	132	---	115	125	---	520	---	170	---	187	153	---
TOTAL	4711	4322	3810	3695	3410	11725	31206	12728	12123	4666	4565	5343
MEAN	152	144	123	119	122	378	1040	411	404	151	147	178
MAX	219	195	135	130	155	1200	2720	967	1440	279	203	414
MIN	131	124	115	115	110	140	280	170	196	123	119	122
CFSM	.56	.53	.45	.44	.45	1.39	3.82	1.51	1.49	.56	.54	.65
IN.	.64	.59	.52	.51	.47	1.60	4.27	1.74	1.66	.64	.62	.73

CAL YR 1978	TOTAL	79722	MEAN	218	MAX	1290	MIN	100	CFSM	.80	IN	10.90
WTR YR 1979	TOTAL	102304	MEAN	280	MAX	2720	MIN	110	CFSM	1.03	IN	13.99

LOCATION.--Lat 46°41'57", long 89°09'36", in SE¼ sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft (3 m) upstream from bridge on U.S. Highway 45, 700 ft (213 m) downstream from East Branch, and 2.8 mi (4.5 km) southeast of Rockland.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft (201.50 m) National Geodetic Vertical Datum of 1929. Prior to April 1, 1959, nonrecording gage at site 400 ft (122 m) upstream at same datum. April 1, 1959 to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records fair. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi (48.3 km) upstream. Diversion to South Branch Ontonagon River 31.0 mi (49.9 km) upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft³/s (765 m³/s) Aug. 22, 1942, gage height, 21.2 ft (6.46 m), from flood-marks, from rating curve extended above 7,500 ft³/s (212 m³/s) on basis of slope-area measurement of peak flow; minimum observed, 142 ft³/s (4.02 m³/s) Dec. 3, 1963, discharge measurement; minimum daily, 145 ft³/s (4.11 m³/s) Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,720 ft³/s (190 m³/s) Apr. 21, gage height, 9.73 ft (2.966 m); minimum daily, 192 ft³/s (5.44 m³/s) Sept. 28, 29.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	296	256	290	270	260	370	1180	1080	427	394	265	272
2	296	240	290	260	250	370	1130	1000	487	400	261	304
3	304	240	280	260	250	360	970	949	494	412	233	280
4	320	240	280	260	240	360	910	880	519	395	243	256
5	329	240	280	250	240	360	963	833	491	393	274	240
6	401	240	280	250	240	360	880	940	442	369	279	264
7	420	240	270	250	240	350	730	1020	810	264	242	296
8	374	234	270	250	240	350	658	1060	987	278	220	248
9	329	234	270	250	240	350	593	2130	701	302	213	240
10	304	234	270	250	230	340	560	1940	1650	270	207	228
11	280	240	270	250	230	340	586	2450	1850	253	199	410
12	280	240	270	250	230	330	856	2010	915	259	198	650
13	280	288	270	250	230	320	2050	1400	608	263	213	700
14	280	374	270	250	230	310	2420	1470	479	300	210	510
15	280	329	270	250	240	310	2080	1230	436	300	205	410
16	280	280	270	250	240	300	2590	905	477	268	196	240
17	280	310	270	250	250	330	3980	774	3890	269	203	240
18	280	340	270	250	260	360	4460	719	1540	265	209	240
19	280	380	270	250	270	450	4620	752	1150	281	198	234
20	280	360	270	250	280	1500	4950	909	1040	302	194	240
21	272	340	270	260	290	3000	6160	844	976	270	195	240
22	264	330	280	260	300	2500	4540	727	790	251	212	240
23	264	320	280	260	310	2100	3890	829	670	245	206	234
24	256	310	280	260	320	1800	3510	699	530	244	220	228
25	256	305	280	260	330	1600	3410	546	440	347	284	210
26	256	300	280	270	350	1400	2860	471	470	358	258	204
27	256	300	280	270	360	1300	2150	429	720	404	262	204
28	256	300	280	270	370	1210	1660	414	560	451	253	192
29	256	300	280	270	---	976	1370	391	471	352	225	192
30	256	290	280	270	---	890	1200	365	418	340	239	198
31	256	---	270	260	---	1160	---	354	---	316	238	---
TOTAL	9021	8634	8540	7960	7520	26056	67916	30520	25438	9815	7054	8644
MEAN	291	289	275	257	269	841	2264	985	848	317	228	288
MAX	420	380	290	270	370	3000	6160	2450	3890	451	284	700
MIN	256	234	270	250	230	300	560	354	418	244	194	190

CAL YR 1978	TOTAL	163193	MEAN	447	MAX	3550	MIN	190
WTR YR 1979	TOTAL	217118	MEAN	595	MAX	6160	MIN	192

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW¼ NE¼ sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi (0.6 km) downstream from dam at outlet of Gogebic Lake and 1.5 mi (2.4 km) east of Bergland.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft (393.439 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi (0.6 km) upstream at different datum.

REMARKS.--Records good except those below 25 ft³/s (0.71 m³/s), which are poor. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft (43.4 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 174 ft³/s (4.928 m³/s), 14.59 in/yr (371 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft³/s (39.6 m³/s) Apr. 26, 1960, gage height, 5.98 ft (1.823 m); minimum daily, 0.70 ft³/s (0.020 m³/s) Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 908 ft³/s (25.7 m³/s) Apr. 27, gage height, 4.87 ft (1.484 m); minimum daily, 4.5 ft³/s (0.13 m³/s) Nov. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	8.0	152	131	264	163	185	824	132	174	10	9.6
2	35	6.8	136	126	264	162	189	793	143	230	10	8.8
3	32	6.8	136	138	264	158	192	770	137	272	10	8.0
4	36	6.5	136	154	264	166	193	654	134	244	10	8.0
5	33	6.8	139	150	261	170	198	512	156	233	10	8.0
6	32	6.8	136	154	259	161	193	190	215	218	10	7.4
7	85	6.5	136	147	250	156	197	59	508	202	10	8.0
8	120	6.5	182	147	246	153	200	69	527	192	10	8.0
9	149	6.5	175	163	240	154	200	358	314	179	10	8.0
10	163	6.5	158	189	233	152	200	697	273	169	10	6.8
11	172	6.2	139	200	226	145	200	821	459	157	10	7.4
12	155	6.2	139	215	218	143	200	798	498	148	10	9.6
13	133	6.2	132	216	215	139	210	780	176	156	10	12
14	131	6.2	129	225	211	143	215	635	274	169	10	8.0
15	125	6.2	124	211	209	142	224	350	308	152	10	7.4
16	89	6.2	119	197	208	136	233	243	270	76	10	6.8
17	57	4.5	115	194	204	134	251	272	307	28	10	128
18	39	7.4	125	183	204	130	281	288	331	114	10	82
19	37	8.0	138	175	200	132	321	212	339	70	8.8	80
20	37	8.0	142	170	199	135	382	183	327	17	8.8	79
21	35	8.0	149	164	193	137	487	185	335	15	8.8	102
22	21	8.0	146	200	191	137	602	186	266	13	8.8	118
23	8.0	8.0	140	251	188	141	700	184	160	13	9.6	116
24	8.0	8.0	141	252	191	158	785	182	17	12	9.6	118
25	8.8	8.0	138	259	184	167	850	183	143	13	9.6	44
26	8.0	8.0	134	278	177	168	887	175	257	7.7	8.8	45
27	8.0	78	129	285	170	170	898	174	152	8.8	8.8	110
28	8.8	108	121	275	166	170	892	138	83	9.6	8.8	100
29	8.0	108	121	267	---	172	871	46	157	10	8.8	97
30	9.6	108	126	259	---	178	847	10	189	10	8.0	97
31	8.0	---	125	261	---	183	---	85	---	10	8.0	---
TOTAL	1823.2	582.8	4258	6236	6099	4755	12283	11056	7587	3322.1	295.2	1447.8
MEAN	58.8	19.4	137	201	218	153	409	357	253	107	9.52	48.3
MAX	172	108	182	285	264	183	898	824	527	272	10	128
MIN	8.0	4.5	115	126	166	130	185	10	17	7.7	8.0	6.8
CAL YR 1978 TOTAL	53532.3		MEAN 147	MAX 979	MIN 4.5							
WTR YR 1979 TOTAL	59745.1		MEAN 164	MAX 898	MIN 4.5							

STREAMS TRIBUTARY TO LAKE SUPERIOR

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE¼ sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft (24 m) downstream from Cisco Lake Dam, 2.5 mi (4.0 km) upstream from Langford Creek, 5.0 mi (8.0 km) upstream from U.S. Highway 2, and 13 mi (21 km) west of Watersmeet.

DRAINAGE AREA.--50.7 mi² (131.3 km²).

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft (509.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft (1.219 m) higher.

REMARKS.--Records good except those below 1.0 ft³/s (0.028 m³/s), which are fair. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft (19.2 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 46.9 ft³/s (1.328 m³/s), 12.56 in/yr (319 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft³/s (8.16 m³/s) May 1-4, 1951, gage height, 6.10 ft (1.859 m), present datum; minimum daily, 0.09 ft³/s (0.003 m³/s) June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 190 ft³/s (5.38 m³/s) June 19, gage height, 5.62 ft (1.713 m); minimum daily, 0.58 ft³/s (0.016 m³/s) Sept. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	30	27	46	57	46	85	115	33	3.2	49	104
2	39	29	27	46	33	46	83	113	34	3.4	63	136
3	63	18	28	45	17	39	82	115	34	3.6	61	112
4	110	4.4	28	45	17	34	81	105	54	3.5	67	98
5	127	2.3	28	45	11	42	70	45	66	3.4	71	51
6	140	2.1	28	45	6.5	48	62	5.3	68	3.2	112	12
7	145	1.8	28	45	6.5	48	62	4.3	67	3.3	97	4.9
8	144	1.4	29	45	6.5	48	62	3.4	96	3.3	64	4.6
9	139	1.3	29	44	6.5	48	62	3.9	114	3.4	63	3.9
10	134	5.4	28	36	6.5	48	61	21	112	15	31	3.5
11	132	5.4	28	26	6.2	47	60	76	113	51	6.0	89
12	123	6.5	28	14	6.2	46	60	110	110	65	5.3	139
13	124	56	28	3.1	6.2	46	61	95	106	64	21	138
14	120	70	29	3.1	6.2	45	62	88	91	31	29	98
15	117	62	29	3.1	31	45	61	111	39	2.5	30	64
16	111	62	29	3.1	52	45	61	124	8.7	2.2	30	64
17	111	63	29	3.1	52	44	62	117	14	1.6	30	63
18	104	75	28	3.1	52	44	64	160	106	1.8	29	31
19	104	82	28	3.1	49	46	77	150	185	1.2	29	4.0
20	103	81	30	3.3	46	47	87	144	182	.77	29	3.2
21	100	70	31	3.8	46	48	75	77	174	.65	29	2.6
22	96	62	39	25	46	49	71	33	114	.67	30	2.2
23	90	62	47	53	46	71	77	33	33	1.0	31	1.8
24	90	61	47	72	46	90	83	33	7.1	1.5	31	1.4
25	87	61	47	79	46	89	102	33	5.9	1.4	30	1.3
26	85	60	46	79	46	89	99	33	5.0	1.1	31	.79
27	85	58	46	69	46	88	102	33	4.6	1.3	74	.68
28	72	41	46	60	46	87	111	33	4.4	1.2	99	.62
29	64	26	46	59	---	86	107	33	4.1	1.4	97	.58
30	63	27	46	58	---	86	114	33	3.8	1.6	68	.60
31	45	---	46	57	---	85	---	33	---	17	53	---
TOTAL	3092	1186.6	1053	1121.8	842.3	1770	2306	2112.9	1988.6	295.19	1489.3	1235.67
MEAN	99.7	39.6	34.0	36.2	30.1	57.1	76.9	68.2	66.3	9.52	48.0	41.2
MAX	145	82	47	79	57	90	114	160	185	65	112	139
MIN	25	1.3	27	3.1	6.2	34	60	3.4	3.8	.65	5.3	.58
CAL YR 1978	TOTAL	17096.18	MEAN	46.8	MAX	211	MIN	.35				
WTR YR 1979	TOTAL	18493.36	MEAN	50.7	MAX	185	MIN	.58				

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04040000 ONTONAGON RIVER NEAR ROCKLAND, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°43'15", long 89°12'25", in NE¼ sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 50 ft (15 m) downstream from bridge on Victoria Road, 1.8 mi (2.9 km) southwest of Rockland, and 2.4 mi (3.9 km) downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi² (3,470 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft (194.682 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft (15 m) upstream at same datum.

REMARKS.--Water--discharge records fair. Plugged or partially plugged intakes July 26 to Aug. 28. Considerable regulation by powerplant on West Branch 5 mi (8 km) upstream; Bond Falls Reservoir (station 04034000) 25 mi (40 km) upstream; Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft (62.6 hm³), in headwaters.

AVERAGE DISCHARGE.--37 years, 1405 ft³/s (39.79 m³/s), 14.24 in/yr (362 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft³/s (1,190 m³/s) Aug. 22, 1942, gage height, 28.6 ft (8.73 m) from flood-mark, from rating curve extended above 14,000 ft³/s (396 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 192 ft³/s (5.44 m³/s) July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 15,100 ft³/s (428 m³/s) Apr. 21, gage height, 15.82 ft (4.822 m), only peak above base of 9,000 ft³/s (255 m³/s); minimum daily, 240 ft³/s (6.80 m³/s) Aug. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	700	607	787	730	900	1000	2500	2790	991	1080	260	969
2	800	721	650	780	900	980	2300	2320	1150	1020	260	847
3	700	816	500	700	840	980	2200	2410	1200	969	240	895
4	550	552	650	660	860	960	2200	2490	1360	959	580	955
5	350	406	750	780	820	950	2200	2140	1300	950	520	938
6	900	435	800	780	800	950	2200	2170	1190	942	560	937
7	1050	380	620	450	820	940	2000	1890	2720	936	670	799
8	1000	613	750	650	780	940	1600	2020	2840	886	470	777
9	950	805	740	820	800	940	1400	4120	1860	849	460	747
10	944	543	720	760	780	940	1350	4160	2750	840	450	798
11	826	570	720	780	760	930	1400	5580	4890	845	440	767
12	962	331	720	800	780	920	1960	5320	3160	800	440	1150
13	960	389	720	780	780	900	3430	3930	1920	927	450	1420
14	859	608	740	800	740	890	4760	3750	1330	827	360	1480
15	698	620	800	850	760	870	4550	3080	1250	851	350	1320
16	788	646	720	760	800	860	5410	2180	1160	935	350	1120
17	716	765	700	760	700	900	7710	1870	5460	1080	400	782
18	688	675	660	780	740	950	9460	1740	4450	965	650	670
19	721	654	800	820	780	1100	10600	1680	3350	831	760	724
20	751	708	750	720	800	2000	12100	1920	2350	892	600	812
21	688	579	780	820	820	5800	14800	1990	2300	730	340	784
22	696	416	740	740	840	5100	13200	1740	1890	484	420	831
23	743	433	740	900	900	4500	11800	1920	1680	464	600	808
24	549	765	740	780	860	3800	10500	1890	1450	414	530	780
25	706	967	740	800	860	3000	9270	1620	1270	575	670	871
26	848	769	740	820	960	2700	7860	1340	1250	360	670	685
27	906	706	680	860	1000	2500	6200	1320	1560	400	540	570
28	817	599	700	840	1000	2300	4650	1300	1570	440	650	600
29	392	862	760	860	---	2100	3540	1220	1230	350	870	660
30	604	918	720	900	---	2000	3030	1060	1110	350	955	675
31	607	---	800	840	---	2200	---	1040	---	320	951	---
TOTAL	23469	18858	22437	24120	23180	55900	166180	74000	61991	23271	16466	26171
MEAN	757	629	724	778	828	1803	5539	2387	2066	751	531	872
MAX	1050	967	800	900	1000	5800	14800	5580	5460	1080	955	1480
MIN	350	331	500	450	700	860	1350	1040	991	320	240	570

CAL YR 1978 TOTAL 447094 MEAN 1225 MAX 7800 MIN 331
WTR YR 1979 TOTAL 536043 MEAN 1469 MAX 14800 MIN 240

STREAMS TRIBUTARY TO LAKE SUPERIOR
04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1974 to current year.

WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1977.

REMARKS.--Daily record is from once-daily observer samples. In addition, monthly samples collected as a cross-section sample at upstream side of bridge on Victoria Road. Complete ice cover during winter period. Biological Data (Phytoplankton) is for 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum recorded, 192 micromhos Mar. 26, 1977, May 28, 1978; minimum (water years 1975-76, 1979), 45 micromhos Dec. 2, 1975.

WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 178 micromhos Nov. 4, Dec. 3, minimum observed, 64 micromhos Apr. 24.

WATER TEMPERATURES: Maximum daily, 26.0°C July 12, 24; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED SATUR- ATION	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
11...	1030	961	132	7.3	10.5	11.0	102	K17	21	64	7
DEC											
05...	1400	750	131	7.5	.0	13.8	97	K8	K12	70	11
JAN											
09...	1530	E900	150	7.2	.0	14.1	99	K10	K5	63	1
FEB											
13...	1430	E900	133	7.2	.0	13.1	91	K6	K3	63	4
MAR											
19...	1430	E1050	153	7.6	.0	13.2	92	K29	120	67	0
APR											
24...	1345	9940	64	7.1	6.0	12.3	101	K25	K37	31	8
MAY											
15...	1500	2670	80	7.5	11.0	10.6	98	29	K9	39	6
JUN											
12...	1515	3240	82	7.3	16.0	9.6	99	390	260	42	1
26...	1100	1230	94	7.4	17.5	9.0	97	--	280	50	5
JUL											
17...	1500	1080	114	7.5	24.0	8.5	102	K10	46	57	8
AUG											
14...	1415	422	146	7.6	16.0	9.9	101	44	60	75	0
SEP											
12...	1330	1490	132	7.7	15.5	9.2	93	360	K1100	68	3

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS CO3)	ALKA- LITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
11...	17	5.3	2.3	.1	7	1.0	70	0	57	5.6	4.3
DEC											
05...	19	5.5	2.7	.1	8	1.2	72	0	59	3.6	5.1
JAN											
09...	17	5.0	2.6	.1	8	.9	76	0	62	7.7	3.1
FEB											
13...	17	4.9	2.4	.1	8	.9	72	0	59	7.3	5.1
MAR											
19...	19	4.8	4.6	.2	13	1.2	82	0	67	3.3	3.7
APR											
24...	9.5	1.7	.9	.1	6	1.0	28	0	23	3.6	4.3
MAY											
15...	11	2.7	1.6	.1	8	1.0	40	0	33	2.0	4.8
JUN											
12...	12	2.9	1.7	.1	8	1.0	50	0	41	4.0	3.3
26...	14	3.6	1.9	.1	8	.9	54	0	44	3.4	4.3
JUL											
17...	16	4.1	2.0	.1	7	.9	60	0	49	3.0	4.3
AUG											
14...	21	5.5	2.6	.1	7	.9	92	0	75	3.7	4.3
SEP											
12...	20	4.5	2.4	.1	7	1.0	80	0	66	2.6	4.1

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)
E--ESTIMATED VALUE

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 11...	2.9	.0	8.9	97	76	252	.05	.00	--	.48	.48
DEC 05...	2.7	.1	11	98	83	198	.12	.01	--	.28	.29
JAN 09...	2.3	.0	11	96	80	233	.16	.02	--	.37	.39
FEB 13...	2.2	.0	10	92	78	224	.17	.04	--	.05	.09
MAR 19...	5.7	.0	11	106	90	300	.24	.04	--	.42	.46
APR 24...	1.6	.0	5.4	64	38	1720	.11	.02	.02	.39	.41
MAY 15...	1.6	.0	6.2	72	49	519	.06	.02	--	.50	.52
JUN 12...	1.6	.1	6.5	81	54	709	.07	.03	.04	.84	.87
JUN 26...	1.6	.1	7.3	84	60	279	.13	.04	.05	.38	.42
JUL 17...	1.8	.1	6.8	81	66	236	.01	.04	.05	.35	.39
AUG 14...	2.0	.1	8.8	100	91	114	.02	.03	.04	.85	.88
SEP 12...	2.0	.1	8.8	93	83	374	.07	.07	.08	.92	.99

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 11...	.20	.28	.53	2.3	.02	--	.01	--	15	39	--
DEC 05...	--	--	.41	1.8	.03	--	.02	6.7	--	--	--
JAN 09...	.00	.39	.55	2.4	.03	--	.01	--	--	--	--
FEB 13...	--	--	.26	1.2	.01	--	.01	7.5	--	--	--
MAR 19...	--	--	.70	3.1	.12	--	.03	7.5	--	--	--
APR 24...	--	--	.52	2.3	.05	.15	.00	--	282	7570	100
MAY 15...	--	--	.58	2.6	.08	.25	.01	11	76	548	100
JUN 12...	--	--	.94	4.2	.09	.28	.05	14	80	700	100
JUN 26...	--	--	.55	2.4	.04	.12	.01	14	32	106	100
JUL 17...	--	--	.40	1.8	.02	.06	.00	--	19	55	100
AUG 14...	--	--	.90	4.0	.02	.06	.01	8.1	15	17	100
SEP 12...	--	--	1.1	4.7	.12	.37	.01	11	163	656	100

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 11...	1030	1	1	0	0	3	3	<10	0	2
JAN 09...	1530	1	1	100	100	2	1	10	0	0
APR 24...	1345	1	1	0	0	0	0	10	10	2
JUL 17...	1500	1	1	--	20	2	0	10	<10	1

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 11...	1	11	2	520	200	21	21	30	30	<.5
JAN 09...	0	11	7	550	170	7	7	30	10	<.5
APR 24...	0	13	4	4400	180	14	6	110	20	.5
JUL 17...	0	5	4	400	110	8	7	40	3	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 11...	<.5	0	0	1	1	10	10	9.4	.9
JAN 09...	<.5	0	0	0	0	30	20	6.5	.3
APR 24...	.5	0	0	0	0	30	0	16	1.2
JUL 17...	<.5	0	0	0	0	10	6	7.3	.4

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
MAY 15...	1500	21	--	.240	.240	.000	.000
JUN 26...	1100	13	706	66.3	67.5	1.70	.000
JUL 17...	1500	21	47.0	1.73	1.97	5.11	.540
SEP 12...	1330	29	109	18.7	19.5	7.33	1.02

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 22,77 1000	MAR 28,78 1215	MAY 23,78 1200	JUN 27,78 1000				
TOTAL CELLS/ML	110	1200	720	340				
DIVERSITY: DIVISION	0.5	0.9	1.5	0.0				
..CLASS	0.5	0.9	1.5	0.0				
...ORDER	0.5	1.1	1.7	0.4				
...FAMILY	2.0	1.7	3.1	2.8				
....GFNUS	2.0	1.8	3.2	2.8				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....MICRACTINIACEAE								
.....GOLENKINIA	--	-	--	-	16	2	--	-
.....MICRACTINIUM	--	-	--	-	64	9	--	-
....OOCYSTACEAE								
.....ANKISTRODESMUS	--	-	--	-				
.....CHLORELLA	--	-	--	-	--	-	--	-
.....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
.....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	64	9	--	-
....TETRASTRUM	--	-	--	-	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
....COSCINODISCACEAE								
.....CYCLOTELLA	--	-	--	-	32	4	--	-
....MELOSIRA	--	-	54	5	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	29	8
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	16	2	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	14	1	--	-	--	-
....CYMBELLA	14	13	--	-	16	2	43	13
...DIATOMACEAE								
....DIATOMA	--	-	--	-	160#	22	72#	21
...EUNOTIACEAE								
....EUNOTIA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	27	2	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	29	8
....SYNEDRA	--	-	27	2	96	13	--	-
...GOMPHONEMACEAE								
....GOMPHONEMA	54#	50	110	9	16	2	29	8
...NAVICULACEAE								
....NAVICULA	14	13	160	14	32	4	29	8
...PINNULARIA	--	-	14	1	--	-	--	-
...NITZSCHACEAE								
....NITZSCHIA	14	13	--	-	48	7	100#	29
...SURIRELLACEAE								
....SURIRELLA	--	-	14	1	--	-	14	4
..CHRYSOPHYCEAE								
...CHRYSONOMADALES								
....OCHROMONADACEAE								
.....OCHROMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR
04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 22,77 1000	MAR 28,78 1215	MAY 23,78 1200	JUN 27,78 1000				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
....CHROOCOCCACEAE								
.....AGMENELLUM	--	-	--	-	--	-	--	-
.....ANACYSTIS	--	-	--	-	140#	20	--	-
...HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
....OSCILLATORIA								
.....LYNGBYA	--	-	730#	64	--	-	--	-
.....OSCILLATORIA	--	-	--	-	--	-	--	-
...CHROOCOCCALES								
....CHROOCOCCACEAE								
.....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
....EUGLENACEAE								
.....TRACHELOMONAS	14	13	--	-	16	2	--	-

DATE TIME	AUG 2,78 1400	AUG 30,78 0945	SEP 19,78 1430
TOTAL CELLS/ML	710	160	12000
DIVERSITY: DIVISION	0.9	0.9	0.5
..CLASS	1.1	0.9	0.5
...ORDER	1.6	0.9	1.5
....FAMILY	3.1	1.7	1.6
.....GENUS	3.2	2.0	1.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
....MICRACTINACEAE						
.....GOLENKINIA	--	-	--	-	--	-
.....MICRACTINIUM	--	-	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	89	13	--	-	--	-
....CHLORELLA	--	-	14	9	--	-
....KIRCHNERIELLA	--	-	58#	36	--	-
...OOCYSTIS	44	6	--	-	--	-
....SFLENASTRUM	--	-	--	-	*	0
....SCENEDESMACEAE						
....SCENEDESMUS	89	13	--	-	--	-
....TFTRASTRUM	--	-	58#	36	--	-
...TETRASPORALES						
...PALMELLACEAE						
...SPHAEROCYSTIS	--	-	--	-	870	7
...VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	--	-	*	0
CHRYSOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
....COSCINODISCACEAE						
.....CYCLOTELLA	130#	19	--	-	*	0

NOTE: #--DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
*--OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 2,78 1400		AUG 30,78 0945		SEP 19,78 1430	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
....MELOSIRA	--	-	--	-	*	0
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
....ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
....COCCONEIS	67	9	--	-	*	0
....CYMBELLACEAE						
....AMPHORA	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	*	0
....DIATOMACEAE						
....DIATOMA	22	3	--	-	--	-
....EUNOTIACEAE						
....EUNOTIA	22	3	--	-	--	-
....FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	110	1
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	*	0
....GOMPHONEMACEAE						
....GOMPHONEMA	89	13	--	-	*	0
....NAVICULACEAE						
....NAVICULA	44	6	14	9	--	-
....PINNULARIA	--	-	--	-	--	-
....NITZSCHACEAE						
....NITZSCHIA	89	13	--	-	*	0
....SURIRELLACEAE						
....SURIRELLA	--	-	--	-	--	-
..CHRYSOPHYCEAE						
..CHRYSOMONADALES						
....OCHROMONADACEAE						
....OCHROMONAS	22	3	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
..CHROOCOCCALES						
....CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	110	1
....ANACYSTIS	--	-	--	-	83	1
..HORMOGONALES						
....NOSTOCACEAE						
....ANABAENA	--	-	--	-	150	1
....APHANIZOMENON	--	-	--	-	5500#	47
....OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	120	1
..CHROOCOCCALES						
....CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	4700#	39
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
..EUGLENALES						
....EUGLENACEAE						
....TRACHELOMONAS	--	-	14	9	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM: MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	143	166	123	138	142	108	78	120	104	150	132
2	152	140	150	145	136	147	111	86	118	104	158	130
3	156	137	178	135	146	146	106	78	116	108	161	---
4	146	178	150	148	138	144	110	84	112	130	152	130
5	172	174	122	146	137	144	111	86	108	128	158	128
6	156	168	84	152	138	152	100	92	108	142	157	128
7	142	166	138	143	136	160	100	99	108	120	150	132
8	138	145	144	140	138	148	99	100	108	133	150	125
9	137	145	144	148	137	142	104	86	---	114	154	125
10	140	155	---	140	136	146	114	88	---	116	153	128
11	160	154	---	144	147	150	118	94	100	132	158	134
12	145	158	---	141	140	148	125	86	88	119	149	150
13	132	156	---	148	145	146	126	83	104	148	164	127
14	142	177	---	138	145	144	90	87	96	124	150	127
15	136	154	---	138	146	146	91	87	116	114	158	118
16	137	156	156	142	145	153	100	90	100	139	158	118
17	140	146	150	138	142	148	96	96	132	126	158	116
18	129	154	158	141	142	144	90	98	100	120	170	110
19	128	152	144	140	142	145	84	99	90	145	148	112
20	128	147	149	146	142	145	82	103	98	126	154	113
21	150	150	148	144	142	130	69	98	104	149	147	116
22	150	158	156	140	142	121	70	---	102	174	151	120
23	132	142	162	143	170	118	68	97	98	132	154	120
24	132	140	161	140	144	---	68	100	100	160	168	118
25	137	148	155	141	138	100	78	102	100	148	146	115
26	131	150	142	139	148	100	82	101	110	176	152	118
27	136	143	148	138	142	101	72	102	---	176	140	122
28	149	151	136	138	142	98	78	102	102	173	140	126
29	165	148	149	138	---	104	78	112	102	146	143	156
30	140	149	149	140	---	114	78	111	104	148	134	122
31	142	---	141	141	---	114	---	110	---	171	138	---
MEAN	144	153		141	142		94			137	152	

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.5	7.5	.0	.0	.0	.0	.5	8.0	17.5	22.5	21.5	22.0
2	14.0	8.0	.0	.0	.0	.0	1.0	8.0	18.0	22.0	22.5	21.5
3	14.0	8.5	.0	.0	.0	.0	1.0	7.5	18.0	22.0	23.0	---
4	14.0	8.5	.0	.0	.0	.0	2.0	7.0	17.0	20.0	19.0	21.0
5	12.0	8.0	.5	.0	.0	.0	1.0	6.5	18.0	22.0	21.5	22.0
6	12.0	6.5	.5	.0	.0	.0	1.0	6.0	18.0	21.0	23.0	20.0
7	11.0	4.5	.5	.0	.0	.0	2.0	9.0	17.0	22.0	25.0	17.5
8	10.0	7.0	.5	.0	.0	.0	1.5	8.0	17.0	23.0	24.0	20.0
9	12.0	6.0	.0	.0	.0	.0	2.0	8.0	17.0	24.0	21.5	19.5
10	12.0	6.0	---	.0	.0	.0	2.5	9.5	14.5	24.5	22.5	19.0
11	11.5	5.0	---	.0	.0	.0	3.0	9.5	16.5	25.0	21.5	17.0
12	11.0	6.0	---	.0	.0	.0	2.0	10.0	18.0	26.0	20.0	16.5
13	10.5	5.0	---	.0	.0	.0	2.5	10.5	19.0	25.0	21.0	17.0
14	9.5	3.5	---	.0	.0	.0	2.5	11.0	19.0	22.0	17.0	16.0
15	8.5	3.5	---	.0	.0	.0	1.0	11.5	20.5	25.0	17.0	16.0
16	9.0	3.5	1.0	.0	.0	.0	3.0	13.0	20.0	24.0	17.5	17.0
17	9.0	2.5	.0	.0	.0	.0	3.0	14.5	18.0	24.0	16.5	18.0
18	8.0	2.5	.0	.0	.0	.0	3.5	16.0	19.0	24.0	18.0	15.5
19	9.0	2.5	.0	.0	.0	.0	3.5	16.0	19.0	24.0	21.5	15.5
20	---	2.0	.0	.0	.0	.0	3.5	15.0	20.5	22.0	22.0	16.0
21	11.0	2.0	.0	.0	.0	.0	3.5	15.0	19.0	24.0	23.0	15.5
22	9.0	1.0	.0	.0	.0	.0	4.0	---	18.0	25.0	20.0	13.5
23	9.0	1.0	.0	.0	.0	.0	2.0	13.5	16.0	25.5	21.0	15.0
24	9.0	1.0	.0	.0	.0	.0	7.0	14.0	18.0	26.0	20.0	16.0
25	8.0	1.0	.0	.0	.0	.0	7.5	15.0	19.0	25.0	21.0	14.5
26	8.5	.0	.0	.0	.0	.0	8.0	14.0	19.0	24.0	20.0	16.0
27	8.5	2.0	.0	.0	.0	.5	8.0	14.5	---	21.0	22.0	17.0
28	8.5	2.0	.0	.0	.0	1.0	7.0	13.5	20.5	18.5	20.0	16.0
29	4.5	1.5	.0	.0	---	1.5	7.5	17.0	21.0	19.0	22.0	14.0
30	9.0	.0	.0	.0	---	1.0	7.0	17.0	21.0	21.0	21.5	16.0
31	8.5	---	.0	.0	---	1.0	---	15.5	---	20.0	20.0	---
MEAN		4.0		.0	.0	.0	3.5			23.0	21.0	

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE¼ SE¼ sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft (9 m) downstream from highway bridge, 3.0 mi (4.8 km) downstream from Rock River, 3.5 mi (5.6 km) northwest of Covington, 6.5 mi (10.5 km) upstream from Perch River, 8.5 mi (13.7 km) northeast of Sidnaw, and at mile 71 (114 km).

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft (370.149 m) National Geodetic Vertical Datum of 1929. October 1912 to September 1915, nonrecording gage at site 200 ft (61 m) upstream at different datum. April 2, 1943 to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 212 ft³/s (6.004 m³/s), 16.84 in/yr (428 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft³/s (131 m³/s) Apr. 24, 1960, gage height, 11.63 ft (3.545 m); minimum, 2.7 ft³/s (0.076 m³/s) Sept. 13, 1976, gage height, 3.17 ft (0.966 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,320 ft³/s (94.0 m³/s) Apr. 26, gage height, 9.52 ft (2.902 m); minimum, 32 ft³/s (0.91 m³/s) Aug. 22, gage height, 3.84 ft (1.170 m).

DISCHARGE, IN CURIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	225	99	120	86	52	68	400	1120	258	159	208	66
2	222	96	115	84	52	68	390	934	264	133	188	64
3	252	94	115	82	52	68	382	824	258	114	145	68
4	273	93	110	80	52	70	364	735	267	99	135	71
5	291	92	110	78	52	76	350	655	249	86	147	71
6	309	90	110	76	52	80	330	600	215	75	137	93
7	343	87	110	74	52	82	310	570	249	67	117	114
8	340	87	105	74	52	80	297	670	285	66	99	99
9	303	87	105	72	52	78	279	1060	240	54	86	86
10	270	83	105	70	52	76	270	1110	346	49	72	73
11	243	89	100	68	54	74	276	1180	530	43	65	105
12	234	92	100	66	54	72	303	1180	424	40	61	185
13	212	97	100	64	54	72	452	990	326	41	65	294
14	195	122	98	62	56	72	535	848	255	54	61	261
15	180	124	98	62	56	74	510	695	210	102	60	210
16	167	92	96	60	58	76	570	565	258	86	56	167
17	159	114	96	58	60	86	780	468	1040	66	50	137
18	151	131	94	56	62	100	1000	402	860	58	47	108
19	145	155	94	56	64	115	1280	432	750	54	44	93
20	141	145	94	54	66	140	1670	496	535	55	40	86
21	133	140	92	54	70	170	2130	496	468	52	36	80
22	130	135	92	54	70	250	2260	452	535	68	33	72
23	131	131	92	54	70	370	2450	484	525	60	40	66
24	130	135	90	54	72	430	2740	452	440	75	96	61
25	128	133	90	54	72	460	3040	396	343	279	87	58
26	122	130	90	52	72	470	3280	340	282	205	73	52
27	121	128	90	52	72	480	2930	285	303	279	83	48
28	112	126	90	52	70	470	2280	273	276	264	70	44
29	108	122	88	52	---	460	1770	243	228	215	67	41
30	107	120	88	52	---	432	1390	215	195	185	65	39
31	100	---	88	52	---	420	---	200	---	200	62	---
TOTAL	5977	3369	3065	1964	1672	6039	35018	19370	11414	3383	2595	3012
MEAN	193	112	98.9	63.4	59.7	195	1167	625	380	109	83.7	100
MAX	343	155	120	86	72	480	3280	1180	1040	279	208	294
MIN	100	83	88	52	52	68	270	200	195	40	33	39
CFSM	1.13	.66	.58	.37	.35	1.14	6.83	3.66	2.22	.64	.49	.59
IN.	1.30	.73	.67	.43	.36	1.31	7.62	4.21	2.48	.74	.56	.66

CAL YR 1978 TOTAL 80884 MEAN 222 MAX 1440 MIN 49 CFSM 1.30 IN 17.60
WTR YR 1979 TOTAL 96878 MEAN 265 MAX 3280 MIN 33 CFSM 1.55 IN 21.08

STREAMS TRIBUTARY TO LAKE SUPERIOR

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE¼ sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi (6.4 km) upstream from Clear Creek, 5.0 mi (8.0 km) southeast of Alston, and at mile 45 (72 km).

DRAINAGE AREA.--346 mi² (896 km²).

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft (216.50 m) mean tide at New York City datum (levels by Corps of Engineers). Prior to Oct. 1, 1963, at datum 40.00 ft (12.192 m) lower.

REMARKS.--Records good except those for period of no gage-height record, Feb. 15 to Mar. 18, which are fair and those below 20 ft³/s (0.57 m³/s), which are poor. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, (water years 1933-40, 1943-79), 418 ft³/s (11.84 m³/s), 16.41 in/yr (417 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft³/s (208 m³/s) Apr. 24, 1960, gage height, 13.09 ft (3.990 m) present datum; minimum daily, 1 ft³/s (0.03 m³/s) Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,470 ft³/s (127 m³/s) Apr. 27, gage height, 9.72 ft (2.963 m); minimum, 9.8 ft³/s (0.278 m³/s) Sept. 10, gage height, 2.66 ft (0.811 m); minimum daily, 16 ft³/s (0.453 m³/s) July 14, 15, Sept. 23, 29, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	331	283	279	20	223	330	729	1430	432	438	454	237
2	382	278	282	252	222	340	666	1430	437	388	405	400
3	372	258	18	253	19	325	608	1260	439	331	400	397
4	522	21	273	253	19	325	607	942	458	278	344	292
5	420	21	193	252	224	325	605	1010	652	280	348	289
6	435	269	281	254	226	320	606	1010	655	257	344	234
7	640	268	281	20	220	300	604	1010	660	261	287	233
8	638	268	280	265	220	300	601	996	604	17	290	236
9	434	271	280	256	223	310	597	1620	659	262	292	236
10	434	270	279	273	222	300	597	1670	661	263	293	235
11	432	22	278	218	21	260	594	1730	1020	255	18	213
12	431	22	276	218	224	160	587	1510	791	260	18	247
13	433	313	277	24	225	180	586	1540	655	260	289	668
14	397	313	274	24	215	200	1020	1240	657	16	237	667
15	384	292	274	226	225	210	1240	1150	657	16	237	666
16	333	261	18	222	225	200	1050	997	645	263	237	567
17	333	265	18	219	225	200	1240	808	1300	264	237	337
18	333	263	278	199	21	200	1540	831	1230	265	17	340
19	332	217	253	208	220	363	1810	844	1170	264	17	285
20	283	264	251	23	220	402	2380	770	951	266	237	285
21	282	264	251	22	220	611	2820	839	915	17	238	284
22	19	265	251	212	210	617	3160	847	794	17	237	230
23	280	267	253	220	220	619	3090	899	793	254	234	16
24	281	266	19	220	220	623	3410	870	853	261	235	233
25	279	268	20	228	220	625	3910	723	675	269	237	231
26	378	21	252	226	400	716	4210	657	673	663	19	231
27	55	259	252	19	370	811	3900	656	671	673	236	231
28	371	274	252	19	350	803	3150	656	669	676	239	231
29	32	278	251	224	---	795	2270	655	656	675	240	16
30	382	277	253	222	---	782	1650	643	442	664	240	16
31	331	---	252	222	---	799	---	434	---	453	237	---
TOTAL	10989	6878	6949	5513	5849	13351	49837	31677	21874	9526	7393	8783
MEAN	354	229	224	178	209	431	1661	1022	729	307	238	293
MAX	640	313	282	273	400	811	4210	1730	1300	676	454	668
MIN	19	21	18	19	19	160	586	434	432	16	17	16
CFSM	1.02	.66	.65	.51	.60	1.25	4.80	2.95	2.11	.89	.69	.85
IN.	1.18	.74	.75	.59	.63	1.44	5.36	3.41	2.35	1.02	.79	.94

CAL YR 1978 TOTAL 145578 MEAN 399 MAX 1980 MIN 13 CFSM 1.15 IN 15.65
WTR YR 1979 TOTAL 178619 MEAN 489 MAX 4210 MIN 16 CFSM 1.41 IN 19.20

04043004 STURGEON RIVER NEAR CHASSELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°58'28", long 88°31'21", in NE¼ SW¼ sec.20, T.53 N., R.33 W., Houghton County, Hydrologic Unit 04020104, 2.2 mi (3.5 km) upstream from bridge on county road, 3.5 mi (5.6 km) south of Chassell, 5.0 mi (8.0 km) downstream from Otter Lake, and at mile 5.2 (8.4 km).

DRAINAGE AREA.--723 mi² (1,873 km²).

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: March 1978 to current year.

WATER TEMPERATURES: March 1978 to current year.

REMARKS.--Daily record is from once-daily observer samples. In addition, monthly samples are collected as a cross-section sample at bridge 2.2 mi (3.5 km) downstream and in the winter, through the ice in the vicinity of the site. Complete ice cover during winter period. Biological Data (Plytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 178 micromhos Nov. 7, 1978; minimum daily, 46 micromhos Apr. 26, 27, 29, 1979.

WATER TEMPERATURES: Maximum daily, 26.0°C July 26, 1978, July 17, 1979; minimum daily, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 178 micromhos Nov. 7; minimum daily, 46 micromhos Apr. 26, 27, 29.

WATER TEMPERATURES: Maximum daily, 26.0°C July 13; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COL.5./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT 24...	1400	563	171	7.4	8.0	10.6	93	25	10	88	12
DEC 06...	1130	E350	140	7.6	.0	13.6	95	K6	36	75	11
JAN 10...	1500	500	151	7.1	.0	--	--	12	K1	66	0
FEB 14...	1430	487	173	7.3	.0	10.5	73	K4	K190	77	3
MAR 20...	1130	924	124	7.3	.0	12.4	86	20	25	69	2
APR 25...	1530	8150	50	6.6	4.5	11.2	89	K11	31	21	5
MAY 16...	1115	2070	68	6.9	10.0	10.0	90	10	K8	32	7
JUN 13...	1100	1810	82	6.9	16.5	8.6	90	38	24	39	3
27...	1230	1130	80	7.1	19.0	8.3	90	62	K105	42	6
JUL 18...	1200	578	114	7.4	21.0	7.9	88	110	130	60	4
AUG 15...	1130	460	125	7.6	17.0	8.4	88	54	48	63	0
SEP 12...	1430	750	135	7.8	15.0	9.0	90	K460	K1400	67	0

DATE	CALCIUM DTS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DTS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
OCT 24...	24	6.7	2.7	.1	6	1.1	--	0	76	--	4.2
DEC 06...	20	6.0	2.4	.1	6	1.2	78	0	64	3.1	4.7
JAN 10...	18	5.2	2.5	.1	7	1.0	82	0	67	10	2.0
FEB 14...	21	5.9	3.2	.2	8	.9	90	0	74	7.2	4.2
MAR 20...	19	5.2	2.6	.1	7	1.1	82	0	67	6.6	3.4
APR 25...	5.7	1.6	1.0	.1	9	.8	19	0	16	7.6	4.7
MAY 16...	9.0	2.2	1.2	.1	7	.8	30	0	25	6.0	6.0
JUN 13...	11	2.9	1.5	.1	7	.8	44	0	36	8.9	3.7
27...	12	2.9	1.5	.1	7	.7	44	0	36	5.6	4.5
JUL 18...	17	4.2	1.9	.1	6	.8	68	0	56	4.3	4.1
AUG 15...	18	4.5	2.3	.1	7	.8	82	0	67	3.3	4.6
SEP 12...	19	4.7	2.2	.1	7	.9	83	0	68	2.1	4.4

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

E--ESTIMATED VALUE

STREAMS TRIBUTARY TO LAKE SUPERIOR

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 24...	1.4	.1	10	113	97	172	.08	.03	--	.39	.42
DEC 06...	2.2	.1	10	95	85	89.8	.03	.02	--	.26	.28
JAN 10...	2.0	.0	11	100	83	135	.14	.01	--	.27	.28
FEB 14...	2.0	.0	12	101	94	133	.16	.02	--	.32	.30
MAR 20...	2.0	.1	11	93	85	232	.19	.02	--	.23	.25
APR 25...	1.2	.0	5.5	50	30	1100	.16	.01	.01	.41	.42
MAY 16...	1.3	.0	5.4	58	41	324	.09	.02	.02	.56	.58
JUN 13...	1.4	.0	5.5	72	49	352	.08	.02	.02	.47	.49
JUN 27...	1.6	.1	5.4	72	50	220	.07	.02	.02	.72	.74
JUL 18...	1.4	.1	6.6	90	70	140	.04	.05	.06	.47	.52
AUG 15...	1.8	.1	7.1	92	80	114	.04	.12	.15	.78	.90
SEP 12...	1.6	.1	7.8	91	82	184	.08	.05	.06	.37	.42

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 24...	--	--	.50	2.2	.02	--	.01	--	8	12	--
DEC 06...	--	--	.31	1.4	.02	--	.01	7.1	--	--	--
JAN 10...	.04	.24	.42	1.9	.02	--	.01	--	11	15	100
FEB 14...	--	--	.46	2.0	.01	--	.01	6.7	7	9.2	100
MAR 20...	--	--	.44	1.9	.03	--	.01	6.6	25	62	100
APR 25...	--	--	.58	2.6	.03	.09	.00	--	292	6430	100
MAY 16...	--	--	.67	3.0	.04	.12	.01	13	52	291	100
JUN 13...	--	--	.57	2.5	.04	.12	.01	11	33	161	100
JUN 27...	--	--	.81	3.6	.03	.09	.01	13	18	55	100
JUL 18...	--	--	.56	2.5	.02	.06	.00	--	12	19	--
AUG 15...	--	--	.94	4.2	.02	.06	.01	9.4	10	12	100
SEP 12...	--	--	.50	2.2	.04	.12	.01	8.5	18	36	100

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 24...	1400	1	1	0	0	0	0	<10	3	1
JAN 10...	1500	1	1	100	100	3	3	10	0	0
APR 25...	1530	1	1	0	0	1	1	10	<10	1
JUL 18...	1200	1	1	0	20	9	1	10	<10	1

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 24...	1	5	3	1100	610	15	8	70	40	<.5
JAN 10...	0	6	3	580	350	42	30	40	30	<.5
APR 25...	0	29	3	3000	240	17	5	80	20	<.5
JUL 18...	0	4	2	630	330	20	22	40	10	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 24...	<.5	0	0	0	0	10	10	8.7	.5
JAN 10...	<.5	0	0	0	0	40	10	8.2	.3
APR 25...	<.5	0	0	0	0	80	10	16	2.1
JUL 18...	<.5	0	0	0	0	20	7	9.9	.5

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
JUN 13...	1100	28	625	30.3	33.7	5.44	.000
27...	1230	14	4109	6.38	8.27	.460	.000
SEP 12...	1430	28	71.4	.870	.940	.980	.110

STREAMS TRIBUTARY TO LAKE SUPERIOR

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 29,78 1600	MAY 24,78 1230	JUN 28,78 1100	AUG 3,78 1430	AUG 31,78 1100	SEP 28,78 1200				
TOTAL CFLLS/ML	140	2300	660	2000	1200	1300				
DIVERSITY: DIVISION	0.0	1.0	1.5	1.1	1.0	0.8				
..CLASS	0.0	1.2	1.5	1.1	1.0	0.8				
...ORDER	1.0	1.4	2.0	1.2	1.2	1.1				
...FAMILY	1.7	1.5	2.1	1.8	1.4	1.8				
....GENUS	2.0	1.7	2.1	1.8	1.5	1.8				
ORGANISM	CFLLS /ML	PER- CENT	CFLLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
....MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	44	2	--	-
....OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	29	4	89	5	*	0
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	*	0
....OOCYSTIS	--	-	--	-	--	-	--	-	*	0
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMACEAE										
....CRUCIGFNIA	--	-	--	-	--	-	--	-	76	7
....SCENEDESMUS	--	-	--	-	--	-	--	-	14	1
....TETRASTRUM	--	-	--	-	--	-	--	-	*	0
....VOLVOCALES										
...CHLAMYDOMONADACEAE										
...CHLAMYDOMONAS	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATALES									7	1
...ZYGNEMATAACEAE										
....SPIROGYRA	--	-	--	-	180#	27	--	-	--	-
CHRYSOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
...COSCINODISCACEAE										
....CYCLOTFLLA	--	-	130	6	--	-	44	2	--	-
....MFLOSIPIA	54#	40	260	11	88	13	--	-	73	6
....STEPHANODISCUS	--	-	--	-	--	-	--	-	*	0
...PENNIALES										
....ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCONEIS	--	-	--	-	--	-	44	2	--	-
....CYMBELLACEAE										
....CYMBELLA	--	-	16	1	--	-	44	2	--	-
....DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	22	1	--	-
....EUNOTIACEAE										
....EUNOTIA	--	-	16	1	--	-	--	-	--	-
....FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	15	2	--	-	34	3
....SYNEDRA	14	10	64	3	--	-	44	2	*	0
....GOMPHONEMACEAE										
....GOMPHONEMA	14	10	--	-	29	4	--	-	--	-
....MERIDIONACEAE										
....MERIDION	--	-	32	1	--	-	--	-	--	-
....NAVICULACEAE										
....CALONEIS	--	-	16	1	--	-	--	-	--	-
....NAVICULA	14	10	32	1	29	4	180	9	--	-
....PINNULARIA	--	-	--	-	--	-	22	1	--	-
....STAURONEIS	41#	30	--	-	--	-	--	-	--	-
....NITZSCHACEAE										
....NITZSCHIA	--	-	--	-	--	-	67	3	*	0
....TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	--	-	68	6
..CHRYSOPHYCEAE										
...CHRYSOMONADALES										
...OCHROMONADACEAE										
....OCHROMONAS	--	-	96	4	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM; MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 29,78 1600	MAY 24,78 1230	JUN 28,78 1100	AUG 3,78 1430	AUG 31,78 1100	SEP 28,78 1200				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
..CRYPTOPHYCEAE										
...CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)										
..CYANOPHYCEAE										
...CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	1600#	69	--	-	--	-	27	2
...HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	290#	44	1400#	69	870#	75
...OSCILLATORIACEAE									200	15
....OSCILLATORIA	--	-	--	-	--	-	--	-	890#	68
EUGLENOPHYTA (EUGLENOIDS)										
..EUGLENOPHYCEAE										
...EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	9	1
....PHACUS	--	-	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	48	2	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
..DINOPHYCEAE										
...GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR
04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	132	121	142	140	156	149	98	56	83	97	122	147
2	148	138	143	144	157	148	98	58	84	96	123	135
3	131	138	144	144	156	156	94	60	94	96	122	134
4	125	128	143	144	168	152	104	60	92	96	122	138
5	104	118	144	139	164	152	94	60	93	95	122	138
6	122	145	140	100	170	160	94	60	94	103	128	142
7	116	178	139	142	164	152	108	60	89	100	120	140
8	110	133	140	144	169	152	96	62	87	101	118	136
9	111	140	142	148	160	152	96	64	88	152	120	138
10	126	143	140	135	164	151	94	64	80	152	120	137
11	126	138	140	144	164	150	94	62	80	121	122	136
12	142	131	142	145	170	150	94	66	77	122	120	136
13	142	152	140	145	168	150	94	64	84	126	193	140
14	143	162	140	145	168	152	94	65	86	102	168	138
15	143	142	142	152	164	150	88	66	83	103	124	140
16	143	138	140	154	162	152	92	70	84	130	124	144
17	143	138	141	153	163	151	78	69	74	171	120	131
18	124	137	149	146	158	152	72	70	73	110	124	137
19	125	142	149	144	162	102	70	70	76	110	123	146
20	142	147	144	146	163	100	62	72	78	136	125	145
21	143	147	144	145	164	100	62	72	83	136	124	148
22	143	146	144	158	163	92	63	72	84	138	124	146
23	143	142	144	160	160	94	52	72	83	148	124	146
24	162	146	142	161	158	94	52	74	83	150	128	158
25	139	148	142	160	156	110	52	73	78	132	126	140
26	140	150	153	146	156	110	46	73	82	109	127	148
27	140	136	150	146	157	112	46	72	83	110	128	141
28	118	163	142	146	156	111	53	74	91	114	158	144
29	155	148	142	149	---	112	46	84	80	115	159	142
30	118	139	142	151	---	110	52	---	93	132	146	144
31	154	---	141	148	---	109	---	82	---	---	146	---
MEAN	134	142	143	146	162	132	78		84		131	141

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	9.0	2.0	1.0	.0	.0	1.0	6.0	14.0	20.0	23.0	20.0
2	14.0	10.0	2.0	1.0	.0	.0	1.5	6.0	14.0	20.0	22.0	20.0
3	14.0	10.0	2.0	1.0	.0	.0	1.5	6.0	14.0	20.0	23.0	20.0
4	14.5	9.0	2.0	1.0	.0	.0	1.0	6.0	15.0	20.0	23.0	20.0
5	15.0	10.0	2.0	1.0	.0	.0	1.5	6.0	15.0	20.0	23.0	20.0
6	13.5	8.0	2.0	1.0	.0	.0	1.5	6.0	16.0	21.0	23.0	19.0
7	12.0	7.0	2.0	1.0	.0	.0	1.5	6.0	16.0	22.0	23.0	19.0
8	13.0	8.0	2.0	1.0	.0	.0	1.0	6.0	16.0	22.0	23.0	19.0
9	13.0	8.0	2.0	1.0	.0	.0	1.0	6.0	16.0	24.0	23.0	19.0
10	13.0	7.0	2.0	.0	.0	.0	1.0	7.0	16.0	24.0	23.0	18.0
11	13.0	7.0	2.0	1.0	.0	.0	1.0	7.0	16.0	25.0	23.0	18.0
12	12.5	6.0	2.0	1.0	.0	.0	1.0	8.0	16.0	25.0	23.0	18.0
13	11.0	6.0	1.5	1.0	.0	.0	1.0	8.0	19.0	26.0	22.0	16.0
14	13.5	6.0	1.5	1.0	.0	.0	1.0	10.0	17.0	25.0	21.0	16.0
15	13.5	5.0	1.0	1.0	.0	.0	2.0	11.0	18.0	25.0	21.0	17.0
16	14.0	5.0	1.0	1.0	.0	.0	2.0	13.0	19.0	25.0	21.0	17.0
17	14.0	4.0	1.0	1.0	.0	.0	2.0	13.0	18.0	24.0	20.0	18.0
18	13.5	4.0	1.0	.0	.0	.0	2.0	14.0	18.0	24.0	19.0	18.0
19	13.0	4.0	1.0	.0	.0	.5	2.0	14.0	18.0	24.0	18.0	17.0
20	12.5	4.0	1.0	.0	.0	.5	2.0	14.0	19.0	25.0	19.0	17.0
21	12.0	3.0	1.0	.0	.0	.5	2.0	15.0	18.0	25.0	19.0	16.0
22	12.0	3.0	1.0	.0	.0	.5	2.0	15.0	18.0	25.0	19.0	16.0
23	12.0	3.0	1.0	.0	.0	.5	4.0	14.0	17.0	25.0	19.0	16.0
24	13.0	2.0	1.0	.0	.0	.5	4.0	14.0	17.0	25.0	19.0	15.0
25	13.0	2.0	1.0	.0	.0	1.0	5.0	14.0	19.0	25.0	19.0	15.0
26	12.0	2.0	1.0	.0	.0	1.0	5.0	14.0	19.0	23.0	19.0	15.0
27	10.0	2.0	1.0	.0	.0	1.0	5.0	13.0	19.0	24.0	19.0	16.0
28	10.0	2.0	1.0	.0	.0	1.0	5.0	13.0	20.0	23.0	20.0	15.0
29	9.0	2.0	1.0	.0	---	1.0	5.0	14.0	20.0	24.0	20.0	15.0
30	9.0	2.0	1.0	.0	---	1.0	5.0	14.0	20.0	24.0	20.0	15.0
31	9.0	---	1.0	.0	---	1.0	---	14.0	---	---	20.0	---
MEAN	12.5	5.5	1.5	.5	.0	.5	2.5	10.5	17.0		21.0	17.5

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE¼ SE¼ sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft (6 m) upstream from bridge on county highway, 2.0 mi (3.2 km) northeast of Lake Linden, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--28.0 mi² (72.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1964 and 1966. October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft (189.49 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. From April 1973 to December 1977, flow includes about 0.1 ft³/s (0.003 m³/s) mine pumpage. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--13 years, 44.4 ft³/s (1.257 m³/s), 21.53 in/yr (547 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,590 ft³/s (45.0 m³/s) May 10, 1979, gage height, 10.72 ft (3.267 m); minimum daily, 6.8 ft³/s (0.19 m³/s) Oct. 3, 1976; minimum gage height, 3.85 ft (1.173 m) June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft³/s (10.8 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Apr. 25	2400	911 25.8	8.77 2.673	June 7	1400	866 24.5	8.62 2.627
May 10	1100	*1,590 45.0	*10.72 3.267				

Minimum discharge, 13.0 ft³/s (0.37 m³/s) July 12, gage height, 3.94 ft (1.201 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	15	24	22	22	24	58	259	85	22	40	19
2	22	15	24	21	21	24	55	251	73	21	27	57
3	39	15	23	21	22	24	49	208	61	20	21	35
4	33	15	25	21	22	24	51	202	51	20	20	25
5	26	16	25	21	22	22	53	166	43	19	19	21
6	24	16	23	21	22	21	50	137	38	19	18	19
7	25	16	21	21	22	21	45	171	569	18	17	18
8	23	16	22	21	22	21	40	291	285	18	16	18
9	21	15	22	21	22	21	38	386	132	18	16	17
10	20	16	22	22	22	21	37	1120	207	19	16	35
11	20	17	22	22	22	22	41	517	244	18	15	47
12	34	17	22	22	22	22	52	283	116	17	15	78
13	28	29	22	22	22	22	80	192	76	18	16	62
14	23	51	22	22	22	22	98	155	60	19	16	38
15	21	34	22	22	22	21	111	122	88	17	15	28
16	20	27	22	21	22	21	148	99	74	17	15	24
17	19	26	22	21	22	22	215	85	161	16	15	20
18	18	51	22	21	22	27	309	79	84	17	15	18
19	18	43	22	21	22	40	375	78	54	19	15	17
20	18	34	22	21	22	51	398	96	45	18	15	20
21	18	29	23	21	22	56	519	102	79	17	14	21
22	17	27	22	21	22	60	640	74	95	24	14	19
23	17	25	22	21	22	75	645	79	60	20	16	18
24	17	25	22	22	22	60	629	64	44	18	17	17
25	18	25	22	23	23	80	818	53	36	18	15	16
26	17	25	22	22	23	65	711	45	32	18	15	15
27	17	24	21	22	24	60	536	43	28	18	16	15
28	16	24	21	22	24	58	403	45	26	18	16	15
29	16	24	22	22	---	53	320	40	25	17	18	15
30	16	24	23	22	---	51	272	37	23	57	16	15
31	16	---	22	22	---	61	---	36	---	84	16	---
TOTAL	655	736	693	667	621	1172	7796	5515	2994	679	535	782
MEAN	21.1	24.5	22.4	21.5	22.2	37.8	260	178	99.8	21.9	17.3	26.1
MAX	39	51	25	23	24	80	818	1120	569	84	40	78
MIN	16	15	21	21	21	21	37	36	23	16	14	15
CFSM	.75	.88	.80	.77	.79	1.35	9.29	6.36	3.56	.78	.62	.93
IN.	.87	.98	.92	.89	.83	1.56	10.36	7.33	3.98	.90	.71	1.04
CAL YR 1978 TOTAL	14214		MEAN 38.9	MAX 415	MIN 12	CFSM 1.39	IN 18.88					
WTR YR 1979 TOTAL	22845		MEAN 62.6	MAX 1120	MIN 14	CFSM 2.24	IN 30.35					

STREAMS TRIBUTARY TO LAKE SUPERIOR
04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED
WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: October 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1971.

REMARKS.--Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 24.5°C July 30, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 21.0°C July 14, 15, 21; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.5	10.0	7.5	5.5	.0	.0	.5	.5	.0	.0	.0	.0
2	11.0	10.5	7.5	6.0	.0	.0	.5	.5	.0	.0	.0	.0
3	11.5	10.5	7.5	5.0	.0	.0	.5	.5	.0	.0	.0	.0
4	12.0	11.0	7.5	6.5	.0	.0	.5	.5	.0	.0	.5	.5
5	11.5	11.0	7.5	7.0	.0	.0	.5	.5	.0	.0	.5	.5
6	10.5	10.0	6.5	5.5	.0	.0	.5	.5	.0	.0	.5	.5
7	9.5	8.0	4.5	4.0	.0	.0	.5	.5	.0	.0	.5	.5
8	8.5	7.5	6.5	4.0	.0	.0	.0	.0	.0	.0	.5	.5
9	9.5	7.0	6.5	6.0	.0	.0	.0	.0	.0	.0	.5	.5
10	10.0	7.5	6.0	4.5	.0	.0	.0	.0	.0	.0	.5	.5
11	10.0	8.5	4.5	3.5	.0	.0	.0	.0	.0	.0	.5	.5
12	9.5	8.5	3.5	3.0	.0	.0	.0	.0	.0	.0	.5	.5
13	7.5	6.5	4.0	3.5	.0	.0	.0	.0	.0	.0	.5	.5
14	7.0	6.0	4.0	3.0	.0	.0	.0	.0	.0	.0	.5	.5
15	6.5	5.5	3.0	2.5	.0	.0	.0	.0	.0	.0	.5	.5
16	6.0	4.5	2.5	2.0	.0	.0	.0	.0	.0	.0	.5	.5
17	6.5	4.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.5	.5
18	6.5	6.5	2.0	1.5	.0	.0	.0	.0	.0	.0	1.5	.5
19	8.0	6.0	1.0	.5	.0	.0	.0	.0	.0	.0	1.5	1.0
20	8.5	5.5	.5	.5	.0	.0	.0	.0	.0	.0	1.5	1.0
21	9.0	7.0	.5	.5	.0	.0	.0	.0	.0	.0	1.5	1.0
22	9.0	7.5	.5	.5	.0	.0	.0	.0	.0	.0	2.5	1.0
23	7.5	6.5	.5	.5	.0	.0	.0	.0	.0	.0	2.0	.5
24	7.5	6.5	1.0	.5	.0	.0	.0	.0	.0	.0	.5	.5
25	7.5	7.0	1.0	1.0	.5	.5	.0	.0	.0	.0	.5	.5
26	7.5	6.5	1.0	.5	.5	.5	.0	.0	.0	.0	.5	.5
27	7.0	6.5	1.0	.5	.5	.5	.0	.0	.0	.0	.5	.5
28	7.5	6.5	.5	.5	.5	.5	.0	.0	.0	.0	.5	.5
29	6.5	4.5	.5	.5	.5	.5	.0	.0	---	---	.5	.5
30	8.0	6.0	.0	.0	.5	.5	.0	.0	---	---	1.0	.5
31	7.5	6.0	---	---	.5	.5	.0	.0	---	---	3.0	.5
MONTH	12.0	4.5	7.5	.0	.5	.0	.5	.0	.0	.0	3.0	.0

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	.5	6.5	3.0	14.5	10.5	18.5	14.5	18.5	15.0	17.5	14.5
2	2.5	.5	6.0	4.5	14.5	11.5	18.5	14.0	20.0	15.5	17.5	16.0
3	3.5	.5	6.0	4.0	13.5	11.5	17.5	13.5	20.5	17.0	16.0	14.5
4	3.5	.5	6.0	4.5	15.0	12.5	17.5	13.5	19.5	17.0	17.0	13.5
5	2.5	1.0	5.5	4.0	16.0	12.0	17.5	13.5	19.0	16.0	18.0	15.5
6	1.5	.5	5.0	4.5	14.0	12.0	19.0	14.5	18.0	14.5	17.5	15.5
7	1.0	.5	8.0	4.5	13.5	12.0	18.5	15.0	20.5	16.5	16.5	13.5
8	2.0	1.0	8.0	6.5	14.5	12.5	19.0	15.5	19.5	16.0	13.5	11.5
9	4.5	1.0	6.5	5.0	16.0	13.0	20.0	16.0	18.0	15.0	15.0	12.5
10	5.0	1.5	7.0	4.5	15.5	13.0	20.0	16.5	18.5	15.5	15.5	14.0
11	4.5	2.5	8.5	7.0	15.0	11.5	20.5	17.0	17.5	14.5	14.0	13.0
12	3.5	2.5	8.5	6.5	15.5	12.0	20.5	17.0	16.5	14.0	13.5	13.0
13	3.0	2.0	10.0	6.5	15.5	12.5	19.5	17.5	18.0	15.0	14.5	13.0
14	2.5	1.5	11.5	8.0	17.5	13.5	21.0	17.5	16.5	13.5	13.5	13.0
15	3.0	2.0	11.5	8.5	19.0	15.5	21.0	17.5	15.0	12.5	14.5	12.5
16	3.0	1.5	12.0	8.0	18.5	15.5	19.5	16.5	14.5	12.0	15.0	12.0
17	3.0	1.0	13.0	10.0	17.5	15.0	18.5	14.5	14.5	13.5	16.0	13.0
18	2.5	1.0	15.5	12.5	17.5	14.5	18.5	14.5	15.5	13.0	16.0	12.5
19	2.5	1.0	14.5	12.0	17.5	13.5	18.5	16.5	17.5	14.5	12.5	10.5
20	1.5	1.0	13.0	10.0	18.5	15.0	20.0	16.0	17.5	15.5	14.0	11.5
21	2.0	1.0	12.5	8.5	16.5	14.5	21.0	16.5	18.0	15.0	13.5	12.0
22	3.0	1.0	12.0	9.5	15.0	13.5	20.5	17.5	16.5	15.5	12.5	10.5
23	3.0	1.0	13.0	8.5	15.5	11.5	20.5	16.0	16.0	15.5	12.5	10.5
24	4.0	1.5	14.0	9.5	16.0	12.0	20.0	17.5	17.0	15.0	14.0	12.0
25	3.0	1.5	14.5	10.5	16.0	12.5	19.0	17.0	17.5	14.5	14.0	11.5
26	5.0	1.5	13.0	10.5	19.0	14.5	18.5	16.0	16.5	15.0	13.5	11.0
27	5.5	1.5	11.5	11.0	19.0	14.5	17.5	15.5	18.0	15.0	13.5	11.5
28	5.5	1.5	15.0	9.5	18.0	14.0	19.0	15.5	16.5	14.5	14.0	12.5
29	5.5	2.0	15.5	11.5	19.5	14.5	19.5	16.0	17.5	14.5	12.5	11.5
30	6.0	3.0	16.0	11.5	19.5	15.0	19.5	16.5	17.5	15.0	13.0	11.0
31	---	---	14.5	12.0	---	---	17.5	16.5	16.0	14.5	---	---
MONTH	6.0	.5	16.0	3.0	19.5	10.5	21.0	13.5	20.5	12.0	18.0	10.5

LOCATION.--Lat 46°31'29", long 87°34'25", in SE¼ sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, on right bank 30 ft (9 m) downstream from bridge on U.S. Highway 41, and 2.0 mi (3.2 km) northeast of Negaunee.

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft (402.306 m) Michigan Department of Highway and Transportation datum. Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft or 27.7 hm³) 5 mi (8 km) upstream. The city of Ishpeming diverted an average of 2.5 ft³/s (0.071 m³/s) into basin as waste effluent (station 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 61.4 ft³/s (1.739 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 351 ft³/s (9.94 m³/s) June 27, 28, 1968, gage height, 4.68 ft (1.426 m); maximum gage height, 5.24 ft (1.597 m) Mar. 2, 1972, backwater from ice; minimum discharge, 3.7 ft³/s (0.10 m³/s) July 29, 1965; minimum gage height, 1.94 ft (0.591 m) Aug. 1, 1962; minimum daily discharge, 3.9 ft³/s (0.11 m³/s) July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 299 ft³/s (8.47 m³/s) June 17, gage height, 4.42 ft (1.347 m); minimum, 13 ft³/s (0.37 m³/s) Mar. 24, gage height, 2.27 ft (0.692 m).

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	85	95	86	78	73	56	82	89	99	137	58
2	97	85	95	86	76	73	57	82	87	98	111	62
3	102	85	95	86	76	73	60	81	89	97	104	59
4	116	85	95	86	74	73	54	79	91	96	105	57
5	106	86	95	86	72	73	55	74	90	96	108	57
6	102	86	95	86	72	73	42	74	102	95	102	60
7	115	85	94	86	70	73	50	78	111	94	98	59
8	119	84	94	86	70	72	51	91	116	94	97	57
9	107	83	94	86	68	72	57	100	112	94	96	57
10	98	83	94	86	70	72	51	81	154	95	96	60
11	95	86	94	86	72	72	50	78	178	94	96	65
12	94	85	92	86	72	72	53	71	134	94	96	70
13	93	85	92	86	72	72	65	66	116	104	97	66
14	91	91	91	86	72	72	75	66	110	176	96	62
15	90	96	90	86	72	72	75	69	108	127	96	60
16	90	95	88	86	72	72	85	86	113	102	95	58
17	89	101	88	86	72	73	102	86	258	97	95	56
18	89	120	88	86	72	74	122	85	189	95	96	56
19	90	113	87	86	72	77	140	127	133	95	96	56
20	89	105	88	84	72	81	168	148	120	95	96	56
21	89	100	88	83	72	81	217	110	142	95	95	57
22	88	100	88	81	72	81	218	97	133	96	95	57
23	89	100	87	81	72	80	195	102	118	96	96	57
24	91	100	88	80	72	37	210	97	110	96	86	56
25	90	97	88	80	72	56	243	90	106	104	65	56
26	89	97	87	80	74	56	225	87	108	105	57	56
27	88	96	87	80	74	56	151	89	121	110	55	56
28	88	96	87	80	74	56	114	91	111	107	55	56
29	87	96	87	80	---	56	96	87	103	101	57	57
30	87	95	87	80	---	56	86	85	100	119	57	57
31	86	---	86	80	---	56	---	87	---	195	56	---
TOTAL	2943	2801	2804	2603	2028	2135	3223	2726	3652	3261	2787	1756
MEAN	94.9	93.4	90.5	84.0	72.4	68.9	107	87.9	122	105	89.9	58.5
MAX	119	120	95	86	78	81	243	148	258	195	137	70
MIN	86	83	86	80	68	37	42	66	87	94	55	56
CAL YR 1978	TOTAL	29132	MEAN 79.8	MAX 245	MIN 19							
WTR YR 1979	TOTAL	32719	MEAN 89.6	MAX 258	MIN 37							

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 46°34'30", long 85°16'10", in NE¼ sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi (1.1 km) upstream from Tahquamenon (Big) Falls, 11.5 mi (18.5 km) west of Tahquamenon Paradise, and 19 mi (31 km) northeast of Newberry.

DRAINAGE AREA.--790 mi² (2,046 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft (212.4 m) from river-profile map (nearest ft).

REMARKS.--Water-discharge records good except those for period of no gage-height record, Dec. 11 to Jan. 16, which are fair.

AVERAGE DISCHARGE.--26 years, 942 ft³/s (26.68 m³/s), 16.19 in/yr (411 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft³/s (198 m³/s) May 10, 1960, gage height, 10.26 ft (3.127 m); minimum, 157 ft³/s (4.45 m³/s) July 26, 1955; minimum gage height, 2.86 ft (0.872 m) July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,520 ft³/s (156 m³/s) Apr. 26, 27, 28, gage height, 9.28 ft (2.829 m); minimum, 361 ft³/s (10.2 m³/s) July 24, 25, gage height, 3.52 ft (1.073 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1250	693	709	455	426	506	2250	5020	793	1600	1240	640
2	1240	660	669	460	435	507	2300	4790	860	1590	1310	651
3	1290	649	642	465	439	502	2300	4540	859	1530	1310	644
4	1490	622	624	465	443	533	2300	4320	824	1430	1250	634
5	1700	594	605	465	447	590	2300	4090	829	1350	1180	601
6	2120	546	589	470	450	620	2300	3830	870	1250	1150	552
7	2570	552	568	470	440	640	2250	3610	875	1120	1150	525
8	2830	569	547	470	440	665	2200	3390	864	994	1140	509
9	2950	543	530	460	430	683	2100	3120	876	849	1110	488
10	2950	551	517	450	430	696	2000	2900	891	756	1060	532
11	2890	548	506	440	430	714	1900	2670	1010	741	991	680
12	2820	559	500	440	430	731	2000	2450	1080	714	912	797
13	2690	561	490	440	425	745	2100	2260	1090	672	821	901
14	2570	578	480	435	425	754	2400	2040	1070	606	768	955
15	2430	600	475	430	420	763	2800	1860	994	557	757	976
16	2270	609	470	430	420	767	3200	1710	921	502	743	970
17	2120	624	460	428	420	768	3700	1580	910	476	698	940
18	1930	835	450	426	430	786	4200	1420	940	463	663	847
19	1780	1020	445	427	430	836	4600	1270	924	438	640	801
20	1650	1110	440	427	440	935	5000	1230	877	424	612	754
21	1510	1120	430	424	450	1040	5400	1250	926	416	583	706
22	1350	1080	425	425	470	1120	5300	1300	1050	392	547	671
23	1240	1070	425	423	480	1300	5200	1300	1130	391	518	636
24	1170	1040	425	419	485	1610	5250	1290	1180	376	521	601
25	1060	985	425	412	490	1720	5340	1250	1190	533	557	561
26	963	899	425	409	495	1840	5470	1210	1190	801	569	526
27	896	820	430	410	500	1930	5490	1150	1450	883	539	511
28	829	768	440	411	505	2000	5480	1080	1580	918	522	479
29	795	739	440	413	---	2050	5390	996	1620	916	503	457
30	763	726	450	416	---	2100	5200	921	1620	884	543	442
31	704	---	455	420	---	2200	---	833	---	1080	603	---
TOTAL	54820	22270	15486	13535	12525	32651	107720	70680	31293	25652	25510	19987
MEAN	1768	742	500	437	447	1053	3591	2280	1043	827	823	666
MAX	2950	1120	709	470	505	2200	5490	5020	1620	1600	1310	976
MIN	704	543	425	409	420	502	1900	833	793	376	503	442
CFSM	2.24	.94	.63	.55	.57	1.33	4.55	2.89	1.32	1.05	1.04	.84
IN.	2.58	1.05	.73	.64	.59	1.54	5.07	3.33	1.47	1.21	1.20	.94
CAL YR 1978	TOTAL	400101	MEAN	1096	MAX	4170	MIN	293	CFSM	1.39	IN	18.84
WTR YR 1979	TOTAL	432129	MEAN	1184	MAX	5490	MIN	376	CFSM	1.50	IN	20.35

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1974 to current year.

WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Once-daily specific conductance and temperature records are based on samples taken by local observer near monitor site. In addition to the water-quality monitor record, monthly samples are collected as a cross-section sample at cableway 40 ft (12 m) downstream from gage or by wading 300 ft (91 m) downstream. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and were analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976-79), 238 micromhos Jan. 24, 1977; minimum (water years 1976, 1978-79), 34 micromhos Apr. 17, 18, 1976.

WATER TEMPERATURES (water years 1976-79): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 173 micromhos Mar. 6; minimum recorded, 46 micromhos Apr. 27.

WATER TEMPERATURES: Maximum, 24.5°C July 23, 25; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L AS CACO3)
OCT											
17...	1100	2110	92	7.1	6.0	6.8	56	K3	K6	47	1
NOV											
07...	1430	556	136	7.3	7.0	10.0	84	K9	K3	65	9
DEC											
05...	1215	600	150	7.0	.0	9.3	65	--	--	71	13
JAN											
16...	1215	430	160	7.4	.0	7.9	55	K5	K2	96	21
FEB											
27...	1300	498	169	7.2	.0	5.6	39	11	K5	81	3
MAR											
27...	1230	1920	88	6.8	.0	6.6	46	K6	K4	43	9
APR											
24...	1200	5190	56	6.9	6.0	9.4	77	K4	--	24	7
MAY											
22...	1130	1310	97	7.4	12.0	7.7	72	22	K10	49	2
JUN											
26...	1245	1170	110	7.3	14.0	8.0	78	48	41	60	0
JUL											
24...	1400	381	159	7.4	24.0	7.5	90	K6	39	85	13
AUG											
22...	1300	579	145	7.4	18.0	6.8	74	K9	16	73	6
SEP											
18...	1345	822	123	7.3	14.0	7.8	77	25	30	66	9

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
17...	13	3.6	1.1	.1	5	.9	56	0	46	7.1	7.5
NOV											
07...	18	4.8	1.5	.1	5	.9	68	0	56	5.5	8.6
DEC											
05...	19	5.6	1.8	.1	5	.8	70	0	57	11	11
JAN											
16...	26	7.6	2.1	.1	5	.8	92	0	75	5.9	10
FEB											
27...	22	6.4	1.9	.1	5	.9	95	0	78	9.6	11
MAR											
27...	12	3.2	1.3	.1	6	1.0	42	0	34	11	8.4
APR											
24...	6.6	1.8	.8	.1	7	.8	21	0	17	4.2	6.3
MAY											
22...	14	3.5	1.2	.1	5	.8	58	0	48	3.7	7.7
JUN											
26...	17	4.2	1.3	.1	4	.4	73	0	60	5.9	7.1
JUL											
24...	24	6.1	1.6	.1	4	.5	88	0	72	5.6	9.1
AUG											
22...	21	5.1	1.4	.1	4	.5	82	0	67	5.2	7.4
SEP											
18...	19	4.6	1.5	.1	5	.5	70	0	57	5.6	5.4

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COUNT)

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 17...	2.5	.0	5.7	94	63	536	.00	.01	--	.51	.52
NOV 07...	2.0	.0	7.1	103	76	155	.07	.04	--	.45	.49
DEC 05...	2.3	.1	8.6	101	84	164	.12	.04	--	.43	.47
JAN 16...	2.0	.0	10	114	104	132	.28	.00	--	.27	.27
FEB 27...	1.6	.1	10	106	101	143	.17	.09	--	.09	.18
MAR 27...	1.8	.0	7.0	85	55	441	.32	.02	--	.45	.47
APR 24...	1.7	.0	4.0	52	33	729	.07	.01	.01	.31	.32
MAY 22...	1.6	.1	2.9	81	60	287	.05	.02	.02	.65	.67
JUN 26...	1.6	.1	4.4	115	72	363	.03	.02	.02	.71	.73
JUL 24...	1.6	.1	6.1	119	94	122	.03	.03	.04	.61	.64
AUG 22...	2.0	.1	7.5	113	85	177	.06	.02	.02	.73	.75
SEP 18...	1.7	.0	6.9	108	74	240	.04	.05	.06	.83	.88

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 17...	.00	--	.52	2.3	.02	--	.01	--	5	28	100
NOV 07...	.02	.47	.56	2.5	.02	--	.00	12	4	6.0	100
DEC 05...	.00	--	.59	2.6	.02	--	.01	14	3	4.9	100
JAN 16...	.23	.04	.55	2.4	.03	--	.01	--	--	--	--
FEB 27...	.00	--	.35	1.6	.02	--	.01	7.5	5	6.7	100
MAR 27...	.00	--	.79	3.5	.02	--	.01	13	2	10	100
APR 24...	--	--	.39	1.7	.00	.00	.00	--	6	84	100
MAY 22...	.00	--	.72	3.2	.01	.03	.01	16	4	14	100
JUN 26...	--	--	.76	3.4	.02	.06	.02	21	7	22	100
JUL 24...	--	--	.67	3.0	.03	.09	.01	--	4	4.1	100
AUG 22...	--	--	.81	3.6	.03	.09	.01	17	4	6.3	100
SEP 19...	--	--	.92	4.1	.03	.09	.01	18	6	13	100

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 17...	1100	1	1	0	0	1	1	<10	2	3
JAN 16...	1215	5	0	0	0	0	0	10	0	0
APR 24...	1200	1	1	0	0	4	0	10	10	1
JUL 24...	1400	1	1	0	--	20	1	10	<10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 17...	3	8	2	880	650	0	0	20	20	<.5
JAN 16...	0	2	0	710	530	12	4	50	--	<.5
APR 24...	0	5	2	530	270	29	1	20	10	<.5
JUL 24...	--	4	2	1900	1400	21	8	60	10	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 17...	<.5	0	0	0	0	40	20	23	.8
JAN 16...	<.5	0	0	0	0	20	0	8.0	--
APR 24...	<.5	0	0	0	0	50	10	12	.2
JUL 24...	<.5	0	0	0	0	30	9	15	--

STREAMS TRIBUTARY TO LAKE SUPERIOR

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04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	AROCLOR TOT. IN BOT MAT 1254 PCB SERIES (UG/KG)	ALDRIN, TOTAL (UG/L)	CHLOR- DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI- AZINON, TOTAL (UG/L)	DI- ELDRIN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)
NOV 07...	1430	ND	12	ND	ND	ND	ND	ND	ND	ND	ND
FEB 27...	1300	ND	--	ND	ND	ND	ND	ND	ND	ND	ND

DATE	ETHION, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA- THION, TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL (UG/L)	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, TOTAL (UG/L)	PARA- THION, TOTAL (UG/L)	TOX- APHENE, TOTAL (UG/L)	TOTAL TRI- THION (UG/L)
NOV 07...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB 27...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 07...	1430	21	--	7.01	7.40	.210	.000
JUN 26...	1245	35	158	.790	1.65	5.45	.840
AUG 22...	1300	29	236	8.27	10.25	9.46	.760

ND--NOT DETECTED

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 8,77 1330	MAR 14,78 1300	MAY 16,78 1315	JUN 14,78 1530
TOTAL CELLS/ML	0	94	130	44
DIVERSITY: DIVISION	0.0	1.2	0.0	0.0
..CLASS	0.0	1.2	0.0	0.0
...ORDER	0.0	1.8	0.0	0.0
...FAMILY	0.0	2.0	1.9	0.9
....GENUS	0.0	2.0	1.9	0.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	29#	31	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...CHAETOCERACEAE								
....CHAETOCEROS	--	-	36#	38	--	-	--	-
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
...COCCONEIS	--	-	--	-	--	-	--	-
...EUNOTIACEAE								
....EUNOTIA	--	-	--	-	29#	22	--	-
...FRAGILARIACEAE								
....SYNEDRA	--	-	--	-	14	11	29#	67
...NAVICULACEAE								
....DIPLONEIS	--	-	--	-	--	-	15#	33
...NAVICULA	--	-	14#	15	43#	33	--	-
...NITZSCHIA								
....NITZSCHIA	--	-	7	8	43#	33	--	-
..CHRYSTOPHYCEAE								
...CHRYSONOMADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...HORMOGONALES								
...OSCILLATORIA								
....OSCILLATORIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	7	8	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
 * - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 24,78 1330	SEP 6,78 1230	SEP 27,78 1115			
TOTAL CELLS/ML	380	7	34			
DIVERSITY: DIVISION	1.5	1.5	0.8			
..CLASS	1.7	1.5	0.8			
...ORDER	2.3	1.5	0.8			
...FAMILY	2.4	1.5	0.8			
....GENUS	2.9	1.5	0.8			
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
....OOCYSTACEAE						
....ANKISTRODESMUS	22	6	--	-	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	4#	50	4	11
...VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	44	12	--	-	--	-
CHRYSTOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...CHAETOCERACEAE						
....CHAETOCEROS	--	-	--	-	--	-
...COSCINODISCEAE						
....CYCLOTELLA	66#	18	--	-	--	-
....MFLOSIRA	110#	29	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	22	6	--	-	--	-
...COCCONEIS	--	-	--	-	2	5
...EUNOTIACEAE						
....EUNOTIA	--	-	--	-	--	-
...FRAGILARIACEAE						
....SYNEDRA	--	-	--	-	--	-
...NAVICULACEAE						
....DIPLONEIS	--	-	--	-	--	-
....NAVICULA	--	-	2#	25	--	-
...NITZSCHIA						
....NITZSCHIA	22	6	--	-	--	-
..CHRYSTOPHYCEAE						
...CHRYSONOMADALES						
...OCHROMONADACEAE						
....OCHROMONAS	22	6	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	44	12	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...HORMOGONALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	28#	84
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	22	6	2#	25	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER		NOVEMBER		DECEMBER				JANUARY	
1	108	---	---	---	136	133	135	160	160	160
2	108	---	---	---	137	136	136	160	158	159
3	108	---	---	---	140	137	138	159	157	158
4	104	---	---	---	145	141	142	160	158	159
5	89	---	---	---	148	144	146	158	157	158
6	84	---	---	---	150	147	148	158	157	157
7	70	137	136	---	152	149	150	158	157	157
8	73	137	137	137	155	151	152	158	156	157
9	79	140	137	138	157	152	154	160	157	159
10	80	144	140	142	155	153	154	161	159	160
11	93	146	144	145	155	153	154	161	159	160
12	80	147	146	147	157	154	156	161	159	160
13	103	148	145	146	160	157	158	161	160	161
14	82	147	144	146	160	158	159	162	161	161
15	84	148	145	147	161	159	160	162	160	161
16	88	148	147	147	161	160	161	163	161	162
17	90	147	143	146	162	160	161	163	162	163
18	---	140	137	139	164	161	162	164	163	163
19	---	136	125	132	168	160	162	164	163	164
20	---	125	117	120	163	161	162	165	163	164
21	---	119	117	118	164	161	163	165	164	164
22	---	119	117	118	165	162	163	165	163	164
23	---	120	118	119	165	163	164	166	164	165
24	---	121	120	120	165	161	163	166	165	165
25	---	123	121	122	165	163	164	166	164	165
26	---	124	123	124	166	163	165	166	165	165
27	---	126	125	125	164	162	163	165	165	165
28	---	128	126	127	163	162	162	165	164	164
29	---	131	128	130	163	161	162	164	163	163
30	---	133	130	132	161	161	161	163	161	162
31	---	---	---	---	160	160	160	161	161	161
MONTH					168	133	156	166	156	161

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY		MARCH		APRIL			MAY				
1	162	161	161	170	165	168	---	---	---	60	57	58
2	161	159	160	169	158	164	---	---	---	63	61	62
3	161	159	160	171	165	168	---	---	---	64	63	63
4	161	158	160	172	167	169	---	---	---	65	63	64
5	158	158	158	171	163	167	---	---	---	66	64	65
6	158	157	157	173	156	164	---	---	---	66	65	66
7	157	156	156	164	150	155	---	---	---	68	66	67
8	156	155	156	155	145	150	---	---	---	73	68	71
9	156	154	155	147	136	141	---	---	---	77	72	74
10	156	154	155	136	131	133	---	---	---	81	76	78
11	155	154	154	136	131	133	---	---	---	85	81	83
12	157	155	156	134	130	132	---	---	---	89	85	86
13	157	156	157	134	129	132	---	---	---	93	88	90
14	157	155	156	135	130	132	---	---	---	96	93	94
15	157	154	157	134	130	132	---	---	---	98	96	97
16	159	156	157	135	132	133	---	---	---	100	97	98
17	157	155	156	136	133	134	---	---	---	101	99	100
18	158	153	156	143	137	140	---	---	---	103	100	102
19	159	156	158	140	134	138	---	---	---	103	102	103
20	160	159	159	140	133	136	---	---	---	102	101	101
21	161	159	160	137	123	130	---	---	---	101	98	100
22	162	158	160	122	112	117	---	---	---	159	95	98
23	164	159	162	112	106	110	---	---	---	99	99	99
24	164	159	162	104	93	100	48	47	---	100	99	100
25	165	159	161	92	85	87	47	47	47	100	99	100
26	164	159	161	85	83	84	47	47	47	102	100	101
27	162	157	160	85	84	---	51	46	49	106	102	105
28	169	159	164	---	---	---	54	51	52	109	106	107
29	---	---	---	---	---	---	56	54	55	111	108	110
30	---	---	---	---	---	---	57	55	56	113	110	112
31	---	---	---	---	---	---	---	---	---	116	113	114
MONTH	169	153	158							159	57	89

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SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	119	116	117	93	90	91	120	107	113	153	140	147
2	121	118	120	90	88	89	109	106	108	140	138	139
3	121	117	120	91	87	89	110	108	109	143	140	141
4	119	116	118	97	91	94	115	111	113	142	141	142
5	124	119	122	101	97	100	119	115	117	144	141	142
6	124	122	123	105	101	103	125	119	121	146	143	145
7	124	122	123	109	105	107	128	125	127	149	146	147
8	126	123	124	113	109	110	130	128	129	149	147	148
9	126	124	125	116	112	114	137	120	124	147	147	147
10	124	121	122	121	116	118	120	119	119	147	145	146
11	121	119	121	126	121	123	121	120	121	147	142	145
12	119	109	114	128	125	126	123	121	122	142	132	138
13	110	107	108	128	126	127	127	123	125	131	128	129
14	113	110	112	128	120	124	132	127	130	129	126	128
15	115	113	114	120	118	119	137	133	136	126	122	124
16	116	115	116	124	120	122	138	137	137	123	121	122
17	117	116	117	130	124	127	142	137	140	125	120	122
18	120	116	118	135	130	132	146	142	145	124	123	123
19	119	119	119	142	135	137	140	137	139	126	124	125
20	123	119	121	148	141	144	139	138	139	125	124	125
21	124	123	123	146	139	143	139	138	139	126	125	125
22	123	118	121	149	145	147	143	140	141	128	126	127
23	117	108	111	162	149	152	146	142	144	129	126	128
24	109	108	108	156	155	155	148	144	147	129	127	129
25	111	109	110	159	148	155	147	146	146	131	129	130
26	110	107	109	148	123	137	149	147	148	135	132	133
27	106	87	99	123	112	117	149	148	148	137	135	136
28	86	74	77	125	112	119	153	148	151	139	138	139
29	80	75	77	131	126	128	155	152	154	146	140	143
30	90	80	85	132	129	131	156	154	155	153	147	151
31	---	---	---	129	120	125	159	154	157	---	---	---
MONTH	126	74	113	162	87	123	159	106	134	153	120	136

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER	NOVEMBER			DECEMBER			JANUARY		
1	12.0	---	---	---	.0	.0	.0	.0	.0	.0
2	11.5	---	---	---	.0	.0	.0	.0	.0	.0
3	11.5	---	---	---	.0	.0	.0	.0	.0	.0
4	11.0	---	---	---	.0	.0	.0	.0	.0	.0
5	11.0	---	---	---	.0	.0	.0	.0	.0	.0
6	11.0	---	---	---	.0	.0	.0	.0	.0	.0
7	10.0	7.0	6.5	---	.0	.0	.0	.0	.0	.0
8	9.0	7.5	7.0	7.0	.0	.0	.0	.0	.0	.0
9	9.0	7.5	7.5	7.5	.0	.0	.0	.0	.0	.0
10	9.0	7.5	7.0	7.0	.0	.0	.0	.0	.0	.0
11	10.0	7.0	5.5	6.5	.0	.0	.0	.0	.0	.0
12	10.0	5.5	5.0	5.5	.0	.0	.0	.0	.0	.0
13	10.0	5.5	5.0	5.0	.0	.0	.0	.0	.0	.0
14	9.0	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0
15	8.0	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
16	7.5	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
17	7.0	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
18	---	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
19	---	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
20	---	.5	.5	.5	.0	.0	.0	.0	.0	.0
21	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
22	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
25	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
26	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
29	---	1.0	.0	.5	.0	.0	.0	.0	.0	.0
30	---	1.0	.0	.5	.0	.0	.0	.0	.0	.0
31	---	---	---	---	.0	.0	.0	.0	.0	.0
MONTH					.0	.0	.0	.0	.0	.0

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	.0	.0	.0	1.5	1.0	1.0	---	---	---	7.5	6.5	7.0
2	.0	.0	.0	1.0	.0	.5	---	---	---	7.5	7.5	7.5
3	.0	.0	.0	1.0	.5	1.0	---	---	---	7.5	7.5	7.5
4	.0	.0	.0	1.5	1.0	1.5	---	---	---	7.0	6.5	7.0
5	.0	.0	.0	2.0	.5	1.0	---	---	---	6.5	6.0	6.0
6	.0	.0	.0	1.5	.0	.5	---	---	---	6.0	5.5	5.5
7	.0	.0	.0	.5	.0	.0	---	---	---	6.5	5.0	6.0
8	.0	.0	.0	.5	.0	.0	---	---	---	8.5	6.0	7.5
9	.0	.0	.0	1.0	.0	.5	---	---	---	10.5	8.5	9.5
10	.0	.0	.0	1.0	.0	.0	---	---	---	12.0	10.5	11.0
11	.0	.0	.0	.0	.0	.0	---	---	---	13.0	12.0	12.5
12	.0	.0	.0	.0	.0	.0	---	---	---	13.0	12.5	13.0
13	.0	.0	.0	.0	.0	.0	---	---	---	12.5	12.0	12.5
14	.0	.0	.0	.0	.0	.0	---	---	---	12.5	12.0	12.5
15	.0	.0	.0	.0	.0	.0	---	---	---	12.5	12.5	12.5
16	.0	.0	.0	.0	.0	.0	---	---	---	13.0	11.5	12.5
17	.0	.0	.0	.0	.0	.0	---	---	---	12.5	12.0	12.5
18	.0	.0	.0	1.5	.0	.5	---	---	---	14.0	12.5	13.0
19	.0	.0	.0	1.5	.0	1.0	---	---	---	14.0	13.0	13.5
20	.0	.0	.0	1.5	.0	1.0	---	---	---	13.5	12.5	13.0
21	.0	.0	.0	1.5	.0	1.0	---	---	---	13.5	12.5	13.0
22	.0	.0	.0	1.0	.0	.5	---	---	---	12.5	11.0	12.0
23	.5	.0	.0	1.5	.0	.5	---	---	---	11.5	11.0	11.0
24	.5	.0	.5	1.5	.5	1.0	7.5	6.0	---	11.5	11.0	11.0
25	.5	.0	.0	1.0	.0	.5	8.0	7.5	7.5	11.5	10.5	11.0
26	.5	.0	.5	1.0	.0	.5	8.0	7.5	7.5	11.5	11.0	11.0
27	.5	.0	.0	.5	.0	---	7.5	7.0	7.5	12.5	11.5	12.0
28	1.0	.0	.5	---	---	---	7.5	7.0	7.5	13.0	12.5	12.5
29	---	---	---	---	---	---	7.5	6.5	7.0	13.5	12.5	13.0
30	---	---	---	---	---	---	7.5	7.0	7.0	14.0	13.0	13.5
31	---	---	---	---	---	---	---	---	---	15.0	14.0	14.0
MONTH	1.0	.0	.0							15.0	5.0	11.0

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	15.0	14.5	14.5	18.0	18.0	18.0	20.5	20.0	20.0	19.0	18.0	18.5
2	15.5	14.5	15.0	18.5	17.5	18.0	20.5	20.0	20.5	19.5	19.0	19.0
3	16.0	15.5	15.5	18.5	17.0	18.0	21.0	20.5	20.5	19.0	18.5	19.0
4	16.0	15.5	16.0	18.5	17.5	18.0	21.5	21.0	21.0	19.0	17.5	18.5
5	17.0	15.5	16.0	18.5	17.5	18.0	21.5	21.0	21.5	19.5	18.0	18.5
6	17.0	16.0	16.5	19.0	18.0	18.5	21.5	21.0	21.5	20.0	19.0	19.5
7	17.5	17.0	17.0	19.0	18.5	19.0	22.0	21.5	21.5	19.0	18.0	18.5
8	17.5	17.5	17.5	19.5	19.0	19.0	22.0	21.0	21.5	18.0	17.0	17.5
9	17.5	17.0	17.0	20.5	19.5	20.0	21.0	20.5	21.0	17.0	16.5	16.5
10	17.5	17.0	17.0	21.0	20.5	20.5	20.5	20.0	20.5	18.0	16.5	17.0
11	17.0	16.5	16.5	22.0	21.0	21.5	20.0	19.5	19.5	16.5	15.5	16.0
12	17.0	16.0	16.5	23.0	21.5	22.0	19.5	18.5	19.0	15.5	14.5	15.0
13	16.5	15.5	16.0	23.5	22.5	23.0	19.0	18.5	19.0	15.0	14.5	14.5
14	17.5	16.0	16.5	24.0	23.0	23.5	18.5	17.0	17.5	14.5	14.0	14.0
15	18.5	17.0	18.0	24.0	23.5	23.5	18.0	17.0	17.5	14.0	13.5	13.5
16	19.5	18.5	19.0	24.0	23.0	23.5	17.0	16.0	17.0	14.5	13.0	14.0
17	19.5	19.0	19.0	23.5	22.5	22.5	16.5	16.0	16.5	14.5	14.0	14.5
18	20.5	19.0	19.5	23.5	22.0	22.5	16.0	15.5	16.0	14.5	14.5	14.5
19	20.5	19.5	20.0	23.0	22.0	22.5	17.0	15.5	16.0	14.5	14.0	14.0
20	20.0	19.0	19.5	23.0	22.5	22.5	18.0	16.0	17.0	14.5	14.0	14.5
21	19.0	18.5	19.0	24.0	22.5	23.0	18.5	16.5	17.5	14.5	14.0	14.0
22	19.0	17.0	18.0	23.5	23.0	23.0	19.0	17.5	18.5	14.0	13.0	13.5
23	16.5	15.0	15.5	24.5	23.0	24.0	19.5	19.0	19.0	13.0	12.5	12.5
24	15.5	14.5	15.0	24.0	23.5	24.0	20.0	19.5	19.5	13.5	12.5	13.0
25	15.0	14.0	15.0	24.5	23.5	24.0	20.0	19.5	19.5	13.5	12.5	13.0
26	15.0	14.5	15.0	23.5	21.5	22.5	20.5	19.5	19.5	13.5	12.5	13.0
27	15.0	14.5	15.0	21.5	21.0	21.5	20.0	19.5	19.5	14.0	13.0	13.5
28	15.0	14.0	14.5	22.0	21.0	21.5	19.5	19.0	19.5	14.5	14.0	14.0
29	16.5	15.0	15.5	21.5	21.0	21.5	20.0	19.5	19.5	14.0	14.0	14.0
30	17.5	16.5	17.0	21.5	21.0	21.0	19.5	19.0	19.5	15.5	14.0	14.5
31	---	---	---	21.0	20.5	20.5	19.0	18.5	19.0	---	---	---
MONTH	20.5	14.0	16.5	24.5	17.0	21.5	22.0	15.5	19.0	20.0	12.5	15.5

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI
(National stream-quality accounting network and radiochemical station)

LOCATION.--Lat 46°29'29", long 84°25'17", in NW¼ sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 1 mi (1.6 km) west of Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi² (210,000 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: March 1974 to current year.

WATER TEMPERATURES: March 1974 to current year.

REMARKS.--Daily observer samples and monthly samples during the winter period were collected at the raw-water tap in Sault Ste. Marie municipal water plant at Big Point. Intake is 1,500 ft (457 m) out at a depth of 30 ft (9 m), 10 ft (3 m) above the bottom of the channel. Monthly samples during ice free months were collected by boat as a cross-section sample at Brush Point, 2.2 mi (3.5 km) upstream. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Once daily temperature and specific conductance records are collected by Sault Ste. Marie municipal treatment facility employees. Discharge records furnished by U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 105 micromhos Nov. 11, 1978; minimum daily, 76 micromhos Apr. 24, 1975.

WATER TEMPERATURES: Maximum daily, 24.0°C July 25, 1979; minimum daily, 0.0°C Mar. 14, 15, 1974, Feb. 1, 1979.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 105 micromhos Nov. 11; minimum daily, 80 micromhos July 2.

WATER TEMPERATURES: Maximum daily, 24.0°C July 25; minimum daily, 0.0°C on Feb. 1.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCHI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
17...	1700	99000	97	7.3	8.5	11.1	96	<1	K5	47	4
NOV											
08...	1300	96800	97	8.0	7.5	11.8	100	<1	<1	47	1
DEC											
19...	1240	74400	90	7.6	7.5	12.5	87	<1	<1	44	1
JAN											
17...	1500	67500	88	7.2	3.5	13.7	96	<1	<1	54	10
FEB											
28...	1345	67000	92	7.8	2.5	13.0	91	K2	<1	44	0
MAR											
28...	1330	67400	90	7.6	3.5	13.4	94	K2	15	44	0
APR											
25...	1400	66900	89	7.6	5.0	11.0	100	--	--	41	0
MAY											
23...	1200	81800	96	7.3	9.0	12.2	106	<1	K3	44	0
JUN											
27...	1145	97100	94	8.1	16.5	9.8	102	K1	K4	44	--
JUL											
25...	1100	112000	90	7.6	19.0	9.7	105	K2	K2	44	4
AUG											
23...	1015	114000	94	7.9	16.0	9.9	101	<1	K2	43	--
SEP											
19...	1020	113000	93	7.8	14.0	10.0	98	<1	K2	44	0

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
OCT											
17...	14	2.9	1.2	.1	5	.5	52	0	43	4.2	2.1
NOV											
08...	14	2.8	1.4	.1	6	.7	56	0	46	.9	2.7
DEC											
19...	13	2.8	1.5	.1	7	.6	53	0	43	2.1	3.1
JAN											
17...	16	3.4	1.5	.1	6	.5	53	0	43	5.4	2.0
FEB											
28...	13	2.8	1.3	.1	6	.6	57	0	47	1.4	1.9
MAR											
28...	13	2.8	1.3	.1	6	.6	56	0	46	2.3	2.2
APR											
25...	12	2.6	1.2	.1	6	.6	54	0	44	2.2	2.6
MAY											
23...	13	2.8	1.6	.1	7	.5	56	0	46	4.5	4.2
JUN											
27...	13	2.7	1.3	.1	6	.6	--	0	--	--	4.9
JUL											
25...	13	2.7	1.1	.1	5	.5	48	0	39	1.9	4.2
AUG											
23...	13	2.6	1.1	.1	5	.4	--	0	--	--	2.4
SEP											
19...	13	2.7	1.3	.1	6	.5	53	0	43	1.3	2.0

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COUNT)

STREAMS TRIBUTARY TO ST. MARYS RIVER
04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 17...	1.2	.0	2.2	45	50	12000	.01	.01	--	.12	.13
NOV 08...	1.2	.0	2.2	57	53	14900	.29	.00	--	.04	.04
DEC 19...	1.3	.1	2.2	54	51	10800	.29	.00	--	.00	.00
JAN 17...	1.1	.0	2.3	58	53	10600	.23	--	--	--	.00
FEB 28...	1.3	.0	2.3	50	51	9050	.31	.00	--	.00	.00
MAR 28...	1.3	.0	1.9	61	51	11100	.31	.00	--	.18	.18
APR 25...	1.7	.0	2.4	58	50	10500	.27	.00	.00	.04	.04
MAY 23...	1.3	.1	2.5	47	54	10400	.30	.01	.01	.18	.19
JUN 27...	1.2	.1	2.0	49	--	12800	.28	.00	.00	.45	.45
JUL 25...	1.2	.0	2.2	63	49	19100	.25	.01	.01	.94	.95
AUG 23...	1.2	.0	2.1	46	--	14200	.24	.02	.02	.17	.19
SEP 19...	1.4	.0	2.1	54	50	16500	.25	.03	.04	.35	.38

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 17...	.00	--	.14	.62	.01	--	.00	--	<1	--	100
NOV 08...	.00	--	.33	1.5	.00	--	.00	5.0	--	--	--
DEC 19...	.00	.00	.29	1.3	.00	--	.00	--	--	--	--
JAN 17...	.00	.00	.23	1.0	.00	--	.00	--	--	--	--
FEB 28...	.00	.00	.31	1.4	.00	--	.00	1.7	--	--	--
MAR 28...	.00	--	.49	2.2	.01	--	.00	3.1	--	--	--
APR 25...	--	--	.31	1.4	.00	.00	.00	--	--	--	--
MAY 23...	--	--	.49	2.2	.00	.00	.00	3.7	2	442	100
JUN 27...	--	--	.73	3.2	.00	.00	.00	2.6	1	262	100
JUL 25...	--	--	1.2	5.3	.00	.00	.00	--	1	302	100
AUG 23...	--	--	.43	1.9	.00	.00	.00	3.0	--	--	--
SEP 19...	--	--	.63	2.8	.00	.00	.00	2.9	1	305	100

STREAMS TRIBUTARY TO ST. MARYS RIVER

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04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 17...	1700	1	0	0	0	1	1	<10	0	3
JAN 17...	1500	5	0	0	0	0	0	10	0	0
APR 25...	1400	1	1	0	0	1	1	<10	10	1
JUL 25...	1100	1	1	0	--	6	2	<10	<10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 17...	2	4	0	60	20	1	1	0	0	<.5
JAN 17...	0	2	1	70	--	11	6	10	10	<.5
APR 25...	0	6	5	130	60	6	7	10	2	<.5
JUL 25...	--	4	1	120	0	35	20	10	0	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 17...	<.5	0	0	0	0	20	10	2.0	.3
JAN 17...	<.5	0	0	0	0	90	60	1.5	.1
APR 25...	<.5	0	0	0	0	130	80	5.5	.1
JUL 25...	<.5	0	0	1	0	40	40	2.1	.1

STREAMS TRIBUTARY TO ST. MARYS RIVER

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90)	RADIUM 226, DIS- SOLVED, RADON METHOD (PCI/L)	URANIUM DIS- SOLVED, EXTRAC- TION (UG/L)
OCT 17...	1700	<.7	<.4	1.6	<.4	1.5	<.4	.05	.05
JUN 27...	1145	<.7	<.4	1.4	<.4	1.3	<.4	.04	.05

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 08...	1300	22	.000	.079	.000	.000
AUG 23...	1015	29	.080	.160	.090	.000
SEP 19...	1020	27	.080	.160	.000	.000

STREAMS TRIBUTARY TO ST. MARYS RIVER

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04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA. WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 9.77 0900	MAR 15.78 0900	MAY 17.78 1530	JUN 15.78 1500
TOTAL CELLS/ML	160	180	27	44
DIVERSITY: DIVISION	1.0	0.9	0.0	0.0
..CLASS	1.0	0.9	1.0	0.0
..ORDER	1.0	1.0	1.0	0.0
...FAMILY	1.5	1.0	1.0	0.9
....GENUS	1.5	1.3	1.0	0.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....OOCYSTACEAE								
.....OOCYSTIS	--	-	--	-	--	-	--	-
.....QUADRIGULA	--	-	--	-	--	-	--	-
.....TETRAEDRON	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	80#	50	--	-	--	-	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
..PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	33#	18	--	-	--	-
....MELOSTIRA	--	-	16	9	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...CYMBELLACEAE								
....AMPHORA	40#	25	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERTONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	15#	33
....SYNEDRA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	14#	50	29#	67
....NEIDIUM	40#	25	--	-	--	-	--	-
...NITZSCHIA								
....NITZSCHIA	--	-	5	3	--	-	--	-
...SURIPELLACEAE								
....SURIPELLA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
..CHRYSOPHYCEAE								
...CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBYRON	--	-	--	-	14#	50	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
....CHROOCOCCACEAE								
.....ANACYSTIS	--	-	130#	71	--	-	--	-
.....HORMOGONALFS								
...OSCILLATORIA								
....OSCILLATORIA	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO ST. MARYS RIVER

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 25,78 1315	SEP 7,78 1315	SEP 28,78 1145
TOTAL CELLS/ML	380	270	190
DIVERSITY: DIVISION	1.5	1.5	1.4
..CLASS	1.7	1.5	1.4
...ORDER	1.8	2.1	1.6
...FAMILY	1.8	2.3	1.8
....GENUS	2.1	2.5	1.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
...OOCYSTACEAE						
....OOCYSTIS	180#	47	--	-	9	5
....QUADRIGULA	--	-	7	3	--	-
....TETRAEDRON	22	6	--	-	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	57#	21	--	-
....SCENEDESMUS	--	-	7	3	--	-
..TETRASPORALES						
...COCCOMYXACEAE						
....ELAKATOTHRIX	--	-	--	-	4	2
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	32	12	14	7
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	2	1	--	-
CHRYSTOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	44	12	23	9	2	1
....MELOSIRA	--	-	--	-	--	-
....STEPHANODISCUS	--	-	4	1	--	-
..PENNALES						
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	2	1
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	2	1	--	-
...NAVICULACEAE						
....NAVICULA	--	-	2	1	2	1
....NEIDIUM	--	-	--	-	--	-
...NITZSCHACEAE						
....NITZSCHIA	22	6	4	1	--	-
...SURIPELLACEAE						
....SURIPELLA	--	-	2	1	--	-
...TABELLARIACEAE						
....TABELLARIA	--	-	12	5	51#	27
..CHRYSTOPHYCEAE						
...CHRYSONOMADALES						
...OCHROMONADACEAE						
....DINOBRYON	22	6	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	120#	43	110#	56
...HORMOGONALES						
...OSCILLATORIA						
....OSCILLATORIA	88#	24	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	93	97	98	90	---	97	94	96	95	90	90	97
2	93	97	97	---	97	97	94	96	95	80	90	98
3	93	97	97	---	98	97	96	91	90	92	91	98
4	95	97	97	---	98	95	94	95	100	94	90	98
5	94	97	93	---	95	97	96	95	95	95	91	97
6	94	97	96	---	95	95	96	95	96	93	91	98
7	94	100	94	---	95	95	93	99	95	92	91	98
8	94	102	94	---	96	94	90	98	95	92	91	98
9	96	102	98	93	96	95	96	94	95	90	90	98
10	96	101	96	90	96	95	96	94	94	94	91	97
11	98	105	99	90	96	96	96	94	94	93	92	98
12	97	103	---	93	96	95	98	94	94	94	91	96
13	99	103	93	94	96	96	98	94	98	95	92	94
14	99	104	100	89	94	95	96	94	95	94	91	94
15	99	101	98	89	96	95	98	95	100	94	94	94
16	98	102	100	92	97	95	98	95	100	95	91	92
17	98	98	98	93	95	95	93	97	98	98	92	93
18	98	101	90	93	95	95	96	97	100	98	92	93
19	98	98	95	93	95	94	97	99	98	98	91	91
20	98	101	90	93	95	94	97	98	99	97	92	92
21	97	101	95	94	95	94	96	98	97	97	92	92
22	98	99	91	91	95	93	97	97	96	95	90	97
23	98	99	90	94	95	93	89	98	98	96	92	91
24	97	99	88	94	95	95	89	97	98	95	94	94
25	97	98	89	92	95	94	91	95	98	91	92	98
26	97	98	91	92	95	93	93	95	100	93	91	98
27	97	99	91	94	95	97	90	97	98	94	91	98
28	97	98	91	94	95	96	91	99	98	94	92	97
29	97	99	90	---	---	94	95	95	90	94	98	98
30	97	99	90	---	---	94	95	95	90	94	98	98
31	97	---	91	---	---	94	---	90	---	96	98	---
MEAN	97	100				95	95	96	96	94	92	96

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	11.0	3.5	1.0	.0	3.0	4.0	5.5	11.5	13.0	20.0	19.0
2	14.5	11.0	3.0	1.0	3.0	2.5	4.0	6.5	12.0	12.5	20.0	18.0
3	14.5	11.0	2.5	1.0	3.0	3.0	4.0	6.5	12.5	12.5	19.5	18.0
4	14.5	11.0	3.0	1.0	3.0	3.5	4.0	6.0	9.0	12.5	19.5	18.0
5	14.5	11.0	3.0	1.0	3.0	3.5	4.5	6.5	10.5	13.0	20.0	17.5
6	14.5	11.0	3.0	1.0	3.0	3.5	4.5	6.5	9.5	14.5	19.5	17.5
7	14.5	8.0	2.5	.5	3.0	3.5	4.5	7.0	10.0	15.0	20.0	17.5
8	14.0	8.0	2.5	.5	2.5	3.5	4.5	7.5	10.0	15.5	20.5	17.0
9	13.5	8.0	2.0	4.5	2.5	3.5	4.5	6.5	10.0	15.5	19.5	17.0
10	13.5	8.0	2.0	3.5	2.5	3.5	4.5	7.0	9.5	16.0	20.0	16.5
11	13.5	8.0	1.5	4.0	2.5	3.5	2.5	6.5	9.5	15.5	19.5	16.5
12	13.5	7.0	---	4.5	2.5	3.5	2.5	7.0	9.5	16.5	20.0	16.0
13	13.0	7.0	2.0	5.5	2.5	3.5	3.0	7.0	10.0	16.5	18.0	16.0
14	12.0	7.0	2.0	5.0	2.5	2.5	3.0	7.5	11.0	17.0	17.0	15.5
15	12.0	9.0	2.0	5.5	2.5	2.5	3.0	6.5	12.5	16.5	16.5	15.5
16	12.0	9.0	2.0	3.5	2.5	3.0	3.5	6.5	12.5	16.0	16.5	16.0
17	11.5	9.0	2.0	3.5	2.0	3.0	3.0	7.0	13.5	16.0	16.5	16.0
18	12.0	7.0	2.0	3.0	2.0	3.0	3.0	7.0	12.5	18.0	17.0	16.0
19	12.0	9.0	1.0	4.0	2.0	3.0	3.0	8.0	12.5	18.0	17.0	16.5
20	11.5	5.0	1.5	4.5	2.0	2.5	3.0	7.5	13.0	19.0	17.0	15.5
21	12.0	5.0	1.0	4.5	2.0	2.5	3.5	8.0	12.5	20.0	19.5	15.0
22	12.0	8.0	4.0	4.5	2.0	3.0	3.5	8.0	12.0	21.5	18.5	15.5
23	12.0	8.0	4.5	2.5	2.0	3.0	4.0	8.0	10.0	22.0	18.0	15.5
24	11.5	8.5	3.5	2.5	2.5	2.5	4.5	8.0	10.0	23.0	17.5	15.5
25	11.5	8.0	3.5	2.5	2.0	2.5	5.0	8.5	10.0	24.0	19.0	15.5
26	11.5	8.0	3.5	2.5	2.0	3.5	5.0	8.5	11.0	22.0	19.0	15.5
27	11.5	4.0	1.0	2.5	2.0	3.5	5.5	8.5	11.5	21.0	17.5	16.0
28	11.5	3.5	1.0	2.5	2.0	4.0	5.5	10.0	13.5	19.5	18.0	16.5
29	10.5	4.5	1.0	3.0	---	4.0	5.0	11.0	14.5	21.0	18.0	16.5
30	10.5	4.0	1.0	---	---	4.0	5.0	12.5	15.5	20.5	18.0	16.5
31	11.0	---	1.0	.5	---	4.0	---	12.5	---	19.5	18.0	---
MEAN	12.5	8.0			2.5	3.0	4.0	7.5	11.5	17.5	18.5	16.5

LOCATION.--Lat 46°01'50", long 86°09'40", in SE₄ sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi (1.6 km) downstream from West Branch, 6.0 mi (9.7 km) northeast of Manistique, and at mile 19.5 (31.4 km).

DRAINAGE AREA.--1,100 mi² (2,849 km²), approximately.

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

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft (185.3 m) from river-profile map (nearest ft). Prior to July 15, 1939, non-recording gage at site 1,600 ft (487.7 m) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVEERAGE DISCHARGE.--41 years, 1,441 ft³/s (40.81 m³/s), 17.79 in/yr (452 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft³/s (479 m³/s) May 11, 1960, gage height, 12.85 ft (3.917 m); minimum, 288 ft³/s (8.16 m³/s) Oct. 4, 1948; minimum gage height, 1.01 ft (0.308 m) Aug. 23, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,230 ft³/s (233 m³/s) Apr. 19, 20, gage height, 11.17 ft (3.405 m); minimum, 800 ft³/s (22.7 m³/s) July 24, 25, gage height, 3.45 ft (1.052 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FFR	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2290	1540	1450	1150	880	980	4300	5960	2120	2130	2290	977
2	2280	1520	1450	1150	870	980	4400	5440	2070	2070	2330	1030
3	2290	1480	1450	1100	860	1000	4400	5060	2100	1980	2180	1020
4	2510	1460	1450	1100	860	1050	4400	4660	2170	1850	2030	991
5	2900	1430	1450	1100	850	1100	4300	4280	2310	1740	1880	950
6	3400	1420	1400	1050	840	1150	4200	4000	2410	1640	1750	913
7	3920	1410	1400	1050	840	1200	4100	3770	2370	1530	1620	881
8	4380	1410	1350	1000	840	1200	4000	3630	2330	1430	1490	856
9	4690	1430	1300	1000	840	1250	3800	3520	2420	1360	1360	835
10	4690	1390	1300	1000	840	1250	3600	3410	2500	1300	1260	818
11	4460	1360	1250	980	840	1300	3300	3280	2540	1260	1200	841
12	4140	1330	1200	980	830	1300	3200	3130	2570	1200	1130	940
13	3780	1320	1200	960	830	1300	3300	2980	2510	1140	1100	1100
14	3410	1350	1200	940	830	1350	3400	2840	2390	1100	1160	1270
15	3100	1370	1200	920	830	1350	3700	2720	2270	1070	1170	1350
16	2840	1360	1200	920	820	1400	4000	2600	2170	1020	1130	1360
17	2620	1390	1200	920	820	1400	5950	2490	2350	982	1090	1360
18	2430	1610	1150	910	840	1450	7710	2380	2690	947	1120	1300
19	2290	1920	1150	900	860	1500	8110	2330	2930	921	1110	1220
20	2200	2090	1150	900	880	1600	8090	2500	3090	899	1080	1150
21	2100	2100	1150	890	900	1700	7830	2830	3300	870	1050	1100
22	2010	1920	1150	880	920	1800	7580	3110	3440	847	1010	1050
23	1940	1850	1150	900	940	2100	7420	3330	3440	825	978	1010
24	1860	1750	1150	900	950	2400	7180	3430	3320	807	1000	977
25	1830	1700	1150	900	960	2700	6860	3350	3140	1010	1000	949
26	1780	1650	1150	900	960	3000	6760	3150	2930	1390	979	922
27	1720	1600	1150	890	960	3400	6980	2930	2720	1560	961	897
28	1660	1550	1150	890	980	3700	7240	2710	2520	1620	939	879
29	1620	1500	1150	880	---	3800	7050	2520	2370	1590	917	860
30	1600	1500	1150	880	---	4000	6550	2350	2220	1510	903	834
31	1580	---	1150	880	---	4100	---	2220	---	1870	887	---
TOTAL	84320	46710	38550	29820	24470	57810	163710	102910	77710	41468	40104	30640
MEAN	2720	1557	1244	962	874	1865	5457	3320	2590	1338	1294	1021
MAX	4690	2100	1450	1150	980	4100	8110	5960	3440	2130	2330	1360
MIN	1580	1320	1150	880	820	980	3200	2220	2070	807	887	818
CFSM	2.47	1.42	1.13	.88	.80	1.70	4.96	3.02	2.36	1.22	1.18	.93
IN.	2.85	1.58	1.30	1.01	.83	1.96	5.54	3.48	2.63	1.40	1.36	1.04
CAL YP 1978	TOTAL	702455	MEAN	1925	MAX	7060	MIN 642	CFSM 1.75	IN 23.76			
WTR YP 1979	TOTAL	738222	MEAN	2023	MAX	8110	MIN 807	CFSM 1.84	IN 24.97			

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE¼ SE¼ sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi (1.1 km) downstream from Indian River, 0.8 mi (1.3 km) upstream from U.S. Highway 2, and 1.8 mi (2.9 km) upstream from mouth.

DRAINAGE AREA.--1,445 mi² (3,743 km²), approximately.

PERIOD OF RECORD.--Water years 1976 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1975 to current year.

WATER TEMPERATURES: October 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--In addition to water-quality monitor, samples are collected periodically by an observer. Monthly samples are collected as a cross-section sample at the Wyman State Nursery site or at railroad bridge 1,200 ft (366 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument. Intermittent ice cover during winter period. Prior to Oct. 1, 1975, water quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi (2.4 km) downstream. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum, 57 micromhos Apr. 25, 1979.

WATER TEMPERATURES: Maximum, 26.5°C July 15, 23, 1979; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 209 micromhos Dec. 14; minimum, 57 micromhos Apr. 25.

WATER TEMPERATURES: Maximum, 26.5°C July 15, 23; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED SATUR- ATION	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
11...	1230	5200	115	7.1	11.0	8.9	82	K9	43	65	18
NOV											
28...	1030	2800	172	7.2	.0	13.0	91	<1	K4	88	28
JAN											
10...	1200	E600	191	7.4	.0	9.0	63	<1	K1	110	30
FEB											
07...	1100	E500	192	7.5	.0	9.6	67	K3	K3	100	29
MAR											
08...	1100	1700	170	7.4	.0	9.4	66	K1	20	83	10
APR											
11...	1115	5440	93	7.2	.0	11.1	77	K4	K2	49	8
MAY											
18...	1230	3550	130	7.8	12.5	9.6	92	K3	<1	68	11
JUN											
20...	0950	4100	125	7.6	18.0	7.9	84	30	30	68	14
JUL											
19...	1000	998	182	7.8	21.5	8.2	93	K4	32	97	3
AUG											
15...	1145	1700	165	8.0	15.0	9.0	89	32	28	88	9
SEP											
05...	1040	1000	175	8.1	18.0	8.2	89	25	32	90	18
25...	1215	1280	179	7.5	14.0	9.5	93	K11	43	90	19

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
11...	18	4.9	1.1	.1	4	.6	57	0	47	7.2	10
NOV											
28...	26	5.6	1.3	.1	3	.8	73	0	60	7.4	23
JAN											
10...	31	7.1	1.5	.1	3	.8	94	0	77	6.0	21
FEB											
07...	29	7.1	1.4	.1	3	.9	89	0	73	4.5	21
MAR											
08...	24	5.5	1.3	.1	3	.8	88	0	72	5.6	19
APR											
11...	14	3.4	.9	.1	4	.6	50	0	41	5.0	9.0
MAY											
18...	20	4.4	1.0	.1	3	.6	69	0	57	1.8	17
JUN											
20...	20	4.3	1.0	.1	3	.5	66	0	54	2.7	12
JUL											
19...	29	5.9	1.3	.1	3	.6	114	0	94	2.9	19
AUG											
15...	26	5.6	1.2	.1	3	.5	96	0	79	1.5	14
SEP											
05...	27	5.6	1.2	.1	3	.6	88	0	72	1.1	20
25...	27	5.5	1.3	.1	3	.6	87	0	71	4.4	21

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)
IE--ESTIMATED VALUE

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PFR DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT											
11...	2.1	.1	5.5	106	71	1490	.03	.01	--	.59	.60
NOV											
28...	2.6	.0	6.4	119	102	900	.10	.12	--	.45	.57
JAN											
10...	2.0	.0	7.7	132	117	214	.12	.07	--	.34	.41
FEB											
07...	1.7	.1	7.9	121	114	--	.15	.06	--	.43	.49
MAR											
08...	1.6	.1	7.3	115	103	528	.28	.06	--	.38	.44
APR											
11...	1.4	.0	5.2	76	60	1120	.12	.02	--	.23	.25
MAY											
18...	1.2	.1	3.9	104	82	997	.57	.09	.11	.28	.37
JUN											
20...	1.6	.1	3.7	115	76	1270	.05	.04	.05	.55	.59
JUL											
19...	1.4	.1	5.9	130	120	350	.08	.04	.05	.39	.43
AUG											
15...	1.7	.1	6.3	128	103	588	.07	.02	.02	.28	.30
SEP											
05...	2.1	.1	6.3	126	106	340	.09	.00	.00	.43	.43
25...	1.8	.1	6.0	122	107	422	.24	.03	.04	.40	.43

DATE	NITRO- GEN,AM- MONIA + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
11...	.15	.45	.63	2.8	.02	--	.00	--	8	112	100
NOV											
28...	.19	.38	.67	3.0	.01	--	.00	8.2	3	23	100
JAN											
10...	--	--	.53	2.3	.01	--	.00	8.2	--	--	--
FEB											
07...	.03	.46	.64	2.8	.01	--	.00	--	6	8.0	100
MAR											
08...	.25	.19	.72	3.2	.01	--	.00	8.9	6	28	100
APR											
11...	--	--	.37	1.6	.01	--	.01	--	2	29	100
MAY											
18...	.02	.35	.94	4.2	.01	.03	.00	9.3	10	96	100
JUN											
20...	.06	.53	.64	2.8	.02	.06	.01	14	9	100	100
JUL											
19...	.04	.39	.51	2.3	.01	.03	.00	--	6	16	100
AUG											
15...	--	--	.37	1.6	.01	.03	.00	14	8	37	100
SEP											
05...	--	--	.52	2.3	.01	.03	.00	9.8	6	16	100
25...	--	--	.67	3.0	.02	.06	.01	10	6	21	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT										
11...	1230	1	0	0	0	0	2	<10	2	2
FEB										
07...	1100	0	0	0	0	2	2	10	0	0
APR										
11...	1115	1	0	0	0	1	1	10	10	1
JUL										
19...	1000	1	1	0	--	6	5	20	<10	0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CORALIT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL, RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 11...	2	3	4	1500	720	9	8	20	20	<.5
FEB 07...	0	1	1	1000	620	18	7	30	40	.5
APR 11...	0	3	2	3500	480	17	10	30	20	<.5
JUL 19...	0	3	1	1300	850	24	18	30	30	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 11...	<.5	0	0	1	2	10	20	14	--
FEB 07...	<.5	0	0	0	0	40	20	7.8	.4
APR 11...	<.5	0	0	1	0	10	0	8.5	.0
JUL 19...	<.5	0	0	0	0	20	20	8.2	.6

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
JAN 10...	1200	43	--	.000	.000	.030	.000
JUN 20...	0950	33	.00	1.18	1.18	.150	.000
SEP 05...	1040	21	200	1.81	2.13	1.60	.180

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 2,77 1015	MAR 8,78 0900	MAY 9,78 1030	JUN 27,78 1130
TOTAL CELLS/ML	59000	58	1400	50000
DIVERSITY: DIVISION	0.2	0.0	0.7	0.2
..CLASS	0.2	0.0	0.7	0.2
...ORDER	0.6	0.0	1.1	0.3
....FAMILY	0.6	1.3	1.1	0.3
.....GENUS	1.7	1.8	1.1	0.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....OOCYSTACEAE								
.....ANKISTRODESMUS	* 0		--	--	--	--	* 0	
.....CHODATELLA	--	--	--	--	--	--	* 0	
.....DICTYOSPHAERIUM	--	--	--	--	--	--	* 0	
.....KIRCHNERIELLA	--	--	--	--	--	--	--	--
....OOCYSTIS	--	--	--	--	--	--	--	--
....SELENASTRUM	--	--	--	--	--	--	--	--
....TETRAEDRON	* 0		--	--	--	--	--	--
...SCENEDESMACEAE								
....CRUCIGENIA	770	1	--	--	--	--	280	1
....SCENEDESMUS	* 0		--	--	--	--	* 0	
..TETRASPORALES								
...PALMELLACEAE								
....GLOEOCYSTIS	--	--	--	--	--	--	--	--
....SPHAEROCYSTIS	--	--	--	--	--	--	--	--
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	* 0		--	--	57	4	* 0	
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARTIUM	--	--	--	--	--	--	--	--
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	500	1	--	--	--	--	* 0	
....MELOSTIRA	--	--	--	--	1100#	80	* 0	
....STEPHANODISCUS	--	--	--	--	--	--	--	--
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	* 0		--	--	--	--	--	--
....COCCONEIS	--	--	--	--	19	1	--	--
...DIATOMACEAE								
....OPEPHORA	--	--	--	--	--	--	--	--
...FRAGILARIACEAE								
....ASTERIONELLA	--	--	29#	50	--	--	--	--
....FRAGILARIA	* 0		--	--	--	--	* 0	
....SYNEDRA	* 0		7	13	76	5	* 0	
...GOMPHONEMACEAE								
....GOMPHONEMA	--	--	7	13	--	--	--	--
...NAVICULACEAE								
....CALONEIS	--	--	--	--	--	--	--	--
....NAVICULA	--	--	--	--	--	--	--	--
...NITZSCHACEAE								
....NITZSCHIA	* 0		15#	25	--	--	* 0	
...SURIARELLACEAE								
....SURIARELLA	--	--	--	--	--	--	--	--
...TABELLARIACEAE								
....TABELLARIA	--	--	--	--	--	--	--	--
..CHRYSTOPHYCEAE								
...CHRYSOMONADALES								
....OCHROMONADACEAE								
.....OCHROMONAS	--	--	--	--	--	--	--	--
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
....CRYPTOMONADACEAE								
.....CRYPTOMONAS	--	--	--	--	--	--	--	--

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 2,77 1015	MAR 8,78 0900	MAY 9,78 1030	JUN 27,78 1130
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)				
..CYANOPHYCEAE				
...CHROOCOCCALES				
...CHROOCOCCACEAE				
....AGMENELLUM	--	-	--	-
....ANACYSTIS	34000#	57	--	-
....COCCOCHLORIS	2100	4	--	-
...HORMOGONALES				
...NOSTOCACEAE				
....ANABAEANA	--	-	--	-
...OSCILLATORIA				
....LYNGRYA	3000	5	--	-
....OSCILLATORIA	380	1	--	-
...RIVULARIACEAE				
....RAPHIDIOPSIS	--	-	--	-
...CHROOCOCCALES				
...CHROOCOCCACEAE				
....GOMPHOSPHERA	18000#	30	--	-
EUGLENOPHYTA (EUGLENOIDS)				
..EUGLENOPHYCEAE				
...EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	--	-	19	1
PYRRHOPHYTA (FIRE ALGAE)				
..DINOPHYCEAE				
...GYMNODINIALES				
...GYMNODINIACEAE				
....GYMNODINIUM	--	-	--	-

DATE TIME	AUG 1,78 1030	AUG 31,78 1200	SEP 20,78 1130
TOTAL CELLS/ML	54000	380	7600
DIVERSITY: DIVISION	0.1	1.0	0.4
..CLASS	0.1	1.0	0.4
...ORDER	0.4	1.9	1.3
...FAMILY	0.4	2.1	1.5
....GENUS	1.1	2.8	1.6

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
...OOCYSTACEAE						
....ANKISTRODESMUS	*	0	*	0	--	-
....CHODATELLA	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	5	1	--	-
....KIRCHNERIELLA	*	0	--	-	--	-
...OOCYSTIS	--	-	--	-	55	1
...SELENASTRUM	*	0	--	-	--	-
...TETRAEDORON	--	-	--	-	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	*	0	16	4	--	-
....SCENEDESMUS	*	0	35	9	*	0
...TETRASPORALES						
...PALMELLACEAE						
....GLOEOCYSTIS	--	-	--	-	*	0
....SPHAEROCYSTIS	--	-	16	4	--	-
...VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	*	0	*	0
...ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	*	0	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM; MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 1, 78 1030		AUG 31, 78 1200		SEP 20, 78 1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHRYSTOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	*	0	8	2	*	0
....MFLOSTRA	*	0	5	1	--	-
....STEPHANODISCUS	*	0	--	-	*	0
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	*	0
...DIATOMACEAE						
....DIPYTHORA	--	-	--	-	*	0
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	*	0	--	-	320	4
....SYNEDRA	--	-	--	-	--	-
...GOMPHONEMACEAE						
....GOMPHONEMA	*	0	--	-	--	-
...NAVICULACEAE						
....CALONEIS	--	-	--	-	*	0
....NAVICULA	*	0	*	0	*	0
...NITZSCHACEAE						
....NITZSCHIA	*	0	*	0	--	-
...SURIPELLACEAE						
....SURIPELLA	--	-	--	-	*	0
...TABELLARIACEAE						
....TABELLARIA	*	0	--	-	--	-
...CHRYSTOPHYCEAE						
..CHRYSOMONADALES						
...OCHROMONADACEAE						
....OCHROMONAS	*	0	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM			110#	28	--	-
....ANACYSTIS	44000#	81	71#	19	4600#	60
....COCCOCHLORIS	2800	5	--	-	--	-
...HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	100#	26	--	-
...OSCILLATORIACEAE						
....LYNGBYA	2400	4	--	-	2300#	30
....OSCILLATORIA	*	0	9	2	140	2
...RIVULARIACEAE						
....RAPIDIOPSIS	--	-	--	-	69	1
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	4500	8	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	*	0	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)						
..DINOPHYCEAE						
...GYMNODINIALES						
...GYMNODINIACEAE						
....GYMNODINIUM	--	-	*	0	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	176	169	174	191	186	189	198	187	192	197	193	194
2	179	173	176	194	191	192	201	196	198	196	194	195
3	180	171	176	192	188	191	201	199	200	195	193	194
4	179	171	176	196	192	195	201	199	200	194	192	193
5	180	166	174	199	191	194	204	200	202	194	191	192
6	169	156	159	198	194	196	204	201	203	194	192	193
7	156	137	146	194	189	191	207	201	204	196	192	193
8	136	123	129	194	188	191	204	202	203	196	192	194
9	136	128	131	199	194	196	207	203	204	195	192	193
10	138	132	135	199	194	196	207	201	204	194	191	192
11	140	131	134	197	193	195	208	205	206	193	190	192
12	146	139	143	196	193	194	208	204	206	194	189	191
13	144	136	141	198	194	195	205	203	204	192	189	191
14	147	138	143	198	196	197	209	203	205	191	188	189
15	156	144	150	199	195	198	205	205	205	191	188	189
16	166	152	156	198	195	196	205	203	204	190	187	189
17	167	157	161	196	195	196	203	201	203	189	187	188
18	170	161	167	196	190	193	202	200	201	190	185	187
19	175	162	169	193	185	191	203	200	202	188	185	187
20	173	163	167	184	171	174	201	199	200	188	186	187
21	178	170	174	173	167	170	200	199	200	188	186	187
22	182	175	179	169	166	167	200	198	199	187	185	186
23	176	170	172	170	166	168	201	198	200	187	185	186
24	173	169	171	171	169	170	200	198	199	186	185	185
25	180	173	177	176	172	174	200	198	199	187	184	185
26	181	173	179	178	173	175	199	197	198	184	181	183
27	184	172	178	183	177	180	196	195	196	182	180	181
28	184	177	180	186	183	185	197	193	195	181	180	180
29	181	178	179	187	182	185	195	191	194	180	178	---
30	187	181	183	190	186	188	193	191	193	---	---	---
31	194	187	189	---	---	---	193	190	193	---	---	---
MONTH	194	123	163	199	166	187	209	187	200			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	---	---	---	191	190	191	129	119	124	98	91	94
2	---	---	---	193	192	192	127	119	124	101	91	94
3	---	---	---	195	192	193	121	109	116	114	101	109
4	---	---	---	193	190	192	122	106	111	111	108	110
5	---	---	---	193	191	192	115	101	105	112	107	109
6	---	---	---	192	187	190	136	115	124	119	111	115
7	178	175	---	189	184	187	133	108	120	127	117	121
8	180	176	178	185	179	182	114	104	109	130	124	127
9	180	178	179	179	175	177	109	104	107	132	128	130
10	184	180	182	178	175	176	107	101	104	130	125	128
11	183	180	181	178	173	175	104	100	101	133	128	130
12	182	179	180	176	172	174	106	99	102	134	130	132
13	184	180	182	174	171	172	112	104	107	138	132	135
14	182	180	181	178	173	176	117	110	113	144	137	140
15	185	181	183	185	177	181	119	109	113	148	142	145
16	185	182	184	177	172	175	116	109	112	148	143	146
17	187	184	185	173	171	172	115	107	111	148	146	147
18	186	183	185	174	171	173	113	90	101	154	146	148
19	187	185	186	173	170	171	102	82	91	154	150	152
20	188	186	187	170	168	169	102	76	84	155	151	153
21	188	187	188	167	163	166	101	77	91	155	151	153
22	191	189	190	163	158	161	87	67	74	153	142	145
23	190	188	189	158	153	156	85	68	74	144	137	140
24	191	188	190	157	153	155	73	64	70	142	133	138
25	194	190	192	159	149	154	74	57	65	140	128	135
26	193	190	192	149	140	146	111	70	95	137	127	131
27	192	191	192	142	130	137	122	105	114	139	132	135
28	192	190	191	134	129	130	104	93	99	145	134	138
29	---	---	---	139	132	135	95	87	91	153	141	145
30	---	---	---	134	128	130	100	88	94	158	146	151
31	---	---	---	137	129	134	---	---	---	153	148	151
MONTH				195	128	168	136	57	102	158	91	133

STREAMS TRIBUTARY TO LAKE MICHIGAN
04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	156	150	153	149	142	145	153	144	147	194	189	192
2	160	154	157	150	142	146	152	148	150	192	189	190
3	167	159	163	154	142	148	150	141	145	191	188	190
4	166	160	163	146	142	144	150	145	147	193	186	190
5	162	153	158	148	144	146	159	151	153	190	178	185
6	162	150	153	154	148	151	164	158	160	184	178	181
7	157	149	152	156	151	154	164	163	164	184	179	181
8	158	153	156	161	154	158	168	162	164	186	180	183
9	158	151	155	165	159	162	172	165	168	190	186	188
10	156	147	151	166	160	163	187	169	178	200	187	191
11	151	143	147	168	163	165	176	167	170	195	180	190
12	151	139	145	168	165	166	181	169	174	194	190	192
13	156	144	150	171	165	168	183	180	181	191	184	188
14	155	150	152	175	170	172	182	164	---	186	179	182
15	159	150	154	173	169	171	173	170	---	182	171	177
16	160	150	155	170	166	168	171	167	169	177	167	173
17	157	149	153	172	166	168	179	170	173	170	163	167
18	156	148	152	172	167	169	186	176	179	172	163	167
19	155	140	145	174	169	171	176	172	174	173	167	169
20	146	123	132	176	173	174	179	171	175	174	168	170
21	130	120	124	177	174	175	186	178	182	178	172	175
22	128	113	124	178	176	177	181	176	179	181	174	177
23	130	112	120	181	176	177	189	182	184	185	177	182
24	131	120	125	182	171	176	192	184	187	188	181	183
25	133	125	130	172	168	170	190	184	186	195	185	189
26	134	129	132	173	165	169	191	185	187	191	187	189
27	135	131	133	166	161	163	191	187	190	195	189	193
28	145	130	138	162	157	159	198	189	191	196	192	194
29	147	137	142	158	151	154	194	187	189	199	194	197
30	148	142	144	157	153	156	192	190	191	202	193	198
31	---	---	---	156	151	155	193	189	191	---	---	---
MONTH	167	112	145	182	142	163	198	141		202	163	184

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	14.0	13.0	13.5	7.0	6.5	7.0	.0	.0	.0	.0	.0	.0
2	13.5	13.5	13.5	7.0	6.5	8.5	.0	.0	.0	.0	.0	.0
3	14.0	13.5	13.5	8.5	7.0	7.5	.0	.0	.0	.0	.0	.0
4	14.5	13.5	14.0	9.0	8.5	8.5	.0	.0	.0	.0	.0	.0
5	14.0	13.5	13.5	9.0	8.5	9.0	.0	.0	.0	.0	.0	.0
6	13.5	12.0	12.5	9.0	7.5	8.5	.0	.0	.0	.0	.0	.0
7	12.0	10.5	11.5	7.5	7.0	7.0	.0	.0	.0	.0	.0	.0
8	10.5	10.0	10.0	7.0	6.0	7.0	.0	.0	.0	.0	.0	.0
9	10.0	10.0	10.0	7.0	7.0	7.0	.0	.0	.0	.0	.0	.0
10	11.0	10.0	10.5	7.0	6.5	6.5	.0	.0	.0	.0	.0	.0
11	11.5	11.0	11.0	6.5	3.5	5.5	.0	.0	.0	.0	.0	.0
12	12.0	11.0	11.5	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
13	11.5	11.0	11.0	4.5	2.5	3.5	.0	.0	.0	.0	.0	.0
14	10.5	10.0	10.0	4.0	2.0	2.5	.0	.0	.0	.0	.0	.0
15	9.5	9.0	9.5	2.5	2.0	2.0	.0	.0	.0	.0	.0	.0
16	9.0	8.0	9.0	2.0	2.0	2.0	.0	.0	.0	.0	.0	.0
17	9.0	7.5	8.0	2.0	2.0	2.0	.0	.0	.0	.0	.0	.0
18	8.5	7.5	8.0	2.0	1.5	1.5	.0	.0	.0	.0	.0	.0
19	8.5	7.5	8.0	1.5	1.0	1.5	.0	.0	.0	.0	.0	.0
20	9.0	7.5	8.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
21	10.0	9.0	9.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	10.0	9.5	10.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	9.5	9.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	9.0	8.5	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	9.0	9.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	9.0	8.5	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	9.0	8.0	8.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	8.5	7.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	7.0	6.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	7.5	6.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	7.5	7.0	7.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	14.5	6.0	10.0	9.0	.0	3.5	.0	.0	.0	.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	.5	.5	.5	---	---	---	9.5	7.0	8.5
2	.0	.0	.0	.5	.0	.0	---	---	---	9.0	8.0	8.5
3	.0	.0	.0	.5	.0	.5	---	---	---	9.5	8.0	8.5
4	.0	.0	.0	.5	.5	.5	---	---	---	9.0	8.0	8.5
5	.0	.0	.0	.5	.0	.5	---	---	---	8.0	7.0	7.5
6	.0	.0	.0	1.0	.0	.5	---	---	---	7.0	6.5	6.5
7	.0	.0	.0	.5	.0	.5	---	---	---	8.5	6.0	7.0
8	.0	.0	.0	.0	.0	.0	---	---	---	9.5	8.5	9.0
9	.0	.0	.0	---	---	---	---	---	---	10.5	9.5	10.0
10	.0	.0	.0	---	---	---	---	---	---	12.5	10.5	11.5
11	.0	.0	.0	---	---	---	---	---	---	13.5	12.0	13.0
12	.0	.0	.0	---	---	---	---	---	---	13.5	13.0	13.5
13	.0	.0	.0	---	---	---	4.0	---	---	14.0	12.5	13.5
14	.0	.0	.0	---	---	---	4.0	3.0	3.5	14.0	13.0	13.5
15	.0	.0	.0	---	---	---	5.0	2.5	4.0	14.0	13.0	13.5
16	.0	.0	.0	---	---	---	6.0	3.5	4.5	15.0	13.0	14.0
17	.0	.0	.0	---	---	---	6.5	3.5	5.0	14.5	13.5	14.0
18	.0	.0	.0	---	---	---	7.0	4.5	6.0	15.5	12.0	14.5
19	.0	.0	.0	---	---	---	7.5	5.5	6.5	15.5	14.5	14.5
20	.0	.0	.0	---	---	---	8.5	6.0	7.5	14.5	13.5	14.0
21	.0	.0	.0	---	---	---	8.5	7.0	8.0	15.0	12.5	14.0
22	.0	.0	.0	---	---	---	9.0	7.0	8.0	14.0	12.5	13.0
23	.0	.0	.0	---	---	---	10.0	7.5	9.0	12.5	12.0	12.5
24	.5	.0	.0	---	---	---	11.0	9.0	10.0	14.0	11.5	12.5
25	.0	.0	.0	---	---	---	10.5	9.5	10.0	14.5	12.0	13.0
26	.0	.0	.0	---	---	---	10.5	9.5	10.0	14.0	12.5	13.0
27	.0	.0	.0	---	---	---	11.0	9.0	10.0	13.5	13.0	13.0
28	.5	.0	.5	---	---	---	9.5	8.5	9.0	14.5	12.5	13.5
29	---	---	---	---	---	---	9.0	7.0	8.5	16.0	13.0	14.5
30	---	---	---	---	---	---	8.5	7.5	8.0	17.0	14.5	16.0
31	---	---	---	---	---	---	---	---	---	17.5	16.0	16.5
MONTH	.5	.0	.0							17.5	6.0	12.0
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	18.0	16.5	17.5	20.0	18.5	19.5	22.5	20.5	21.5	21.5	20.5	21.0
2	18.5	17.0	18.0	20.5	18.0	19.0	22.5	21.5	22.0	22.0	20.5	21.0
3	19.5	17.5	18.5	21.0	19.0	20.0	22.5	21.0	21.5	21.0	19.5	20.0
4	19.0	18.0	18.5	20.5	19.5	20.0	22.5	21.5	22.0	20.0	19.0	19.5
5	19.5	17.5	18.5	20.5	19.0	19.5	22.5	20.5	21.5	20.5	19.0	20.0
6	19.0	17.5	18.0	21.0	19.5	20.0	22.5	21.5	22.0	21.0	20.0	20.5
7	18.0	17.0	17.5	22.0	20.0	21.0	22.5	22.0	22.5	20.5	18.0	19.0
8	18.5	17.5	18.0	22.5	20.5	21.5	22.5	21.5	22.0	18.0	17.5	18.0
9	19.0	17.5	18.0	23.0	21.5	22.0	21.5	20.5	21.0	18.0	17.0	17.5
10	18.5	17.5	18.0	23.5	22.0	22.5	21.0	20.0	20.5	18.0	17.5	18.0
11	18.0	16.5	17.5	24.0	22.5	23.0	21.0	18.5	20.0	17.5	16.5	17.0
12	18.5	16.0	17.0	25.0	23.0	24.0	20.5	19.0	19.5	16.5	16.5	16.5
13	19.0	17.0	18.0	25.5	24.0	25.0	19.5	17.5	18.5	17.5	16.5	16.5
14	18.5	17.5	18.0	26.0	24.5	25.0	17.5	15.5	16.0	16.5	15.5	16.0
15	19.5	17.5	18.5	26.5	25.0	25.5	17.0	16.0	---	15.5	15.0	15.0
16	20.0	19.0	19.5	25.5	24.0	24.5	17.0	15.5	16.5	16.0	14.5	15.5
17	20.0	18.5	19.5	24.0	23.0	23.5	16.5	16.0	16.0	16.5	15.5	16.0
18	21.0	18.0	19.5	23.5	23.0	23.5	17.5	16.0	16.5	16.5	15.5	16.5
19	20.5	18.5	19.5	23.5	23.0	23.0	18.0	17.0	17.5	15.5	15.0	15.0
20	19.5	18.0	18.5	24.0	23.0	23.5	18.0	17.5	17.5	15.0	15.0	15.0
21	19.0	17.5	18.0	25.0	23.5	24.0	21.0	18.0	19.5	15.5	14.5	15.0
22	18.5	16.0	17.0	26.0	24.0	25.0	21.0	20.0	20.0	15.5	14.5	15.0
23	16.5	15.0	16.0	26.5	25.0	25.5	20.5	20.0	20.0	15.5	14.5	15.0
24	16.5	15.0	16.0	25.5	25.0	25.5	21.5	20.0	20.5	15.0	14.5	15.0
25	17.5	16.0	16.5	25.5	23.0	24.0	21.0	20.0	20.5	15.5	14.5	15.0
26	17.0	16.0	16.5	24.0	23.0	23.5	21.0	19.5	20.0	16.0	14.5	15.5
27	18.0	16.0	17.0	23.0	22.0	22.5	20.5	20.0	20.5	16.5	15.0	16.0
28	19.0	17.5	18.0	23.5	22.5	23.0	20.0	19.0	19.5	17.0	16.0	16.5
29	20.0	18.0	19.0	23.5	22.5	23.0	21.0	19.0	19.5	16.5	16.5	16.5
30	20.5	19.0	19.5	22.5	21.5	22.0	21.0	20.0	20.5	17.0	16.5	16.5
31	---	---	---	21.5	20.0	21.0	20.5	20.0	20.5	---	---	---
MONTH	21.0	15.0	18.0	26.5	18.0	22.5	22.5	15.5		22.0	14.5	17.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW¼ SE¼ sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft (9 m) upstream from bridge on Forest Service Road 2231, 500 ft (152 m) downstream from Mormon Creek, 0.1 mi (0.2 km) east of Federal Forest Highway 13, and 3.2 mi (5.1 km) north of Nahma Junction.

DRAINAGE AREA.--183 mi² (474 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft (186.230 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 212 ft³/s (6.004 m³/s), 15.73 in/yr (400 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft (3.002 m); minimum, 35 ft³/s (0.991 m³/s) Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft (1.091 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) Apr. 22, gage height, 9.61 ft (2.929 m); minimum, 82 ft³/s (2.32 m³/s) Sept. 28, 29, 30, gage height, 4.02 ft (1.225 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	318	161	150	120	92	110	520	705	396	203	340	123
2	278	157	150	120	92	115	530	624	494	187	270	117
3	369	153	150	115	94	120	530	588	435	172	216	106
4	604	151	150	115	96	120	525	547	409	161	265	100
5	649	150	145	110	98	120	520	502	528	150	338	96
6	616	153	140	110	98	125	510	521	545	141	268	110
7	613	148	140	110	98	125	490	534	489	134	214	103
8	552	144	140	105	98	125	480	509	564	130	179	95
9	480	142	135	100	98	120	460	509	531	125	156	91
10	424	138	130	100	98	120	440	504	505	122	148	89
11	381	136	130	100	98	125	430	469	531	124	138	93
12	359	134	125	98	98	125	414	429	467	140	126	133
13	328	140	125	98	98	130	537	393	413	139	153	237
14	298	166	120	98	96	130	686	387	371	127	173	235
15	276	160	120	96	96	135	720	370	333	121	149	194
16	260	150	120	94	94	140	829	346	350	115	132	166
17	245	176	120	94	94	150	969	324	506	109	125	143
18	236	360	120	94	96	160	1080	309	499	105	124	127
19	227	368	115	94	98	170	1210	523	410	107	118	115
20	218	312	115	92	100	180	1340	819	371	135	113	109
21	211	280	115	92	100	200	1450	769	439	118	107	105
22	207	260	120	92	105	230	1480	668	427	109	102	100
23	202	240	120	92	105	270	1340	631	380	103	101	95
24	197	220	120	92	110	310	1230	580	345	100	105	92
25	191	200	120	92	110	340	1140	503	307	158	105	90
26	187	190	120	92	110	360	1380	437	274	162	98	87
27	183	180	120	92	110	400	1350	392	278	205	94	85
28	178	170	120	92	110	450	1090	356	266	247	92	83
29	173	160	120	92	---	470	932	321	241	196	92	82
30	169	155	120	92	---	490	812	292	219	191	90	82
31	165	---	120	92	---	510	---	270	---	373	90	---
TOTAL	9794	5654	3955	3075	2790	6675	25424	15131	12323	4709	4821	3483
MEAN	316	188	128	99.2	99.6	215	847	488	411	152	156	116
MAX	649	368	150	120	110	510	1480	819	564	373	340	237
MIN	165	134	115	92	92	110	414	270	219	100	90	82
CFSM	1.73	1.03	.70	.54	.54	1.18	4.63	2.67	2.25	.83	.85	.63
IN.	1.99	1.15	.80	.63	.57	1.36	5.17	3.08	2.50	.96	.98	.71

CAL YR 1978 TOTAL 94015 MEAN 258 MAX 1020 MIN 75 CFSM 1.41 IN 19.11
WTR YR 1979 TOTAL 97834 MEAN 268 MAX 1480 MIN 82 CFSM 1.46 IN 19.89

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW¼ sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft (5 m) upstream from county highway, 0.3 mi (0.5 km) north of Humboldt, and 1.5 mi (2.4 km) downstream from Halfway Creek.

DRAINAGE AREA.--46.0 mi² (119.1 km²).

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft (463.662 m) Cleveland-Cliffs Iron Co. datum. Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. From July 1960 to June 1972, some diversion 100 ft (30 m) above station by industry for iron ore processing, figures of runoff adjusted. Several observations of water temperature were made during the year.

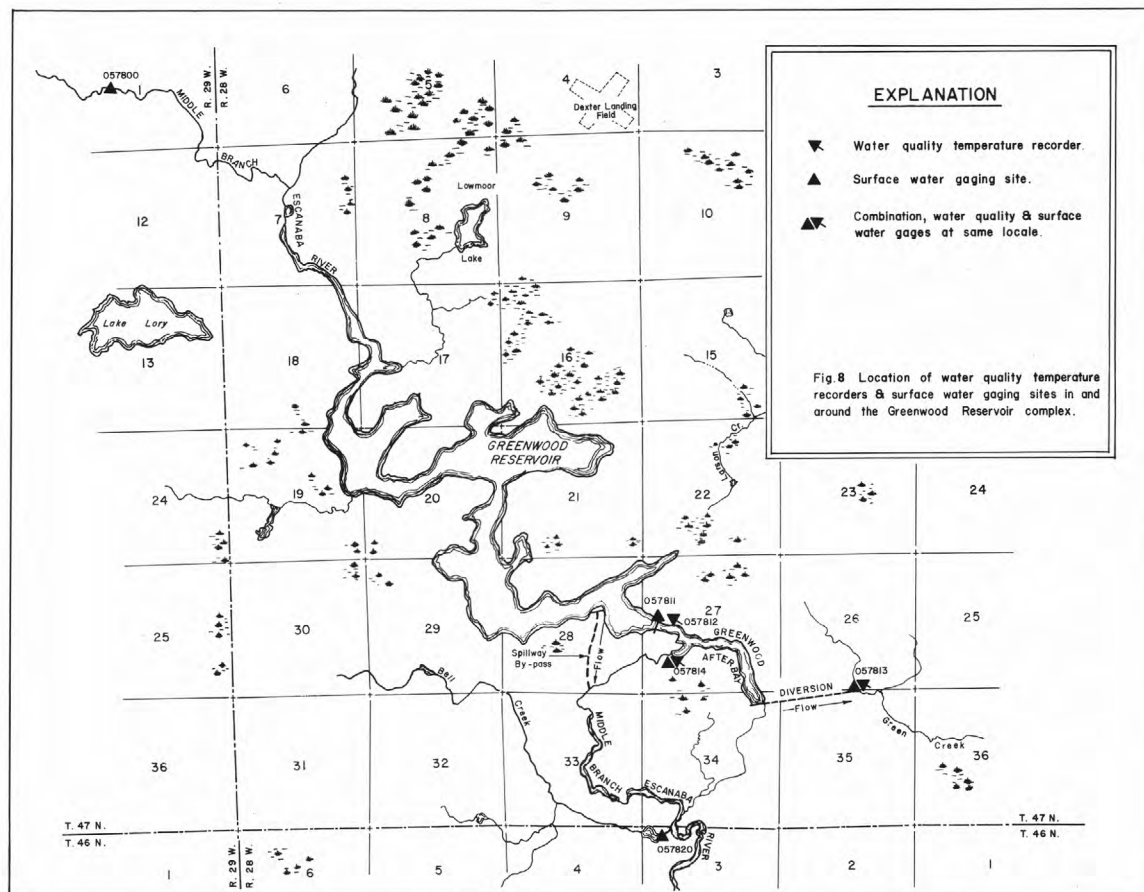
AVERAGE DISCHARGE.--20 years, 61.4 ft³/s (1.739 m³/s), 18.13 in/yr (461 mm/yr), adjusted for diversion 1960 to 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft³/s (46.4 m³/s) Apr. 24, 1960, gage height, 8.30 ft (2.530 m), from flood-mark; minimum, 4.0 ft³/s (0.11 m³/s) Sept. 12, 1976; minimum gage height, 1.07 ft (0.326 m) Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,040 ft³/s (29.5 m³/s) Apr. 26, gage height, 7.36 ft (2.243 m); minimum, 13.0 ft³/s (0.37 m³/s) Sept. 28, gage height, 1.79 ft (0.546 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	37	38	26	19	22	101	275	77	44	149	28
2	68	50	37	26	19	21	96	247	73	37	93	36
3	79	49	37	26	19	21	90	229	80	34	78	33
4	247	46	37	26	19	21	85	213	94	38	72	28
5	341	44	36	25	19	22	79	196	82	35	100	26
6	229	43	34	25	19	22	80	185	75	29	84	42
7	215	40	33	25	19	22	79	176	79	25	66	36
8	201	38	32	24	19	22	76	202	99	30	51	28
9	154	34	31	24	19	21	74	286	181	33	42	25
10	119	33	31	24	19	21	71	294	135	47	38	24
11	103	36	30	23	19	20	70	265	95	68	32	40
12	99	35	31	23	20	20	66	256	77	117	28	80
13	88	38	32	22	20	20	80	211	69	157	35	78
14	75	44	32	21	20	20	92	202	114	103	33	62
15	68	41	32	21	20	21	97	188	318	76	27	49
16	64	37	31	21	21	21	110	154	387	58	24	40
17	61	42	31	21	21	23	146	129	239	46	22	34
18	57	66	30	20	22	25	190	110	169	43	23	30
19	55	65	28	20	23	28	257	145	208	34	22	25
20	58	59	28	20	23	32	346	225	204	31	22	23
21	56	51	28	20	23	38	462	202	155	48	21	23
22	48	44	28	20	23	50	613	158	114	49	21	21
23	57	43	28	19	23	63	672	162	90	88	19	19
24	46	44	28	19	23	94	754	159	88	113	42	18
25	44	42	28	19	23	111	860	129	98	92	49	17
26	43	41	27	19	23	107	1000	105	86	99	35	16
27	47	39	27	19	22	105	781	98	99	72	30	15
28	45	39	27	19	22	111	547	96	68	55	27	15
29	40	39	27	19	---	109	411	85	56	127	29	15
30	39	39	27	19	---	105	327	74	49	163	30	14
31	38	---	26	19	---	105	---	70	---	160	26	---
TOTAL	2955	1298	952	674	581	1443	8712	5526	3758	2151	1370	940
MEAN	95.3	43.3	30.7	21.7	20.8	46.5	290	178	125	69.4	44.2	31.3
MAX	341	66	38	26	23	111	1000	294	387	163	149	80
MIN	38	33	26	19	19	20	66	70	49	25	19	14
CFSM	2.07	.94	.67	.47	.45	1.01	6.30	3.87	2.72	1.51	.96	.68
IN.	2.39	1.05	.77	.55	.47	1.17	7.05	4.47	3.04	1.74	1.11	.76
CAL YR 1978	TOTAL	26755.1	MEAN	73.3	MAX	1220	MIN	9.4	CFSM	1.59	IN	21.64
WTR YR 1979	TOTAL	30360.0	MEAN	83.2	MAX	1000	MIN	14	CFSM	1.81	IN	24.55



Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm³) at a spillway elevation of 1515 ft (461.8 m). At pool elevation exceeding 1515 ft (461.8 m), water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057813), and the gaging station below the release from the afterbay to Middle Branch Escanaba River (Greenwood Release, 04057814).

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi (6.0 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft (246.720 m) National Geodetic Vertical Datum of 1929 (levels by Cleveland Cliffs Iron Co.); gage readings have been reduced to elevations NGVD. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm³) at spillway elevation 1,515 ft (461.8 m). Above elevation of 1,515 ft (461.8 m), water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft (610 m) below station 04057814. The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft (518,000 m³) at elevation 1,480 ft (451.1 m). Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,400 acre-ft (31.3 hm³) Apr. 26, 27, 1979, elevation, 1516.5 ft (462.23 m); minimum since first filling, 3,240 acre-ft (3.99 hm³) Mar. 12, 1977, elevation, 1,491.1 ft (454.49 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 25,400 acre-ft (31.3 hm³) Apr. 26, 27, elevation, 1516.5 ft (462.23 m); minimum, 19,860 acre-ft (24.5 hm³) Mar. 22, elevation, 1,512.3 ft (460.95 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	(equivalent in ft ³ /s)
Sept. 30	1515.2	23580	--	--
Oct. 31	1515.1	23440	-140	-2.3
Nov. 30	1515.0	23300	-140	-2.4
Dec. 31	1514.4	22520	-780	-12.7
CAL YR 1978	--	--	-780	-1.1
Jan. 31	1513.7	21610	-910	-14.8
Feb. 28	1512.8	20460	-1150	-20.7
Mar. 31	1513.1	20830	+370	+6.0
Apr. 30	1515.8	24420	+3590	+60.3
May 31	1515.3	23720	-700	-11.4
June 30	1515.3	23720	0	0
July 31	1515.3	23720	0	0
Aug. 31	1514.8	23040	-680	-11.1
Sept. 30	1514.2	22260	-780	-13.1
WTR YR 1979	--	--	-1320	-1.8

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 mi (5.6 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Flow regulated by the multi-port outlets of Greenwood Reservoir. Altitude of outlets are: (No. 1) 1,505 ft (458.7 m), (No. 2) 1,495 ft (455.7 m), (No. 3) 1,485 ft (452.6 m), (No. 4) 1,478 ft (450.5 m) above mean sea level. Outlets open were: Oct. 1 to Sept. 30, No. 3. Other outlets also open were: Oct. 1 to about Oct. 9, No. 1 and from about Oct. 9 to about Nov. 21, No. 2.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, 0.0°C on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 17.0°C Aug. 14; minimum, 1.0°C Apr. 16-29.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.5	12.5	6.5	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
2	12.5	12.5	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
3	12.5	12.0	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
4	12.0	12.0	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
5	12.0	12.0	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
6	12.0	12.0	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
7	12.0	11.5	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
8	11.5	11.5	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
9	11.5	10.0	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
10	11.0	11.0	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
11	11.0	11.0	6.0	5.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
12	11.0	10.5	5.5	5.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
13	10.5	10.0	5.0	4.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
14	10.0	9.5	4.5	4.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
15	9.5	9.5	4.5	4.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
16	9.5	9.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
17	9.0	9.0	4.0	3.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
18	9.0	9.0	3.5	3.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
19	9.0	8.5	3.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
20	8.5	8.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
21	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
22	8.0	8.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
23	8.0	8.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
24	8.0	8.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
25	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
26	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
27	8.0	7.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
28	7.5	7.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
29	7.5	7.0	2.0	2.0	2.0	2.0	2.0	2.0	---	---	1.5	1.5
30	7.0	6.5	2.0	2.0	2.0	2.0	2.0	2.0	---	---	1.5	1.5
31	6.5	6.5	---	---	2.0	2.0	2.0	2.0	---	---	1.5	1.5
MONTH	12.5	6.5	6.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5	1.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.5	2.0	1.5	9.5	9.0	12.5	12.5	16.0	16.0	16.0	16.0
2	1.5	1.5	2.0	2.0	10.0	9.5	12.5	12.5	16.0	16.0	16.0	16.0
3	1.5	1.5	2.5	2.0	10.0	9.5	12.5	12.5	16.0	16.0	16.0	16.0
4	1.5	1.5	2.5	2.5	10.0	9.5	13.5	13.0	16.0	16.0	16.0	16.0
5	1.5	1.5	2.5	2.5	10.0	10.0	13.5	13.0	16.0	16.0	15.5	15.5
6	1.5	1.5	2.5	2.5	10.0	10.0	13.5	13.5	16.0	16.0	15.5	15.5
7	1.5	1.5	2.5	2.5	10.0	10.0	13.5	13.5	16.5	16.0	15.5	15.5
8	1.5	1.5	3.0	2.5	10.0	10.0	13.5	13.5	16.0	16.0	15.5	15.5
9	1.5	1.5	3.0	3.0	10.0	10.0	13.5	13.0	16.0	16.0	15.5	15.5
10	1.5	1.5	3.5	3.0	10.0	10.0	13.5	13.5	16.0	16.0	15.5	15.5
11	1.5	1.5	4.5	3.5	10.5	10.5	14.0	13.5	16.0	16.0	15.5	15.5
12	1.5	1.5	4.5	4.5	10.5	10.5	13.5	13.5	16.0	16.0	15.5	15.5
13	1.5	1.5	5.0	4.5	10.5	10.5	14.0	13.5	16.5	16.0	15.5	15.5
14	1.5	1.5	6.0	5.0	10.5	10.5	14.0	14.0	17.0	16.5	15.5	15.5
15	1.5	1.5	6.5	6.0	10.5	10.5	14.0	14.0	16.5	16.5	15.5	15.5
16	1.5	1.0	6.0	6.0	11.0	10.5	14.0	14.0	16.5	16.5	15.5	15.5
17	1.0	1.0	6.5	6.0	11.0	11.0	14.0	14.0	16.0	15.5	15.5	15.5
18	1.0	1.0	7.0	6.5	11.5	11.5	14.0	14.0	15.5	15.5	15.5	15.5
19	1.0	1.0	7.5	7.0	11.5	11.5	14.5	14.5	15.5	15.5	15.5	15.0
20	1.0	1.0	8.5	7.5	12.0	11.5	14.5	14.5	15.5	15.5	15.0	15.0
21	1.0	1.0	8.0	7.5	12.0	12.0	14.5	14.5	15.5	15.5	15.0	14.5
22	1.0	1.0	8.0	7.5	12.0	12.0	14.5	14.5	15.5	15.5	15.0	14.5
23	1.0	1.0	8.0	8.0	12.0	12.0	14.5	14.5	15.5	15.5	14.5	14.5
24	1.0	1.0	8.5	8.0	12.0	12.0	14.5	14.5	15.5	15.5	14.5	14.5
25	1.0	1.0	8.5	8.5	12.0	12.0	14.5	14.5	15.5	15.5	14.5	14.5
26	1.0	1.0	8.5	8.5	12.5	12.0	15.0	15.0	15.5	15.5	14.5	14.5
27	1.0	1.0	8.5	8.5	12.5	12.0	15.0	15.0	15.5	15.5	14.5	14.5
28	1.0	1.0	8.5	8.5	12.5	12.0	15.0	15.0	15.5	15.5	14.5	14.5
29	1.5	1.0	8.5	8.5	12.5	12.5	15.0	15.0	15.5	15.5	14.5	14.5
30	1.5	1.5	8.5	8.5	12.5	12.5	15.0	15.0	16.0	15.5	14.5	14.5
31	---	---	8.5	8.5	---	---	15.5	15.0	16.0	15.5	---	---
MONTH	1.5	1.0	8.5	1.5	12.5	9.0	15.5	12.5	17.0	15.5	16.0	14.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW¼ NE¼ sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft (61 m) upstream from Green Creek, 0.7 mi (1.1 km) downstream from Greenwood Afterbay, and 3.6 mi (5.8 km) south of Greenwood.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,460 ft (445 m) from topographic map (nearest 10 ft). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Flow completely regulated. A pipeline, 0.7 mi (1.1 km) long, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing and some returned to Middle Branch Escanaba River via another Green Creek (tributary to Middle Branch Escanaba River); 27 mi (43 km) below station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft³/s (0.85 m³/s) June 25-28, 1977, Nov. 9, 1979; no flow Dec. 27, 1972 to Jan. 6, 1973.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	15	25	25	18	22	14	5.9	5.7	6.0	16	22
2	15	18	25	25	19	22	13	5.9	5.7	6.0	16	22
3	15	24	25	25	22	22	13	5.8	5.8	5.9	16	22
4	15	24	25	25	22	23	13	5.9	5.9	5.9	16	22
5	15	24	25	25	22	22	13	6.0	5.9	5.9	16	22
6	15	23	25	25	22	22	13	6.0	5.9	9.5	16	22
7	15	20	25	25	22	22	14	6.0	5.9	14	16	22
8	15	29	25	25	21	22	14	6.1	5.9	14	16	22
9	15	30	25	25	22	22	14	6.1	5.9	13	16	22
10	15	28	25	25	22	22	14	6.1	6.0	13	16	22
11	15	24	25	24	22	22	14	6.1	6.0	14	16	22
12	15	25	24	21	23	22	14	6.0	6.0	15	16	22
13	15	26	25	15	23	22	14	5.8	6.0	15	16	22
14	15	26	25	15	23	22	14	5.7	6.0	15	16	22
15	15	26	25	15	23	22	14	5.7	6.0	15	16	22
16	15	25	25	16	23	22	14	5.6	6.0	15	16	22
17	15	25	25	18	23	22	14	5.6	6.2	15	15	22
18	15	25	25	18	23	22	14	5.6	6.2	15	15	22
19	15	25	25	18	22	22	14	5.7	6.2	15	15	22
20	15	25	25	18	22	22	14	6.0	6.2	15	16	22
21	15	25	25	18	22	22	14	6.1	6.2	15	16	22
22	15	25	25	18	22	19	14	6.1	6.2	15	16	22
23	15	25	25	18	22	14	14	6.1	6.2	15	16	22
24	15	25	25	18	22	14	14	6.2	6.2	15	16	21
25	15	25	25	18	22	14	14	6.2	6.1	16	16	22
26	15	24	25	18	22	14	8.9	6.0	6.1	16	16	23
27	15	24	25	18	22	15	6.0	5.9	6.1	16	17	29
28	15	24	25	18	22	15	6.0	5.9	6.0	16	22	29
29	15	24	25	18	---	15	6.0	5.8	6.0	16	22	29
30	14	25	25	18	---	14	5.9	5.7	6.0	16	22	29
31	15	---	25	18	---	14	---	5.7	---	16	22	---
TOTAL	464	733	774	626	615	611	377.8	183.3	180.5	414.2	518	688
MEAN	15.0	24.4	25.0	20.2	22.0	19.7	12.6	5.91	6.02	13.4	16.7	22.9
MAX	15	30	25	25	23	23	14	6.2	6.2	16	22	29
MIN	14	15	24	15	18	14	5.9	5.6	5.7	5.9	15	21
CAL YR 1978	TOTAL	5173.9	MEAN	14.2	MAX	30	MIN	5.8				
WTR YR 1979	TOTAL	6184.8	MEAN	16.9	MAX	30	MIN	5.6				

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 31, 1973.

REMARKS.--Temperature recorder clock stopped Mar. 8-20 (range in temperature 1.0°C). Flow regulated by inlet structure of pipeline from Greenwood Afterbay 0.7 mi (1.1 km) above station.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 22.5°C July 18, 19, 1974; minimum, 0.5°C on many days during winter periods 1977, 1978.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 18.5°C Aug. 8-14, Sept. 3; minimum, 1.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.5	6.5	6.5	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0
2	12.5	12.5	6.5	6.5	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0
3	12.5	12.0	6.5	6.5	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0
4	12.0	12.0	7.0	6.5	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0
5	12.0	12.0	7.0	7.0	2.0	2.0	2.0	2.0	1.5	1.5	1.0	1.0
6	12.0	11.5	7.0	7.0	2.0	2.0	2.0	2.0	1.5	1.5	1.0	1.0
7	11.5	11.0	7.0	6.0	2.0	2.0	2.0	2.0	1.5	1.5	1.0	1.0
8	11.0	10.0	5.5	5.0	2.0	2.0	2.0	2.0	1.5	1.5	---	---
9	10.0	10.0	5.0	5.0	2.0	2.0	2.0	2.0	1.5	1.5	---	---
10	10.0	10.0	5.0	5.0	2.0	2.0	2.0	2.0	1.5	1.5	---	---
11	10.0	10.0	5.0	4.5	2.0	2.0	2.0	2.0	1.5	1.0	---	---
12	10.5	10.0	4.5	4.0	2.0	2.0	2.0	2.0	1.5	1.5	---	---
13	10.5	10.0	4.0	3.5	2.0	2.0	2.0	2.0	1.5	1.5	---	---
14	10.0	10.0	3.5	3.5	2.0	2.0	2.0	2.0	1.5	1.5	---	---
15	9.5	8.5	3.5	3.0	2.0	2.0	2.0	2.0	1.0	1.0	---	---
16	8.5	8.5	3.0	3.0	2.0	2.0	2.0	2.0	1.0	1.0	---	---
17	8.5	8.0	3.0	3.0	2.0	2.0	2.0	2.0	1.0	1.0	---	---
18	8.0	8.0	3.0	3.0	2.0	2.0	2.0	2.0	1.0	1.0	---	---
19	8.0	8.0	3.0	3.0	2.0	2.0	1.5	1.5	1.0	1.0	---	---
20	8.0	8.0	3.0	3.0	2.0	2.0	1.5	1.5	1.0	1.0	---	---
21	8.0	8.0	3.0	3.0	2.0	2.0	1.5	1.5	1.0	1.0	1.0	1.0
22	8.0	7.5	3.0	3.0	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
23	8.5	8.0	3.0	3.0	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
24	8.5	8.0	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
25	8.0	8.0	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
26	8.0	8.0	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
27	8.0	7.5	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.0
28	7.5	7.5	2.5	2.5	2.0	2.0	1.5	1.5	1.0	1.0	1.0	1.0
29	7.5	7.0	2.5	2.5	2.0	2.0	1.5	1.5	---	---	1.0	1.0
30	7.0	6.5	2.5	2.5	2.0	2.0	1.5	1.5	---	---	1.0	1.0
31	6.5	6.5	---	---	2.0	2.0	1.5	1.5	---	---	1.0	1.0
MONTH	13.0	6.5	7.0	2.5	2.5	2.0	2.0	1.5	1.5	1.0		

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.0	1.0	4.0	3.5	10.5	10.5	13.5	13.5	18.0	17.0	18.0	17.5
2	1.0	1.0	3.5	3.5	11.0	10.5	14.0	13.5	17.0	17.0	18.0	18.0
3	1.5	1.0	5.0	4.0	11.0	10.5	14.0	14.0	18.0	17.0	18.5	17.5
4	1.5	1.0	5.0	5.0	11.5	11.0	14.5	14.5	18.0	18.0	17.5	17.0
5	2.0	1.5	5.0	4.5	12.0	11.5	14.5	14.5	18.0	18.0	17.5	17.0
6	2.5	2.0	4.5	4.5	12.0	12.0	15.0	14.5	18.0	18.0	18.0	17.5
7	2.5	2.0	4.5	4.5	12.0	12.0	15.0	15.0	18.0	18.0	18.0	17.5
8	2.0	2.0	4.5	4.5	12.0	12.0	16.0	15.0	18.5	18.0	17.5	16.5
9	2.0	2.0	4.5	4.5	12.0	12.0	16.5	16.0	18.5	18.5	16.5	16.5
10	2.0	1.5	4.5	4.5	12.0	12.0	17.0	16.5	18.5	18.5	17.5	16.5
11	1.5	1.5	5.0	4.5	12.5	12.0	17.0	16.5	18.5	18.5	17.0	17.0
12	2.0	2.0	5.5	5.0	12.5	12.0	16.5	16.0	18.5	18.5	17.0	16.0
13	2.0	2.0	5.5	5.5	12.5	12.5	16.5	16.5	18.5	18.0	16.0	15.5
14	2.0	2.0	6.0	6.0	12.5	12.5	17.0	16.5	18.5	18.0	15.5	15.5
15	2.0	2.0	6.5	6.0	12.5	12.5	17.0	17.0	17.5	15.5	15.5	14.5
16	2.0	2.0	6.5	6.5	12.5	12.5	17.5	17.0	16.0	15.5	14.5	14.5
17	2.0	2.0	7.5	7.0	12.5	12.5	17.5	17.0	16.5	16.0	15.0	14.5
18	2.0	2.0	8.5	7.5	13.0	12.5	17.5	17.5	16.5	16.5	16.0	15.0
19	2.5	2.0	9.5	8.5	13.0	13.0	17.5	17.5	16.5	16.5	16.0	14.5
20	2.5	2.5	10.0	9.5	13.0	13.0	17.5	17.5	17.0	16.5	14.5	14.5
21	2.5	2.5	10.0	9.5	13.5	13.0	17.5	17.5	17.0	17.0	15.5	14.5
22	3.0	3.0	9.5	9.5	15.0	13.5	17.5	17.5	17.5	17.0	15.0	14.5
23	3.0	3.0	9.5	9.5	15.0	14.0	17.5	17.5	17.5	17.5	14.5	14.5
24	3.0	3.0	9.5	9.0	14.0	13.5	17.5	17.5	17.5	17.5	14.5	14.5
25	3.0	3.0	9.0	9.0	13.5	13.5	17.5	17.5	18.0	17.5	14.5	14.5
26	3.0	3.0	9.5	9.0	13.5	13.5	17.5	17.5	18.0	18.0	14.5	14.5
27	3.0	3.0	9.5	9.5	13.5	13.5	17.5	17.0	18.0	18.0	14.5	14.5
28	3.0	3.0	10.0	9.5	13.5	13.5	17.0	17.0	18.0	18.0	14.5	14.5
29	3.0	3.0	10.0	10.0	13.5	13.5	17.0	17.0	17.5	17.5	15.0	14.5
30	4.0	3.0	10.5	10.0	13.5	13.5	17.0	17.0	18.0	17.5	15.0	14.5
31	---	---	10.5	10.5	---	---	17.5	17.0	18.0	18.0	---	---
MONTH	4.0	1.0	10.5	3.5	15.0	10.5	17.5	13.5	18.5	15.5	18.5	14.5

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LOCATION.--Lat 46°26'22", long 87°47'52", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi (4.2 km) upstream from Bell Creek and 3.8 mi (6.1 km) southwest of Greenwood.

WATER-DISCHARGE RECORDS

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,480 ft (451 m) from topographic map (nearest 10 ft). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Water-discharge records good. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft (462 m) is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water is diverted immediately above this station (station 04057813) to Green Creek for iron ore processing and some returned via another Green Creek to Middle Branch Escanaba River 27 mi (43 km) below this station. Overflow from the reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi (0.8 km) below this station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft³/s (8.21 m³/s) Oct. 1, 1972; (since regulation began), 63 ft³/s (1.78 m³/s) July 10, 11, 1974; minimum daily, 10 ft³/s (0.28 m³/s) Dec. 29, 30, 1972, result of construction.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	26	27	27	27	27	24	30	32	33	27	27
2	27	27	26	27	27	27	23	30	32	33	27	27
3	27	27	27	27	26	27	23	30	32	33	27	27
4	27	27	27	27	26	27	22	30	32	33	27	26
5	27	26	27	27	26	27	22	31	32	33	27	26
6	27	26	27	27	25	27	23	32	32	30	27	26
7	27	26	27	27	25	26	24	32	32	26	27	26
8	27	26	26	27	25	26	25	33	32	23	27	26
9	27	25	26	27	25	26	26	33	32	21	27	26
10	27	25	26	27	26	26	26	33	33	21	27	26
11	27	27	26	27	26	26	26	34	33	25	27	26
12	27	28	26	26	26	26	25	33	33	26	26	26
13	27	28	26	26	26	26	26	32	33	26	26	26
14	27	29	27	26	27	26	26	31	33	27	26	26
15	27	29	27	26	27	26	26	31	33	27	26	26
16	27	28	27	26	27	26	26	30	33	27	26	26
17	27	28	27	26	27	25	26	29	34	27	26	26
18	27	28	27	26	27	26	26	29	34	27	26	26
19	27	28	27	26	27	26	26	31	34	27	26	26
20	27	27	27	26	27	26	26	33	34	27	26	25
21	27	27	27	26	27	26	26	35	34	27	26	25
22	27	27	27	26	27	26	27	36	34	27	26	25
23	26	27	27	26	27	26	27	37	35	27	26	25
24	26	27	27	26	27	26	26	37	34	27	26	25
25	26	27	27	26	27	26	26	37	34	27	26	25
26	26	27	27	26	27	27	28	36	34	27	26	25
27	26	27	27	26	27	27	30	34	34	27	27	26
28	26	27	27	26	27	27	31	33	34	27	27	27
29	26	27	27	26	---	26	31	33	34	27	27	27
30	26	27	27	26	---	26	31	32	33	27	27	27
31	26	---	27	26	---	25	---	32	---	27	27	---
TOTAL	828	811	830	817	741	813	780	1009	995	849	822	779
MEAN	26.7	27.0	26.8	26.4	26.5	26.2	26.0	32.5	33.2	27.4	26.5	26.0
MAX	27	29	27	27	27	27	31	37	35	33	27	27
MIN	26	25	26	26	25	25	22	29	32	21	26	25
CAL YR 1978	TOTAL	9390	MEAN 25.7	MAX 29	MIN 24							
WTR YR 1979	TOTAL	10074	MEAN 27.6	MAX 37	MIN 21							

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Sept. 1, 1973.

REMARKS.--Temperature recorder clock stopped Jan. 21-30 (range in temperature 1.0 to 1.5°C). Flow regulated by valve at outlet of Greenwood Afterbay.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES.--Maximum, 23.5°C July 14, 15, 1974; minimum, 0.0°C Mar. 24, 25, 1979.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 19.5°C Aug. 7; minimum, 0.0°C Mar. 24, 25.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.0	7.0	6.0	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
2	13.0	12.5	7.0	6.0	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5
3	12.5	12.5	7.0	6.0	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.0
4	12.5	12.0	7.0	6.5	2.0	2.0	1.5	1.5	1.0	1.0	1.0	1.0
5	12.0	12.0	7.0	6.5	2.0	2.0	1.5	1.5	1.0	1.0	1.0	1.0
6	12.0	11.5	6.5	6.0	2.0	2.0	1.5	1.5	1.0	1.0	1.0	1.0
7	11.5	10.5	6.0	5.5	2.0	2.0	1.5	1.5	1.0	1.0	1.0	1.0
8	11.0	10.0	6.0	5.5	2.0	2.0	1.5	1.5	1.0	1.0	1.5	1.0
9	11.0	10.0	6.0	6.0	2.0	2.0	1.5	1.5	1.0	1.0	2.0	1.5
10	11.0	10.5	6.0	5.5	2.0	2.0	1.5	1.5	1.0	1.0	2.0	1.5
11	11.0	11.0	5.5	5.0	2.0	2.0	1.5	1.5	1.0	1.0	2.0	2.0
12	11.0	10.0	5.0	5.0	2.0	2.0	1.5	1.5	1.0	1.0	2.0	2.0
13	10.0	10.0	5.0	4.5	2.0	2.0	1.5	1.5	1.5	1.5	2.0	2.0
14	10.0	9.5	4.5	4.0	2.0	2.0	1.5	1.5	1.5	1.5	2.0	1.5
15	9.5	9.0	4.0	4.0	2.0	2.0	1.5	1.5	1.5	1.5	2.0	1.5
16	9.0	9.0	4.0	3.5	2.0	2.0	1.5	1.5	1.5	1.5	2.0	2.0
17	9.0	8.5	3.5	3.0	2.0	2.0	1.5	1.5	1.5	1.5	2.0	2.0
18	9.0	8.5	3.0	3.0	2.0	2.0	1.5	1.5	1.5	1.5	2.0	2.0
19	9.0	8.5	3.0	2.5	2.0	2.0	1.5	1.5	1.5	1.5	1.5	1.5
20	9.0	8.0	2.5	2.5	2.0	2.0	1.5	1.5	1.5	1.5	1.5	1.5
21	9.0	8.5	2.5	2.5	2.0	2.0	---	---	1.5	1.5	1.5	1.5
22	8.5	8.0	2.5	2.5	2.0	2.0	---	---	1.5	1.5	2.0	1.5
23	8.0	7.5	2.5	2.5	2.0	2.0	---	---	1.5	1.5	2.0	.5
24	8.0	7.5	2.5	2.5	2.0	2.0	---	---	1.5	1.5	.5	.0
25	7.5	7.5	2.5	2.5	2.0	2.0	---	---	1.5	1.5	1.0	.0
26	7.5	7.0	2.5	2.5	2.0	2.0	---	---	1.5	1.5	1.5	1.0
27	7.0	7.0	2.5	2.5	2.0	2.0	---	---	1.5	1.5	2.0	1.5
28	7.0	6.5	2.5	2.5	2.0	2.0	---	---	1.5	1.5	2.0	1.5
29	7.0	6.5	2.0	2.0	2.0	2.0	---	---	---	---	1.5	1.5
30	7.0	6.5	2.5	2.0	2.0	2.0	---	---	---	---	1.5	1.5
31	7.0	6.5	---	---	2.0	2.0	1.0	1.0	---	---	2.0	1.5
MONTH	13.0	6.5	7.0	2.0	2.0	2.0			1.5	1.0	2.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	2.0	3.5	2.5	12.5	10.0	17.0	13.5	17.0	15.5	17.5	16.0
2	2.0	2.0	3.5	3.0	12.5	10.0	16.5	13.5	19.0	16.0	17.0	16.5
3	2.0	1.5	4.5	3.0	12.0	10.0	16.0	14.5	19.0	16.0	16.5	15.5
4	2.5	2.0	4.5	3.0	12.0	11.0	17.5	14.5	18.5	16.0	16.5	15.5
5	2.5	1.0	3.5	3.0	13.0	10.0	17.5	14.0	18.5	16.5	18.5	16.5
6	1.5	.5	3.0	3.0	12.5	10.0	18.0	14.0	18.0	16.0	17.5	16.5
7	1.5	1.5	5.0	3.0	12.5	10.5	17.0	14.5	19.5	16.5	16.5	16.0
8	1.5	1.5	5.0	4.5	14.0	12.0	16.5	14.5	19.0	16.5	16.5	15.5
9	1.5	1.5	4.5	4.0	14.0	12.0	16.5	14.0	17.5	16.0	16.5	16.0
10	2.0	1.5	7.5	4.0	14.0	11.0	17.0	14.0	18.0	16.0	17.5	16.5
11	2.0	1.5	7.5	5.5	13.5	10.0	16.0	14.0	18.5	15.5	16.5	15.5
12	1.5	1.0	7.0	5.5	13.0	10.5	17.0	14.5	16.5	15.5	16.5	15.5
13	2.0	1.5	7.0	5.5	13.0	11.0	16.5	15.0	17.0	15.5	16.5	15.5
14	2.0	1.5	8.5	6.0	13.0	11.5	18.0	15.0	16.5	14.5	16.0	15.0
15	2.0	1.5	8.5	6.5	15.5	12.5	17.0	14.5	17.5	14.5	16.5	15.0
16	2.5	1.5	8.0	6.0	14.5	13.0	17.0	14.5	17.0	15.0	16.5	15.0
17	3.5	1.5	8.5	7.0	14.5	12.0	16.5	14.0	16.0	15.5	17.0	15.0
18	3.0	2.0	9.0	8.0	15.0	12.0	17.5	15.0	17.5	15.5	16.5	15.5
19	3.5	2.5	8.5	7.5	15.0	12.5	17.5	15.0	16.5	16.0	16.5	14.5
20	3.5	2.5	8.0	7.5	15.0	13.5	17.5	15.5	17.0	16.0	15.5	14.5
21	3.5	2.5	10.5	7.5	14.0	13.5	19.0	15.5	17.0	16.0	15.5	14.5
22	3.5	2.0	8.5	7.5	13.5	12.5	18.0	15.5	16.5	16.0	15.5	14.0
23	4.0	2.5	10.5	7.5	15.0	11.5	17.5	16.0	16.5	16.0	15.0	14.0
24	4.0	3.0	11.0	8.5	14.5	12.0	17.5	16.0	16.5	16.0	15.5	14.5
25	3.5	3.5	12.0	8.5	15.0	13.0	17.5	16.5	17.5	15.5	15.5	14.0
26	3.5	2.5	11.0	9.5	15.0	13.0	17.0	15.5	16.5	15.5	15.0	14.0
27	3.5	2.0	9.5	9.0	15.5	13.0	16.5	15.5	17.0	16.0	15.5	14.5
28	4.5	2.5	12.5	8.5	15.5	13.5	18.5	15.5	16.5	15.5	16.0	14.5
29	3.5	2.5	12.5	9.5	16.5	14.5	17.5	15.5	18.0	15.5	15.0	14.5
30	3.5	2.5	11.5	9.5	17.5	14.5	17.0	15.5	18.0	15.5	15.5	14.0
31	---	---	11.5	10.0	---	---	16.5	15.5	16.5	16.0	---	---
MONTH	4.5	.5	12.5	2.5	17.5	10.0	19.0	13.5	19.5	14.5	18.5	14.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI

LOCATION.--Lat 46°25'12", long 87°47'50", in NW¼ sec.3, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) downstream from county highway bridge, 100 ft (30 m) downstream from Bell Creek and 5.0 mi (8.0 km) southwest of Greenwood.

DRAINAGE AREA.--73.3 mi² (189.8 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-71, and annual maximum, water years 1970-72, October 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,400 ft (427 m) from topographic map (nearest 10 ft). Prior to Sept. 20, 1973, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for winter period, which are fair. Since December 1972, considerable regulation 2.1 mi (3.4 km) above station (station 04057814) and 2.6 mi (4.2 km) above station (station 04057811). Since January 1973, flow diverted 2.3 mi (3.7 km) above station at Greenwood Afterbay, to Green Creek (station 04057813) for iron ore processing and some returned to Middle Branch Escanaba River 24 mi (39 km) below station via another Green Creek. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 86.7 ft³/s (2.455 m³/s), 16.06 in/yr (408 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,130 ft³/s (32.0 m³/s) Apr. 26, 1979, gage height, 13.40 ft (4.084 m); minimum daily, 12 ft³/s (0.34 m³/s) Dec. 28, 1972, Jan. 2-4, Nov. 5, 1973, result of construction upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 8.62 ft³/s (0.24 m³/s) was measured Aug. 22, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,130 ft³/s (32.0 m³/s) Apr. 26, gage height, 13.40 ft (4.084 m); minimum daily, 28 ft³/s (0.79 m³/s) Apr. 4, 5, Sept. 22-27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	54	34	33	32	30	30	504	116	78	121	33
2	105	52	35	33	32	30	30	420	112	64	111	33
3	120	52	35	33	32	31	29	375	109	53	90	33
4	173	52	34	33	31	31	28	330	111	46	86	31
5	249	51	33	33	31	31	28	307	113	41	88	31
6	300	50	32	33	31	31	29	293	109	38	76	34
7	276	45	33	33	31	31	30	277	113	34	67	33
8	242	35	33	33	31	31	30	279	127	33	56	31
9	214	35	33	33	31	31	31	322	123	31	47	31
10	181	35	33	33	31	31	31	375	157	30	43	31
11	156	34	33	33	31	31	31	383	184	30	38	32
12	142	34	33	32	31	31	31	364	198	31	35	33
13	128	36	33	32	31	31	32	338	177	42	34	33
14	117	37	33	32	31	31	33	304	147	89	34	32
15	106	37	33	32	31	31	33	266	130	103	32	31
16	98	35	33	32	31	31	34	239	132	95	32	30
17	91	36	33	32	31	30	36	209	245	75	31	29
18	86	43	33	32	31	30	48	187	321	60	31	30
19	82	48	33	32	31	31	147	213	381	51	31	30
20	77	48	33	32	31	30	271	249	330	45	31	29
21	76	46	33	32	31	30	465	273	307	40	31	29
22	75	43	33	32	31	30	696	255	278	37	31	28
23	72	41	33	32	31	33	872	248	247	36	31	28
24	68	41	33	32	31	34	959	230	202	36	31	28
25	66	40	33	32	32	33	1030	207	163	66	31	28
26	64	38	33	32	31	33	1110	181	145	83	31	28
27	63	37	33	32	31	33	1110	163	153	111	31	28
28	63	37	33	32	30	32	990	154	130	100	32	29
29	59	36	33	32	---	31	829	141	114	80	34	29
30	56	34	33	32	---	31	656	128	95	83	33	29
31	56	---	33	32	---	31	---	119	---	117	33	---
TOTAL	3767	1242	1028	1003	871	966	9709	8333	5269	1858	1463	914
MEAN	122	41.4	33.2	32.4	31.1	31.2	324	269	176	59.9	47.2	30.5
MAX	300	54	35	33	32	34	1110	504	381	117	121	34
MIN	56	34	32	32	30	30	28	119	95	30	31	28

CAL YR 1978 TOTAL 29275 MEAN 80.2 MAX 951 MIN 25 MEAN+ 93.3 CFSM+ 1.27 IN+ 17.28
WTR. YR 1979 TOTAL 36423 MEAN 99.8 MAX 1110 MIN 28 MEAN+ 115 CFSM+ 1.57 IN+ 21.30

*Adjusted for diversion and change in contents in Greenwood Reservoir.

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LOCATION.--Lat 46°23'40", long 87°45'30", in NW¼ SW¼ sec.12, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at former gaging station on left bank 0.5 mi (0.8 km) downstream from County Highway 581, 6 mi (10 km) southwest of Ishpeming, and 10 mi (16 km) east of Republic.

PERIOD OF DAILY RECORD.--

INSTRUMENTATION.--Temperature recorder since Aug. 24, 1961.

REMARKS.--Complete ice cover during winter period. Some regulation and diversion 6 mi (10 km) above station since December 1972.

EXTREMES FOR PERIOD OF DAILY RECORD. --

WATER TEMPERATURES: Maximum, 26.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR. --

WATER TEMPERATURES: Maximum, 20.5°C Aug. 8, 9; minimum, 0.0°C on many days during winter period.

[illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	.0	.0	3.5	3.0	13.5	12.0	17.5	15.0	18.0	16.5	18.0	16.0
2	.0	.0	3.5	3.5	14.0	12.5	17.0	14.0	19.0	17.0	18.0	17.5
3	.0	.0	4.5	3.5	14.0	13.0	17.0	15.0	19.5	18.5	17.5	15.5
4	.0	.0	3.5	3.0	14.0	13.0	17.5	14.0	19.5	18.5	15.5	14.5
5	.5	.5	3.5	3.0	14.0	12.5	16.5	13.5	19.0	18.5	18.0	15.5
6	.5	.5	3.0	3.0	14.0	12.5	17.5	14.0	18.5	16.5	18.0	16.5
7	.5	.5	5.0	3.0	13.5	12.5	17.5	15.0	19.5	18.0	16.5	14.5
8	.5	.5	5.5	5.5	16.0	13.5	17.5	15.5	20.5	18.5	14.5	13.0
9	.5	.5	5.5	5.5	16.5	15.0	17.5	15.5	20.5	17.5	15.0	13.5
10	.5	.5	8.0	5.5	16.5	14.0	19.5	15.5	18.5	17.5	15.5	15.0
11	.5	.5	8.0	7.5	14.0	12.5	19.5	17.5	18.5	16.0	15.5	14.0
12	.5	.5	8.0	7.0	14.5	13.0	19.0	16.5	18.0	16.0	14.0	14.0
13	1.5	.5	7.0	6.5	14.5	13.5	18.5	17.5	17.5	16.5	15.0	14.0
14	1.5	1.5	8.0	7.0	15.5	14.0	20.0	17.5	17.5	15.0	15.0	13.5
15	1.5	1.5	8.0	7.0	17.5	15.5	20.0	19.5	16.0	13.5	14.0	12.5
16	1.5	1.5	9.0	6.5	17.5	16.0	20.0	18.5	16.0	14.0	14.5	13.0
17	1.5	1.0	9.0	9.0	16.0	14.5	18.5	16.0	16.0	15.0	15.5	14.0
18	1.5	1.0	9.5	9.0	16.0	14.5	18.5	16.5	17.0	15.0	15.5	13.5
19	1.5	.5	9.5	9.0	16.0	15.0	18.5	17.0	17.0	16.5	13.5	11.5
20	.5	.5	9.0	8.5	16.0	16.0	18.5	17.0	18.5	16.5	13.0	12.5
21	.5	.5	9.5	8.5	16.0	16.0	20.0	17.0	18.5	16.5	13.0	12.5
22	1.5	.5	8.5	8.0	16.0	14.0	20.0	18.5	18.5	16.5	12.5	11.0
23	2.5	1.5	8.0	8.0	14.0	13.0	19.5	17.5	17.5	17.0	12.0	11.0
24	2.5	2.5	11.0	9.0	15.0	13.0	20.0	18.5	17.5	17.0	13.0	12.0
25	2.5	2.5	11.0	10.0	15.0	14.0	19.5	18.0	18.0	16.5	13.0	11.5
26	2.5	2.5	11.0	10.0	15.0	15.0	18.5	17.5	18.0	16.5	12.5	11.5
27	3.0	2.5	10.0	10.0	16.0	14.5	18.0	17.5	18.5	17.0	14.0	12.5
28	3.0	2.5	11.0	9.5	16.0	14.0	18.0	16.5	18.0	15.5	14.5	14.0
29	3.0	2.5	13.0	10.5	16.5	14.5	18.5	17.0	18.5	15.5	14.5	13.5
30	3.5	3.0	13.0	11.0	17.5	15.0	18.5	17.0	18.5	17.0	13.5	12.5
31	---	---	13.5	12.0	---	---	17.0	17.0	18.0	16.0	---	---
MONTH	3.5	.0	13.5	3.0	17.5	12.0	20.0	13.5	20.5	13.5	18.0	11.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI

LOCATION.--Lat 46°19'02", long 87°30'07", in NW¼ sec.12, T.45 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 400 ft (122 m) downstream from powerplant, 0.3 mi (0.5 km) upstream from Green Creek, and 2.2 mi (3.5 km) northwest of Princeton.

DRAINAGE AREA.--210 mi² (544 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,100 ft (335 m) from topographic map (nearest 20 ft).

REMARKS.--Water-discharge records good. Flow regulated by powerplant above station. Since December 1972, additional regulation 27 mi (43 km) above station (station 04057814). Since January 1973, flow diverted to Green Creek 27 mi (43 km) above station (station 04057813) by industry for iron ore processing and some returned via another Green Creek 0.3 mi (0.5 km) below this station.

AVERAGE DISCHARGE.--18 years, 223 ft³/s (6.315 m³/s), 14.42 in/yr (366 mm/yr), adjusted for storage and diversion since December 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,580 ft³/s (73.1 m³/s) May 6, 1972, gage height, 7.85 ft (2.393 m); maximum gage height, 8.37 ft (2.551 m) Apr. 27, 1979; minimum discharge recorded, 2.2 ft³/s (0.062 m³/s) Oct. 5, 1964; minimum daily, 4.1 ft³/s (0.12 m³/s) Feb. 4, 1967.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 25 and 26, 1960, reached a stage of 10.5 ft (3.20 m) from floodmark, discharge, 3,850 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,480 ft³/s (70.2 m³/s) Apr. 27, gage height, 8.37 ft (2.551 m); minimum, 7.9 ft³/s (0.22 m³/s) Nov. 2, gage height, 0.74 ft (0.226 m); minimum daily, 66 ft³/s (1.87 m³/s) July 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	409	172	159	140	93	123	228	1330	328	345	530	137
2	331	157	101	142	93	117	271	1100	282	298	485	174
3	326	153	101	142	93	113	245	954	282	270	392	174
4	430	122	101	125	93	119	218	851	284	265	320	202
5	538	122	101	108	93	107	190	775	290	182	350	137
6	596	123	102	112	95	92	198	744	290	152	352	262
7	608	125	123	115	95	93	201	719	336	152	322	248
8	572	125	147	115	97	94	195	705	357	152	318	137
9	519	125	132	120	97	108	193	723	328	110	312	167
10	461	125	134	125	97	122	201	769	342	80	248	307
11	410	125	134	132	97	119	200	819	526	82	212	303
12	338	125	123	136	97	104	220	799	574	120	210	123
13	337	125	105	128	91	92	242	757	535	118	142	146
14	382	125	107	125	95	93	278	721	454	190	101	250
15	370	160	107	125	190	95	287	654	359	375	101	272
16	232	180	106	127	207	96	378	586	323	467	101	269
17	202	156	106	133	118	101	267	522	586	365	101	180
18	251	182	107	128	118	105	379	467	767	322	101	124
19	321	238	107	124	118	140	512	520	834	188	101	124
20	221	299	106	118	115	154	713	669	808	101	101	124
21	155	258	106	113	114	150	1110	684	749	101	103	126
22	155	164	109	109	106	235	1370	667	720	103	103	125
23	157	140	109	115	102	187	1630	645	690	108	103	125
24	174	140	108	121	99	228	1900	616	605	260	115	113
25	198	141	110	117	98	265	2170	574	506	66	130	113
26	195	142	110	107	97	315	2340	506	428	428	130	113
27	186	172	110	96	98	293	2430	451	434	452	130	113
28	172	190	123	95	112	239	2340	420	419	497	132	104
29	172	189	142	95	---	165	2020	395	375	455	129	93
30	172	191	139	94	---	184	1650	386	348	425	127	93
31	172	---	139	93	---	214	---	380	---	530	130	---
TOTAL	9762	4791	3614	3675	3018	4662	24576	20908	14159	7759	6232	4978
MEAN	315	160	117	119	108	150	819	674	472	250	201	166
MAX	608	299	159	142	207	315	2430	1330	834	530	530	307
MTN	155	122	101	93	91	92	190	380	282	66	101	93

CAL YR 1978 TOTAL 86443 MEAN 237 MAX 1870 MIN 82 MEAN+ 250 CFSM+ 1.19 IN+ 16.16
WTR YR 1979 TOTAL 108134 MEAN 296 MAX 2430 MIN 66 MEAN+ 311 CFSM+ 1.48 IN+ 20.11

+Adjusted for diversion and change in contents in Greenwood Reservoir.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963, 1965, 1967 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	TUR- BID- ITY (NTU)	HARD- NESS (MG/L AS CAC03)
OCT									
11...	1300	410	61	7.3	10.5	200	3	--	30
NOV									
08...	1145	125	75	7.3	4.5	120	3	--	38
JAN									
11...	1115	130	92	7.3	.0	60	--	3.0	47
30...	0945	97	90	7.5	1.0	50	3	--	43
FEB									
20...	1040	118	95	7.2	.0	80	--	3.0	44
MAR									
20...	1015	168	92	7.5	.5	70	--	3.0	43
MAY									
07...	1000	725	47	7.0	4.0	80	--	2.0	19
JUN									
13...	1015	545	50	7.0	15.5	100	--	2.0	23
JUL									
11...	1100	79	75	7.5	24.0	80	--	2.0	39
AUG									
01...	1315	524	60	6.8	18.5	120	--	3.0	29
29...	1230	132	90	7.1	19.0	85	--	3.0	42
SEP									
25...	1215	115	82	7.3	12.5	80	--	3.0	39

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, SUS- PENDED RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, SUS- PENDED RECOV. (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)
OCT									
11...	8.0	2.5	.10	1800	600	1200	70	10	60
NOV									
08...	9.7	3.3	.13	1400	450	950	90	30	60
JAN									
11...	12	4.2	.21	1300	450	850	90	0	90
30...	11	3.8	.33	1300	480	820	50	10	40
FEB									
20...	11	4.0	.23	1200	320	880	70	10	60
MAR									
20...	11	3.8	.30	1200	330	870	60	0	60
MAY									
07...	5.0	1.7	.20	760	290	470	30	10	20
JUN									
13...	6.1	2.0	.09	930	390	540	50	10	40
JUL									
11...	10	3.3	.09	1300	440	860	220	50	170
AUG									
01...	7.7	2.4	.10	1600	600	1000	110	20	90
29...	11	3.6	.09	1700	500	1200	160	40	120
SEP									
25...	10	3.3	.07	1700	--	1200	110	0	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058120 GREEN CREEK NEAR PALMER, MI

LOCATION.--Lat 46°22'22", long 87°36'21", in NW¼ sec.19, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at culvert on County Road 565, 4.5 mi (7.2 km) south of Palmer.

DRAINAGE AREA.--8.42 mi² (21.81 km²).

PERIOD OF RECORD.--Water years 1964-65, 1969 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: October 1964 to September 1965, March to September 1979.

INSTRUMENTATION.--Temperature recorder since Mar. 20, 1979.

REMARKS.--In addition to temperature recorder, samples were collected approximately monthly. Temperature recorder clock stopped June 4-12 (range in temperature 14.0 to 18.0°C). Temperature recorder malfunctioned July 24-31. Since 1970, industrial diversion into headwaters from Schweitzer Reservoir (station 04058190), for iron ore processing.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 25.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	TUR- BID- ITY (NTU)	HARD- NESS (MG/L AS CAC03)
OCT									
11...	1400	32	365	7.7	11.0	30	2	--	88
NOV									
08...	1300	15	380	7.8	6.0	25	2	--	93
JAN									
11...	1330	19	430	7.8	.0	0	--	2.0	120
30...	1300	20	470	8.0	1.0	5	2	--	110
FEB									
20...	1410	23	450	7.8	.0	5	--	3.0	110
MAR									
20...	1340	29	420	8.1	1.0	5	--	3.0	110
MAY									
07...	1220	31	315	8.2	7.0	20	--	5.0	78
JUN									
13...	1200	22	345	8.4	17.0	5	--	2.0	91
JUL									
11...	1245	25	350	8.2	26.0	10	--	1.0	95
AUG									
01...	1515	43	350	8.0	21.0	8	--	.00	91
29...	1400	22	350	8.1	20.0	10	--	2.0	91
SEPT									
25...	1345	17	375	8.2	14.5	5	--	1.0	100

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, SUS- PENDE RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, SUS- PENDE RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)
OCT									
11...	14	13	.28	140	0	140	80	30	50
NOV									
08...	16	13	.44	320	250	70	80	30	50
JAN									
11...	17	18	.89	290	140	150	350	0	350
30...	16	16	.93	310	250	60	530	10	520
FEB									
20...	16	17	1.1	550	480	70	620	30	590
MAR									
20...	17	17	1.2	430	370	60	520	20	500
MAY									
07...	13	11	.69	880	660	220	410	20	390
JUN									
13...	15	13	.31	410	330	80	200	160	40
JUL									
11...	15	14	.19	370	280	90	210	170	40
AUG									
01...	15	13	.25	620	520	100	300	260	40
29...	15	13	.11	350	270	80	200	170	30
SEPT									
25...	17	15	.17	240	--	20	110	80	30

STREAMS TRIBUTARY TO LAKE MICHIGAN
04058120 GREEN CREEK NEAR PALMER, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1											---	---
2											---	---
3											---	---
4											---	---
5											---	---
6											---	---
7											---	---
8											---	---
9											---	---
10											---	---
11											---	---
12											---	---
13											---	---
14											---	---
15											---	---
16											---	---
17											---	---
18											---	---
19											---	---
20											---	1.5
21											1.5	1.5
22											2.0	.5
23											1.5	.0
24											.5	.0
25											.5	.0
26											.5	.0
27											.5	.0
28											.5	.0
29											1.0	.5
30											1.0	.5
31											1.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.0	.5	7.5	6.5	15.0	14.5	21.0	18.5	22.5	21.0	20.5	19.0
2	1.5	1.0	7.0	7.0	16.5	15.5	19.5	18.5	21.5	20.5	20.5	19.5
3	1.5	1.0	8.5	7.0	17.5	16.0	20.5	18.5	22.5	20.5	19.5	18.0
4	1.5	.5	7.5	7.0	---	---	20.5	19.0	22.5	21.0	18.5	17.5
5	1.0	.5	7.5	7.0	---	---	19.5	19.0	22.5	21.0	21.0	18.5
6	1.5	1.0	7.0	7.0	---	---	20.5	18.5	22.0	20.0	20.0	18.5
7	1.5	1.0	9.5	7.0	---	---	21.5	19.5	23.0	20.5	18.5	16.5
8	2.0	1.5	8.0	7.5	---	---	21.5	20.0	23.0	21.5	16.5	16.0
9	2.0	1.0	8.5	8.0	---	---	21.5	20.5	21.5	20.5	17.0	16.0
10	2.0	1.5	10.0	8.5	---	---	23.0	21.5	21.0	20.0	17.0	16.5
11	2.0	1.5	11.5	10.0	---	---	25.0	22.0	21.5	19.0	16.5	15.5
12	2.5	1.5	11.5	11.0	---	---	25.0	23.0	20.5	19.0	15.5	15.5
13	2.5	2.0	11.5	10.5	19.0	17.5	24.5	23.0	20.5	19.5	16.5	15.5
14	2.5	2.5	12.0	11.0	18.0	17.0	24.5	22.5	19.5	16.5	15.5	14.5
15	2.5	2.0	12.0	11.5	21.5	18.0	24.5	23.5	17.5	15.5	15.5	14.5
16	3.0	2.5	12.5	11.0	21.0	17.5	23.5	22.0	18.0	15.5	16.0	14.0
17	4.5	2.0	12.5	11.5	18.5	17.0	21.5	20.5	17.5	16.5	16.5	15.5
18	3.0	1.5	13.5	12.5	18.5	17.5	22.5	20.5	19.5	16.0	16.5	14.5
19	3.5	2.0	13.5	13.0	18.5	17.5	22.5	21.5	18.0	17.0	15.5	14.0
20	3.0	2.5	13.0	12.5	18.5	18.5	22.5	21.5	19.5	17.5	15.5	14.5
21	4.0	3.5	13.5	11.5	18.5	18.0	23.5	22.0	20.5	17.5	15.0	14.5
22	4.0	3.0	13.5	12.0	18.0	16.5	23.5	23.5	19.5	18.5	15.5	13.5
23	5.5	3.5	12.5	11.5	16.0	14.5	24.0	22.5	20.0	19.0	14.5	13.0
24	6.0	5.0	13.5	11.5	16.0	14.5	---	---	20.0	19.5	15.0	13.5
25	6.0	5.5	14.5	12.5	16.5	15.5	---	---	20.5	18.5	15.5	13.5
26	6.0	5.5	14.5	13.5	17.0	16.5	---	---	20.5	18.5	15.0	13.5
27	7.0	5.0	13.5	12.5	17.5	16.5	---	---	20.5	19.5	16.0	14.5
28	7.0	5.5	14.0	12.0	18.5	17.5	---	---	19.5	18.5	17.5	15.5
29	6.5	5.5	14.5	13.0	18.5	18.0	---	---	21.5	18.5	17.0	15.5
30	6.5	6.0	15.0	13.5	19.5	18.5	---	---	21.0	19.5	15.5	13.0
31	---	---	15.0	15.0	---	---	---	---	19.5	19.5	---	---
MONTH	7.0	.5	15.0	6.5					23.0	15.5	21.0	13.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058130 GREEN CREEK NEAR PRINCETON, MI

LOCATION.--Lat 46°20'02", long 87°31'58", in SW¼ SW¼ sec.35, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 100 ft (30 m) downstream from bridge on State Highway 35, 3.0 mi (4.8 km) upstream from mouth, 4.0 mi (6 km) northwest of Princeton.

DRAINAGE AREA.--13.8 mi² (35.7 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-65, 1971. October 1976 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,165.74 ft (355.318 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 14, 1977, nonrecording gage at bridge 100 ft (30 m) upstream at datum 0.97 ft (0.296 m) higher.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Feb. 18 to Mar. 19, which are fair. Regulation by tailings ponds in headwaters.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 166 ft³/s (4.70 m³/s) Sept. 12, 1978, gage height, 5.75 ft (1.753 m); maximum gage height, 7.23 ft (2.204 m) Mar. 27, 1979, backwater from ice; minimum daily discharge, 6.8 ft³/s (0.19 m³/s) Aug. 12, 26, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 2.84 ft³/s (0.080 m³/s) was measured Oct. 1, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 110 ft³/s (3.12 m³/s) Apr. 25, 26, gage height, 5.23 ft (1.594 m); maximum gage height, 7.23 ft (2.204 m) Mar. 27, backwater from ice; minimum discharge, 9.2 ft³/s (0.26 m³/s) Nov. 7, gage height, 2.40 ft (0.732 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	30	25	28	26	25	80	57	37	45	60	35
2	35	30	25	27	26	25	80	54	34	42	55	31
3	42	29	25	27	26	24	78	52	33	40	52	30
4	63	14	25	27	26	25	78	48	36	38	54	29
5	68	11	25	27	26	25	76	48	39	35	57	29
6	57	10	25	27	26	25	72	51	33	34	52	39
7	56	9.6	25	27	26	25	70	50	33	32	49	32
8	55	18	25	26	26	25	68	48	34	31	46	30
9	51	22	25	26	26	25	66	49	31	29	44	29
10	49	21	25	26	26	25	60	46	53	28	43	29
11	46	21	25	26	26	24	53	45	57	28	39	34
12	46	19	25	25	26	24	52	43	45	29	36	42
13	44	20	26	25	26	24	57	42	38	33	37	48
14	42	20	26	25	26	24	58	44	35	50	34	47
15	40	19	26	25	26	23	54	41	33	42	32	41
16	39	19	26	25	26	24	57	38	34	40	30	38
17	38	24	26	25	26	26	62	36	72	39	29	36
18	37	33	27	25	27	28	69	36	60	39	17	34
19	36	28	27	25	27	31	78	52	48	38	17	33
20	35	27	27	25	27	37	88	60	47	36	17	32
21	35	26	27	25	27	44	94	51	53	35	18	30
22	34	23	27	25	27	50	98	47	53	34	19	29
23	34	23	28	25	27	65	96	52	51	33	21	28
24	33	23	28	26	28	70	101	49	49	32	23	27
25	33	23	28	26	28	75	108	45	49	53	23	26
26	32	23	28	26	27	78	102	42	49	54	23	25
27	32	23	28	26	26	80	84	41	60	62	24	25
28	31	24	28	26	26	80	71	41	54	60	30	26
29	31	24	28	26	---	80	63	38	50	51	33	27
30	31	25	28	26	---	80	59	36	47	52	30	13
31	31	---	28	26	---	80	---	36	---	72	30	---
TOTAL	1273	661.6	817	802	739	1296	2232	1418	1347	1266	1074	954
MEAN	41.1	22.1	26.4	25.9	26.4	41.8	74.4	45.7	44.9	40.8	34.6	31.8
MAX	68	33	28	28	28	80	108	60	72	72	60	48
MIN	31	9.6	25	25	26	23	52	36	31	28	17	13
CAL YR 1978	TOTAL	9890.5	MEAN	27.1	MAX	134	MIN	8.9				
WTR YR 1979	TOTAL	13879.6	MEAN	38.0	MAX	108	MIN	9.6				

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961-64, 1971, 1977 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: January 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Complete ice cover during winter period. Since 1970, diversion into headwaters from Schweitzer Reservoir (station 04058190), via iron-ore processing.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum recorded, 23.5°C June 29, 1978; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum recorded, 22.5°C June 17, 18; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	11.5	9.0	10.0	4.5	2.0		.0	.0		.0	.0	
2	11.0	10.0	10.5	5.0	3.0		.0	.0		.0	.0	
3	11.0	10.5	11.0	5.5	3.0		.0	.0		.0	.0	
4	10.5	9.5	10.0	5.5	4.5		.0	.0		.0	.0	
5	10.5	9.5	10.0	6.0	5.0		.0	.0		.0	.0	
6	10.0	9.0	---	6.0	3.5		.0	.0		.0	.0	
7	9.5	7.0	---	3.5	1.5		.0	.0		.0	.0	
8	7.5	5.0	---	4.5	3.5		.0	.0		.0	.0	
9	7.0	5.0	---	3.5	1.0		.0	.0		.0	.0	
10	8.0	5.5	---	1.5	.5		.0	.0		.0	.0	
11	9.5	6.5	---	2.5	1.0		.0	.0		.0	.0	
12	10.0	9.5	---	3.0	2.0		.0	.0		.0	.0	
13	10.0	7.5	---	2.5	1.0		.5	.0		.0	.0	
14	9.0	6.5	---	1.0	.0		1.0	.0		.0	.0	
15	7.0	4.5	---	.0	.0		.5	.0		.0	.0	
16	5.0	4.0	---	.0	.0		.5	.0		.0	.0	
17	5.0	3.5	---	.5	.0		.5	.0		.0	.0	
18	5.0	4.5	---	.5	.0		.5	.0		.0	.0	
19	4.5	3.0	---	.0	.0		.5	.0		.0	.0	
20	5.5	5.0	---	.0	.0		.5	.0		.0	.0	
21	6.0	4.5	---	.5	.0		1.0	.0		.0	.0	
22	6.5	4.0	---	.0	.0		1.0	.0		.0	.0	
23	7.0	4.0	---	.0	.0		.5	.0		.0	.0	
24	8.0	5.5	---	.0	.0		.0	.0		.0	.0	
25	8.0	5.0	---	.0	.0		.0	.0		.0	.0	
26	5.0	4.5	---	.0	.0		.0	.0		.0	.0	
27	5.0	4.0	---	.0	.0		.0	.0		.0	.0	
28	4.5	3.5	---	.0	.0		.0	.0		.0	.0	
29	4.0	2.5	---	.0	.0		.0	.0		.0	.0	
30	5.5	3.0	---	.0	.0		.0	.0		.0	.0	
31	6.0	4.0	---	---	---		.0	.0		.0	.0	
MONTH	11.5	2.5		6.0	.0		1.0	.0		.0	.0	

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0		.0	.0		.0	.0		8.0	3.5	
2	.0	.0		.0	.0		.0	.0		7.0	5.5	
3	.0	.0		.0	.0		.0	.0		10.5	5.5	
4	.0	.0		.0	.0		.0	.0		7.5	5.0	
5	.0	.0		.0	.0		.0	.0		4.5	3.0	
6	.0	.0		.0	.0		.0	.0		4.5	3.5	
7	.0	.0		.0	.0		.0	.0		11.0	4.5	
8	.0	.0		.0	.0		.0	.0		10.0	8.5	
9	.0	.0		.0	.0		1.0	.0		8.5	8.0	
10	.0	.0		.0	.0		1.0	.0		15.5	7.5	
11	.0	.0		.0	.0		1.5	.0		14.5	11.5	
12	.0	.0		.0	.0		1.5	.5		12.0	9.0	
13	.0	.0		.0	.0		2.0	.5		11.5	8.0	
14	.0	.0		.0	.0		1.0	.5		13.5	9.5	
15	.0	.0		.0	.0		2.5	.5		12.0	9.0	
16	.0	.0		.0	.0		3.5	1.0		14.5	7.5	
17	.0	.0		.0	.0		1.5	.0		15.5	10.5	
18	.0	.0		.0	.0		1.0	.0		16.0	12.5	
19	.0	.0		.0	.0		2.0	.0		14.5	11.0	
20	.0	.0		.0	.0		1.0	.0		11.0	9.5	
21	.0	.0		.0	.0		1.5	.0		14.5	8.5	
22	.0	.0		.0	.0		2.5	.0		11.5	9.0	
23	.0	.0		.0	.0		7.0	.0		13.5	8.0	
24	.0	.0		.0	.0		7.5	4.0		14.0	8.5	
25	.0	.0		.0	.0		8.0	6.5		15.0	9.0	
26	.0	.0		.0	.0		7.0	4.5		15.5	9.5	
27	.0	.0		.0	.0		9.0	4.0		11.5	9.5	
28	.0	.0		.0	.0		9.0	4.5		11.0	10.5	
29	---	---		.0	.0		6.5	3.5		15.5	9.5	
30	---	---		.0	.0		6.5	4.5		15.5	10.5	
31	---	---		.0	.0		---	---		17.0	11.5	
MONTH	.0	.0		.0	.0		9.0	.0		17.0	3.0	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.5	11.5		19.5	14.0		---	---	---	21.0	17.5	18.5
2	14.5	13.0		19.0	14.0		20.0	17.5	---	20.5	18.5	19.5
3	18.5	13.0		---	---		20.5	19.0	---	18.5	16.0	16.5
4	19.0	13.5		---	---		20.0	18.0	---	17.0	14.0	15.5
5	18.0	13.5		---	---		21.0	20.0	---	21.0	17.0	18.5
6	16.5	12.5		---	---		19.5	15.5	---	19.5	17.5	18.0
7	18.5	11.5		---	---		22.0	16.5	---	17.5	15.0	15.5
8	16.0	12.0		---	---		21.0	18.5	19.5	15.0	13.0	14.0
9	15.5	12.5		---	---		18.0	16.0	17.0	16.5	14.0	15.0
10	18.0	15.5		---	---		19.5	17.0	18.0	17.0	16.0	16.5
11	19.5	15.5		---	---		18.5	15.0	16.5	15.5	13.5	14.0
12	20.0	15.5		---	---		17.5	15.0	16.5	15.0	14.0	14.5
13	16.0	12.5		---	---		19.0	16.5	17.5	16.0	14.0	15.0
14	17.5	11.0		---	---		16.0	14.0	15.0	14.0	12.5	13.0
15	19.0	12.5		---	---		16.0	12.5	14.5	14.5	12.0	13.5
16	19.0	15.0		---	---		15.5	12.5	14.5	15.5	12.0	13.5
17	22.5	17.0		---	---		15.0	14.5	14.5	17.0	14.0	15.5
18	22.5	17.5		---	---		17.0	14.0	15.5	16.5	13.0	14.5
19	17.0	13.5		---	---		16.5	15.0	15.5	13.5	10.0	12.0
20	19.0	13.5		---	---		18.0	15.0	16.5	14.5	13.0	13.5
21	19.0	14.0		---	---		18.5	14.5	16.5	14.0	12.5	13.0
22	18.0	15.5		---	---		17.5	15.5	16.5	13.0	10.5	12.0
23	17.0	11.0		---	---		18.0	17.0	17.5	13.0	10.5	11.5
24	15.0	10.0		---	---		18.5	17.5	17.5	14.5	12.5	13.5
25	16.0	11.0		---	---		19.0	16.0	17.0	13.5	11.5	12.5
26	17.5	14.0		---	---		19.5	16.5	18.0	14.0	11.0	12.5
27	18.5	13.5		---	---		19.5	17.5	18.0	15.5	13.0	14.0
28	19.0	15.0		---	---		17.5	15.5	16.0	16.5	15.0	15.5
29	21.0	16.0		---	---		20.5	16.5	18.5	15.5	14.0	14.5
30	19.0	14.0		---	---		20.0	17.5	18.5	14.5	12.5	13.5
31	---	---		---	---		17.5	16.5	17.0	---	---	---
MONTH	22.5	10.0								21.0	10.0	14.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE¼ NW¼ sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft (36 m) upstream from dam on Schweitzer Creek, and 3.0 mi (4.8 km) southwest of Palmer.

DRAINAGE AREA.--23.1 mi² (59.8 km²).

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft (396.240 m) Cleveland-Cliffs Iron Co. datum; gage readings have been reduced to elevations NGVD. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft (6.53 hm³) at spillway elevation 1,338.00 ft (407.822 m). The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 2.5 ft³/s (0.071 m³/s) was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 33 ft³/s (0.93 m³/s) was diverted from reservoir for iron ore processing and some returned to the Middle Branch Escanaba River basin by Green Creek. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 17.4 ft³/s (0.49 m³/s) for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft (7.27 hm³) May 31, 1970, elevation, 1,339.5 ft (408.28 m); minimum recorded since first filling, 2,920 acre-ft (3.60 hm³) Apr. 10, 1974, elevation, 1,329.7 ft (405.29 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,620 acre-ft (6.93 hm³) Apr. 22-25, elevation, 1,338.8 ft (408.07 m); minimum, 4,470 acre-ft (5.51 hm³) Sept. 30, elevation, 1,335.4 ft (407.03 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre- feet)	(equivalent in ft ³ /s)
Sept. 30	1338.1	5340	--	--
Oct. 31	1336.7	4860	-480	-7.8
Nov. 30	1337.9	5260	+400	+6.7
Dec. 31	1338.0	5300	+40	+0.6
CAL YR 1978	--	--	+40	+0.1
Jan. 31	1337.4	5090	-210	-3.4
Feb. 28	1337.7	5200	+110	+2.0
Mar. 31	1338.1	5340	+140	+2.3
Apr. 30	1338.2	5380	+40	+0.7
May 31	1338.2	5380	0	0
June 30	1338.0	5300	-80	-1.3
July 31	1338.6	5540	+240	+3.9
Aug. 31	1336.7	4860	-680	-11.1
Sept. 31	1335.4	4470	-390	-6.6
WTR YR 1979	--	--	-870	-1.2

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW¼ sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) upstream from highway bridge, and 2.5 mi (4.0 km) southwest of Palmer.

DRAINAGE AREA.--23.6 mi² (61.1 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft (387 m) from topographic map (nearest 10 ft). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter periods, which are fair. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi (1.6 km) upstream. An average of 2.5 ft³/s (0.071 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 23 ft³/s (0.65 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing and some returned to the Middle Branch Escanaba River via Green Creek. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) May 31, 1970, gage height, 6.50 ft (1.981 m); minimum, 0.4 ft³/s (0.011 m³/s) Sept. 6, 1962, gage height, 1.22 ft (0.372 m); minimum daily, 1.0 ft³/s (0.028 m³/s) Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 292 ft³/s (8.27 m³/s) Apr. 22, gage height, 4.85 ft (1.478 m); minimum, 4.9 ft³/s (0.14 m³/s) Sept. 24, gage height, 2.86 ft (0.872 m); minimum daily, 5.7 ft³/s (0.16 m³/s) Sept. 24, 26, 29, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	6.4	7.0	12	6.4	6.1	29	57	10	7.4	112	6.3
2	28	6.4	6.5	10	6.2	6.1	30	51	8.7	6.9	52	6.1
3	37	6.4	6.4	10	6.1	6.2	28	49	7.7	6.7	35	6.0
4	68	6.4	6.4	10	6.2	6.3	27	44	8.0	6.6	32	6.0
5	68	6.4	6.4	10	6.0	6.1	29	40	8.0	6.6	43	6.3
6	54	6.4	6.2	10	6.0	6.1	26	41	7.2	6.6	32	6.6
7	48	6.2	6.0	10	6.0	6.1	23	43	8.2	6.6	21	6.1
8	45	6.2	6.0	9.7	5.9	6.1	27	47	10	6.5	12	6.1
9	39	6.2	6.0	9.1	5.9	6.1	24	53	10	6.6	8.2	6.1
10	34	6.4	6.0	8.6	6.0	6.1	20	49	40	6.6	7.8	6.0
11	31	6.3	6.0	7.7	6.1	6.1	19	40	84	6.5	6.6	6.7
12	30	6.4	8.0	6.9	5.9	6.2	22	34	64	6.5	6.5	6.2
13	24	6.5	22	6.4	5.9	6.1	32	28	34	8.2	6.6	6.2
14	22	6.4	21	6.4	5.9	6.1	43	26	20	78	6.5	6.2
15	21	6.3	16	6.4	6.0	6.2	49	21	13	98	6.4	6.2
16	19	6.2	14	6.4	5.9	6.1	62	17	12	36	6.4	6.2
17	17	6.2	12	6.4	6.0	6.2	85	14	121	16	6.3	6.1
18	17	6.4	12	6.4	6.0	6.3	125	11	132	8.9	6.3	5.9
19	16	6.5	11	6.4	6.1	6.8	182	41	64	7.5	6.3	5.9
20	13	8.0	12	6.4	6.1	11	213	95	41	6.7	6.2	5.9
21	7.2	20	13	6.4	6.1	21	242	68	59	6.5	6.2	5.8
22	6.6	22	13	6.4	6.1	22	278	43	63	6.6	6.1	5.8
23	6.6	17	12	6.4	6.1	37	258	43	40	6.5	6.1	5.8
24	6.5	14	15	6.4	6.1	43	274	43	24	7.0	6.2	5.7
25	6.4	13	12	6.4	6.0	31	280	30	16	11	6.2	5.8
26	6.4	12	11	6.4	6.1	34	258	21	13	19	6.0	5.7
27	6.4	12	10	6.4	6.1	30	183	17	26	52	6.1	6.0
28	6.4	13	9.8	6.4	6.1	32	123	15	23	45	6.0	5.8
29	6.4	13	11	6.4	---	30	89	12	14	24	6.4	5.7
30	6.4	7.7	12	6.4	---	30	70	8.7	8.8	39	6.0	5.7
31	6.4	---	13	6.4	---	30	---	8.0	---	194	6.3	---
TOTAL	734.7	272.3	328.7	235.6	169.3	468.4	3150	1109.7	989.6	750.0	486.7	180.9
MEAN	23.7	9.08	10.6	7.60	6.05	15.1	105	35.8	33.0	24.2	15.7	6.03
MAX	68	22	22	12	6.4	43	280	95	132	194	112	6.7
MIN	6.4	6.2	6.0	6.4	5.9	6.1	19	8.0	7.2	6.5	6.0	5.7
CAL YR 1978	TOTAL	7456.2	MEAN 20.4	MAX 442	MIN 5.2							
WTR YR 1979	TOTAL	8875.9	MEAN 24.3	MAX 280	MIN 5.7							

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058250 WARNER CREEK TRIBUTARY NEAR PALMER, MI

LOCATION.--Lat 46°25'20", long 87°36'09", in NW¼ SE¼ sec.31, T.47 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at double culvert on County Road 565, 0.3 mi (0.5 km) upstream from mouth, and 0.8 mi (1.3 km) south of Palmer.

DRAINAGE AREA.--4.05 mi² (10.49 km²).

PERIOD OF RECORD.--Water years 1972 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	TUR- BID- ITY (NTU)	HARD- NESS (MG/L AS CAC03)
OCT									
11...	1530	3.0	286	7.3	10.5	55	3	--	110
NOV									
08...	1415	2.8	360	7.0	7.0	40	3	--	150
JAN									
11...	1420	1.5	450	7.9	.0	10	--	4.0	210
30...	1200	1.2	460	7.4	.5	10	4	--	180
FEB									
20...	1525	1.2	430	7.5	.5	25	--	6.0	160
MAR									
20...	1130	2.0	330	7.4	.0	30	--	8.0	130
MAY									
07...	1350	3.2	235	7.6	4.5	45	--	5.0	71
JUN									
13...	1400	4.2	320	7.4	16.5	35	--	2.0	120
JUL									
11...	1530	1.8	380	7.4	25.0	20	--	1.0	160
AUG									
01...	1650	5.4	250	7.0	19.5	70	--	2.0	87
29...	1530	2.8	400	7.2	20.0	15	--	2.0	160
SEP									
25...	1445	1.6	400	7.4	12.0	8	--	2.0	160

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, SUS- PENDE RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, SUS- PENDE RECOV. (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)
OCT									
11...	27	11	.28	280	80	200	30	0	30
NOV									
08...	36	14	.33	600	320	280	70	0	70
JAN									
11...	48	21	.37	780	520	260	140	0	140
30...	41	18	.29	790	610	180	160	0	160
FEB									
20...	38	17	.25	1000	710	290	230	0	230
MAR									
20...	31	13	.42	1500	920	580	380	0	380
MAY									
07...	17	6.9	.31	760	430	330	30	10	20
JUN									
13...	28	11	.05	480	270	210	60	10	50
JUL									
11...	39	15	.00	420	290	130	160	30	130
AUG									
01...	22	7.9	.10	1300	490	810	160	10	150
29...	39	15	.01	780	520	260	480	70	410
SEP									
25...	38	15	.04	780	--	320	260	0	260

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI

LOCATION.--Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank 0.8 mi (1.3 km) upstream from mouth, and 3 mi (5 km) west of Sands Station.

DRAINAGE AREA.--37.5 mi² (97.1 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,160 ft (354 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good. Some mine water pumped into basin at headwaters.

AVERAGE DISCHARGE.--10 years (water years 1966-75), 32.8 ft³/s (0.929 m³/s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 458 ft³/s (13.0 m³/s) May 31, 1970, gage height, 5.89 ft (1.795 m); minimum, 3.7 ft³/s (0.105 m³/s) Oct. 10, 1976, Jan. 22, Feb. 14 and part or all of each day Feb. 16-23, Feb. 26 to Mar. 8, 1977, gage height, 1.35 ft (0.411 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 396 ft³/s (11.2 m³/s) Apr. 22, gage height, 5.47 ft (1.667 m); minimum, 10 ft³/s (0.283 m³/s) Mar. 10, gage height, 1.56 ft (0.475 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	20	20	17	13	13	53	128	48	35	50	15
2	40	20	20	17	13	13	60	111	46	33	45	14
3	48	19	20	16	13	13	56	100	45	30	39	13
4	54	19	21	16	13	13	58	91	46	28	41	12
5	52	19	21	15	13	13	62	83	43	26	39	13
6	51	19	19	15	13	13	51	79	41	24	35	19
7	54	18	18	14	13	13	46	75	41	23	32	18
8	52	19	18	14	13	13	50	78	40	22	29	17
9	50	18	18	13	13	13	48	73	39	21	26	16
10	49	18	17	13	13	13	42	69	63	20	25	16
11	47	19	17	12	13	13	43	65	74	20	23	19
12	46	18	17	12	13	13	51	61	72	19	21	20
13	41	19	17	12	12	13	55	57	65	21	21	21
14	37	20	17	12	12	13	61	56	58	35	19	19
15	35	19	17	12	12	13	69	51	53	27	18	18
16	34	18	17	12	12	13	91	49	52	25	17	17
17	31	24	17	12	12	14	116	46	100	24	16	16
18	32	31	17	12	12	15	170	44	106	22	16	15
19	30	30	17	12	11	16	230	61	97	21	15	14
20	28	27	18	13	12	18	300	72	85	20	15	14
21	27	23	18	13	12	18	363	75	82	19	14	17
22	26	22	17	13	12	19	380	69	74	18	14	17
23	26	23	17	13	13	31	366	71	67	18	21	16
24	25	24	17	12	13	26	358	66	60	21	15	17
25	25	23	17	13	12	21	340	62	53	44	13	15
26	23	23	17	13	12	21	300	58	49	35	12	17
27	23	23	17	13	13	22	275	58	47	43	12	16
28	22	23	16	13	13	22	230	56	43	35	12	18
29	21	22	16	13	---	28	187	52	40	30	14	19
30	21	21	17	13	---	42	153	49	38	40	13	18
31	21	---	17	13	---	51	---	48	---	52	14	---
TOTAL	1112	641	549	413	351	572	4664	2113	1767	851	696	496
MEAN	35.9	21.4	17.7	13.3	12.5	18.5	155	68.2	58.9	27.5	22.5	16.5
MAX	54	31	21	17	13	51	380	128	106	52	50	21
MIN	21	18	16	12	11	13	42	44	38	18	12	12

CAL YR 1978 TOTAL 13247.3 MEAN 36.3 MAX 225 MIN 7.7

WTR YR 1979 TOTAL 14225.0 MEAN 39.0 MAX 380 MIN 11

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: November 1976 to current year.

INSTRUMENTATION.--Water-quality monitor since November 1976.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 25.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 23.5°C July 14; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	11.0	9.0	10.0	4.5	2.5	3.5	---	---	---	.0	.0	.0
2	10.5	10.0	10.5	5.5	3.5	4.0	---	---	---	.0	.0	.0
3	11.0	10.5	10.5	6.5	3.5	5.0	---	---	---	.0	.0	.0
4	11.0	9.5	10.0	6.5	5.5	6.0	---	---	---	.0	.0	.0
5	10.5	9.5	10.0	7.0	5.5	6.0	---	---	---	.0	.0	.0
6	10.0	8.5	9.0	5.5	4.0	---	---	---	---	.0	.0	.0
7	8.5	7.0	7.5	---	---	---	---	---	---	.0	.0	.0
8	7.0	5.5	6.5	---	---	---	---	---	---	.0	.0	.0
9	8.0	6.0	7.0	---	---	---	---	---	---	.0	.0	.0
10	9.5	7.0	8.0	---	---	---	---	---	---	.0	.0	.0
11	10.5	9.5	10.0	---	---	---	.0	.0	.0	.0	.0	.0
12	9.5	8.0	9.0	---	---	---	.5	.0	.0	.0	.0	.0
13	7.5	6.5	7.0	---	---	---	.5	.0	.0	.0	.0	.0
14	6.0	4.5	5.0	---	---	---	.5	.0	.0	.0	.0	.0
15	5.0	3.5	4.0	---	---	---	.5	.0	.0	.0	.0	.0
16	5.0	4.0	4.5	---	---	---	.5	.0	.0	.0	.0	.0
17	5.0	3.0	4.0	---	---	---	.5	.0	.0	.0	.0	.0
18	6.5	5.0	5.5	---	---	---	.5	.0	.0	.5	.0	.0
19	7.0	5.0	6.0	---	---	---	.0	.0	.0	.5	.0	.0
20	7.0	4.5	6.0	---	---	---	.0	.0	.0	.5	.0	.5
21	8.5	6.0	7.0	---	---	---	.5	.0	.0	1.0	.5	.5
22	8.5	7.0	8.5	---	---	---	.5	.0	.0	1.0	.0	.5
23	7.0	5.0	6.0	---	---	---	.5	.0	.0	.5	.0	.0
24	6.0	4.5	5.0	---	---	---	.5	.0	.0	.0	.0	.0
25	6.5	5.0	5.5	---	---	---	.0	.0	.0	.5	.0	.0
26	6.0	5.0	5.5	---	---	---	.5	.0	.0	.5	.0	.5
27	6.0	4.5	5.0	---	---	---	.0	.0	.0	.5	.5	.5
28	5.0	3.5	4.0	---	---	---	.0	.0	.0	.5	.0	.5
29	4.0	2.0	3.5	---	---	---	.0	.0	.0	.5	.0	.5
30	6.0	3.5	5.0	---	---	---	.5	.0	.0	.5	.0	.0
31	5.5	4.5	5.0	---	---	---	.0	.0	.0	.5	.0	.0
MONTH	11.0	2.0	7.0							1.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI---CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.5	.0	.0	1.5	.0	.5	.0	.0	.0	6.5	2.5	4.5
2	.5	.0	.0	2.0	.0	1.0	.0	.0	.0	6.5	4.0	4.5
3	.5	.0	.0	1.5	.0	1.0	1.0	.0	.0	8.5	4.0	6.0
4	.0	.0	.0	.0	.0	.0	1.0	.0	.0	7.0	4.0	5.0
5	.0	.0	.0	.5	.0	.0	.0	.0	.0	4.0	2.5	3.0
6	.0	.0	.0	1.5	.0	.5	.0	.0	.0	4.0	2.5	3.0
7	.0	.0	.0	1.0	.0	.5	.0	.0	.0	10.0	4.0	7.0
8	.0	.0	.0	1.0	.0	.5	.0	.0	.0	10.0	8.0	9.0
9	.0	.0	.0	1.5	.5	1.5	.5	.0	.0	8.0	7.0	7.5
10	.0	.0	.0	.5	.0	.0	.5	.0	.0	13.0	6.5	9.5
11	.0	.0	.0	.5	.0	.0	.5	.0	.0	13.0	10.0	12.0
12	.0	.0	.0	1.0	.0	.0	.5	.0	.0	9.5	7.5	8.5
13	.0	.0	.0	1.0	.0	.5	2.0	.0	.5	9.0	6.5	8.0
14	.0	.0	.0	.5	.0	.0	.5	.0	.0	12.0	8.5	10.0
15	.0	.0	.0	1.0	.0	.0	1.5	.0	.5	11.0	9.0	9.5
16	.0	.0	.0	2.0	.0	1.0	2.0	.0	.5	12.0	7.0	10.0
17	.0	.0	.0	2.5	.5	1.5	2.0	.0	.5	13.0	10.5	12.0
18	.0	.0	.0	2.0	1.5	2.0	2.0	.0	.5	14.0	12.0	13.0
19	.0	.0	.0	2.0	2.0	2.0	2.0	.0	1.0	13.0	10.5	11.5
20	.0	.0	.0	2.5	1.5	2.0	1.5	.0	.5	10.0	9.0	9.5
21	.0	.0	.0	2.0	1.5	2.0	2.0	.0	1.0	13.5	8.0	11.0
22	.5	.0	.0	4.0	1.5	2.5	3.5	.0	1.5	12.0	9.0	9.5
23	.5	.0	.0	2.5	.0	1.0	6.0	.0	3.0	12.5	8.0	10.0
24	.0	.0	.0	.0	.0	.0	6.5	2.5	4.5	14.0	9.5	12.0
25	.5	.0	.0	.0	.0	.0	6.5	4.5	5.0	14.0	10.0	12.5
26	.5	.0	.0	.0	.0	.0	5.0	3.0	4.0	13.0	10.5	11.5
27	.5	.0	.0	.0	.0	.0	6.5	2.0	4.5	11.0	10.5	11.0
28	1.0	.0	.5	.0	.0	.0	6.5	3.0	5.0	14.5	10.0	12.0
29	---	---	---	.0	.0	.0	5.5	2.5	4.0	16.0	11.5	14.0
30	---	---	---	.0	.0	.0	5.0	3.0	4.0	16.0	12.5	14.5
31	---	---	---	1.5	.0	.5	---	---	---	15.5	13.0	14.0
MONTH	1.0	.0	.0	4.0	.0	.5	6.5	.0	1.5	16.0	2.5	9.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.5	12.5	14.5	18.0	16.5	17.0	17.0	14.0	15.5	17.0	13.5	15.0
2	17.0	14.0	15.5	19.0	14.5	16.5	19.0	14.5	16.5	16.0	14.5	15.5
3	16.5	14.0	15.5	18.0	15.0	16.5	20.0	17.0	18.5	14.0	12.0	13.5
4	16.0	14.0	15.0	17.5	14.0	15.5	18.5	17.0	17.5	13.5	10.5	12.5
5	16.5	12.5	14.5	18.0	13.0	15.5	18.5	17.0	17.5	17.0	13.0	15.0
6	14.5	12.0	13.0	19.0	14.0	16.5	17.5	14.0	16.0	16.0	14.0	15.0
7	16.0	13.0	14.5	19.0	14.5	17.0	20.5	16.5	18.0	14.0	12.0	13.0
8	18.0	15.5	16.5	19.5	14.5	17.0	19.5	16.5	18.0	12.5	10.5	11.5
9	18.0	15.5	17.0	18.5	15.0	17.0	16.5	14.0	15.0	14.0	11.0	12.5
10	16.0	12.5	14.0	21.0	15.5	18.0	17.0	14.5	16.0	14.5	13.0	13.5
11	16.5	11.5	14.0	21.0	16.5	18.5	16.5	13.0	14.5	13.0	11.5	12.0
12	17.0	12.5	15.0	22.0	16.0	19.0	15.5	12.0	14.0	12.5	11.5	12.0
13	17.5	13.0	15.5	20.0	17.5	19.0	16.5	13.5	15.0	14.0	12.0	13.0
14	18.0	15.5	17.0	23.5	18.5	20.5	14.5	12.0	13.0	12.5	10.5	11.5
15	21.0	17.5	19.0	22.0	18.5	20.0	15.0	10.5	12.5	12.0	10.0	11.0
16	20.5	15.5	18.5	19.5	16.5	18.0	14.0	10.5	12.5	13.5	9.5	11.5
17	17.0	14.0	15.5	18.0	13.5	16.0	13.0	12.0	12.5	15.0	11.0	13.0
18	18.0	14.0	16.0	18.5	13.5	16.0	15.5	12.0	13.5	13.5	10.5	12.5
19	18.0	14.0	16.5	19.0	15.5	17.0	14.5	13.0	14.0	11.5	8.5	10.0
20	17.5	16.5	17.0	20.0	15.5	17.5	16.0	13.0	14.5	12.0	10.0	11.0
21	17.0	16.0	16.5	21.5	16.5	19.0	16.5	12.5	14.5	12.5	10.0	11.0
22	16.5	12.5	14.5	21.0	17.5	19.0	15.5	12.5	14.0	11.5	8.5	10.5
23	15.5	11.0	13.0	21.0	16.5	19.0	16.5	15.5	15.5	11.5	8.5	10.5
24	16.0	11.5	14.0	21.5	18.0	19.5	15.5	14.0	15.0	13.0	10.5	12.0
25	17.0	12.5	15.0	19.5	17.0	18.5	16.0	13.5	14.5	12.5	10.0	11.5
26	16.5	15.5	16.0	17.5	15.0	16.5	16.0	13.5	14.5	13.0	10.0	11.5
27	18.5	14.5	16.5	16.5	15.5	16.0	16.0	13.5	14.5	14.0	11.0	12.5
28	17.5	14.5	16.0	18.5	14.0	16.0	13.5	11.5	12.5	14.5	13.5	14.0
29	18.5	15.5	17.0	19.0	15.0	17.0	16.5	12.5	14.5	13.5	12.0	13.0
30	20.0	15.5	17.5	17.5	16.0	16.5	16.0	14.0	14.5	13.5	11.0	12.5
31	---	---	---	16.0	15.5	16.0	14.0	13.0	13.5	---	---	---
MONTH	21.0	11.0	15.5	23.5	13.0	17.5	20.5	10.5	15.0	17.0	8.5	12.5

04058500 EAST BRANCH ESCANABA RIVER AT GWINN, MI

LOCATION.--Lat 46°17'10", long 87°26'00", in NE¼ sec.21, T.45 N., R.25 W., Marquette County, Hydrologic Unit 04030110, on right bank in county park at Gwinn, 1.1 mi (1.8 km) upstream from mouth.

DRAINAGE AREA.--124 mi² (321 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,079.2 ft (328.94 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 16 mi (26 km) above station. An average of 2.5 ft³/s (0.071 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River Basin. An average of 23 ft³/s (0.65 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing and some returned to the Middle Branch Escanaba River via Green Creek. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Some mine water pumped into basin at headwaters.

AVERAGE DISCHARGE.--23 years (water years 1955-77), 111 ft³/s (3.144 m³/s), 12.16 in/yr (309 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,390 ft³/s (67.7 m³/s) June 1, 1970, gage height, 14.97 ft (4.563 m); minimum, 19 ft³/s (0.54 m³/s) July 30, Oct. 11, 1963; minimum gage height, 6.46 ft (1.969 m) Sept. 14, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) Apr. 26, gage height, 12.97 ft (3.953 m); minimum, 43 ft³/s (1.22 m³/s) Mar. 15, gage height, 6.92 ft (2.109 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	158	70	76	67	52	50	166	354	139	103	401	81
2	144	68	72	65	52	49	170	316	132	95	267	70
3	154	66	68	62	51	48	166	299	123	87	173	61
4	273	66	70	62	50	51	165	279	128	80	165	55
5	296	65	69	63	50	52	160	257	144	75	194	53
6	232	66	65	58	50	51	147	261	128	72	164	87
7	211	63	59	56	50	51	145	261	130	69	133	92
8	212	63	60	54	50	50	144	264	139	66	110	71
9	191	63	58	52	50	50	141	281	125	63	92	63
10	171	62	56	51	50	49	125	263	235	62	83	57
11	153	64	55	50	50	48	109	243	390	60	77	63
12	146	64	56	50	50	49	103	222	331	60	71	96
13	138	64	58	50	48	49	124	192	246	64	71	97
14	127	72	60	50	48	48	179	194	183	123	69	91
15	121	68	60	50	48	45	201	176	155	173	64	76
16	115	63	60	50	48	48	276	157	142	157	60	66
17	110	74	60	50	48	50	427	144	427	100	58	60
18	107	155	60	50	49	54	562	137	547	78	58	53
19	108	145	61	50	49	61	730	220	394	71	57	51
20	102	135	62	52	50	72	921	373	272	65	56	51
21	97	120	66	52	50	85	1090	336	264	61	53	53
22	88	105	68	52	50	101	1190	263	263	58	52	57
23	85	95	66	53	50	135	1120	256	229	57	60	61
24	83	89	66	53	50	136	1140	253	178	56	63	53
25	86	85	70	53	50	145	1220	211	150	280	57	51
26	81	83	67	53	50	170	1290	178	136	195	52	50
27	78	82	63	53	50	165	971	166	161	233	51	49
28	76	83	61	53	51	165	705	162	156	234	49	50
29	77	83	61	53	---	163	517	149	135	164	56	53
30	74	80	64	54	---	157	411	135	123	168	63	50
31	72	---	67	53	---	160	---	130	---	403	56	---
TOTAL	4166	2461	1964	1674	1394	2607	14815	7132	6305	3632	3035	1921
MEAN	134	82.0	63.4	54.0	49.8	84.1	494	230	210	117	97.9	64.0
MAX	296	155	76	67	52	170	1290	373	547	403	401	97
MIN	72	62	55	50	48	45	103	130	123	56	49	49
CAL YR 1978	TOTAL	44586	MEAN	122	MAX	1130	MIN	35				
WTR YR 1979	TOTAL	51106	MEAN	140	MAX	1290	MIN	45				

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04058500 EAST BRANCH ESCANABA RIVER AT GWINN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1955 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	TUR- BID- ITY (NTU)	HARD- NESS (MG/L AS CAC03)
OCT									
11...	1145	152	151	7.2	10.0	80	2	--	66
NOV									
08...	0930	63	160	7.5	8.0	50	2	--	76
JAN									
11...	0945	50	180	7.3	.0	30	--	3.0	82
30...	0900	55	170	7.6	.0	20	3	--	73
FEB									
20...	0910	50	170	7.3	.0	30	--	4.0	74
MAR									
20...	0915	71	145	6.8	.0	35	--	3.0	65
MAY									
07...	0915	262	125	7.4	3.5	40	--	2.0	51
JUN									
13...	0845	256	122	7.5	13.5	55	--	2.0	52
JUL									
11...	0920	62	160	7.8	19.5	40	--	2.0	74
AUG									
01...	1115	418	87	7.0	17.0	90	--	2.0	40
29...	0930	54	155	7.5	15.0	40	--	2.0	68
SEP									
25...	0945	52	230	7.8	10.0	20	--	2.0	69

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, SUS- PENDE- RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, SUS- PENDE- RECOV. (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)
OCT									
11...	17	5.6	.43	620	150	470	40	10	30
NOV									
08...	21	5.6	.20	720	330	390	40	10	30
JAN									
11...	22	6.5	.28	840	330	510	50	0	50
30...	20	5.7	.28	780	340	440	40	10	30
FEB									
20...	20	5.9	.28	740	340	400	30	0	30
MAR									
20...	18	4.8	.35	820	330	490	50	10	40
MAY									
07...	14	3.8	.20	510	250	260	30	0	30
JUN									
13...	14	4.2	.16	610	270	340	50	20	30
JUL									
11...	21	5.2	.12	800	310	490	60	20	40
AUG									
01...	11	3.0	.12	930	440	490	80	60	20
29...	19	5.1	.17	750	270	480	40	20	20
SEP									
25...	19	5.2	.10	690	--	380	10	0	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059000 ESCANABA RIVER AT CORNELL, MI

(National stream-quality accounting network station)

LOCATION.--Lat 45°54'31", long 87°12'49", in NW¼ sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft (15 m) downstream from bridge on County Road 519, 0.4 mi (0.6 km) downstream from Bobs Creek, 0.7 mi (1.1 km) northeast of Cornell, and 16 mi (26 km) upstream from mouth.

DRAINAGE AREA.--870 mi² (2,253 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year.
Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904.

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft (228.374 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi (16 km) downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Sept. 1-30, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation caused by Boney Falls powerplant, 7 mi (11 km) upstream. Since August 1962, some regulation by Schweitzer Reservoir, about 50 mi (80 km) upstream (station 04058190). Since December 1972, some regulation by Greenwood Reservoir about 60 mi (97 km) upstream (station 04057811).

AVERAGE DISCHARGE.--38 years, (water years 1904-12, 1951-79), 896 ft³/s (25.37 m³/s), 13.99 in/yr (355 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 26, 1979, gage height, 5.00 ft (1.524 m); maximum gage height, 6.40 ft (1.951 m) Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft³/s (2.55 m³/s) July 5, 1910, gage height, 1.5 ft (0.46 m), site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 26, gage height, 5.00 ft (1.524 m); minimum recorded, 305 ft³/s (8.64 m³/s) Aug. 28, but may have been less during periods of no gage-height record Aug. 8-21 and Sept. 1-30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1570	613	460	490	395	410	1500	4030	1180	1320	2080	570
2	1410	614	430	490	390	410	1520	3440	1250	1280	1900	680
3	1790	584	460	500	385	410	1550	3110	1060	1100	1470	700
4	2520	574	480	500	380	410	1550	2850	1090	1000	1170	800
5	2460	527	490	500	370	410	1530	2640	1140	880	1410	620
6	2170	534	500	480	360	410	1490	2530	1350	640	1420	1030
7	1970	543	510	460	350	410	1450	2650	1280	590	1200	980
8	1780	535	510	440	350	410	1400	2650	1470	570	1050	600
9	1660	503	510	430	340	415	1340	2740	1500	520	850	700
10	1470	520	500	410	340	415	1300	2830	1340	613	700	1220
11	1360	525	500	400	340	420	1260	2750	1840	349	580	1180
12	1270	517	490	390	340	430	1370	2610	2400	381	550	490
13	1170	535	490	390	340	430	1550	2420	1950	493	600	570
14	1130	590	490	390	340	440	2300	2350	1700	585	450	1000
15	1110	563	490	390	340	450	2630	2250	1450	1090	350	1070
16	1020	602	490	385	345	470	3100	2040	1300	1250	420	950
17	872	637	490	385	350	500	3740	1850	2200	1120	440	750
18	807	1100	490	380	350	530	4110	1690	2900	722	460	500
19	895	1270	490	380	350	620	5000	1660	3200	703	420	500
20	901	1250	490	375	355	680	5930	2750	3100	552	420	500
21	758	1260	490	370	360	750	6770	3150	2900	461	390	500
22	701	822	490	370	360	900	7560	2910	2800	483	410	500
23	700	726	490	370	365	1000	7490	2610	2700	454	391	490
24	701	687	490	370	370	1080	7820	2450	2300	425	515	470
25	695	693	490	375	380	1130	8400	2250	2000	731	553	450
26	713	707	490	380	390	1200	10200	1940	1750	784	533	450
27	679	656	490	385	400	1270	9460	1700	1680	1280	460	450
28	666	707	490	390	400	1280	7540	1570	1650	1320	428	420
29	641	697	490	390	---	1300	6070	1480	1550	1230	465	390
30	643	602	490	395	---	1360	4870	1370	1400	1100	494	380
31	619	---	490	395	---	1420	---	1290	---	1890	540	---
TOTAL	36851	20693	15150	12755	10135	21770	121800	74560	55430	25916	23119	19910
MEAN	1189	690	489	411	362	702	4060	2405	1848	836	746	664
MAX	2520	1270	510	500	400	1420	10200	4030	3200	1890	2080	1220
MIN	619	503	430	370	340	410	1260	1290	1060	349	350	380
CFSM	1.37	.79	.56	.47	.42	.81	4.67	2.76	2.12	.96	.86	.76
IN.	1.58	.88	.65	.55	.43	.93	5.21	3.19	2.37	1.11	.99	.85
CAL YR 1978	TOTAL	359989	MEAN	986	MAX	6070	MIN 308	CFSM 1.13	IN 15.39			
WTR YR 1979	TOTAL	438089	MEAN	1200	MAX	10200	MIN 340	CFSM 1.38	IN 18.73			

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February 1975 to current year.

WATER TEMPERATURES: February 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--Interruptions in the daily record were due to malfunctions of the instrument. Monthly samples are collected as a cross-section sample in the reach of stream from the County Road 519 bridge to a point 200 ft (61 m) downstream. Complete ice cover during winter period. Biological Data (Plytoplankton) is for 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1975-76, 1978-79): Maximum daily, 360 micromhos Sept. 10, 1975; minimum daily, 115 micromhos Apr. 24, 25, 1975, Sept. 13, 1978.

WATER TEMPERATURES: Maximum daily, 35°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum recorded, 262 micromhos Mar. 9; minimum recorded, 131 micromhos Nov. 19.

WATER TEMPERATURES: Maximum, 30.5°C July 14, 23; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANFOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
10...	1400	1460	180	7.7	9.5	11.2	100	10	54	79	17
NOV											
22...	1200	720	166	7.6	.0	14.9	104	20	77	87	19
DEC											
18...	1330	500	234	7.3	.0	14.0	98	--	--	110	14
JAN											
23...	1330	369	228	7.0	.0	11.7	84	15	K800	100	1
MAR											
02...	1230	470	227	7.4	.0	11.7	81	16	9	99	0
27...	1330	1270	200	6.9	.0	11.2	78	K9	27	89	10
APR											
18...	1230	3960	142	7.4	1.0	12.8	93	29	20	70	6
MAY											
30...	1115	1310	147	8.1	13.5	9.7	95	K3	K3	73	4
JUL											
03...	1300	1110	139	8.0	20.0	9.8	109	K9	30	75	9
31...	1045	2090	148	7.5	17.5	9.0	96	81	420	73	11
AUG											
22...	1345	407	188	8.0	21.5	9.4	109	K4	224	94	2
SEP											
26...	1400	362	182	7.9	17.5	11.2	118	K2	20	87	5

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
OCT											
10...	19	7.7	2.6	.1	7	.8	76	0	62	2.4	6.6
NOV											
22...	20	8.9	2.5	.1	6	1.1	82	0	67	3.3	8.2
DEC											
18...	25	11	5.6	.2	10	1.2	114	0	94	9.1	12
JAN											
23...	24	10	5.2	.2	10	1.0	122	0	100	20	11
MAR											
02...	23	10	5.4	.2	11	1.2	120	0	98	7.6	12
27...	21	8.9	3.2	.1	7	1.2	96	0	79	19	11
APR											
18...	17	6.7	1.6	.1	5	.8	78	0	64	5.0	7.2
MAY											
30...	18	6.9	2.4	.1	7	.7	84	0	69	1.1	8.7
JUL											
03...	18	7.2	3.7	.2	10	.8	80	0	66	1.3	7.8
31...	18	6.9	2.4	.1	7	.7	76	0	62	3.8	6.9
AUG											
22...	23	8.8	3.4	.2	7	.9	112	0	92	1.8	7.7
SEP											
26...	21	8.4	4.6	.2	10	1.0	100	0	82	2.0	8.7

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE MICHIGAN
04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 10...	3.6	.1	7.3	122	86	481	.18	.02	--	.53	.55
NOV 22...	3.5	.1	8.1	116	93	226	.23	.01	--	.41	.42
DEC 18...	3.9	.1	9.5	126	125	170	.25	.01	--	.25	.26
JAN 23...	3.9	.1	9.9	131	126	131	.27	.04	--	.19	.23
MAR 02...	3.8	.1	9.7	129	124	164	.32	.01	--	.31	.32
MAR 27...	3.6	.1	7.5	119	104	408	.59	.04	--	.40	.44
APR 18...	2.5	.1	5.5	93	80	994	.34	.01	.01	.28	.29
MAY 30...	2.8	.1	3.9	109	85	386	.08	.01	.01	.34	.35
JUL 03...	3.3	.1	5.4	115	86	345	.06	.02	.02	.54	.56
JUL 31...	2.8	.1	7.0	109	83	615	.12	.04	.05	.57	.61
AUG 22...	3.4	.1	7.7	119	110	131	.10	.01	.01	.52	.53
SEP 26...	3.8	.1	7.8	122	105	119	.05	.02	.02	.36	.38

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 10...	.09	.46	.73	3.2	.02	--	.00	--	--	--	--
NOV 22...	.02	.40	.65	2.9	.01	--	.00	11	7	14	100
DEC 18...	.17	.09	.51	2.3	.00	--	.00	--	--	--	--
JAN 23...	.04	.19	.50	2.2	.00	--	.01	--	5	5.0	100
MAR 02...	.05	.27	.64	2.8	.01	--	.01	4.8	6	7.6	100
MAR 27...	--	--	1.0	4.6	.01	--	.01	8.3	0	.00	100
APR 18...	--	--	.63	2.8	.02	.06	.00	--	7	75	100
MAY 30...	--	--	.43	1.9	.01	.03	.00	14	2	7.1	100
JUL 03...	--	--	.62	2.7	.03	.09	.01	9.9	7	21	100
JUL 31...	--	--	.73	3.2	.02	.06	.01	--	7	40	100
AUG 22...	--	--	.63	2.8	.01	.03	.00	13	4	4.4	100
SEP 26...	--	--	.43	1.9	.02	.06	.01	13	2	2.0	100

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 10...	1400	1	0	0	0	3	2	10	2	2
JAN 23...	1330	2	1	0	0	2	2	70	1	1
APR 18...	1230	1	1	0	0	0	0	<10	<10	1
JUL 31...	1045	1	1	0	8	0	2	<10	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 10...	1	4	3	1100	570	19	15	30	20	<.5
JAN 23...	0	4	3	1000	380	13	4	10	0	<.5
APR 18...	1	4	2	680	290	8	7	50	20	<.5
JUL 31...	0	4	1	1200	460	21	19	110	20	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 10...	<.5	0	0	1	1	30	10	14	.6
JAN 23...	<.5	0	0	0	0	0	0	6.2	.4
APR 18...	<.5	0	0	0	0	10	0	10	.3
JUL 31...	<.5	0	0	0	0	20	4	17	.0

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
OCT 10...	1400	27	--	1.30	2.00	1.65	.000
NOV 22...	1200	43	--	--	--	.340	--
MAY 30...	1115	42	721	22.6	24.8	3.05	.710
AUG 22...	1345	23	38.0	.630	.790	4.21	.400

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 4,77 1130	MAR 8,78 1300	MAY 18,78 1400	JUN 13,78 1200	AUG 15,78 1130	SEP 13,78 1215				
TOTAL CELLS/ML	410	220	400	320	2000	820				
DIVERSITY: DIVISION	0.9	0.2	1.7	0.8	1.3	1.0				
..CLASS	0.9	0.2	1.7	0.8	1.3	1.0				
...ORDER	0.9	0.2	1.7	1.1	1.4	1.7				
...FAMILY	1.6	1.8	2.8	2.6	2.0	2.6				
...GENUS	1.6	1.8	2.8	2.6	2.0	2.9				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	88#	27	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	22	1	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	270#	32
....KIRCHNFRIELLA	--	-	--	-	--	-	130	7	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	120#	29	--	-	--	-	89	4	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	57	14	--	-	44	5
CHRYSOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	--	-	15	5	44	2	22	3
....MFLOSIRA	--	-	--	-	--	-	--	-	89	11
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	180#	43	24	11	--	-	130	7	180#	22
...COCCONEIS	--	-	--	-	--	-	--	-	22	3
...RHOICOSPHENTIA	--	-	--	-	38	10	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	*	0	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	59#	18	22	1	44	5
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	22	1	--	-
...FUNOTIACEAE										
....FUNOTIA	--	-	--	-	15	5	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	--	-	--	-	--	-	44	2	22	3
...GOMPHONEMACEAE										
....GOMPHONEMA	--	-	40#	18	38	10	44	14	130	7
...MERIDIONACEAE									66	8
....MERIDION	--	-	24	11	57	14	--	-	--	-
...NAVICULACEAE										
....NAVICULA	120#	29	--	-	76#	19	15	5	89	4
...PINNULARIA	--	-	--	-	--	-	--	-	44	5
...NITZSCHACEAE									22	3
....NITZSCHIA	--	-	130#	57	--	-	15	5	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	73#	23	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
..CYANOPHYCEAE										
...HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	76#	19	--	-	--	-
...OSCILLATORIA	--	-	--	-	--	-	--	-	1300#	64
EUGLENOPHYTA (EUGLENOIDS)										
..EUGLENOPHYCEAE										
...EUGLENALS										
...EUGLENACEAE										
...TRACHELOMONAS	--	-	8	4	57	14	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	217	197	203	187	179	182	241	216	232	232	218	224
2	205	194	197	187	178	181	235	217	224	256	234	247
3	206	195	201	192	178	185	239	210	218	---	---	---
4	201	184	188	186	178	181	215	202	209	---	---	---
5	192	180	185	187	178	184	237	213	219	---	---	---
6	225	177	204	186	176	181	237	202	212	---	---	---
7	219	181	192	182	174	177	217	205	213	---	---	---
8	199	179	186	184	175	179	220	204	211	---	---	---
9	209	161	185	184	170	177	218	210	212	---	---	---
10	219	167	180	174	169	171	---	---	---	---	---	---
11	214	186	192	175	163	168	---	---	---	---	---	---
12	222	197	209	173	167	170	---	---	---	---	---	---
13	228	193	209	177	170	174	---	---	---	---	---	---
14	201	188	192	175	168	172	---	---	---	---	---	---
15	195	189	192	172	161	168	---	---	---	---	---	---
16	191	179	186	175	154	161	---	---	---	---	---	---
17	195	180	187	178	151	160	---	---	---	---	---	---
18	195	186	191	178	132	149	---	---	---	---	---	---
19	192	182	188	140	131	136	---	---	---	---	---	---
20	200	183	188	165	139	150	232	220	227	---	---	---
21	201	189	196	161	141	154	221	202	213	---	---	---
22	199	191	196	233	163	212	231	204	219	---	---	---
23	196	190	193	244	220	231	225	208	218	237	235	236
24	199	195	197	242	220	226	217	198	204	236	234	235
25	201	190	196	243	216	226	230	206	220	235	233	234
26	193	189	191	223	212	220	241	231	235	236	234	235
27	194	188	192	244	213	224	249	235	243	239	235	238
28	191	184	187	220	204	212	260	233	243	239	235	237
29	190	185	188	230	213	219	232	214	218	238	235	236
30	193	184	189	237	205	218	219	208	213	237	235	236
31	186	179	181	---	---	---	228	218	222	243	233	237
MONTH	228	161	192	244	131	185						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	238	236	237	249	241	246	208	202	205	---	---	---
2	247	231	238	248	241	244	204	200	202	---	---	---
3	244	238	240	242	236	240	212	197	202	---	---	---
4	243	235	240	239	235	236	220	197	207	---	---	---
5	246	233	239	236	235	236	219	203	214	---	---	---
6	247	241	244	247	236	242	231	199	215	---	---	---
7	247	238	242	260	247	252	232	211	222	---	---	---
8	244	233	241	261	244	251	222	216	220	---	---	---
9	246	235	242	262	245	251	224	216	220	---	---	---
10	246	236	241	256	248	252	234	220	223	---	---	---
11	246	235	242	258	252	256	229	219	224	---	---	---
12	246	239	243	261	252	257	247	224	230	---	---	---
13	248	239	245	257	252	255	247	219	228	---	---	---
14	247	245	246	260	252	257	239	204	215	---	---	---
15	250	245	248	259	256	258	220	212	215	---	---	---
16	247	239	244	260	257	259	216	204	209	---	---	---
17	245	233	241	259	254	257	205	177	194	---	---	---
18	244	240	242	254	250	252	179	175	177	---	---	---
19	241	238	240	252	245	250	---	---	---	---	---	---
20	243	241	241	253	247	249	---	---	---	---	---	---
21	244	242	243	259	247	253	---	---	---	---	---	---
22	245	241	243	257	246	251	---	---	---	---	---	---
23	245	237	240	257	232	248	---	---	---	---	---	---
24	247	239	246	229	214	220	---	---	---	---	---	---
25	248	242	245	239	209	222	---	---	---	---	---	---
26	249	242	247	226	209	218	---	---	---	---	---	---
27	249	246	248	209	190	198	---	---	---	---	---	---
28	250	245	247	198	190	193	---	---	---	---	---	---
29	---	---	---	201	194	198	---	---	---	---	---	---
30	---	---	---	208	201	204	---	---	---	185	184	185
31	---	---	---	208	200	203	---	---	---	187	182	185
MONTH	250	231	243	262	190	239						

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	190	186	188	184	173	176	197	187	190	206	196	201
2	194	185	189	179	175	177	193	186	189	205	198	201
3	193	187	191	180	169	175	197	186	193	197	190	193
4	197	188	191	184	177	181	212	192	202	196	191	193
5	196	190	193	187	180	184	214	206	212	204	193	198
6	192	187	190	187	181	185	205	200	202	202	191	197
7	201	190	195	193	186	189	210	201	204	190	179	182
8	201	198	200	193	187	190	203	197	201	185	177	181
9	200	197	198	194	190	192	205	192	197	189	183	186
10	199	193	197	204	184	197	213	205	209	192	182	186
11	193	181	188	206	199	203	213	203	208	183	182	182
12	180	174	176	205	201	203	209	204	206	201	183	191
13	178	172	175	211	200	203	218	208	212	213	202	210
14	183	175	180	204	197	202	215	209	212	205	199	202
15	195	183	188	194	186	189	218	205	211	204	197	200
16	196	186	192	184	166	173	219	209	215	206	195	199
17	195	176	184	169	163	167	217	210	212	201	194	197
18	173	164	167	174	168	172	219	210	214	197	186	191
19	169	159	163	183	172	176	217	210	214	198	189	194
20	172	165	169	197	184	192	220	211	215	199	196	197
21	177	169	174	195	188	192	220	213	216	197	193	195
22	174	166	169	200	193	198	214	200	206	201	193	198
23	170	165	167	206	199	203	206	200	203	205	197	200
24	171	165	167	214	205	208	206	194	199	201	197	200
25	172	163	168	210	200	204	195	191	193	200	195	197
26	178	168	173	202	191	196	197	189	193	211	195	201
27	178	171	174	210	195	203	195	190	192	214	208	211
28	175	170	173	193	189	190	206	187	193	214	208	211
29	177	172	174	193	188	191	207	201	204	219	209	212
30	182	174	176	217	188	200	200	191	194	220	214	217
31	---	---	---	215	194	204	196	191	193	---	---	---
MONTH	201	159	181	217	163	191	220	186	203	220	177	197

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	12.0	10.0	11.0	5.0	.0	3.0	.5	.0	.5	.0	.0	.0
2	11.5	10.0	11.0	4.0	.0	1.0	1.0	.0	.5	.0	.0	.0
3	12.0	10.0	11.0	7.0	.0	3.0	1.0	.0	.5	---	---	---
4	10.5	9.5	10.0	7.5	4.5	5.5	.5	.0	.0	---	---	---
5	10.0	9.0	9.5	7.0	4.5	5.5	.5	.0	.0	---	---	---
6	10.0	8.5	9.5	5.0	1.5	3.0	.0	.0	.0	---	---	---
7	9.0	6.5	8.0	4.0	.0	1.5	.0	.0	.0	---	---	---
8	7.5	6.0	6.5	4.5	.5	2.0	.0	.0	.0	---	---	---
9	8.5	6.0	7.0	5.5	3.5	4.5	.0	.0	.0	---	---	---
10	9.5	7.5	8.5	5.5	4.5	4.5	---	---	---	---	---	---
11	10.0	8.5	9.5	5.0	1.5	3.5	---	---	---	---	---	---
12	9.5	8.0	9.0	3.5	.5	2.0	---	---	---	---	---	---
13	8.5	7.0	7.5	5.0	2.0	3.5	---	---	---	---	---	---
14	8.0	5.5	6.5	4.0	.0	2.5	---	---	---	---	---	---
15	6.0	4.5	5.0	2.5	.0	1.0	---	---	---	---	---	---
16	5.5	3.5	4.5	2.5	.0	1.0	---	---	---	---	---	---
17	6.0	2.5	4.0	2.5	.0	1.0	---	---	---	---	---	---
18	7.0	4.5	5.5	2.0	.0	1.0	---	---	---	---	---	---
19	7.0	3.0	5.0	1.0	.0	.5	---	---	---	---	---	---
20	7.5	4.0	5.5	.5	.0	.0	.0	.0	.0	---	---	---
21	8.5	5.0	6.5	1.0	.0	.5	.0	.0	.0	---	---	---
22	8.0	6.0	7.0	.5	.0	.0	.0	.0	.0	---	---	---
23	7.0	5.0	6.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
24	7.0	4.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	6.5	5.0	6.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
26	6.5	5.0	5.5	1.0	.0	.5	.0	.0	.0	.5	.0	.0
27	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	5.5	1.0	3.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
29	4.0	.5	2.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
30	8.0	1.0	4.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
31	5.0	2.0	3.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	12.0	.5	6.5	7.5	.0	1.5						

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	.0	.0	.0	.5	.0	.0	---	---	---
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	---	---
3	.0	.0	.0	.0	.0	.0	.5	.0	.0	---	---	---
4	.0	.0	.0	.0	.0	.0	.5	.0	.0	---	---	---
5	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	---	---
6	.0	.0	.0	.0	.0	.0	.5	.0	.0	---	---	---
7	.0	.0	.0	.0	.0	.0	.5	.0	.5	---	---	---
8	.0	.0	.0	.0	.0	.0	.5	.5	.5	---	---	---
9	.0	.0	.0	.0	.0	.0	.5	.5	.5	---	---	---
10	.0	.0	.0	.0	.0	.0	.5	.0	.5	---	---	---
11	.0	.0	.0	.0	.0	.0	.5	.5	.5	---	---	---
12	.0	.0	.0	.5	.0	.0	.5	.0	.5	---	---	---
13	.0	.0	.0	.5	.5	.5	.5	.0	.5	---	---	---
14	.0	.0	.0	.5	.0	.5	.5	.0	.0	---	---	---
15	.0	.0	.0	.5	.0	.0	.5	.0	.0	---	---	---
16	.0	.0	.0	.5	.0	.5	.5	.0	.0	---	---	---
17	.0	.0	.0	.5	.5	.5	1.0	.0	.5	---	---	---
18	.0	.0	.0	.5	.5	.5	.5	.0	.0	---	---	---
19	.0	.0	.0	1.0	.5	.5	---	---	---	---	---	---
20	.0	.0	.0	1.0	.5	.5	---	---	---	---	---	---
21	.0	.0	.0	.5	.0	.5	---	---	---	---	---	---
22	.0	.0	.0	.5	.0	.5	---	---	---	---	---	---
23	.0	.0	.0	1.0	.5	.5	---	---	---	---	---	---
24	.0	.0	.0	.5	.0	.5	---	---	---	---	---	---
25	.0	.0	.0	.5	.0	.5	---	---	---	---	---	---
26	.0	.0	.0	1.0	.0	.5	---	---	---	---	---	---
27	.0	.0	.0	.5	.0	.0	---	---	---	---	---	---
28	.0	.0	.0	1.0	.0	.5	---	---	---	---	---	---
29	---	---	---	.5	.0	.5	---	---	---	---	---	---
30	---	---	---	1.0	.5	.5	---	---	---	16.5	13.5	15.0
31	---	---	---	.5	.0	.5	---	---	---	16.0	13.5	14.5
MONTH	.0	.0	.0	1.0	.0	.5						
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	19.5	14.5	16.5	23.0	18.0	19.5	19.0	16.5	17.5	25.0	18.0	21.0
2	20.5	15.5	17.5	25.0	16.5	20.0	20.0	17.0	18.5	23.0	18.0	20.5
3	21.0	15.0	17.5	24.0	16.5	20.0	23.0	18.5	20.0	19.0	16.5	17.5
4	20.0	15.5	17.5	24.0	14.5	19.5	21.0	18.0	19.5	21.0	14.0	17.0
5	19.5	14.0	16.5	25.0	14.5	19.5	22.0	18.0	19.5	25.0	15.5	19.5
6	16.5	13.5	14.5	27.0	15.5	21.0	20.5	16.5	18.5	24.0	16.5	19.5
7	17.0	14.0	15.0	27.5	17.5	22.0	23.5	18.0	20.0	19.0	15.0	17.0
8	17.5	14.5	16.0	25.5	18.0	21.0	24.0	18.5	20.5	20.0	13.5	16.0
9	18.5	15.0	17.0	27.0	16.0	21.5	20.0	17.0	18.5	20.5	13.5	16.0
10	17.0	14.5	15.5	28.5	19.0	24.0	21.5	16.5	18.5	19.5	14.0	16.0
11	16.5	13.5	15.0	28.0	18.5	23.0	22.5	15.0	18.0	16.0	13.5	14.5
12	17.5	13.5	15.5	29.0	17.0	23.0	21.0	15.0	17.5	16.0	14.5	15.5
13	18.0	13.5	16.0	27.5	20.5	23.5	22.5	16.5	18.0	17.0	13.5	15.0
14	19.5	15.5	17.0	30.5	21.0	25.0	18.0	14.0	15.5	15.0	11.5	13.5
15	23.0	17.5	19.5	27.0	21.5	24.0	20.5	13.0	16.0	15.5	11.0	13.0
16	20.0	17.5	19.0	25.5	18.5	21.5	20.5	11.5	16.0	18.0	11.5	14.0
17	19.0	16.0	18.0	24.5	16.5	20.5	17.0	14.0	15.5	20.0	12.5	15.5
18	17.5	15.0	16.5	27.0	17.0	21.0	22.5	14.5	17.5	15.5	11.5	14.0
19	18.5	15.5	17.0	25.5	17.5	20.5	22.0	15.0	18.0	18.5	9.5	13.0
20	18.0	16.5	17.0	27.5	18.0	23.0	24.0	15.5	19.0	16.5	11.5	13.5
21	18.5	17.0	17.5	29.0	20.0	23.5	25.5	16.0	20.0	18.5	11.5	14.0
22	17.0	14.5	16.0	28.5	20.5	24.0	22.0	15.5	18.0	19.0	9.5	13.5
23	16.5	13.5	14.5	30.5	22.0	25.0	21.5	18.0	19.5	18.0	9.5	13.0
24	17.5	12.5	15.0	29.0	21.5	25.0	22.0	17.5	19.5	19.0	11.5	14.0
25	18.0	13.5	16.0	24.5	19.0	22.0	23.5	15.5	18.5	19.5	10.0	14.0
26	20.0	16.0	17.5	25.5	19.5	22.5	24.0	16.5	19.5	19.5	10.0	14.0
27	23.0	17.0	19.0	21.5	19.0	20.0	20.5	17.0	18.5	21.0	12.0	16.0
28	21.5	16.5	18.5	24.0	18.5	21.0	19.0	15.0	17.0	21.5	13.5	16.0
29	21.5	16.5	19.0	24.5	18.5	21.0	24.5	16.5	20.0	17.0	13.0	14.5
30	24.0	17.5	20.0	20.0	18.0	19.0	24.0	17.0	20.0	20.5	13.0	16.0
31	---	---	---	18.5	17.5	18.0	24.0	17.0	19.5	---	---	---
MONTH	24.0	12.5	17.0	30.5	14.5	21.5	25.5	11.5	18.5	25.0	9.5	15.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059500 FORD RIVER NEAR HYDE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°45'20", long 87°12'05", in SW¼ sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft (12 m) downstream from bridge on County Road 533, 1.4 mi (2.3 km) downstream from Tennile Creek, and 1.5 mi (2.4 km) north of Hyde.

DRAINAGE AREA.--450 mi² (1,166 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 677.9 ft (206.62 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Aug. 21 to Sept. 26, which are fair.

AVERAGE DISCHARGE.--25 years, 386 ft³/s (10.93 m³/s), 11.65 in/yr (296 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft³/s (215 m³/s) May 7, 1960, gage height, 8.27 ft (2.521 m); minimum, 18 ft³/s (0.510 m³/s) Aug. 30, 1976, gage height, 1.33 ft (0.405 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,620 ft³/s (131 m³/s) Apr. 26, gage height, 6.84 ft (2.085 m); minimum, 90 ft³/s (2.55 m³/s) Sept. 30, gage height, 1.84 ft (0.561 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	958	250	258	125	94	115	710	2090	546	293	712	220
2	906	244	240	120	94	115	700	1750	518	256	674	205
3	1180	237	230	120	94	115	700	1560	500	224	643	195
4	1480	232	220	120	96	115	700	1390	495	195	621	180
5	1390	231	210	120	98	110	680	1280	692	176	657	170
6	1270	229	200	115	98	110	670	1280	695	158	640	195
7	1140	224	190	115	100	110	660	1410	756	146	611	180
8	1010	217	175	110	100	110	640	1420	1020	133	591	175
9	880	215	160	110	100	105	620	1520	906	123	512	165
10	769	211	150	105	100	105	640	1600	905	117	423	165
11	683	207	145	105	100	105	780	1580	1010	111	343	180
12	632	203	145	105	100	105	1120	1480	988	142	280	250
13	588	217	140	100	98	105	1440	1360	941	133	314	400
14	542	258	140	100	98	110	1890	1280	938	127	350	380
15	504	268	135	100	96	110	2150	1170	886	183	349	320
16	472	258	135	100	96	120	2600	1060	775	334	328	280
17	442	301	135	98	96	130	3200	950	910	390	287	250
18	419	506	130	98	96	140	3620	861	1150	365	255	230
19	401	580	130	98	98	190	3740	1180	1260	268	233	200
20	383	465	130	96	100	250	3900	1650	1270	202	212	180
21	368	443	130	96	100	380	3930	1700	1360	171	190	160
22	362	400	130	94	100	520	4050	1580	1260	169	180	150
23	347	385	125	94	100	660	4010	1530	1080	165	175	140
24	330	363	125	94	105	700	3950	1430	927	152	190	130
25	318	340	125	94	105	750	4040	1260	835	171	210	120
26	308	320	125	94	105	750	4550	1090	707	155	220	110
27	297	300	125	94	110	750	4510	955	551	345	185	105
28	286	280	125	94	115	750	4180	827	460	483	180	100
29	277	272	125	94	---	740	3470	715	392	447	190	95
30	267	262	125	94	---	730	2730	632	339	501	200	92
31	259	---	125	94	---	720	---	566	---	719	200	---
TOTAL	19468	8918	4783	3196	2792	9925	70580	40156	25072	7554	11155	5722
MEAN	628	297	154	103	99.7	320	2353	1295	836	244	360	191
MAX	1480	580	258	125	115	750	4550	2090	1360	719	712	400
MIN	259	203	125	94	94	105	620	566	339	111	175	92
CFSM	1.40	.66	.34	.23	.22	.71	5.23	2.88	1.86	.54	.80	.42
IN.	1.61	.74	.40	.26	.23	.82	5.83	3.32	2.07	.62	.92	.47
CAL YR 1978 TOTAL	178366			MEAN 489	MAX 2990	MIN 65	CFSM 1.09	IN 14.74				
WTR YR 1979 TOTAL	209321			MEAN 573	MAX 4550	MIN 92	CFSM 1.27	IN 17.30				

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: December 1974 to current year.

WATER TEMPERATURES: July 1956 to current year.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor since October 1975.

REMARKS.--In addition to the water-quality monitor, samples were collected periodically by a local observer. Interruptions in the daily record were due to malfunctions of the instrument. Monthly samples are collected as a cross-section sample in reach of stream 200 ft (61 m) upstream to 200 ft (61 m) downstream from gage. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.

WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 381 micromhos Feb. 17; minimum observed, 153 micromhos May 2.

WATER TEMPERATURES: Maximum, 28.5°C July 14; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)
OCT											
12...	1100	638	268	8.2	10.0	10.6	95	28	--	150	11
NOV											
21...	1300	420	250	7.5	.0	14.3	100	14	11	150	14
DEC											
20...	1230	129	365	7.5	.0	11.5	80	K2	K11	210	27
JAN											
24...	1230	93	370	7.4	.0	9.4	67	K3	K5	200	8
FEB											
21...	1330	102	355	7.4	.0	10.4	74	K2	K4	190	13
MAR											
28...	1030	746	270	7.2	.0	7.4	52	2	26	140	5
APR											
19...	1200	3620	184	7.6	1.0	12.6	91	K3	K4	99	2
MAY											
29...	1300	722	198	8.2	13.0	10.0	97	K3	K3	120	5
JUL											
02...	1215	256	259	8.1	19.5	9.1	100	12	20	150	11
31...	1445	722	248	7.8	18.0	9.2	99	225	220	140	15
AUG											
21...	1430	188	268	8.2	21.0	9.1	103	K20	K5	160	11
SEP											
26...	1030	120	294	8.0	13.0	10.0	95	K17	K21	160	0

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
12...	35	16	1.1	.0	2	.8	173	0	142	1.7	5.9
NOV											
21...	36	15	1.2	.0	2	1.0	168	0	138	8.5	8.0
DEC											
20...	47	22	1.5	.0	2	.9	220	0	180	11	11
JAN											
24...	44	21	1.5	.0	2	.8	230	0	189	15	11
FEB											
21...	43	21	1.5	.0	2	.8	220	0	180	14	12
MAR											
28...	36	13	1.1	.0	2	1.1	164	0	135	17	12
APR											
19...	24	9.4	.8	.0	2	.7	118	0	97	4.7	6.4
MAY											
29...	28	12	.9	.0	2	.6	140	0	115	1.4	6.3
JUL											
02...	35	15	1.0	.0	1	.5	169	0	139	2.1	6.8
31...	35	12	1.0	.0	2	.4	152	0	125	3.9	8.6
AUG											
21...	37	16	1.3	.0	2	.6	182	0	149	1.8	5.7
SEP											
26...	38	17	1.4	.0	2	.7	203	0	167	3.2	7.3

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE MICHIGAN
04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 12...	2.0	.0	7.5	184	154	317	.01	.01	--	.47	.48
NOV 21...	2.7	.0	7.6	179	154	203	.11	.01	--	.42	.43
DEC 20...	2.2	.0	9.7	220	203	77.0	.16	.00	--	.20	.20
JAN 24...	2.2	.1	10	212	204	53.3	.20	.04	--	.31	.35
FEB 21...	2.2	.0	10	215	199	59.2	.20	.03	--	.19	.22
MAR 28...	2.6	.0	6.6	171	153	344	.33	.01	--	.38	.39
APR 19...	1.8	.0	5.0	123	106	1200	.11	.00	.00	.29	.29
MAY 29...	1.8	.0	3.4	144	122	281	.01	.01	.01	.46	.47
JUL 02...	1.9	.0	5.9	191	150	132	.00	.02	.02	.41	.43
31...	2.2	.1	7.3	175	141	341	.04	.04	.05	.72	.76
AUG 21...	2.2	.1	7.1	187	160	95.0	.03	.02	.02	.59	.61
SEP 26...	2.3	.1	7.4	190	174	62.0	.02	.06	.07	.88	.94

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 12...	--	--	.49	2.2	.01	--	.00	--	5	8.6	--
NOV 21...	.03	.40	.54	2.4	.00	--	.00	14	6	6.8	--
DEC 20...	.03	.17	.36	1.6	.00	--	.00	8.8	34	12	--
JAN 24...	.02	.33	.55	2.4	.00	--	.00	--	4	1.0	100
FEB 21...	--	--	.42	1.9	.00	--	.00	8.2	4	1.1	100
MAR 28...	--	--	.72	3.2	.01	--	.01	11	7	14	100
APR 19...	--	--	.40	1.8	.02	.06	.00	--	70	684	100
MAY 29...	--	--	.48	2.1	.00	.00	.00	14	4	7.8	100
JUL 02...	--	--	.43	1.9	.03	.09	.01	--	4	2.8	100
31...	--	--	.80	3.5	.02	.06	.01	--	16	31	100
AUG 21...	--	--	.64	2.8	.01	.03	.00	17	3	1.5	100
SEP 26...	--	--	.96	4.3	.01	.03	.01	16	1	.32	100

STREAMS TRIBUTARY TO LAKE MICHIGAN
04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 12...	1100	8	1	0	0	1	1	<10	3	1
JAN 24...	1230	2	1	0	0	2	1	20	1	0
APR 19...	1200	1	1	0	0	0	0	10	<10	1
JUL 02...	1215	1	1	0	9	1	1	20	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 12...	1	4	2	400	320	5	3	20	20	<.5
JAN 24...	0	3	1	280	190	20	3	0	10	<.5
APR 19...	1	21	2	630	120	13	8	40	10	<.5
JUL 02...	0	4	2	320	190	4	6	50	20	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 12...	<.5	0	0	0	0	20	10	25	.4
JAN 24...	<.5	0	0	0	0	20	0	14	.2
APR 19...	<.5	0	0	0	0	10	0	13	.5
JUL 02...	<.5	0	0	0	0	10	0	15	.2

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
OCT 12...	1100	21	.000	.000

STREAMS TRIBUTARY TO LAKE MICHIGAN
04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 3,77 1130	MAR 9,78 1100	MAY 19,78 1200	JUN 14,78 1200	AUG 16,78 1115	SEP 21,78 1300				
TOTAL CELLS/ML	770	82	180	1300	4500	87				
DIVERSITY: DIVISION	0.5	0.0	0.0	1.1	1.6	0.9				
..CLASS	0.5	0.0	0.0	1.1	1.6	0.9				
..ORDER	0.5	0.0	0.0	1.1	2.1	0.9				
...FAMILY	2.9	1.6	2.1	1.6	2.9	1.9				
....GENUS	2.9	1.6	2.1	1.7	3.6	1.9				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
...CHARACIACEAE										
...SCHROEDERIA	15	2	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
...ANKISTRODESMUS	7	1	--	-	--	-	180	4	--	-
...KIRCHNERIELLA	--	-	--	-	--	-	44	1	--	-
...OOCYSTIS	--	-	--	-	--	-	110	2	--	-
...SELENASTRUM	--	-	--	-	--	-	130	3	--	-
...TETRAEDRON	--	-	--	-	--	-	*	0	--	-
...SCENEDESMACEAE										
...CRUCIGFANIA	--	-	--	-	--	-	89	2	--	-
...SCENEDESMUS	52	7	--	-	--	-	800#	18	--	-
...VOLVOCALES										
...CHLAMYDOMONADACEAE										
...CARTERIA	--	-	--	-	--	-	*	0	--	-
...CHLAMYDOMONAS	--	-	--	-	--	-	67	1	--	-
...ZYGNEMATALES										
...DESMIDIACEAE										
...COSMARTIUM	--	-	--	-	--	-	45	3	44	1
CHRYSOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
...COSCINODISCACEAE										
...CYCLOTELLA	--	-	--	-	--	-	*	0	--	-
..PENNALES										
...ACHNANTHACEAE										
...ACHNANTHES	15	2	--	-	--	-	110	2	14#	17
...COCONEIS	52	7	*	0	14	8	67	5	*	0
...CYMBELLACEAE										
...AMPHORA	--	-	--	-	--	-	45	3	--	-
...CYMBELLA	74	10	--	-	14	8	45	3	44	1
...EPITHEMIA	--	-	--	-	--	-	*	0	--	-
...DIATOMACEAE										
...DIATOMA	60	8	48#	58	--	-	--	-	--	-
...FRAGILARIACEAE										
...FRAGILARIA	--	-	--	-	--	-	330	7	--	-
...SYNEDRA	160#	20	14#	17	14	8	--	-	--	-
...GOMPHONEMACEAE										
...GOMPHONEMA	74	10	14#	17	14	8	--	-	67	1
...NAVICULACEAE										
...NAVICULA	30	4	7	8	41#	23	110	8	130	3
...NITZSCHACEAE										
...NITZSCHIA	230#	30	--	-	82#	46	110	8	240	5
CRYPTOPHYTA (CRYPTOMONADS)										
..CRYPTOPHYCEAE										
...CRYPTOMONADALES										
...CRYPTOMONADACEAE										
...CRYPTOMONAS	--	-	--	-	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
..CYANOPHYCEAE										
...CHROOCOCCALES										
...CHROOCOCCACEAE										
...AGMENELLUM	--	-	--	-	--	-	580	13	--	-
...ANACYSTIS	--	-	--	-	--	-	910#	20	--	-
...HORMOGONALES										
...OSCILLATORIACEAE										
...LYNGBYA	--	-	--	-	--	-	890#	68	--	-
...OSCILLATORIA	--	-	--	-	--	-	--	-	510	11
EUGLENOPHYTA (EUGLENOIDS)										
..EUGLENOPHYCEAE										
...EUGLENALS										
...EUGLENACEAE										
...TRACHELOMONAS	--	-	--	-	--	-	--	-	29#	33

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE MICHIGAN
04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

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SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	272	269	271	301	300	301	329	315	323	347	344	344
2	269	268	269	303	300	301	339	330	335	349	343	347
3	271	268	269	301	299	301	339	333	336	348	343	346
4	269	263	267	305	301	304	336	329	333	346	342	343
5	269	263	267	305	301	303	330	315	322	354	343	348
6	268	265	266	309	303	306	323	312	317	354	342	349
7	266	264	265	310	305	307	323	314	320	359	354	354
8	265	262	264	307	303	305	339	306	312	353	353	353
9	266	260	265	306	304	305	342	313	332	353	353	353
10	269	268	269	309	306	308	350	341	344	353	352	352
11	272	269	270	313	307	310	350	344	348	357	352	356
12	272	268	270	315	312	313	347	342	346	358	356	356
13	273	271	272	314	304	308	346	342	344	359	353	357
14	273	264	269	324	313	320	346	342	346	361	361	361
15	274	272	273	326	314	322	346	346	346	363	363	363
16	273	272	273	315	305	309	349	346	346	365	365	365
17	276	272	273	305	302	304	359	354	355	365	362	365
18	276	272	274	302	302	302	360	355	358	365	365	365
19	276	275	276	287	283	286	360	357	359	365	362	364
20	277	275	276	281	277	278	359	354	358	367	363	364
21	286	283	285	277	272	273	359	356	358	367	363	365
22	290	285	287	278	274	277	359	359	359	366	366	366
23	292	289	292	278	276	277	360	357	359	368	368	368
24	293	289	291	275	273	274	360	357	359	370	370	370
25	293	289	292	278	273	275	360	360	360	360	360	360
26	292	289	292	281	278	279	362	357	360	357	351	353
27	292	290	291	291	291	291	362	356	358	351	350	350
28	294	294	294	304	302	304	362	355	359	351	348	350
29	296	293	295	304	301	303	357	356	356	352	349	350
30	298	295	297	314	304	307	353	351	352	350	348	349
31	301	300	300	---	---	---	348	348	348	353	349	350
MONTH	301	260	278	326	272	298	362	306	345	370	342	356

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	ONCE-DAILY		
	FEBRUARY			MARCH			APRIL			MAY		
1	357	340	344	358	355	356	277	272	275	---	---	---
2	340	333	338	357	352	355	284	277	280	153	---	---
3	346	340	344	354	352	352	291	284	285	---	---	---
4	352	347	350	354	352	354	304	297	302	---	---	---
5	355	347	353	353	350	352	311	303	306	---	---	---
6	352	341	349	350	349	350	315	309	311	170	---	---
7	340	339	339	349	349	349	318	301	305	---	---	---
8	346	337	339	349	348	349	322	308	316	---	---	---
9	351	342	346	349	347	348	328	318	325	---	---	---
10	356	346	351	349	347	347	334	315	322	---	---	---
11	355	351	353	349	346	348	337	318	323	194	---	---
12	363	355	359	348	345	346	322	311	318	---	---	---
13	365	365	365	345	343	344	321	240	299	---	---	---
14	367	362	364	344	343	343	252	240	245	---	---	---
15	369	364	365	345	343	343	---	---	---	200	---	---
16	372	366	369	343	341	342	---	---	---	---	---	---
17	381	378	379	342	340	341	---	---	---	---	---	---
18	377	377	377	340	338	339	---	---	---	---	---	---
19	377	377	377	339	337	338	---	---	---	---	---	---
20	372	365	368	338	336	336	---	---	---	204	---	---
21	366	363	364	336	336	336	---	---	---	---	---	---
22	365	359	363	336	276	323	---	---	---	---	---	---
23	364	361	363	277	275	---	---	---	---	187	---	---
24	363	358	362	281	269	273	---	---	---	---	---	---
25	362	357	361	281	273	277	---	---	---	---	---	---
26	366	359	361	272	260	265	---	---	---	---	---	---
27	366	356	361	266	261	263	---	---	---	---	---	---
28	363	356	358	261	258	259	---	---	---	---	---	---
29	---	---	---	264	259	261	---	---	---	---	---	---
30	---	---	---	266	262	263	---	---	---	210	---	---
31	---	---	---	273	266	269	---	---	---	---	---	---
MONTH	381	333	358	358	258	324						

STREAMS TRIBUTARY TO LAKE MICHIGAN
04059500 FORD RIVER NEAR HYDE, MI---CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE		JULY			AUGUST			SEPTEMBER	
1	229		ONCE-DAILY	254	256	252	255	302	296	298
2	---		ONCE-DAILY	263	251	241	246	301	296	298
3	241	275	273	274	240	233	237	295	290	292
4	240	276	271	271	233	229	231	290	285	287
5	243	279	273	276	238	232	235	294	285	289
6	236	288	282	285	236	229	232	298	291	294
7	234	298	296	297	228	225	227	297	292	294
8	248	301	298	299	226	222	224	295	293	294
9	240	301	292	300	222	220	221	299	294	296
10	248	301	290	297	230	221	226	303	298	300
11	243	306	300	302	238	230	235	303	299	301
12	234	323	296	311	245	238	242	303	291	296
13	218	314	298	308	254	242	247	292	271	284
14	207	320	315	317	256	251	254	271	255	260
15	213	325	319	323	253	250	252	261	249	255
16	---	318	222	289	254	251	253	258	241	249
17	240	217	202	208	256	252	254	251	245	248
18	208	201	198	200	264	255	260	253	249	251
19	204	209	200	205	271	263	267	---	---	---
20	187	226	210	217	276	269	272	---	---	---
21	194	245	227	236	284	274	278	---	---	---
22	196	256	244	248	286	281	283	---	---	---
23	201	267	255	259	289	283	285	---	---	---
24	202	271	259	266	293	289	290	---	---	---
25	200	268	260	264	295	290	292	---	---	---
26	207	284	268	278	296	292	294	---	---	---
27	222	284	269	275	296	291	293	290	285	287
28	228	281	277	279	300	295	297	293	289	291
29	244	278	270	274	301	295	298	297	291	294
30	250	274	259	268	304	299	301	299	296	297
31	---	264	256	261	304	294	302	---	---	---
MONTH				272	304	220	261			

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	13.0	10.5	11.5	6.5	4.5	5.5	.0	.0	.0	.0	.0	.0
2	12.0	11.0	11.5	6.0	4.5	5.5	.0	.0	.0	.0	.0	.0
3	12.0	11.5	12.0	7.5	5.5	6.5	.0	.0	.0	.0	.0	.0
4	12.0	11.5	11.5	8.5	7.0	8.0	.0	.0	.0	.0	.0	.0
5	12.0	11.0	11.5	7.5	7.0	7.5	.0	.0	.0	.0	.0	.0
6	11.5	10.5	11.0	7.5	5.5	6.5	.0	.0	.0	.0	.0	.0
7	10.5	8.5	9.5	5.5	3.5	4.5	.0	.0	.0	.0	.0	.0
8	8.5	7.0	8.0	5.5	3.5	4.5	.0	.0	.0	.0	.0	.0
9	8.5	7.0	7.5	6.0	5.5	5.5	.0	.0	.0	.0	.0	.0
10	11.5	8.0	9.5	5.5	5.5	5.5	.0	.0	.0	.0	.0	.0
11	11.5	10.5	11.0	5.5	3.5	4.5	.0	.0	.0	.0	.0	.0
12	11.5	10.0	11.0	3.0	1.5	2.0	.0	.0	.0	.0	.0	.0
13	11.0	9.0	9.5	4.5	1.5	3.0	.0	.0	.0	.0	.0	.0
14	9.0	7.0	8.0	4.5	2.5	3.5	.0	.0	.0	.0	.0	.0
15	7.5	5.5	6.5	2.5	.5	1.5	.0	.0	.0	.0	.0	.0
16	6.5	5.0	5.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
17	6.5	4.5	5.5	1.5	.0	1.0	.0	.0	.0	.0	.0	.0
18	7.5	6.5	7.0	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
19	8.5	6.0	7.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
20	9.0	6.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	10.0	8.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	10.5	9.5	10.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	9.0	7.0	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	8.0	6.0	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	9.0	7.0	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	8.5	7.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	7.5	6.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	7.5	5.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	8.5	5.5	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	8.0	6.5	7.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	13.0	4.5	8.5	8.5	.0	2.5	.0	.0	.0	.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.0	3.0	4.5
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.0	5.0	5.0
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.5	4.5	5.0
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	8.0	5.0	6.0
5	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.0	3.5	5.0
6	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.0	2.0	2.5
7	.0	.0	.0	.0	.0	.0	.0	.0	.0	5.0	2.5	3.0
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	8.0	5.5	6.0
9	.0	.0	.0	.0	.0	.0	.0	.0	.0	10.0	8.5	9.0
10	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.0	8.0	9.0
11	.0	.0	.0	.0	.0	.0	.0	.0	.0	12.5	11.5	12.0
12	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	11.0	12.0
13	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	9.5	11.0
14	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.5	10.0	11.0
15	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	10.5	11.5
16	.0	.0	.0	.0	.0	.0	.0	.0	.0	12.5	9.0	11.0
17	.0	.0	.0	.0	.0	.0	.5	.0	.0	13.5	10.0	11.5
18	.0	.0	.0	.0	.0	.0	3.0	.0	.5	13.0	11.0	12.0
19	.0	.0	.0	.0	.0	.0	4.0	.0	1.5	15.5	13.0	14.5
20	.0	.0	.0	.0	.0	.0	4.0	.5	2.0	14.0	11.0	12.5
21	.0	.0	.0	.0	.0	.0	4.5	2.0	3.0	12.0	10.0	11.0
22	.0	.0	.0	.0	.0	.0	5.5	2.0	3.5	14.0	10.0	12.0
23	.0	.0	.0	.0	.0	.0	6.0	2.5	4.5	10.5	9.5	10.0
24	.0	.0	.0	.0	.0	.0	7.5	5.0	5.5	11.5	9.5	10.5
25	.0	.0	.0	.0	.0	.0	8.0	7.0	7.5	13.5	10.0	11.5
26	.0	.0	.0	.0	.0	.0	8.0	6.0	7.0	15.0	10.5	12.5
27	.0	.0	.0	.0	.0	.0	7.5	5.0	6.0	---	---	---
28	.0	.0	.0	.0	.0	.0	7.0	4.5	5.5	---	---	---
29	---	---	---	.0	.0	.0	6.5	4.5	5.0	---	---	---
30	---	---	---	.0	.0	.0	5.0	4.0	4.5	---	---	---
31	---	---	---	.0	.0	.0	---	---	---	---	---	---
MONTH	.0	.0	.0	.0	.0	.0	8.0	.0	2.0			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	20.0	15.5	17.5	22.0	19.0	20.5	21.0	17.0	19.0	24.0	20.5	22.0
2	20.0	15.5	18.0	25.5	18.5	22.5	22.0	17.5	19.5	23.0	21.0	22.0
3	20.0	16.5	18.5	25.0	23.0	24.0	23.0	19.0	21.0	21.0	17.0	18.5
4	19.5	17.0	18.5	24.5	21.5	23.0	22.5	19.0	20.5	18.5	15.5	17.0
5	18.5	14.5	17.0	24.5	20.0	22.5	22.0	19.5	20.5	22.0	17.5	19.5
6	16.5	14.0	15.0	25.5	21.5	24.0	21.0	17.5	19.5	23.0	20.5	22.0
7	16.5	14.0	15.5	27.5	23.5	25.5	23.5	19.0	21.0	20.0	16.0	18.0
8	17.5	15.0	16.0	28.0	24.0	26.0	22.5	19.5	21.0	17.0	14.0	15.5
9	19.0	15.5	17.5	25.5	24.0	24.5	21.0	18.0	18.5	18.5	15.5	16.5
10	18.0	14.0	16.0	25.0	22.5	24.0	20.5	17.5	19.0	19.5	17.0	18.0
11	17.5	13.0	15.0	28.0	23.0	25.0	19.5	16.5	18.0	17.0	15.0	16.0
12	17.0	13.5	15.0	28.0	23.0	25.5	19.0	17.0	18.0	16.0	15.0	15.5
13	17.5	13.5	15.5	27.0	24.5	26.0	19.5	17.0	18.5	17.5	15.5	16.0
14	18.5	14.5	16.5	28.5	24.0	26.0	19.0	15.5	16.5	17.0	13.5	15.0
15	21.5	17.0	19.0	27.0	24.5	26.0	17.5	13.5	15.5	15.0	12.0	13.5
16	21.0	18.0	19.0	25.5	21.5	23.0	17.5	14.5	16.0	16.5	12.5	14.5
17	18.5	16.0	17.5	23.0	18.5	21.0	17.5	15.0	16.0	18.0	14.5	16.0
18	18.5	15.0	16.5	23.5	18.5	21.0	19.0	15.0	16.5	18.0	14.5	16.0
19	18.0	14.5	16.5	23.0	19.5	21.5	21.0	18.5	19.5	---	---	---
20	17.0	15.5	16.0	24.5	21.0	23.0	21.5	19.0	20.0	---	---	---
21	17.0	15.5	16.0	25.5	22.5	24.0	22.5	19.5	21.0	---	---	---
22	16.5	14.0	15.0	26.5	23.5	25.0	22.0	20.0	20.5	---	---	---
23	16.0	12.0	14.0	26.5	23.5	25.5	21.0	19.5	20.0	---	---	---
24	16.5	12.0	14.0	27.5	24.0	25.5	21.5	19.5	20.5	---	---	---
25	17.5	13.0	15.0	26.0	22.5	24.5	20.5	18.0	19.0	---	---	---
26	18.5	14.5	16.5	22.5	20.0	21.5	22.5	18.5	20.0	---	---	---
27	20.0	16.5	18.5	21.5	19.5	20.0	21.5	19.0	20.0	18.0	14.5	17.0
28	20.0	16.5	18.5	23.0	18.0	20.0	18.5	17.0	17.5	19.5	16.5	17.5
29	20.5	17.5	19.0	23.5	19.0	21.5	22.5	17.5	19.5	17.5	15.5	16.0
30	22.5	18.5	20.5	22.5	19.0	20.0	23.5	20.5	22.0	18.0	14.5	16.0
31	---	---	---	19.5	17.5	18.5	23.0	20.0	21.0	---	---	---
MONTH	22.5	12.0	17.0	28.5	17.5	23.0	23.5	13.5	19.0			

STREAMS TRIBUTARY TO LAKE MICHIGAN

04060500 IRON RIVER AT CASPIAN, MI

LOCATION.--Lat 46°03'31", long 88°37'38", in SE¼ SW¼ sec.1, T.42 N., R.35 W., Iron County, Hydrologic Unit 04030106, on right bank 10 ft (3 m) downstream from bridge on County Highway 424 in Caspian, and 5.0 mi (8.0 km) upstream from mouth.

DRAINAGE AREA.--92.1 mi² (238.5 km²).

PERIOD OF RECORD.--March 1948 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,438.78 ft (438.540 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 25, 1969, nonrecording gage at site 10 ft (3 m) upstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to August 1978, the average flow includes mine pumpage and sewage effluent. Since August 1978, average flow includes about 1 ft³/s (0.03 m³/s) sewage effluent. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 87.1 ft³/s (2.467 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) July 2, 1953, gage height, 10.20 ft (3.109 m); minimum, 25 ft³/s (0.71 m³/s) Mar. 29, 1969, gage height, 3.30 ft (1.006 m), result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 840 ft³/s (23.8 m³/s) Apr. 22, gage height, 9.04 ft (2.755 m); minimum daily, 45 ft³/s (1.27 m³/s) Mar. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	60	52	50	52	56	106	234	119	84	91	111
2	68	59	50	52	52	56	106	210	112	81	85	95
3	86	58	52	52	52	56	102	192	109	82	80	85
4	207	58	54	52	50	56	103	172	141	81	166	81
5	151	58	56	52	50	56	102	166	169	78	167	79
6	109	58	58	52	50	54	104	171	130	76	113	76
7	100	56	56	52	50	54	97	189	121	75	95	73
8	92	56	54	50	50	52	96	206	118	75	86	71
9	86	56	50	50	50	50	92	235	107	75	82	70
10	82	56	50	50	50	50	92	215	150	76	85	70
11	80	58	50	50	50	48	94	332	167	74	81	123
12	83	56	50	50	50	48	93	435	133	74	80	150
13	77	59	50	50	50	46	120	297	112	93	113	147
14	73	63	52	50	50	46	156	258	103	92	99	116
15	70	60	52	50	50	45	168	215	98	80	85	97
16	73	56	52	50	50	46	201	182	115	75	79	87
17	73	62	54	50	50	50	283	164	303	72	79	82
18	70	80	52	50	50	58	332	155	253	71	79	77
19	68	78	50	50	50	70	370	216	169	72	83	72
20	67	73	50	50	50	80	454	237	159	74	80	71
21	67	70	50	50	50	86	760	193	199	71	76	70
22	66	62	52	50	50	84	804	168	167	70	76	68
23	65	60	54	50	50	80	689	173	139	69	83	67
24	64	58	52	50	50	76	543	158	116	84	126	67
25	64	56	52	50	52	73	532	139	107	193	101	66
26	64	54	54	52	54	72	493	127	103	127	86	65
27	63	54	52	52	54	68	422	121	98	132	85	71
28	62	54	50	54	56	90	350	119	91	111	83	77
29	61	54	48	56	---	98	303	112	88	92	100	73
30	60	54	46	56	---	100	268	108	85	92	93	72
31	61	---	48	54	---	102	---	110	---	100	96	---
TOTAL	2481	1796	1602	1586	1422	2006	8445	6009	4081	2701	2913	2529
MEAN	80.0	59.9	51.7	51.2	50.8	64.7	282	194	136	87.1	94.0	84.3
MAX	207	80	58	56	56	102	804	435	303	193	167	150
MIN	60	54	46	50	50	45	92	108	85	69	76	65

CAL YR 1978 TOTAL 26093 MEAN 71.5 MAX 207 MIN 46
WTR YR 1979 TOTAL 37571 MEAN 103 MAX 804 MIN 45

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE¼ SE¼ sec.11, T.41 N., R.32 W., Michigan meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft (12 m) upstream from highway bridge, 1.0 mi (1.6 km) upstream from Paint River, 2.5 mi (4.0 km) north of Florence, and 5.0 mi (8.0 km) upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi² (1,008 km²).

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft (365.928 m) National Geodetic Vertical Datum of 1929 (levels by Own Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft (12 m) downstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Discharge includes some mine pumpage prior to August, 1977 (station 04060500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years (water years 1915, 1945-79), 358 ft³/s (10.14 m³/s), 12.50 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft³/s (133 m³/s) July 2, 1953, gage height, 6.57 ft (2.003 m); maximum gage height, 8.27 ft (2.521 m) Dec. 26, 1969, backwater from ice; minimum discharge, 118 ft³/s (3.34 m³/s) Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft (0.546 m) July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,470 ft³/s (70.0 m³/s) Apr. 23, gage height, 4.78 ft (1.457 m); maximum gage height, 5.34 ft (1.628 m) Nov. 20, backwater from ice; minimum discharge, 193 ft³/s (5.47 m³/s) Dec. 27, (discharge measurement); minimum gage height, 1.99 ft (0.607 m) Nov. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	372	234	225	215	245	250	450	816	447	368	359	573
2	346	231	225	220	245	250	450	716	451	364	325	520
3	351	230	225	220	245	250	450	688	433	361	301	456
4	533	236	220	220	240	250	450	649	423	370	348	398
5	507	242	220	215	240	250	450	616	495	358	554	363
6	415	241	220	210	240	250	440	616	508	348	461	345
7	379	235	220	210	240	250	430	676	490	342	379	326
8	344	234	220	210	240	250	420	733	503	335	335	313
9	328	234	215	205	240	250	410	850	487	325	314	301
10	309	236	215	205	240	250	400	809	703	319	312	298
11	301	241	215	205	240	250	400	741	767	309	303	350
12	303	234	215	205	240	250	402	986	663	302	293	400
13	294	241	215	205	240	260	462	1040	551	347	403	450
14	281	260	210	205	240	270	539	853	482	559	447	440
15	285	252	210	205	235	280	557	721	448	390	386	410
16	291	234	210	205	235	300	636	641	463	323	340	400
17	301	256	210	205	235	320	859	588	1020	303	320	360
18	280	300	210	205	235	340	1150	553	1020	296	323	340
19	270	297	210	205	235	360	1450	704	788	292	326	320
20	263	275	210	210	235	380	1760	822	646	291	319	300
21	259	260	210	210	240	400	2080	707	863	282	302	300
22	257	255	210	210	240	430	2350	626	710	274	289	320
23	255	255	210	210	240	450	2450	610	594	269	327	300
24	250	255	210	210	240	490	2340	585	517	282	408	290
25	247	250	210	215	245	490	2160	532	461	410	438	280
26	246	250	210	215	245	490	1990	494	432	423	387	260
27	245	240	210	220	250	490	1720	505	413	432	367	275
28	242	235	210	220	250	480	1410	475	395	427	347	294
29	240	230	210	225	---	480	1110	448	384	361	352	291
30	237	230	210	230	---	470	927	421	376	344	374	286
31	236	---	215	235	---	460	---	417	---	391	403	---
TOTAL	9467	7403	6635	6585	6735	10640	31102	20638	16933	10797	11142	10559
MEAN	305	247	214	212	241	343	1037	666	564	348	359	352
MAX	533	300	225	235	250	490	2450	1040	1020	559	554	573
MIN	236	230	210	205	235	250	400	417	376	269	289	260
CFSM	.78	.64	.55	.55	.62	.88	2.67	1.71	1.45	.90	.92	.91
IN.	.91	.71	.63	.63	.64	1.02	2.97	1.97	1.62	1.03	1.07	1.01
CAL YR 1978	TOTAL	103380	MEAN 283	MAX 811	MIN 175	CFSM .73	IN 9.89					
WTR YR 1979	TOTAL	148636	MEAN 407	MAX 2450	MIN 205	CFSM 1.05	IN 14.21					

STREAMS TRIBUTARY TO LAKE MICHIGAN

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE¼ sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft (46 m) downstream from municipal powerplant at Crystal Falls, and 14.5 mi (23.3 km) upstream from mouth.

DRAINAGE AREA.--597 mi² (1,546 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft (398.10 m), Wisconsin Electric Power Co. datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 2 to Feb. 26, which are fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 590 ft³/s (16.71 m³/s), 13.42 in/yr (341 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft³/s (309 m³/s) Apr. 25, 1960, gage height, 9.82 ft (2.993 m); minimum, 7.7 ft³/s (0.22 m³/s) Sept. 17, 1950, gage height, 0.89 ft (0.271 m); minimum daily, 81 ft³/s (2.29 m³/s) Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,970 ft³/s (169 m³/s) Apr. 24, gage height, 7.14 ft (2.176 m); minimum recorded, 84 ft³/s (2.38 m³/s) Aug. 31, gage height, 1.61 ft (0.491 m), but may have been less during periods of no gage-height record Nov. 20-28, Jan. 2 to Feb. 26; minimum daily, 261 ft³/s (7.39 m³/s) Mar. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	490	344	304	290	290	310	711	2270	696	542	671	487
2	472	345	308	290	290	330	710	1980	755	496	581	498
3	486	345	317	290	280	340	691	1780	753	461	509	465
4	770	342	340	290	280	330	686	1590	737	431	580	440
5	1030	346	347	300	280	325	715	1430	755	415	1090	422
6	943	341	351	290	280	304	703	1370	736	394	950	405
7	856	335	324	290	280	312	657	1470	706	371	748	394
8	809	334	293	280	280	303	660	1640	734	364	574	391
9	762	334	298	280	280	307	634	2020	917	341	498	371
10	709	336	294	280	280	281	615	2500	937	350	460	354
11	632	329	303	280	280	280	610	3300	1040	356	430	477
12	606	332	298	280	300	280	644	3800	1320	352	402	728
13	561	343	311	280	290	280	796	2800	1260	469	455	871
14	520	366	300	280	280	271	991	2300	1060	755	476	929
15	499	369	316	280	280	261	1130	1900	878	734	420	802
16	466	344	313	280	300	262	1350	1600	874	640	406	705
17	453	367	315	280	300	301	1760	1300	2010	491	384	592
18	430	448	312	280	280	331	2360	800	2160	425	379	509
19	423	433	292	280	280	402	2960	1200	1790	397	384	450
20	406	420	295	280	300	475	4000	1600	1540	397	374	424
21	402	400	294	280	290	553	5000	1600	1690	379	356	402
22	392	350	311	280	280	604	5760	1400	1640	356	338	385
23	381	360	314	290	280	733	5890	1300	1460	346	352	365
24	376	360	302	290	290	754	5910	1350	1230	356	460	347
25	371	360	308	290	290	747	5860	1150	1030	425	532	341
26	367	360	314	290	300	735	5720	1000	859	390	455	331
27	366	360	315	300	330	796	5260	920	781	700	415	341
28	364	360	294	300	320	767	4500	850	744	1020	410	316
29	362	363	290	300	---	728	3510	800	691	1010	435	310
30	360	333	278	290	---	704	2740	730	607	734	460	304
31	353	---	290	290	---	698	---	695	---	713	425	---
TOTAL	16417	10759	9541	8880	8090	14104	73533	50445	32390	15610	15409	14156
MEAN	530	359	308	286	289	455	2451	1627	1080	504	497	472
MAX	1030	448	351	300	330	796	5910	3800	2160	1020	1090	929
MIN	353	329	278	280	280	261	610	695	607	341	338	304
CFSM	.89	.60	.52	.48	.48	.76	4.11	2.73	1.81	.84	.83	.79
IN.	1.02	.67	.59	.55	.50	.88	4.58	3.14	2.02	.97	.96	.88

CAL YR 1978 TOTAL 182238 MEAN 499 MAX 2020 MIN 203 CFSM .84 IN 11.36
WTR YR 1979 TOTAL 269334 MEAN 738 MAX 5910 MIN 261 CFSM 1.24 IN 16.78

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW¼ NW¼ sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi (1.0 km) downstream from Lower Paint Dam, 5.5 mi (8.8 km) upstream from Brule River, and 6.0 mi (9.7 km) southeast of Alpha.

DRAINAGE AREA.--631 mi² (1,634 km²).

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft (384 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage-height record, Apr. 22-25, which are fair. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi (1.0 km) above station. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 173 ft³/s (4.899 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft³/s (228 m³/s) July 2, 1953, gage height, 10.50 ft (3.200 m); minimum daily, 62 ft³/s (1.76 m³/s) Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 4,500 ft³/s (127 m³/s) Apr. 23; minimum daily, 84 ft³/s (2.38 m³/s) Oct. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86	92	92	90	88	88	90	1750	89	90	95	100
2	86	92	92	90	88	88	90	1210	88	90	95	99
3	87	92	92	90	88	88	90	1200	88	92	95	97
4	88	92	92	90	88	88	90	1090	91	91	97	97
5	87	92	92	90	88	88	90	986	90	91	97	97
6	84	92	92	88	88	88	90	467	91	92	97	97
7	85	92	92	88	88	88	90	93	92	92	96	97
8	86	92	92	88	88	88	90	510	404	92	95	97
9	87	92	90	88	88	88	90	1430	310	91	96	97
10	88	92	90	88	88	88	90	1930	710	92	95	97
11	87	92	90	88	88	88	92	2310	1110	92	95	98
12	90	92	90	88	88	88	92	2960	803	92	96	98
13	88	92	90	88	88	88	94	1710	295	96	98	98
14	88	92	90	88	88	88	96	1500	92	96	118	97
15	88	92	90	88	88	88	100	1360	90	93	97	97
16	88	92	90	88	88	88	112	1080	92	92	97	97
17	88	93	90	88	88	88	137	1080	690	92	97	96
18	90	92	90	88	88	88	233	849	880	92	97	95
19	90	92	90	88	88	90	862	1110	659	92	97	95
20	90	92	90	88	88	90	1480	1480	907	92	97	94
21	90	92	90	88	88	90	2590	1310	1150	92	97	99
22	88	92	90	88	88	90	4000	1090	1160	92	97	95
23	88	92	90	88	88	90	4500	1080	1150	92	97	95
24	89	92	90	88	88	90	4200	616	1140	93	97	95
25	92	92	90	88	88	90	4000	92	622	94	97	95
26	90	92	90	88	88	90	3830	91	92	95	97	95
27	90	92	90	88	88	90	3530	90	92	96	97	95
28	92	92	90	88	88	90	2920	90	91	97	97	94
29	92	92	90	88	---	90	2550	90	90	97	97	92
30	92	92	90	88	---	90	2330	90	90	96	97	92
31	92	---	90	88	---	90	---	90	---	96	100	---
TOTAL	2746	2761	2806	2738	2464	2754	38648	30834	13348	2882	3017	2887
MEAN	88.6	92.0	90.5	88.3	88.0	88.8	1288	995	445	93.0	97.3	96.2
MAX	92	93	92	90	88	90	4500	2960	1160	97	118	100
MIN	84	92	90	88	88	88	90	90	88	90	95	92
CAL YR 1978	TOTAL	40780	MEAN 112	MAX 1220	MIN 83							
WTR YR 1979	TOTAL	107885	MEAN 296	MAX 4500	MIN 84							

STREAMS TRIBUTARY TO LAKE MICHIGAN

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI

LOCATION.--Lat 46°28'00", long 88°04'28", in SW¼ SW¼ sec.16, T.47 N., R.30 W., Marquette County, Hydrologic Unit 04030107, on right bank 20 ft (6 m) upstream from Northern Natural Gas Co. pipeline, 0.6 mi (1.0 km) upstream from Spruce River, 1.2 mi (1.9 km) downstream from Lake Michigamme, and 5.0 mi (8.0 km) southeast of Michigamme.

DRAINAGE AREA.--194 mi² (502 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,520 ft (463 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--11 years, 288 ft³/s (8.156 m³/s), 20.16 in/yr (512 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,180 ft³/s (90.1 m³/s) Apr. 19, 1976, gage height, 7.77 ft (2.368 m); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 30, 1976, gage height, 1.56 ft (0.475 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,090 ft³/s (87.5 m³/s) Apr. 27, gage height, 7.64 ft (2.329 m); minimum, 90 ft³/s (2.55 m³/s) Mar. 2, 3, gage height, 2.97 ft (0.905 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	347	190	171	135	103	92	242	2300	444	466	264	112
2	341	184	167	133	102	91	254	2050	429	415	262	114
3	343	179	167	129	102	91	263	1830	426	375	257	112
4	354	175	167	128	102	98	273	1660	426	341	258	109
5	376	169	164	127	100	104	288	1510	411	309	261	109
6	397	164	162	125	101	103	297	1390	391	290	250	118
7	410	157	160	122	101	101	299	1280	386	271	241	118
8	424	150	157	120	100	101	311	1220	400	255	232	117
9	441	147	153	119	96	101	317	1270	401	242	216	117
10	446	146	149	117	96	100	316	1340	425	231	207	119
11	435	146	144	115	94	100	314	1420	451	216	192	125
12	426	141	140	114	94	98	316	1470	469	205	176	149
13	404	138	141	112	93	98	323	1470	464	208	172	185
14	379	139	142	111	94	98	330	1400	435	245	162	217
15	357	139	141	110	94	98	340	1310	418	256	148	232
16	337	140	138	107	94	96	356	1200	415	259	139	240
17	314	152	136	109	94	96	381	1100	545	248	132	239
18	304	169	135	107	94	96	429	1010	680	237	128	237
19	292	175	132	105	93	97	517	968	744	227	123	225
20	281	178	134	105	92	100	663	943	754	218	117	214
21	273	180	137	103	92	103	878	907	773	206	113	204
22	266	180	135	104	93	109	1130	863	783	203	106	192
23	258	180	134	105	96	128	1420	832	759	196	106	180
24	246	180	137	108	97	140	1790	795	723	190	123	168
25	240	180	137	108	95	155	2210	745	662	203	120	157
26	234	180	136	107	94	167	2690	687	613	207	117	146
27	227	180	135	105	93	176	3010	632	600	229	117	138
28	221	177	134	104	92	189	3020	586	580	241	115	134
29	212	176	134	104	---	203	2840	540	555	245	115	127
30	202	175	138	104	---	215	2580	489	516	251	116	121
31	198	---	137	104	---	229	---	455	---	262	114	---
TOTAL	9985	4966	4494	3506	2691	3773	28397	35672	16078	7947	5199	4775
MEAN	322	166	145	113	96.1	122	947	1151	536	256	168	159
MAX	446	190	171	135	103	229	3020	2300	783	466	264	240
MIN	198	138	132	103	92	91	242	455	386	190	106	109
CFSM	1.66	.86	.75	.58	.50	.63	4.88	5.93	2.76	1.32	.87	.82
IN.	1.91	.95	.86	.67	.52	.72	5.45	6.84	3.08	1.52	1.00	.92
CAL YR 1978 TOTAL	111533			MEAN 306	MAX 1500	MIN 80	CFSM 1.58	IN 21.39				
WTR YR 1979 TOTAL	127483			MEAN 349	MAX 3020	MIN 91	CFSM 1.80	IN 24.45				

STREAMS TRIBUTARY TO LAKE MICHIGAN
04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI--CONTINUED
WATER-QUALITY RECORDS

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PERIOD OF RECORD.--Water years 1970 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW+ INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	TUR- BID- ITY (NTU)	HARD- NESS (MG/L AS CAC03)
OCT									
12...	1030	410	44	7.1	11.5	100	1	--	22
NOV									
09...	0900	137	50	7.0	6.5	100	1	--	19
DEC									
14...	0915	136	45	6.9	.0	100	1	--	20
JAN									
31...	1030	98	44	7.2	.5	70	2	--	21
FEB									
21...	0950	86	42	7.0	.0	85	--	1.0	20
MAR									
21...	0930	99	44	6.8	1.0	100	--	1.0	20
MAY									
01...	1215	2350	42	6.9	2.5	100	--	1.0	18
JUN									
14...	0845	422	39	6.7	13.5	55	--	1.0	16
JUL									
12...	0845	193	40	6.8	24.0	70	--	.00	16
AUG									
02...	0915	251	40	6.6	21.5	60	--	.00	17
30...	0845	120	43	6.7	18.5	60	--	1.0	17
SEP									
26...	0915	148	44	6.7	14.0	60	--	1.0	17

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, SUS- PENDE RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, SUS- PENDE RECOV. (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)
OCT									
12...	5.7	1.8	.14	360	0	260	30	10	20
NOV									
09...	5.0	1.6	.15	340	130	210	20	20	0
DEC									
14...	5.0	1.8	.18	400	120	280	0	0	0
JAN									
31...	5.5	1.8	.19	570	300	270	10	3	7
FEB									
21...	5.2	1.7	.18	430	120	310	10	1	9
MAR									
21...	5.3	1.6	.21	400	70	330	10	0	10
MAY									
01...	4.6	1.6	.20	390	120	270	30	10	20
JUN									
14...	4.0	1.4	.15	260	90	170	20	10	10
JUL									
12...	4.1	1.4	.10	260	100	160	30	20	9
AUG									
02...	4.3	1.5	.11	270	120	150	30	20	9
30...	4.4	1.5	.14	250	80	170	20	10	7
SEP									
26...	4.5	1.4	.12	240	--	150	30	10	20

STREAMS TRIBUTARY TO LAKE MICHIGAN

04062400 MICHIGAMME RIVER NEAR WITCH LAKE, MI

LOCATION.--Lat 46°14'48", long 88°00'45", in NW¼ NW¼ sec.1, T.44 N., R.30 W., Dickinson County, Hydrologic Unit 04030107, on left bank 20 ft (6 m) upstream from bridge on county highway, 0.4 mi (0.6 km) upstream from Witch Lake Outlet, and 2.0 mi (3.2 km) south of Witch Lake.

DRAINAGE AREA.--316 mi² (818 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,384.25 ft (421.919 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation caused by dam 14 mi (23 km) above station. Some flow diverted and returned above station by iron ore processing plant.

AVERAGE DISCHARGE.--15 years, 429 ft³/s (12.15 m³/s), 18.44 in/yr (468 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,360 ft³/s (123 m³/s) May 11, 1965, gage height, 11.60 ft (3.536 m); minimum, 23 ft³/s (0.65 m³/s) Nov. 15, 28, 1976; minimum gage height, 1.96 ft (0.597 m) Sept. 10, 11, 12, 13, Nov. 15, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 4,150 ft³/s (118 m³/s) Apr. 28, gage height, 11.22 ft (3.420 m); minimum, 128 ft³/s (3.62 m³/s) Aug. 23, gage height, 2.65 ft (0.808 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	567	273	235	190	160	135	410	3380	652	696	560	277
2	575	246	230	185	160	135	440	2950	652	620	446	304
3	596	243	230	180	160	140	460	2580	648	532	439	232
4	675	238	230	180	155	150	470	2290	640	520	492	197
5	683	215	225	175	155	155	490	2070	624	500	492	193
6	651	212	220	170	150	160	510	1920	604	414	446	267
7	643	210	215	170	150	160	520	1760	568	386	425	338
8	732	207	210	170	150	160	530	1650	560	352	362	253
9	695	205	205	170	145	160	540	1650	560	306	330	191
10	643	200	200	170	145	160	540	1710	672	302	324	197
11	675	200	200	165	140	160	550	1760	744	302	312	296
12	683	200	195	165	140	160	550	1870	784	279	231	336
13	655	205	190	165	140	160	566	1900	760	242	232	319
14	575	212	190	165	140	160	587	1870	684	476	261	335
15	555	212	190	165	140	160	629	1780	652	564	279	386
16	547	207	190	165	140	160	657	1630	612	472	228	429
17	485	222	190	160	140	160	716	1480	804	414	166	392
18	466	273	185	160	140	160	819	1350	1060	334	161	362
19	462	273	185	160	140	165	966	1340	1110	306	162	345
20	455	270	185	160	135	170	1140	1430	1080	320	200	316
21	426	270	190	160	135	180	1380	1360	1130	296	208	312
22	419	265	190	160	135	200	1630	1270	1210	264	169	307
23	401	260	190	160	140	225	1960	1250	1150	235	132	281
24	372	260	190	165	140	250	2370	1220	1060	230	163	240
25	338	255	190	170	140	270	2890	1130	980	480	248	233
26	317	254	190	170	140	290	3490	1030	912	480	290	229
27	317	251	190	170	135	310	3940	966	872	528	259	227
28	317	257	190	165	135	330	4130	876	840	516	187	211
29	310	246	190	165	---	350	4080	856	776	442	186	186
30	307	235	190	165	---	370	3790	784	752	428	202	183
31	280	---	190	165	---	390	---	672	---	636	217	---
TOTAL	15822	7076	6190	5205	4025	6295	41750	49784	24152	12872	8809	8374
MEAN	510	236	200	168	144	203	1392	1606	805	415	284	279
MAX	732	273	235	190	160	390	4130	3380	1210	696	560	429
MIN	280	200	185	160	135	135	410	672	560	230	132	183
CFSM	1.61	.75	.63	.53	.46	.64	4.41	5.08	2.55	1.31	.90	.88
IN.	1.86	.83	.73	.61	.47	.74	4.91	5.86	2.84	1.52	1.04	.99

CAL YR 1978 TOTAL 152247 MEAN 417 MAX 1860 MIN 111 CFSM 1.32 IN 17.92
WTR YR 1979 TOTAL 190354 MEAN 522 MAX 4130 MIN 132 CFSM 1.65 IN 22.41

STREAMS TRIBUTARY TO LAKE MICHIGAN
04062400 MICHIGAN RIVER NEAR WITCH LAKE, MI--CONTINUED

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WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	TUR- BID- ITY (NTU)	HARD- NESS (MG/L AS CAC03)
OCT 12...	1200	675	69	7.0	10.0	120	1	--	31
NOV 09...	1100	200	90	7.2	5.0	100	3	--	46
DEC 14...	1100	185	96	7.4	.0	100	2	--	41
JAN 31...	1200	166	115	7.3	.0	50	3	--	49
FEB 21...	1300	132	107	7.0	.0	70	--	2.0	50
MAR 21...	1100	160	118	7.2	.0	80	--	7.0	52
MAY 01...	1530	3170	50	7.2	4.5	80	--	2.0	19
JUN 14...	1050	645	64	7.3	16.5	60	--	2.0	29
JUL 12...	1125	278	80	7.5	24.0	70	--	1.0	36
AUG 02...	1150	425	90	7.4	21.0	75	--	2.0	44
30...	1300	188	120	7.4	19.0	50	--	2.0	55
SEP 26...	1200	220	100	7.4	13.0	50	--	2.0	44

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, SUS- PENDED RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, SUS- PENDED RECOV. (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)
OCT 12...	7.7	2.8	.19	430	70	360	50	30	20
NOV 09...	11	4.4	.26	630	240	390	70	30	40
DEC 14...	10	4.0	.25	500	100	400	60	10	50
JAN 31...	12	4.7	.29	640	--	--	60	0	60
FEB 21...	12	4.9	.28	640	200	440	60	10	50
MAR 21...	13	4.7	.42	910	520	390	90	30	60
MAY 01...	5.0	1.7	.21	450	190	260	40	20	20
JUN 14...	7.0	2.7	.13	400	130	270	40	20	20
JUL 12...	8.8	3.5	.15	530	200	330	90	50	40
AUG 02...	11	4.0	.34	810	290	520	70	30	40
30...	13	5.4	.25	650	200	450	50	10	40
SEP 26...	11	4.1	.20	480	--	300	30	0	40

STREAMS TRIBUTARY TO LAKE MICHIGAN

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW¼ sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft (122 m) upstream from highway bridge, 5.0 mi (8.0 km) downstream from Michigamme Reservoir, 6.0 mi (9.7 km) east of Crystal Falls and 15 mi (24 km) upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi² (1,699 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft (396 m) from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), 5 mi (8 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 699 ft³/s (19.80 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft³/s (206 m³/s) Apr. 28, 1960, gage height, 10.73 ft (3.271 m); minimum daily, 71 ft³/s (2.01 m³/s) Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,140 ft³/s (88.9 m³/s) May 9, 10, 13, gage height, 7.43 ft (2.265 m); minimum, 98 ft³/s (2.78 m³/s) Nov. 10, gage height, 1.42 ft (0.433 m); minimum daily, 137 ft³/s (3.88 m³/s) Oct. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	720	599	599	1170	578	757	755	2360	710	1160	1180	172
2	719	598	598	1190	577	640	753	2380	710	1150	1170	175
3	724	465	599	1180	577	148	757	2110	711	1160	1040	172
4	953	138	900	1180	574	166	772	1970	989	1140	728	169
5	1160	141	1050	1180	869	334	815	1970	1220	897	735	168
6	1060	398	1100	1170	992	487	612	1570	1220	683	994	153
7	724	604	1100	1160	1130	468	785	1220	1220	683	1190	151
8	716	603	1000	1180	1060	584	800	1600	1210	683	1180	150
9	939	604	682	1180	1040	560	783	2620	1200	671	1170	393
10	1150	372	678	1190	748	164	779	3060	1250	707	1160	577
11	1150	138	900	1190	550	180	799	2630	1270	689	1150	418
12	1150	139	1050	1050	860	369	826	2890	1260	687	1150	433
13	1040	392	1050	534	1070	478	910	3130	1240	532	1160	230
14	704	602	1050	531	1060	476	980	3120	1220	646	1150	165
15	701	599	1050	927	1040	726	979	2810	1210	1230	1170	154
16	700	598	1050	1170	895	518	630	2280	1240	1200	1180	170
17	645	377	1050	1160	521	152	235	2060	2200	1170	1170	426
18	699	145	1050	1150	531	160	258	1820	1710	1160	1170	625
19	698	146	1050	992	591	359	298	2070	1230	1160	1160	676
20	541	400	1050	521	679	569	525	2520	1570	1150	1150	674
21	166	592	1050	522	681	612	1260	2120	1920	1140	1160	670
22	149	465	1050	856	770	603	1250	1750	1910	1130	881	368
23	452	139	1050	1070	644	624	1230	1760	1890	1130	673	156
24	694	140	1050	1060	174	772	770	1480	1870	1130	674	409
25	694	140	1050	934	186	998	663	1190	1500	1140	400	559
26	638	140	1050	551	510	811	1160	1170	1180	1130	419	559
27	445	436	1100	522	779	743	1160	1160	1180	942	574	561
28	137	602	1150	521	719	723	1160	1160	1170	557	572	559
29	138	602	1170	859	---	698	1680	911	1170	186	577	326
30	386	599	1160	1070	---	721	2310	706	1160	462	564	160
31	560	---	1160	762	---	798	---	707	---	936	337	---
TOTAL	21352	11913	30696	29732	20405	16398	26694	60304	39540	28441	28988	10578
MEAN	689	397	990	959	729	529	890	1945	1318	917	935	353
MAX	1160	604	1170	1190	1130	998	2310	3130	2200	1230	1190	676
MIN	137	138	598	521	174	148	235	706	710	186	337	150
CAL YR 1978 TOTAL	234967			MEAN 644	MAX 2600	MIN 121						
WTR YR 1979 TOTAL	325041			MEAN 691	MAX 3130	MIN 137						

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE¼ sec.16, T.41 N., R.31 W., Michigan meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi (0.8 km) downstream from confluence of Brule and Michigamme Rivers, 3.5 mi (5.6 km) northeast of Florence, and at mile 117 (188 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²).

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953(M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 (341.141 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi (16.7 km) downstream.

REMARKS.--Records excellent. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--65 years, 1,797 ft³/s (50.89 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft³/s (552 m³/s) Apr. 26, 1960, gage height, 14.15 ft (4.313 m); minimum, 38 ft³/s (1.08 m³/s) Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft (0.360 m) Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft³/s (1.61 m³/s) Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,440 ft³/s (267 m³/s) May 12, gage height, 9.32 ft (2.841 m); minimum, 242 ft³/s (6.85 m³/s) Mar. 15, gage height, 1.93 ft (0.588 m); minimum daily, 763 ft³/s (21.6 m³/s) Nov. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1670	1170	1390	1690	1530	1850	2120	5840	2190	1700	2640	1430
2	1750	1310	1280	1750	1410	1980	2130	4520	1760	1640	2450	1000
3	1730	1210	1330	1740	891	1920	1980	4350	1590	1700	2220	1710
4	2360	862	1440	1820	1030	2070	2110	4290	2070	1930	2050	1040
5	2880	763	1580	1790	1800	1870	1840	4280	2310	1620	2380	900
6	2860	1250	1710	1790	1780	1950	2100	3980	2510	1870	2510	1080
7	2650	1150	1780	1720	1710	1940	1880	3440	2690	1950	2560	1360
8	2270	1120	1820	1850	1690	1650	1850	3650	2990	1380	2520	1310
9	2360	1100	1580	1760	1760	1810	1910	5000	2760	1320	2440	1480
10	2250	1150	1610	1830	1330	1190	2110	5320	3700	1480	2090	1420
11	2150	882	1680	1850	1280	1380	2210	6220	4360	1550	2010	1650
12	2010	923	1690	1730	1760	1330	2340	8940	3880	1530	1960	1390
13	1960	1370	1700	1260	1850	1310	2230	7980	3370	1690	1920	1310
14	1690	1150	1800	1260	1870	1220	2060	6580	2540	2410	2230	1680
15	1490	1230	1720	1780	1700	1340	2650	5140	2170	2640	2400	1730
16	1540	1170	1360	1710	1640	1530	2970	4430	3020	2320	2340	1580
17	1590	1270	1260	1630	1460	1150	3260	4280	5940	2730	2250	2050
18	1480	1260	1700	1550	1520	1500	4050	4000	4840	2540	1750	1810
19	1540	892	1720	1530	1840	1750	4280	4070	3910	2310	1680	1590
20	1380	1230	1730	1040	1990	1940	5810	4770	3940	2010	1800	1650
21	1170	1180	1750	1030	1940	1850	7150	4760	4200	1880	1940	1290
22	1030	1290	1750	1590	2010	1740	8610	4400	4200	1650	1780	902
23	1230	840	1630	1800	1830	1850	9000	4370	4350	1920	2100	873
24	1180	790	1570	1570	1250	2460	8690	3990	4210	1450	1810	1310
25	1420	906	1510	1670	1250	2440	8400	3090	3570	1820	1640	1290
26	1400	875	1810	1350	1840	1720	8940	2940	2860	1810	1330	1400
27	1160	1200	1960	982	1880	2180	8570	2910	2820	1930	1500	1310
28	1110	1270	1950	1040	1850	1940	7650	2830	2700	1920	1390	1220
29	969	1330	1810	1480	---	2030	7650	2680	2750	1740	1490	1060
30	1120	1180	1700	1590	---	2200	7110	2250	2030	2320	1580	986
31	1230	---	1770	1420	---	2000	---	2140	---	2730	1410	---
TOTAL	52629	33323	51090	48602	45691	55090	133660	137440	96230	59490	62170	40811
MEAN	1698	1111	1648	1568	1632	1777	4455	4434	3208	1919	2005	1360
MAX	2880	1370	1960	1850	2010	2460	9000	8940	5940	2730	2640	2050
MIN	969	763	1260	982	891	1150	1840	2140	1590	1320	1330	873
CAL YR 1978	TOTAL	583694	MEAN	1599	MAX	4110	MIN	630				
WTR YR 1979	TOTAL	816226	MEAN	2236	MAX	9000	MIN	763				

04065300 WEST BRANCH STURGEON RIVER NEAR RANDVILLE, MI

LOCATION.--Lat 46°00'45", long 87°58'41", in NE¼ sec.30, T.42 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on right bank 500 ft (152 m) downstream from county highway bridge, 3.0 mi (4.8 km) downstream from Tom Kings Creek, and 4.0 mi (6.4 km) north-east of Randville.

DRAINAGE AREA.--56.1 mi² (145.3 km²).

PERIOD OF RECORD.--August 1958 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Sharp-crested weir since Aug. 6, 1976. Altitude of gage is 1,170 ft (357 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Since December 1958, diversion above station for industrial use; figures of runoff adjusted thereafter. Small diversions for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 43.7 ft³/s (1.238 m³/s), 10.58 in/yr (269 mm/yr), adjusted for industrial diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 570 ft³/s (16.1 m³/s) May 7, 1960, gage height, 6.40 ft (1.951 m); minimum, 1.5 ft³/s (0.042 m³/s) July 22, 1964, gage height, 1.35 ft (0.411 m); minimum daily, 3.4 ft³/s (0.096 m³/s) July 22, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 451 ft³/s (12.8 m³/s) Apr. 20, gage height, 5.98 ft (1.823 m); minimum daily, 13 ft³/s (0.37 m³/s) Dec. 10, 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	23	24	19	18	19	62	118	58	29	80	70
2	61	21	18	18	19	19	61	108	58	26	54	58
3	66	22	18	18	19	19	56	106	56	23	38	38
4	105	22	19	18	18	20	55	100	58	25	48	29
5	122	22	19	18	18	20	54	92	90	21	84	25
6	90	23	19	17	19	20	53	94	86	21	74	23
7	70	22	16	17	18	20	53	112	74	19	48	24
8	54	21	15	17	19	22	52	140	70	19	35	23
9	44	21	14	17	19	22	51	144	74	18	26	25
10	40	21	13	17	19	21	50	140	110	21	33	19
11	37	21	13	16	19	20	55	125	228	18	25	43
12	40	20	14	16	18	21	65	110	219	18	23	88
13	37	24	15	16	18	21	70	98	131	23	56	100
14	34	30	15	16	18	18	100	92	86	72	66	80
15	32	29	16	17	19	17	130	88	68	70	50	58
16	30	22	17	16	19	17	190	80	62	43	32	41
17	30	29	17	16	19	18	250	72	149	33	32	29
18	29	62	16	16	18	19	309	66	257	23	31	24
19	28	60	16	16	18	24	410	96	217	21	26	21
20	27	40	17	16	18	35	439	184	116	21	24	23
21	26	34	18	17	17	47	425	162	104	21	23	21
22	26	26	18	17	16	47	420	116	131	18	19	17
23	25	22	18	23	18	57	372	104	120	17	19	18
24	25	22	18	18	19	78	349	106	88	16	24	17
25	25	22	19	17	19	80	353	92	68	23	26	16
26	24	22	18	18	19	80	394	76	56	28	23	15
27	24	22	19	18	19	80	351	70	48	58	21	15
28	22	22	19	18	19	80	254	70	41	66	21	15
29	22	21	19	18	---	78	177	64	36	41	25	15
30	22	21	19	18	---	72	136	56	32	43	23	15
31	21	---	19	18	---	67	---	54	---	92	26	---
TOTAL	1318	789	535	537	516	1178	5796	3135	2991	987	1135	1005
MEAN	42.5	26.3	17.3	17.3	18.4	38.0	193	101	99.7	31.8	36.6	33.5
MAX	122	62	24	23	19	80	439	184	257	92	84	100
MIN	21	20	13	16	16	17	50	54	32	16	19	15
+	5.3	5.5	4.4	3.1	3.3	4.8	5.3	4.8	4.8	4.8	5.9	5.3
MEAN‡	47.8	31.8	21.7	20.4	21.7	42.8	198	106	104	36.6	42.5	38.8
CFSM‡	.85	.57	.39	.36	.39	.76	3.53	1.89	1.85	.65	.76	.69
IN‡	.98	.63	.45	.42	.40	.88	3.95	2.18	2.08	.75	.87	.77

CAL YR 1978 TOTAL 13223.7 MEAN 36.2 MAX 272 MIN 8.1 MEAN‡ 41.6 CFSM‡ .74 IN‡ 10.08
WTR YR 1979 TOTAL 19922.0 MEAN 54.6 MAX 439 MIN 13 MEAN‡ 59.4 CFSM‡ 1.06 IN‡ 14.37

*Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.
‡Adjusted for diversion.

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW¼ NE¼ sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on right bank 50 ft (15 m) downstream from Skunk Creek, and 2.2 mi (3.5 km) north of Felch.

DRAINAGE AREA.--61.8 mi² (160.1 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,069.53 ft (325.993 m) National Geodetic Vertical Datum of 1929. Prior to December 20, 1973, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Feb. 11 to Mar. 22, which are fair. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir (usable capacity, 3,990 acre-ft or 4.92 hm³) 3 mi (5 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--6 years, 56.1 ft³/s (1.589 m³/s), 12.33 in/yr (313 mm/yr), adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 628 ft³/s (17.8 m³/s) Apr. 26, 1979, gage height, 4.28 ft (1.305 m); minimum, 3.4 ft³/s (0.096 m³/s) Sept. 7, 8, 9, 13, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 628 ft³/s (17.8 m³/s) Apr. 26, gage height, 4.28 ft (1.305 m); minimum, 14 ft³/s (0.40 m³/s) July 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	32	31	22	22	22	125	234	200	34	141	66
2	118	32	29	22	22	22	120	213	194	30	111	56
3	134	32	27	22	22	22	115	202	82	27	82	43
4	167	32	25	22	22	23	110	190	46	25	100	35
5	174	32	24	21	22	23	105	176	75	23	149	33
6	161	32	22	21	22	24	105	176	71	19	126	34
7	132	31	21	21	22	24	100	192	64	17	93	36
8	102	30	20	20	22	24	100	210	64	15	69	36
9	85	30	19	20	22	24	96	224	58	15	52	31
10	74	30	19	20	22	24	93	228	124	15	48	26
11	67	30	19	20	22	24	105	217	192	21	40	51
12	68	30	19	20	22	24	114	201	195	28	33	93
13	63	32	19	20	22	23	133	181	150	23	56	116
14	58	36	19	20	22	22	163	175	98	70	70	111
15	52	35	20	20	21	22	198	164	78	63	55	86
16	50	36	20	20	21	21	247	144	76	48	44	65
17	47	40	20	20	21	22	306	119	204	39	38	52
18	46	79	21	20	20	23	374	105	298	34	37	42
19	45	89	21	20	20	27	433	141	273	31	34	37
20	42	86	21	20	20	40	480	207	221	35	32	33
21	40	74	21	20	20	60	496	225	202	33	29	43
22	40	62	22	21	20	74	507	207	183	31	25	37
23	38	52	22	21	20	95	466	195	149	27	26	31
24	38	48	22	21	21	110	440	187	112	24	32	26
25	37	46	23	21	22	120	459	168	87	38	30	22
26	36	39	23	21	22	130	608	140	71	35	26	21
27	35	37	23	21	22	135	502	116	61	59	24	20
28	34	38	23	21	22	140	384	107	50	79	24	19
29	33	35	23	21	---	145	314	175	44	60	24	18
30	33	33	23	22	---	140	269	198	38	64	23	18
31	33	---	23	22	---	130	---	199	---	144	26	---
TOTAL	2218	1270	684	643	600	1759	8067	5616	3760	1206	1699	1337
MEAN	71.5	42.3	22.1	20.7	21.4	56.7	269	181	125	38.9	54.8	44.6
MAX	174	89	31	22	22	145	608	234	298	144	149	116
MIN	33	30	19	20	20	21	93	105	38	15	23	18
CFSM	1.16	.68	.36	.34	.35	.92	4.35	2.93	2.02	.63	.89	.72
IN.	1.34	.76	.41	.39	.36	1.06	4.86	3.38	2.26	.73	1.02	.80
CAL YR 1978 TOTAL	20374		MEAN 55.8	MAX 305	MIN 12	CFSM .90	IN 12.26					
WTR YR 1979 TOTAL	28859		MEAN 79.1	MAX 608	MIN 15	CFSM 1.28	IN 17.37					

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI

LOCATION.--Lat 45°57'55", long 87°41'53", in SW¼ NW¼ sec.9, T.41 N., R.27 W., Dickinson County, Hydrologic Unit 04030108, on right bank 10 ft (3 m) downstream from bridge on county highway, at Hardwood, 350 ft (107 m) upstream from Schultz Creek, and 9 mi (14 km) upstream from confluence with West Branch.

DRAINAGE AREA.--90.8 mi² (235.2 km²). Area of site used prior to October 1, 1977, 89.8 mi² (232.6 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972-77. October 1977 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,030 ft (314 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Dec. 18 to Feb. 8, which are fair. Occasional regulation during low flows by Gene Lake Reservoir in headwaters (station 04065393) and Hardwood Reservoir 1.2 mi (1.9 km) upstream, combined usable capacity, 11,180 acre-ft (13.8 hm³).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 869 ft³/s (24.6 m³/s) Apr. 27, 1979, gage height, 8.44 ft (2.573 m); minimum, 3.6 ft³/s (0.10 m³/s) Oct. 29, 31, 1977, gage height, 2.68 ft (0.817 m), occurred during the refilling of Hardwood Reservoir.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 869 ft³/s (24.6 m³/s) Apr. 27, gage height, 8.44 ft (2.573 m); minimum, 4.8 ft³/s (0.13 m³/s) Dec. 9, 10, gage height, 2.74 ft (0.835 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	171	40	5.6	36	35	51	170	453	183	67	126	48
2	167	45	5.6	36	35	58	181	385	189	59	136	59
3	195	44	5.4	36	35	58	182	337	185	52	135	66
4	209	43	5.3	36	35	59	185	300	171	45	154	66
5	205	43	5.2	35	35	59	191	282	141	37	150	63
6	206	42	5.0	35	35	59	194	272	130	34	142	60
7	191	33	5.0	35	38	60	178	271	129	32	139	56
8	121	41	4.9	35	44	61	169	282	122	30	129	50
9	165	42	4.9	35	44	61	162	317	125	29	112	48
10	150	43	4.9	35	44	61	155	325	145	28	102	46
11	137	39	4.9	35	44	61	151	319	159	31	87	51
12	129	16	4.9	35	44	61	165	299	185	32	75	75
13	120	34	4.9	35	44	61	176	283	187	39	77	109
14	97	45	4.9	35	44	61	193	269	170	44	80	125
15	71	26	4.9	35	44	63	219	247	147	51	80	129
16	61	16	4.9	35	44	62	269	225	192	55	78	127
17	34	29	5.0	35	44	62	344	95	223	53	73	112
18	37	37	5.0	35	44	62	483	131	251	50	67	98
19	36	14	20	35	44	62	617	219	287	49	61	85
20	38	9.0	36	35	44	63	680	251	318	51	58	73
21	42	8.3	36	35	44	63	724	273	292	48	53	64
22	44	7.8	36	35	45	63	761	291	251	45	48	58
23	44	7.5	36	35	46	72	769	280	211	42	45	54
24	44	7.2	36	35	47	81	756	250	177	40	44	50
25	46	6.8	36	35	47	69	763	227	148	43	44	44
26	47	6.6	36	35	47	65	841	204	129	42	43	40
27	46	6.4	36	35	47	68	859	187	112	67	42	37
28	46	6.2	36	35	47	64	783	166	101	74	39	34
29	40	5.9	36	35	---	64	663	150	90	79	37	32
30	47	5.7	36	35	---	80	560	156	78	97	35	29
31	46	---	36	35	---	133	---	175	---	121	34	---
TOTAL	3032	749.4	543.2	1089	1190	2027	12543	7921	5228	1566	2525	1988
MEAN	97.8	25.0	17.5	35.1	42.5	65.4	418	256	174	50.5	81.5	66.3
MAX	209	45	36	36	47	133	859	453	318	121	154	129
MIN	34	5.7	4.9	35	35	51	151	95	78	28	34	29
CFSM	1.08	.28	.19	.39	.47	.72	4.60	2.82	1.92	.56	.90	.73
IN.	1.24	.31	.22	.45	.49	.83	5.14	3.25	2.14	.64	1.03	.81
CAL YR 1978 TOTAL	28048.6			76.8	MAX 350	MIN 4.9	CFSM .85	IN 11.49				
WTR YR 1979 TOTAL	40401.6			MEAN 111	MAX 859	MIN 4.9	CFSM 1.22	IN 16.55				

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04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: December 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 28.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter periods.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	14.5	14.0	14.0	7.5	6.5	7.0	2.0	1.5	1.5			
2	14.0	12.5	13.5	8.0	7.0	7.0	2.0	1.5	1.5			
3	13.0	12.5	13.0	7.5	6.5	7.0	2.0	2.0	2.0			
4	13.5	13.0	13.0	8.0	7.0	7.0	2.0	2.0	2.0			
5	14.0	13.0	13.5	7.5	7.0	7.0	2.0	2.0	2.0			
6	14.5	14.0	14.0	7.0	6.5	7.0	2.0	1.5	2.0			
7	14.0	13.5	14.0	7.0	5.5	6.0	2.0	1.5	1.5			
8	13.5	12.5	13.0	7.0	5.5	6.0	2.0	1.5	1.5			
9	12.5	11.5	12.0	6.5	6.0	6.0	2.0	1.5	1.5			
10	12.0	9.5	11.0	6.0	5.5	5.5	1.5	1.0	1.5			
11	11.5	9.5	11.0	5.5	4.5	5.0	2.0	1.0	1.5			
12	12.5	11.0	11.5	4.0	4.0	4.0	2.0	2.0	2.0			
13	12.0	12.0	12.0	4.0	3.5	3.5	2.0	2.0	2.0			
14	12.0	11.0	11.5	4.0	3.5	3.5	2.0	2.0	2.0			
15	11.0	10.5	11.0	3.5	2.5	3.0	2.0	2.0	2.0			
16	10.5	9.5	10.0	3.5	2.5	2.5	2.0	2.0	2.0			
17	10.5	9.0	9.5	2.5	2.0	2.5	2.0	2.0	2.0			
18	10.5	9.0	9.5	2.5	2.0	2.5	2.0	2.0	2.0			
19	10.5	9.0	10.0	2.5	2.0	2.5	2.0	2.0	2.0			
20	11.0	9.0	9.5	2.0	2.0	2.0	2.0	2.0	---			
21	10.5	9.0	9.5	2.0	2.0	2.0	---	---	---			
22	9.5	9.5	9.5	2.0	2.0	2.0	---	---	---			
23	10.0	9.0	9.5	2.0	2.0	2.0	---	---	---			
24	10.0	9.0	9.0	2.5	2.0	2.0	---	---	---			
25	9.5	9.0	9.0	2.5	2.0	2.0	---	---	---			
26	9.0	8.5	9.0	2.5	2.0	2.0	---	---	---			
27	9.0	8.5	8.5	2.5	2.0	2.0	---	---	---			
28	9.0	7.5	8.0	2.0	2.0	2.0	---	---	---			
29	8.0	7.5	7.5	2.0	2.0	2.0	---	---	---			
30	8.5	7.0	8.0	2.0	1.5	2.0	---	---	---			
31	8.5	7.0	7.5	---	---	---	---	---	---			
MONTH	14.5	7.0	10.5	8.0	1.5	4.0						

STREAMS TRIBUTARY TO LAKE MICHIGAN
04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	1.5	.5	1.0	7.0	6.0	6.5
2	---	---	---	---	---	---	.5	.5	.5	6.5	6.0	6.5
3	---	---	---	---	---	---	1.5	.0	1.0	7.5	6.0	6.5
4	---	---	---	---	---	---	1.5	.5	1.0	7.0	7.0	7.0
5	---	---	---	---	---	---	1.0	.0	.5	7.0	6.0	6.5
6	---	---	---	---	---	---	1.5	.0	.5	6.0	6.0	6.0
7	---	---	---	---	---	---	1.5	.0	.5	6.0	5.5	---
8	1.0	.5	---	---	---	---	.5	.5	.5	---	---	---
9	.5	.0	.5	---	---	---	1.5	.0	.5	---	---	---
10	1.0	.0	.5	---	---	---	2.0	.0	1.0	---	---	---
11	1.0	.5	.5	---	---	---	1.5	.5	1.0	---	---	---
12	1.0	.5	.5	---	---	---	1.0	.5	.5	---	---	---
13	1.5	.5	.5	---	---	---	2.0	.5	---	---	---	---
14	1.0	.5	.5	---	---	---	---	---	---	---	---	---
15	1.0	.5	.5	---	---	---	---	---	---	---	---	---
16	1.0	.0	.5	---	---	---	---	---	---	---	---	---
17	.5	.0	.0	---	---	---	---	---	---	---	---	---
18	.5	.0	.5	---	---	---	---	---	---	---	---	---
19	1.0	.0	.5	---	---	---	---	---	---	---	---	---
20	1.5	.5	1.0	---	---	---	1.0	1.0	---	---	---	---
21	1.5	.5	1.0	---	---	---	1.5	1.0	1.0	---	---	---
22	1.5	1.0	1.0	---	---	---	2.0	1.0	1.5	---	---	---
23	1.0	.5	.5	.5	.5	---	3.5	2.0	3.0	---	---	---
24	1.0	.5	---	1.0	.5	1.0	4.0	3.5	4.0	---	---	---
25	---	---	---	1.5	.5	1.0	5.5	4.0	4.5	---	---	---
26	---	---	---	1.5	1.0	1.5	7.5	5.5	6.5	---	---	---
27	---	---	---	2.0	1.0	1.5	8.5	7.0	8.0	---	---	---
28	---	---	---	1.5	1.0	1.5	8.0	7.5	8.0	---	---	---
29	---	---	---	1.5	.5	1.0	7.5	7.0	7.0	---	---	---
30	---	---	---	1.0	.0	.5	7.0	6.5	6.5	---	---	---
31	---	---	---	1.5	.5	1.0	---	---	---	---	---	---
MONTH												
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	---	---	---	23.5	20.0	21.5	24.0	21.0	22.5	21.0	18.0	19.5
2	---	---	---	24.0	20.0	22.0	22.5	20.5	21.5	20.5	18.5	20.0
3	---	---	---	24.0	21.0	22.5	22.5	21.0	22.0	20.5	19.5	20.0
4	---	---	---	23.5	19.0	21.0	23.5	21.5	22.5	19.5	18.0	18.5
5	---	---	---	23.5	18.0	21.0	24.0	21.5	22.5	18.0	15.5	17.0
6	---	---	---	24.0	19.0	21.5	24.5	21.5	23.0	20.5	16.5	19.0
7	---	---	---	25.5	20.0	22.5	23.5	20.5	22.0	20.0	18.5	19.5
8	---	---	---	25.0	20.5	22.0	24.5	22.0	23.0	20.0	17.0	18.5
9	---	---	---	25.5	20.0	22.0	24.0	21.5	22.5	19.0	17.0	17.5
10	---	---	---	26.0	21.5	23.5	23.0	20.5	21.5	20.0	17.0	17.5
11	---	---	---	28.0	23.0	25.0	23.0	19.5	21.0	17.5	16.5	16.5
12	---	---	---	28.0	22.5	25.0	21.5	20.0	20.5	16.5	15.5	16.0
13	---	---	---	26.0	24.0	25.0	20.0	18.5	19.5	16.5	15.5	16.0
14	---	---	---	25.5	23.0	24.0	18.5	17.5	18.0	16.5	16.0	16.0
15	---	---	---	25.5	20.5	23.0	20.5	16.5	18.5	16.0	15.0	15.5
16	---	---	---	24.5	22.0	23.0	19.5	17.0	18.0	16.0	15.0	15.5
17	---	---	---	25.0	20.5	23.0	17.0	16.5	17.0	16.0	14.5	15.0
18	---	---	---	24.5	20.5	22.5	19.0	16.5	17.0	16.5	15.0	15.5
19	---	---	---	23.5	21.0	22.0	19.0	17.0	18.0	16.5	14.5	15.5
20	---	---	---	24.0	20.5	22.0	21.0	17.5	19.0	15.0	14.5	15.0
21	---	---	---	24.5	21.0	22.5	25.5	19.0	22.0	16.5	14.0	15.0
22	18.0	17.0	---	26.5	22.0	24.0	22.5	21.0	21.5	16.5	14.0	15.0
23	18.5	16.5	17.5	26.5	23.5	24.5	21.5	20.0	21.0	16.5	13.5	15.0
24	20.0	16.5	18.0	27.0	23.5	25.0	21.0	18.0	20.0	16.0	14.5	15.0
25	19.0	16.0	17.0	25.0	23.5	24.0	21.5	18.5	19.5	16.5	13.5	14.5
26	17.0	15.5	16.5	25.0	21.5	23.0	23.0	19.5	20.5	17.5	13.5	15.0
27	23.0	16.5	19.0	23.5	21.0	22.5	21.5	20.0	20.5	16.5	14.5	15.5
28	21.5	18.0	20.0	24.5	21.0	22.5	20.5	19.0	19.5	17.5	15.0	15.5
29	22.0	19.0	20.5	24.0	21.0	22.5	21.5	18.5	19.5	16.5	15.0	16.0
30	23.5	19.5	21.5	23.0	21.5	22.0	24.0	19.0	21.0	17.5	14.0	15.0
31	---	---	---	22.5	20.5	21.5	22.0	20.5	21.0	---	---	---
MONTH				28.0	18.0	23.0	25.5	16.5	20.5	21.0	13.5	16.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04065500 STURGEON RIVER NEAR FOSTER CITY, MI

LOCATION.--Lat 45°54'30", long 87°45'15", in NW¼ sec.36, T.41 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on left bank 30 ft (9 m) downstream from bridge on County Highway 569, 1.8 mi (2.9 km) downstream from confluence of East and West Branches, and 4.0 mi (6.4 km) south of Foster City.

DRAINAGE AREA.--237 mi² (614 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 966.6 ft (294.620 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Feb. 8 to Mar. 23, which are fair. Since December 1958, diversion above station for industrial use; figures of runoff adjusted thereafter. Since June 1975, occasional regulation during low flows by reservoirs in headwaters of East Branch (stations 04065393 and 04065397). Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--25 years, 189 ft³/s (5.352 m³/s), 10.83 in/yr (275 mm/yr), adjusted for industrial diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,570 ft³/s (72.8 m³/s) May 8, 1960, gage height, 10.35 ft (3.155 m); minimum, 15 ft³/s (0.42 m³/s) July 24, 1964; minimum gage height, 1.96 ft (0.597 m) Aug. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,920 ft³/s (54.4 m³/s) Apr. 27, gage height, 9.46 ft (2.883 m); minimum, 67 ft³/s (1.90 m³/s) Sept. 30, gage height, 2.72 ft (0.829 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	402	113	110	100	95	105	490	998	323	168	304	165
2	411	113	110	100	95	105	500	839	331	149	292	203
3	452	114	105	100	95	105	520	738	339	137	261	198
4	536	113	100	100	95	105	520	664	342	124	254	175
5	575	112	96	100	95	105	520	608	363	116	298	154
6	552	110	94	98	95	110	510	590	362	106	296	136
7	515	109	88	98	95	115	500	625	338	100	283	124
8	448	108	84	96	95	120	460	668	333	94	245	113
9	389	108	80	94	96	120	440	742	316	90	210	107
10	342	110	78	94	98	120	400	791	334	85	193	100
11	306	108	78	92	100	120	390	796	473	83	174	103
12	286	107	78	92	100	120	400	734	535	87	152	150
13	272	110	80	90	100	120	440	654	575	92	168	250
14	254	128	82	88	100	120	530	607	537	109	200	298
15	243	135	84	88	100	120	704	570	430	140	209	294
16	234	133	84	88	100	120	849	520	349	154	189	261
17	184	141	84	88	100	120	1030	470	528	140	168	224
18	142	248	84	88	100	130	1250	358	766	126	154	219
19	137	289	84	88	100	150	1480	397	747	113	144	159
20	132	262	86	88	100	200	1660	691	748	112	140	140
21	132	242	88	88	100	260	1770	755	762	107	130	122
22	134	215	92	90	100	310	1850	749	665	99	117	114
23	132	190	96	90	100	370	1800	702	562	94	112	105
24	130	170	100	90	100	410	1740	634	490	90	116	99
25	130	153	100	92	100	440	1690	558	406	91	114	93
26	126	145	100	92	100	450	1800	491	328	95	112	87
27	128	135	100	94	100	470	1890	438	279	137	107	85
28	124	125	100	94	105	470	1720	399	238	192	102	78
29	120	120	100	95	---	480	1460	366	210	193	99	73
30	119	115	100	95	---	480	1210	333	187	187	96	70
31	118	---	100	95	---	480	---	313	---	273	98	---
TOTAL	8205	4381	2845	2885	2759	7050	30523	18798	13196	3883	5537	4499
MEAN	265	146	91.8	93.1	98.5	227	1017	606	440	125	179	150
MAX	575	289	110	100	105	480	1890	998	766	273	304	298
MIN	118	107	78	88	95	105	390	313	187	83	96	70
+	5.3	5.5	4.4	3.1	3.3	4.8	5.3	4.8	4.8	4.8	5.9	5.3
MEAN‡	270	152	96.2	96.2	102	232	1022	611	445	130	185	155
CFSM‡	1.14	.64	.41	.41	.43	.98	4.31	2.58	1.88	.55	.78	.65
IN‡	1.31	.71	.47	.47	.45	1.13	4.82	2.97	2.09	.63	.90	.73

CAL YR 1978 TOTAL 72946 MEAN 200 MAX 814 MIN 57 MEAN‡ 205 CFSM‡ .86 IN‡ 11.76
WTR YR 1979 TOTAL 104561 MEAN 286 MAX 1890 MIN 70 MEAN‡ 291 CFSM‡ 1.23 IN‡ 16.69

*Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.

‡Adjusted for diversion.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04065500 STURGEON RIVER NEAR FOSTER CITY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: July 1956 to current year.

INSTRUMENTATION.--Temperature recorder since July 26, 1956.

REMARKS.--Temperature recorder clock stopped Nov. 7-14 (range in temperature 2.5 to 4.5°C), Apr. 15-19 (range in temperature 0.0 to 2.5°C), May 5-10 (range in temperature 5.0 to 10.0°C). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 30.0°C July 1, 1963, July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 27.0°C July 12, 14, 24; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.0	5.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
2	13.0	12.5	5.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
3	12.5	12.5	6.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0
4	12.5	12.5	6.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0
5	12.5	12.0	6.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0
6	12.0	11.5	6.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0
7	11.5	10.5	---	---	.0	.0	.0	.0	.0	.0	.0	.0
8	10.5	9.5	---	---	.0	.0	.0	.0	.0	.0	.0	.0
9	9.5	9.5	---	---	.0	.0	.0	.0	.0	.0	.0	.0
10	10.5	9.0	---	---	.0	.0	.0	.0	.0	.0	.0	.0
11	11.0	10.5	---	---	.0	.0	.0	.0	.0	.0	.0	.0
12	11.0	9.0	---	---	.0	.0	.0	.0	.0	.0	.0	.0
13	10.0	9.0	---	---	.0	.0	.0	.0	.0	.0	.0	.0
14	9.0	8.0	---	---	.0	.0	.0	.0	.0	.0	.0	.0
15	8.0	7.0	2.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
16	7.0	6.5	2.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
17	6.5	6.0	.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
18	7.5	6.5	.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
19	8.0	7.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	8.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	9.0	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	9.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	9.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	8.0	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	7.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	7.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	6.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	6.5	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	5.5	5.0	.0	.0	.0	.0	.0	.0	---	---	.0	.0
30	6.5	5.0	.0	.0	.0	.0	.0	.0	---	---	.0	.0
31	6.5	5.0	---	---	.0	.0	.0	.0	---	---	.0	.0
MONTH	13.0	5.0			.0	.0	.0	.0	.0	.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04065500 STURGEON RIVER NEAR FOSTER CITY, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	.0	.0	7.5	6.0	18.5	15.5	22.0	19.5	22.5	20.5	20.5	19.0
2	.0	.0	7.0	6.5	18.5	16.5	22.5	19.5	23.0	21.0	20.5	20.0
3	.0	.0	8.5	6.5	18.5	16.5	22.0	20.0	24.0	22.5	20.0	17.5
4	.0	.0	8.5	7.0	18.5	17.5	21.5	19.0	24.0	22.5	17.5	16.0
5	.0	.0	---	---	18.0	16.5	22.0	18.5	23.5	21.5	20.0	17.5
6	.0	.0	---	---	18.0	15.5	22.0	19.0	22.5	21.0	20.5	19.5
7	.0	.0	---	---	17.5	16.0	23.0	20.0	24.0	22.0	20.0	17.0
8	.0	.0	---	---	18.5	17.5	24.0	21.0	24.0	22.5	17.0	15.0
9	.0	.0	---	---	19.5	18.0	24.5	21.0	22.5	21.0	17.0	15.5
10	.0	.0	---	---	19.5	17.5	26.0	22.5	22.0	21.0	18.0	17.0
11	.0	.0	13.5	12.5	17.5	15.5	26.0	24.0	22.0	19.5	17.0	16.0
12	.0	.0	13.5	11.5	17.5	15.5	27.0	23.0	20.5	19.5	15.5	14.5
13	.5	.0	12.5	10.5	18.0	16.0	26.0	24.5	21.0	19.5	15.5	14.5
14	.5	.0	12.5	11.0	18.5	17.5	27.0	23.5	19.5	17.5	15.0	13.5
15	---	---	12.5	11.5	21.0	18.5	26.0	24.0	18.5	17.0	14.0	13.0
16	---	---	13.5	10.5	21.0	20.5	25.0	22.0	18.0	16.5	15.0	13.5
17	---	---	14.0	12.5	20.0	17.5	23.0	20.0	17.5	17.0	16.5	14.5
18	---	---	15.0	13.5	18.5	16.5	23.0	20.0	19.5	17.0	16.0	15.5
19	---	---	15.0	14.0	18.5	17.0	22.5	21.0	19.0	18.5	14.5	12.5
20	2.0	2.0	14.0	12.5	18.5	18.5	24.0	21.0	21.5	18.5	14.0	13.0
21	3.0	2.5	14.5	12.0	18.5	18.5	25.0	22.0	22.0	19.5	14.5	12.5
22	3.0	2.5	14.5	12.0	18.5	17.0	26.0	23.0	21.5	19.5	13.5	11.5
23	5.5	3.5	12.5	11.0	17.5	15.5	26.5	23.5	20.5	20.0	13.5	11.5
24	7.0	6.0	14.5	11.5	18.0	15.5	27.0	25.0	20.5	20.0	14.5	12.5
25	7.5	7.0	15.0	12.5	18.5	16.5	26.0	25.0	21.0	18.0	14.5	12.5
26	7.5	7.5	15.0	13.0	18.5	17.5	24.0	22.0	20.5	19.0	14.5	12.5
27	7.5	7.0	13.5	12.5	20.0	18.5	23.0	21.5	20.0	19.0	15.5	13.0
28	7.5	7.5	15.5	12.5	20.0	18.5	23.0	20.5	19.0	18.0	16.5	14.5
29	7.5	7.0	17.5	14.0	20.5	19.0	22.0	21.0	21.0	18.0	16.0	15.0
30	7.0	6.5	17.5	15.5	21.5	19.0	22.0	21.0	21.5	19.0	15.5	13.5
31	---	---	17.0	16.0	---	---	20.5	20.0	21.0	19.0	---	---
MONTH					21.5	15.5	27.0	18.5	24.0	16.5	20.5	11.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI

LOCATION.--Lat 45°55'51", long 87°58'18", in SE¼ SE¼ sec.19, T.41 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on left bank 20 ft (6 m) upstream from culvert on County Road 866, 1.2 mi (1.9 km) downstream from Steel Creek, and 9.0 mi (14.5 km) northeast of Iron Mountain.

DRAINAGE AREA.--16.8 mi² (43.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water year 1971. October 1971 to current year.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Sept. 7, 1979. Datum of gage is 1,034.4 ft (315.16 m) National Geodetic Vertical Datum of 1929, from topographic leveling (nearest 0.5 ft). Prior to Nov. 23, 1971, nonrecording gage 20 ft (6 m) downstream at same datum.

REMARKS.--Water-discharge records fair. No gage height record Nov. 29 to Jan. 15, Mar. 1 to Apr. 15. Flow includes an average of 4.8 ft³/s (0.14 m³/s) diverted from West Branch Sturgeon River Basin. Regulation and storage by reservoirs in the headwaters.

AVERAGE DISCHARGE.--5 years (water years 1972-76), 14.5 ft³/s (0.411 m³/s), 11.72 in/yr (298 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 272 ft³/s (7.70 m³/s) May 16, 1976, gage height, 6.42 ft (1.957 m); maximum gage height, 8.8 ft (2.68 m) Mar. 27, 1979, from floodmark in gage house, backwater from ice; minimum discharge, 0.70 ft³/s (0.020 m³/s) Aug. 11, 12, 1975; minimum gage height, 1.46 ft (0.445 m) Aug. 11, 12, 1975, and July 27, 28, Aug. 15, 1977, result of unusual regulation upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 151 ft³/s (4.28 m³/s) Apr. 19, 20, gage height, 4.93 ft (1.503 m); maximum gage height, 8.8 ft (2.68 m) Mar. 27, from floodmark in gage house, backwater from ice; minimum daily discharge, 5.3 ft³/s (0.15 m³/s) Nov. 7, 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	6.5	10	7.7	9.8	16	31	53	25	14	10	24
2	16	6.3	10	7.7	13	16	30	47	21	13	8.7	22
3	16	6.1	9.6	7.6	17	15	29	45	19	13	8.7	21
4	44	6.7	9.2	7.5	18	14	28	41	18	13	15	21
5	37	6.1	9.0	7.4	18	13	27	38	18	12	14	20
6	28	6.1	8.2	7.3	17	13	26	45	16	11	10	19
7	19	5.3	7.6	7.1	17	12	26	57	16	11	9.3	17
8	16	5.3	6.6	7.0	16	12	26	58	16	11	8.5	14
9	16	5.5	6.2	7.0	14	11	27	68	17	11	8.1	12
10	16	5.5	6.2	7.0	14	11	29	66	26	11	10	10
11	16	5.7	6.1	6.9	13	10	33	58	44	10	9.1	12
12	14	7.9	6.0	6.9	14	9.8	45	50	35	10	8.9	16
13	13	7.1	6.0	6.8	15	9.6	52	43	25	9.7	17	20
14	12	6.5	6.2	6.7	17	9.2	60	43	14	11	13	16
15	12	6.5	6.4	6.7	21	9.0	78	40	18	9.6	11	14
16	11	18	6.5	6.6	25	9.0	96	37	18	8.5	11	10
17	11	16	6.7	6.6	27	9.2	114	34	70	7.2	11	8.5
18	11	20	6.8	6.8	27	9.6	133	33	60	5.9	11	7.2
19	11	13	6.9	7.0	26	11	145	54	42	5.4	9.3	6.6
20	10	10	7.0	7.2	25	13	145	72	29	6.2	8.5	7.2
21	10	10	7.1	7.3	25	18	142	61	30	6.6	8.3	7.0
22	9.3	11	7.2	7.6	24	22	137	47	26	7.4	8.3	6.2
23	9.1	11	7.3	8.0	23	30	122	46	23	7.9	9.5	6.0
24	8.7	10	7.5	8.4	22	33	110	41	20	8.0	11	5.8
25	8.5	9.5	7.5	8.6	21	37	111	35	19	8.3	12	5.6
26	8.1	9.3	7.6	8.8	20	38	120	31	18	6.1	10	5.5
27	7.5	9.8	7.6	9.0	19	39	103	30	16	13	9.5	5.8
28	7.7	10	7.6	9.0	17	38	81	30	16	10	9.8	5.6
29	7.7	11	7.6	9.0	---	38	68	28	15	7.3	11	5.6
30	7.5	11	7.6	9.0	---	35	60	29	15	11	11	5.4
31	7.1	---	7.7	9.2	---	33	---	32	---	15	14	---
TOTAL	439.2	272.7	229.5	235.4	534.8	593.4	2234	1392	745	304.1	326.5	356.0
MEAN	14.2	9.09	7.40	7.59	19.1	19.1	74.5	44.9	24.8	9.81	10.5	11.9
MAX	44	20	10	9.2	27	39	145	72	70	15	17	24
MIN	7.1	5.3	6.0	6.6	9.8	9.0	26	28	14	5.4	8.1	5.4

CAL YR 1978 TOTAL 3907.3 MEAN 10.7 MAX 44 MIN 3.4
WTR YR 1979 TOTAL 7662.6 MEAN 21.0 MAX 145 MIN 5.3

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1972 to current year.

PERIOD OF DAILY RECORD.--November 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Nov. 10, 1971.

REMARKS.--Complete ice cover during winter period. Temperature recorder malfunctioned Feb. 8 to Apr. 12 (range in temperature 0.0°C), based on observations of complete ice cover and thermometer readings Feb. 28, Mar. 13, 23, Apr. 12; Apr. 13-15, no recorded range; clock stopped Apr. 17 to May 8 (range in temperature 1.0 to 9.0°C), May 19-30 (range in temperature 10.5 to 16.0°C), June 9-13 (range in temperature 13.5 to 18.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 22.5°C July 10-13; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW- INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)
OCT							
02...	1300	13	314	7.5	11.0	9.8	92
JAN							
16...	1330	6.6	440	7.2	.0	11.0	78
FEB							
07...	1245	17	630	7.0	.0	11.2	79
MAR							
13...	1515	9.6	450	7.3	.0	12.7	90
APR							
12...	1115	46	280	7.5	.0	13.0	92
MAY							
09...	1500	70	310	7.4	9.0	11.0	98
JUN							
14...	1030	18	350	7.5	16.0	9.0	94
JUL							
17...	0930	7.2	500	8.0	15.5	8.8	91
AUG							
21...	0945	8.3	552	7.6	15.5	8.7	90

STREAMS TRIBUTARY TO LAKE MICHIGAN
04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	11.0	2.5	2.0	.0	.0	.0	.0	.0	.0		
2	11.0	11.0	1.5	1.5	.0	.0	.0	.0	.0	.0		
3	11.0	11.0	1.5	1.5	.0	.0	.0	.0	.0	.0		
4	10.5	10.5	2.0	2.0	.0	.0	.0	.0	.0	.0		
5	10.5	10.5	1.5	1.0	.0	.0	.0	.0	.0	.0		
6	10.5	10.5	.0	.0	.0	.0	.0	.0	.0	.0		
7	10.0	8.5	.0	.0	.0	.0	.0	.0	.0	.0		
8	8.5	7.5	.0	.0	.0	.0	.0	.0	---	---		
9	7.5	7.0	.0	.0	.0	.0	.0	.0	---	---		
10	8.5	7.0	.0	.0	.0	.0	.0	.0	---	---		
11	8.5	8.0	.0	.0	.0	.0	.0	.0	---	---		
12	8.5	8.0	.0	.0	.0	.0	.0	.0	---	---		
13	8.0	7.0	.0	.0	.0	.0	.0	.0	---	---		
14	6.5	5.5	.0	.0	.0	.0	.0	.0	---	---		
15	5.5	5.0	.0	.0	.0	.0	.0	.0	---	---		
16	5.0	5.0	.0	.0	.0	.0	.0	.0	---	---		
17	5.0	5.0	.0	.0	.0	.0	.0	.0	---	---		
18	4.5	4.5	.0	.0	.0	.0	.0	.0	---	---		
19	4.5	4.5	.0	.0	.0	.0	.0	.0	---	---		
20	4.5	4.5	.0	.0	.0	.0	.0	.0	---	---		
21	5.5	4.5	.0	.0	.0	.0	.0	.0	---	---		
22	5.0	5.0	.0	.0	.0	.0	.0	.0	---	---		
23	5.0	4.5	.0	.0	.0	.0	.0	.0	---	---		
24	4.5	4.0	.0	.0	.0	.0	.0	.0	---	---		
25	3.5	3.5	.0	.0	.0	.0	.0	.0	---	---		
26	3.5	3.5	.0	.0	.0	.0	.0	.0	---	---		
27	3.5	3.5	.0	.0	.0	.0	.0	.0	---	---		
28	3.5	3.0	.0	.0	.0	.0	.0	.0	---	---		
29	2.5	2.5	.0	.0	.0	.0	.0	.0	---	---		
30	2.5	2.5	.0	.0	.0	.0	.0	.0	---	---		
31	2.5	2.5	---	---	.0	.0	.0	.0	---	---		
MONTH	11.0	2.5	2.5	.0	.0	.0	.0	.0				
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	---	---	16.0	14.0	20.0	18.0	18.0	16.5	19.5	18.5
2	---	---	---	---	17.0	15.0	21.0	17.0	19.0	17.0	19.5	19.0
3	---	---	---	---	17.0	15.0	21.0	19.0	20.5	18.5	18.5	17.5
4	---	---	---	---	17.0	16.0	20.0	17.0	20.5	19.0	18.0	16.5
5	---	---	---	---	16.0	14.0	19.0	15.5	19.5	19.0	19.5	17.5
6	---	---	---	---	16.0	14.0	19.5	16.5	19.5	16.5	19.0	17.5
7	---	---	---	---	16.0	14.0	20.0	17.5	21.0	18.5	18.0	16.0
8	---	---	---	---	18.0	16.5	20.5	18.5	21.0	19.0	19.5	13.5
9	---	---	9.0	9.0	---	---	20.5	18.0	19.5	17.0	15.0	13.5
10	---	---	13.0	9.0	---	---	22.5	19.5	18.0	17.0	15.0	15.0
11	---	---	13.0	13.0	---	---	22.5	20.5	17.5	15.0	14.0	13.5
12	---	---	13.0	11.0	---	---	22.5	19.5	17.0	15.5	13.5	13.5
13	---	---	11.0	9.5	---	---	22.5	21.0	17.0	16.0	14.0	13.5
14	---	---	12.0	10.0	19.0	17.0	22.0	21.0	16.5	15.0	14.0	13.5
15	---	---	12.0	10.0	21.5	19.5	22.0	19.5	15.0	13.5	13.0	12.0
16	1.5	1.0	13.0	10.5	22.0	18.5	21.0	18.0	15.0	14.0	12.5	12.0
17	---	---	14.0	11.5	18.5	17.0	18.0	15.5	15.0	15.0	12.0	11.5
18	---	---	14.0	13.5	18.5	16.0	18.0	16.0	16.5	15.5	12.0	12.0
19	---	---	---	---	18.5	16.0	18.0	17.5	16.5	16.5	11.5	10.5
20	---	---	---	---	19.5	18.5	19.0	17.0	17.0	16.5	13.0	10.5
21	---	---	---	---	19.5	18.5	20.0	18.0	17.0	15.5	13.0	13.0
22	---	---	---	---	18.5	17.0	21.0	19.5	18.5	17.5	13.0	12.5
23	---	---	---	---	17.5	15.0	22.0	20.0	18.5	18.0	12.5	12.5
24	---	---	---	---	18.0	14.5	22.0	21.5	18.5	18.5	13.5	12.5
25	---	---	---	---	18.5	15.5	22.0	21.0	18.5	17.5	13.5	13.0
26	---	---	---	---	18.0	16.5	21.0	17.0	19.0	18.0	13.0	13.0
27	---	---	---	---	20.0	17.0	18.0	18.0	19.0	18.5	14.0	13.0
28	---	---	---	---	20.0	17.0	19.0	18.0	19.5	18.0	15.5	14.0
29	---	---	---	---	20.0	18.0	19.0	17.0	20.0	18.0	14.5	14.5
30	---	---	---	---	20.0	18.0	19.0	18.0	20.0	18.5	14.5	14.0
31	---	---	14.0	14.0	---	---	18.0	17.5	19.5	18.5	---	---
MONTH							22.5	15.5	21.0	13.5	19.5	10.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04066000 MENOMINEE RIVER NEAR PEMBINE, WI

LOCATION.--Lat 45°35'56", long 87°46'32", in sec.16, T.37 N., R.28 W., Michigan Meridian, Menominee County, Michigan, Hydrologic Unit 04030108, on left bank 0.6 mi (1.0 km) upstream from Pemene Creek, 4.0 mi (6.4 km) west of Nathan, Michigan, 15 mi (24 km) south-east of Pembine, and at mile 65.8 (105.9 km).

DRAINAGE AREA.--3,240 mi² (8,390 km²), approximately.

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1277: 1952.

GAGE.--Water-stage recorder. Altitude of gage is 770 ft (235 m), from river-profile map. Prior to Oct. 28, 1972, at site 0.5 mi (0.8 km) downstream at datum 15 ft (4.6 m) lower.

REMARKS.--Records fair. Flow regulated by powerplants and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--30 years, 2,978 ft³/s (84.34 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,900 ft³/s (762 m³/s) May 8, 1960, gage height, 13.90 ft (4.237 m); minimum, 694 ft³/s (19.7 m³/s) Sept. 3, 1969, gage height, 1.66 ft (0.506 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,300 ft³/s (490 m³/s) Apr. 27, gage height, 15.40 ft (4.694 m); minimum daily, 1,400 ft³/s (39.6 m³/s) Jan. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3760	2050	1800	2000	1900	2100	4800	11300	4180	3260	4240	2860
2	3520	2000	1600	2200	1700	2200	3540	8620	3540	2820	3520	3030
3	3900	1970	1700	2100	1500	2100	3160	7610	3430	2820	3480	3060
4	4400	1850	1900	2100	1600	2600	3320	7190	3810	3050	3360	3180
5	5470	1600	2000	2100	1700	2700	3230	7210	3930	2540	3740	2810
6	5600	1530	2100	2200	1800	2600	3130	7200	4120	2800	4030	2500
7	4860	1850	2200	2300	2200	2300	2980	6630	4410	2820	3850	2300
8	4420	1970	2100	2000	2100	2300	2710	6730	4570	2550	3630	2100
9	4030	2040	2200	2000	2200	2100	2690	8130	4660	2280	3490	2200
10	3820	1960	2000	2100	2000	2300	2750	9530	4990	2300	3330	2700
11	3650	1650	2300	2100	1700	1800	2760	9430	7080	2480	3070	2500
12	3630	1410	2200	2100	1700	1800	2900	11200	6760	2630	2860	2500
13	3350	1620	2300	2100	2100	1900	3080	12000	6690	2930	2810	2600
14	3030	2110	1900	1500	2200	1800	3270	10800	4960	3030	3240	3100
15	2690	2040	2000	1600	2100	2200	3740	8390	4180	4180	3470	3000
16	2820	2260	1800	2000	2200	2000	4480	7150	4460	3400	3420	2700
17	2560	2200	1600	1900	1600	1800	5650	6600	7960	3400	3050	3300
18	2800	2720	1700	2000	1900	1700	6640	6800	9620	3750	2910	3090
19	2580	2570	1900	1900	2000	2300	7670	6310	7090	3390	2790	2550
20	2600	2300	2200	1700	1900	2200	8580	8820	7330	2990	2770	2230
21	2540	2290	2300	1500	2100	2600	10100	8250	7570	2650	2660	2460
22	2320	2330	2300	1400	2200	2900	14600	8540	7850	2430	2750	1970
23	2550	1900	2000	1800	2100	2700	16400	7540	7030	2520	2720	1770
24	2730	1710	2100	2000	2200	4000	16900	7090	6960	2540	2810	1820
25	2300	1790	2100	2300	2000	4500	16500	6160	6270	2600	3150	2000
26	2280	1700	2100	1900	1800	4900	16200	5320	5150	2480	2330	2010
27	2150	1800	2100	1600	1900	4200	17100	5020	4360	3020	2330	1910
28	1900	2190	2300	1600	2000	4100	15800	5090	4440	3000	2490	2010
29	1720	2040	2400	1700	---	4300	14000	4600	4230	3000	2600	1920
30	1970	2150	2400	1700	---	4400	13200	4240	3710	3260	2550	1660
31	1990	---	2300	1800	---	4600	---	3850	---	3850	2570	---
TOTAL	97940	59600	63900	59300	54400	86000	231880	233350	165340	90770	96020	73840
MEAN	3159	1987	2061	1913	1943	2774	7729	7527	5511	2928	3097	2461
MAX	5600	2720	2400	2300	2200	4900	17100	12000	9620	4180	4240	3300
MIN	1720	1410	1600	1400	1500	1700	2690	3850	3430	2280	2330	1660
CAL YR 1978 TOTAL	997130			2732		7150		1380				
WTR YR 1979 TOTAL	1312340			3595		17100		1400				

STREAMS TRIBUTARY TO LAKE MICHIGAN

04067000 MENOMINEE RIVER BELOW KOSS, MI

LOCATION.--Lat 45°21'16", long 87°38'55", in sec.9, T.34 N., R.27 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank at powerplant of Wisconsin Public Service Corp., 0.5 mi (0.8 km) upstream from Little Cedar River, 3.6 mi (5.8 km) southeast of Koss, and at mile 24.7 (39.7 km).

DRAINAGE AREA.--3,790 mi² (9,820 km²), approximately.

PERIOD OF RECORD.--July 1907 to March 1909 (published as "at Koss"), July 1913 to current year.

GAGE.--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees. Prior to June 1913, chain gage on railroad bridge 4 mi (6.4 km) upstream.

REMARKS.--Daily discharges computed on basis of average daily load and load-discharge rating of combined hydroelectric units. Flow regulated by powerplants, and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³) on Michigamme River, and by many smaller reservoirs above station.

COOPERATION.--Records of daily discharge furnished by Wisconsin Public Service Corp. since 1913.

AVERAGE DISCHARGE.--67 years (water years 1908, 1914-79), 3,152 ft³/s (89.26 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 33,000 ft³/s (935 m³/s) May 10, 1960; minimum daily, 162 ft³/s (4.59 m³/s) Sept. 15, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 23,800 ft³/s (674 m³/s) Apr. 27; minimum daily, 1,400 ft³/s (39.6 m³/s) Dec. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4710	2230	1400	2150	2120	2270	5840	15200	4210	3980	4570	2720
2	4700	2330	2150	2370	2100	2400	5820	13500	4140	2570	5090	2940
3	4630	2180	1970	2290	2010	2440	5770	13000	3560	2540	3780	4140
4	5250	2270	2120	2100	1870	2710	5510	11500	3290	2630	3270	4090
5	5850	1870	2230	2230	1800	2880	5770	11700	4730	2610	3890	3740
6	6930	1760	2670	2330	1890	2860	5370	11900	4390	2590	4340	3830
7	6520	1870	2200	2460	2270	2690	6080	12000	4980	2760	4720	2870
8	5740	2060	2250	2330	2290	2500	5940	8360	5890	2570	4850	2180
9	4650	2370	2440	2120	2250	2570	5690	9020	5960	2200	3570	2230
10	5010	2250	2400	2230	2330	2440	4510	10800	5770	2310	3950	2710
11	4870	2030	2520	2160	2030	2440	5550	11500	6630	2440	3500	2530
12	4160	1950	2420	2180	1870	2140	5600	11100	7240	2540	2860	2500
13	4620	1780	2540	2310	2060	2310	5900	12200	7070	2660	2860	3230
14	3050	1890	2540	1890	2370	2010	7010	12900	7920	3490	3370	3320
15	3010	2610	2270	1590	2330	2230	7590	11700	5990	4130	3420	3050
16	3070	2480	2540	1930	2420	2420	9570	9500	4350	4180	3300	2710
17	2710	2630	2400	2100	2100	2310	11900	8500	5500	4100	3950	3270
18	3360	2820	2160	2140	2140	2180	11300	8060	9010	3470	3760	3120
19	2800	3730	2310	2180	2180	2520	13000	8430	9640	4110	3350	2460
20	3600	3090	2140	2180	2100	2990	13500	8740	7350	3700	3050	2310
21	3480	2460	2250	1950	2100	3030	14300	10700	8180	3060	2890	2250
22	3210	2400	2520	1670	2440	3140	15600	10400	8220	2330	3190	2200
23	2890	2710	2650	1930	2310	3880	16700	10400	8100	2440	3120	1570
24	2930	2120	2420	2120	2350	4570	17500	6590	7310	2700	2910	1780
25	2760	2140	2370	2270	2310	4990	18000	9090	6950	2940	2890	2030
26	3240	1910	2160	2270	2330	5590	18500	8240	5870	2730	3280	2010
27	3360	1890	2310	2120	1990	5800	23800	7940	5090	2590	2380	1910
28	2120	2250	2420	1820	2310	5750	19700	7690	4910	3770	2330	1840
29	2010	1530	2610	1840	---	5600	20000	7120	4690	3750	2520	2100
30	1910	3100	2570	1950	---	5810	16400	5190	4230	3310	2540	1840
31	2250	---	2480	2180	---	5570	---	5060	---	4220	2590	---
TOTAL	119400	68710	72430	65390	60670	103040	327720	308030	181170	95420	106090	79480
MEAN	3852	2290	2336	2109	2167	3324	10920	9936	6039	3078	3422	2649
MAX	6930	3730	2670	2460	2440	5810	23800	15200	9640	4220	5090	4140
MIN	1910	1530	1400	1590	1800	2010	4510	5060	3290	2200	2330	1570

CAL YR 1978	TOTAL	1119450	MEAN	3067	MAX	8950	MIN	1230
WTR YR 1979	TOTAL	1587550	MEAN	4349	MAX	23800	MIN	1400

04067500 MENOMINEE RIVER NEAR McALLISTER, WI
(National stream-quality accounting network station)

LOCATION.--Lat 45°19'20", long 87°39'40", in SW¼SE¼ sec.17, T.33 N., R.23 E., Marinette County, Hydrologic Unit 04030108, at bridge on County Trunk Highway JJ, 2.9 mi (4.7 km) east of McAllister.

DRAINAGE AREA.--4,020 mi² (10,400 km²), approximately.

PERIOD OF RECORD.--December 1977 to current year.

REMARKS.--Records of instantaneous discharge furnished by the Wisconsin Public Service Corp.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)
OCT										
19...	1030	2280	230	7.7	7.5	12.1	106	K6	K4	110
NOV										
09...	0900	2640	200	8.1	6.5	11.8	100	K2	K2	110
DEC										
07...	1100	2200	240	7.8	.0	--	--	K32	260	130
JAN										
11...	1100	2230	220	7.5	.0	4.4	32	K10	K18	110
FEB										
13...	1100	1870	220	7.6	.0	14.4	104	K15	K9	110
MAR										
13...	0945	2110	230	7.5	.0	10.6	76	73	K16	120
APR										
18...	1000	10400	165	7.3	2.0	14.8	112	83	38	91
MAY										
09...	1500	9500	155	7.7	9.0	11.4	104	80	47	74
JUN										
06...	1400	3970	170	8.0	17.5	9.8	107	K14	K9	91
JUL										
10...	1300	1940	200	7.9	24.0	7.7	95	K6	21	90
AUG										
21...	1330	3240	220	8.3	21.0	9.4	109	K14	K12	92
SEP										
19...	1300	2550	220	8.2	16.5	9.0	96	K10	K8	110

DATE	HARD- NESS, NONCAR- BONATE (MG/L AS CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT										
19...	21	25	12	2.2	.1	4	1.1	91	3.5	11
NOV										
09...	16	26	12	2.6	.1	5	1.2	98	1.6	12
DEC										
07...	19	27	15	2.8	.1	4	1.3	110	3.4	13
JAN										
11...	21	26	12	2.5	.1	5	1.1	93	5.7	8.7
FEB										
13...	14	25	12	2.8	.1	5	1.1	98	4.8	13
MAR										
13...	17	27	12	2.3	.1	4	1.1	100	6.1	12
APR										
18...	10	21	9.4	1.6	.1	4	1.1	81	7.9	11
MAY										
09...	15	17	7.6	1.5	.1	4	.9	59	2.3	8.0
JUN										
06...	17	21	9.3	1.9	.1	4	.9	74	1.4	9.8
JUL										
10...	14	21	9.1	1.8	.1	4	.7	76	1.8	8.2
AUG										
21...	5	22	9.0	2.1	.1	5	.9	87	.9	9.0
SEP										
19...	19	24	12	1.7	.1	3	1.0	90	1.1	10

STREAMS TRIBUTARY TO LAKE MICHIGAN

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 19...	3.3	.1	8.9	151	119	930	.15	.02	--	.56	.58
NOV 09...	3.2	.1	7.8	142	124	1010	.12	.00	--	.70	.70
DEC 07...	3.6	.1	9.5	154	138	915	.19	.02	--	.74	.76
JAN 11...	3.1	.0	9.0	119	119	717	.25	.01	--	.93	.94
FEB 13...	3.0	.1	11	142	127	717	.28	.04	--	.23	.27
MAR 13...	3.2	.1	11	141	129	803	.31	.04	--	.41	.45
APR 18...	2.5	.1	7.4	116	103	3260	.18	.01	.01	.38	.39
MAY 09...	2.2	.1	5.6	104	78	2670	.12	.01	.01	.61	.62
JUN 06...	2.8	.1	5.0	120	95	1290	.06	.01	.01	.45	.46
JUL 10...	2.4	.1	5.9	117	95	613	.04	.04	.05	.46	.50
AUG 21...	2.3	.1	6.8	127	105	1110	.08	.03	.04	.32	.35
SEP 19...	3.0	.1	8.2	140	114	964	.07	.00	.00	.72	.72
DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDEDED (MG/L)	SEDI- MENT DIS- CHARGE, TOTAL (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 19...	.00	.68	.73	3.2	.02	--	.03	--	2	12	80
NOV 09...	.03	.67	.82	3.6	.01	--	.00	13	12	86	97
DEC 07...	.51	.25	.95	4.2	.01	--	.00	8.6	1	5.9	100
JAN 11...	.04	.90	1.2	5.3	.01	--	.01	--	2	12	84
FEB 13...	.00	.29	.55	2.4	.00	--	.00	--	--	--	--
MAR 13...	.16	.29	.76	3.4	.01	--	.00	6.9	1	5.7	--
APR 18...	.07	.32	.57	2.5	.03	.09	.01	--	18	505	29
MAY 09...	.00	.67	.74	3.3	.02	.06	.01	13	7	180	67
JUN 06...	.05	.41	.52	2.3	.03	.09	.00	13	26	279	23
JUL 10...	.15	.35	.54	2.4	.02	.06	.00	--	4	21	77
AUG 21...	.00	.48	.43	1.9	.02	.06	.00	12	6	52	70
SEP 19...	.00	.75	.79	3.5	.02	.06	.01	15	2	14	--

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 19...	1030	1	1	0	0	2	2	10	1	1
JAN 11...	1100	1	1	0	0	0	0	30	0	1
APR 18...	1000	1	0	0	0	1	1	10	<10	1
JUL 10...	1300	1	1	<50	10	2	2	20	<10	1

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 19...	1	3	1	370	230	2	1	40	30	<.5
JAN 11...	1	3	1	300	200	2	2	10	10	<.5
APR 18...	1	3	3	730	150	2	0	70	20	<.5
JUL 10...	1	4	2	340	120	2	2	80	6	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 19...	<.5	0	0	4	4	10	0	11	.8
JAN 11...	<.5	0	0	0	0	20	10	7.7	.4
APR 18...	<.5	0	0	0	0	10	0	9.3	.2
JUL 10...	<.5	0	0	0	0	40	20	9.4	--

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
JUN 06...	1400	103	6.10	7.80	16.0	2.90
JUL 10...	1300	237	2.00	3.00	4.00	.860
AUG 21...	1330	109	1.30	2.60	12.0	8.00
SEP 19...	1300	26.3	.710	.940	8.80	.950

STREAMS TRIBUTARY TO LAKE MICHIGAN

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 9,78 0900	MAR 13,79 0945	MAY 9,79 1500	JUN 6,79 1400				
TOTAL CELLS/ML	100	330	520	7300				
DIVERSITY: DIVISION	0.0	0.0	1.6	1.6				
..CLASS	0.0	0.0	1.6	1.6				
...ORDER	0.9	0.4	1.6	2.1				
....FAMILY	2.0	0.4	1.6	2.5				
....GENUS	2.2	0.4	1.6	3.1				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	*	0
....HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	100	1
....MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
....OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	380	5
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	75	1
....TREUBARIA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....CRUCIGENTA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	1200#	16
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	150	2
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
....COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	--	-	--	-
....MELOSTRA	29#	29	--	-	--	-	580	8
....STEPHANODISCUS	--	-	--	-	--	-	800	11
..PENNALES								
....ACHNANTHACEAE								
....ACHNANTHES	14	14	--	-	--	-	--	-
....COCCONEIS	14	14	--	-	--	-	--	-
....FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	180	2
....NAVICULACEAE								
....NAVICULA	29#	29	--	-	--	-	*	0
....NITZSCHIA	14	14	--	-	29	6	230	3

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 9, 78 0900	MAR 13, 79 0945	MAY 9, 79 1500	JUN 6, 79 1400
TOTAL CELLS/ML	100	330	520	7300
DIVERSITY: DIVISION	0.0	0.0	1.6	1.6
..CLASS	0.0	0.0	1.6	1.6
..ORDER	0.9	0.4	1.6	2.1
...FAMILY	2.0	0.4	1.6	2.5
....GENUS	2.2	0.4	1.6	3.1

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
....CRYPTOCHRYSIDACEAE								
.....CHROOMONAS	--	-	--	-	14	3	130	2
....CRYPTOMONADACEAE								
.....CRYPTOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
....CHROOCOCCACEAE								
.....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	29	9	--	-	300	4
...HORMOGONALES								
....NOSTOCACEAE								
.....APHANIZOMENON	--	-	300#	91	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	290#	56	2000#	27
....OSCILLATORIA	--	-	--	-	--	-	1100#	15
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
....EUGLENACEAE								
.....PHACUS	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	--	-	160#	31	--	-
PYRRHOPHYTA (FIRE ALGAE)								
..DINOPHYCEAE								
...GYMNODINIALES								
....GYMNODINIACEAE								
.....GYMNODINIUM	--	-	--	-	29	6	--	-

STREAMS TRIBUTARY TO LAKE MICHIGAN

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 10,79 1300	AUG 21,79 1330	SEP 19,79 1300			
TOTAL CELLS/ML	680	1200	620			
DIVERSITY: DIVISION	1.5	1.6	1.1			
..CLASS	1.5	1.6	1.1			
...ORDER	1.9	2.2	1.5			
....FAMILY	2.3	2.7	2.6			
.....GENUS	2.7	3.3	3.0			
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
....CHARACIACEAE						
.....SCHROEDERIA	--	-	--	-	--	-
....HYDRODICTYACEAE						
.....PEDIASTRUM	--	-	--	-	--	-
....MICRACTINIACEAE						
.....GOLENKINIA	--	-	26	2	--	-
....MICRACTINIUM	--	-	--	-	57	9
....OOCYSTACEAE						
.....ANKISTRODESMUS	--	-	65	6	43	7
....DICTYOSPHAERIUM	--	-	--	-	57	9
.....KIRCHNERIELLA	--	-	--	-	29	5
....OOCYSTIS	64	9	--	-	--	-
.....SELENASTRUM	--	-	13	1	--	-
....TREUBARIA	--	-	--	-	14	2
....SCENEDESMACEAE						
.....ACTINASTRUM	100#	15	--	-	--	-
....CRUCIGENIA	--	-	52	4	--	-
....SCENEDESMUS	150#	23	150	13	190#	30
..VOLVOCALES						
....CHLAMYDOMONADACEAE						
.....CHLAMYDOMONAS	39	6	100	9	14	2
CHRYSTOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
....COSCINODISCAEAE						
.....CYCLOTELLA	77	11	77	7	86	14
....MFLOSIRA	13	2	77	7	--	-
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
....ACHNANTHACEAE						
.....ACHNANTHES	--	-	--	-	--	-
....COCCONEIS	--	-	52	4	29	5
....FRAGILARIACEAE						
.....ASTERIONELLA	26	4	--	-	--	-
....FRAGILARIA	--	-	130	11	86	14
....NAVICULACEAE						
.....NAVICULA	--	-	--	-	--	-
....NITZSCHIAEAE						
.....NITZSCHIA	--	-	13	1	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
....CRYPTOCHRYSIDACEAE						
.....CHROOMONAS	--	-	--	-	--	-
....CRYPTOMONADACEAE						
.....CRYPTOMONAS	13	2	--	-	14	2
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
....CHROOCOCCACEAE						
.....AGMENELLUM	--	-	210#	18	--	-
....ANACYSTIS	190#	28	190#	17	--	-
....HORMOGONALES						
....NOSTOCACEAE						
.....APHANIZOMENON	--	-	--	-	--	-
....OSCILLATORIAEAE						
.....LYNGRYA	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM; MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) upstream from bridge on 13 Mile Rd., 2.0 mi (3.2 km) east of Burlington, 4.0 mi (6.4 km) downstream from Tekonsha Creek, and at mile 164 (264 km).

DRAINAGE AREA.--201 mi² (521 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 159 ft³/s (4.503 m³/s), 10.74 in/yr (273 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,030 ft³/s (29.2 m³/s) Mar. 6, 1976, gage height, 5.31 ft (1.618 m); maximum gage height, 5.51 ft (1.679 m) Feb. 5, 1968; minimum discharge, 8.0 ft³/s (0.23 m³/s) Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 760 ft³/s (21.5 m³/s), Mar. 10, gage height, 4.82 ft (1.469 m); minimum, 43 ft³/s (1.22 m³/s) Sept. 25, 27, 28, 29, 30; minimum gage height, 1.60 ft (0.488 m) Sept. 25, 27, 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	74	107	228	100	130	369	288	146	144	68	100
2	56	71	113	249	100	150	372	274	146	140	82	97
3	57	70	131	233	98	192	376	308	144	129	93	89
4	59	69	172	220	96	399	381	322	134	141	98	83
5	61	68	190	200	95	640	392	308	126	145	105	80
6	79	68	194	190	95	633	394	299	119	137	109	76
7	83	73	198	170	95	590	377	292	115	131	109	71
8	81	71	195	160	95	626	367	284	115	120	104	67
9	74	70	193	155	95	711	399	273	112	110	98	64
10	67	68	180	150	95	709	397	258	112	102	98	62
11	64	66	160	145	95	671	379	241	112	96	95	60
12	61	64	150	140	95	601	386	234	103	90	87	57
13	59	64	145	135	95	561	394	234	99	86	78	57
14	62	76	140	135	95	531	393	227	94	83	74	56
15	69	84	135	130	95	469	385	225	90	81	69	54
16	81	92	130	125	95	425	369	215	86	75	64	55
17	84	103	125	120	95	394	351	202	82	69	67	54
18	78	119	125	115	95	362	330	185	79	64	97	52
19	71	119	122	115	95	353	309	173	76	60	115	50
20	66	112	121	115	95	336	290	168	75	57	134	49
21	63	104	128	110	95	311	275	165	78	55	141	49
22	60	98	131	110	95	294	263	159	76	52	139	47
23	62	111	127	110	95	285	250	152	74	51	140	46
24	62	127	123	110	95	281	246	148	70	51	146	46
25	66	130	120	110	100	272	260	150	66	52	144	45
26	88	124	115	110	105	261	273	155	64	54	129	44
27	93	122	115	110	110	250	287	157	61	55	118	44
28	92	117	120	105	120	242	286	155	72	55	112	43
29	87	114	130	105	---	250	280	150	83	58	111	43
30	81	107	140	105	---	322	287	148	126	64	112	43
31	77	---	146	100	---	360	---	147	---	72	105	---
TOTAL	2200	2755	4421	4415	2729	12611	10117	6696	2935	2679	3241	1783
MEAN	71.0	91.8	143	142	97.5	407	337	216	97.8	86.4	105	59.4
MAX	93	130	198	249	120	711	399	322	146	145	146	100
MIN	56	64	107	100	95	130	246	147	61	51	64	43
CFSM	.35	.46	.71	.71	.49	2.03	1.68	1.08	.49	.43	.52	.30
IN	.41	.51	.82	.82	.51	2.33	1.87	1.24	.54	.50	.60	.33

CAL YR 1978 TOTAL 67813 MEAN 186 MAX 922 MIN 41 CFSM .93 IN 12.55
WTR YR 1979 TOTAL 56582 MEAN 155 MAX 711 MIN 43 CFSM .77 IN 10.47

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE¼ SE¼ sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft (4 m) downstream from bridge on U.S. Highway 12, 1.0 mi (1.6 km) downstream from Little Hog Creek, and 3.1 mi (5.0 km) west of Allen.

DRAINAGE AREA.--48.7 mi² (126.1 km²).

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft (308 m) from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 39.6 ft³/s (1.121 m³/s), 11.04 in/yr (280 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 426 ft³/s (12.1 m³/s) June 28, 1978, gage height 5.78 ft (1.762 m); minimum, 1.2 ft³/s (0.034 m³/s) Aug. 20, 21, 1971; minimum gage height, 1.33 ft (0.405 m) Sept. 30, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 258 ft³/s (7.31 m³/s) Mar. 5, gage height, 4.98 ft (1.518 m); minimum, 3.7 ft³/s (0.105 m³/s) Sept. 30, gage height, 1.33 ft (0.405 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.8	8.5	13	35	15	55	117	69	23	29	7.1	14
2	5.8	8.3	13	50	15	70	115	68	21	27	11	13
3	6.0	8.3	20	40	15	100	108	75	19	21	12	12
4	6.4	8.3	30	30	15	173	100	87	18	25	11	11
5	6.7	8.2	28	25	15	243	95	89	17	32	13	11
6	9.5	8.1	23	20	15	246	94	87	16	27	16	10
7	10	8.6	21	17	15	212	89	79	16	21	14	9.4
8	8.9	8.8	20	15	15	174	85	70	17	18	12	8.8
9	7.8	8.7	20	15	15	146	98	62	16	17	12	8.2
10	7.4	8.4	19	14	15	134	115	55	15	17	12	7.6
11	7.0	8.3	19	14	15	120	119	49	16	15	12	7.2
12	6.9	8.3	18	14	15	115	117	48	15	14	12	7.3
13	7.1	8.3	18	15	15	95	113	48	13	13	11	7.3
14	7.1	19	18	15	15	91	110	46	12	13	10	7.3
15	7.4	18	17	15	15	89	105	45	11	12	9.3	6.8
16	8.1	13	17	15	15	87	97	41	10	11	8.7	6.4
17	8.2	15	17	15	15	71	88	36	10	10	9.4	6.2
18	7.8	20	16	15	15	68	81	32	9.7	9.6	25	5.9
19	7.7	16	16	15	15	68	73	29	9.1	8.9	36	5.7
20	7.4	13	16	15	15	66	66	27	8.8	8.3	34	5.5
21	7.3	12	19	16	15	63	60	25	9.2	8.1	30	5.4
22	7.0	12	19	16	15	60	56	22	8.7	7.8	25	5.4
23	7.4	16	17	16	16	57	51	21	8.1	7.6	22	5.0
24	8.1	19	15	16	17	57	49	24	7.6	7.2	21	4.6
25	8.3	16	14	16	19	56	53	34	7.1	7.7	19	4.3
26	11	14	15	16	23	51	56	33	6.8	8.0	17	4.3
27	12	14	15	16	30	45	60	28	6.5	7.5	16	4.1
28	10	13	16	16	40	42	63	26	8.0	7.7	16	4.1
29	9.2	13	16	16	---	55	63	25	9.0	7.9	16	4.0
30	8.9	13	18	16	---	88	65	23	18	7.5	15	3.8
31	8.7	---	25	15	---	108	---	23	---	6.8	15	---
TOTAL	246.9	365.1	568	584	475	3105	2561	1426	381.6	432.6	499.5	215.6
MEAN	7.96	12.2	18.3	18.8	17.0	100	85.4	46.0	12.7	14.0	16.1	7.19
MAX	12	20	30	50	40	246	119	89	23	32	36	14
MIN	5.8	8.1	13	14	15	42	49	21	6.5	6.8	7.1	3.8
CFSM	.16	.25	.38	.39	.35	2.05	1.75	.95	.26	.29	.33	.15
IN.	.19	.28	.43	.45	.36	2.37	1.96	1.09	.29	.33	.38	.16
CAL YR 1978	TOTAL	15964.1	MEAN	43.7	MAX	412	MIN	5.8	CFSM	.90	IN	12.19
WTR YR 1979	TOTAL	10860.3	MEAN	29.8	MAX	246	MIN	3.8	CFSM	.61	IN	8.30

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW¼ NE¼ sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Rd., 2.5 mi (4.0 km) northwest of Hodunk, and 3.5 mi (5.6 km) upstream from mouth.

DRAINAGE AREA.--293 mi² (759 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 26, 1963, non-recording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 229 ft³/s (6.485 m³/s), 10.61 in/yr (269 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,930 ft³/s (54.7 m³/s) June 28, 1978, gage height, 7.77 ft (2.368 m); minimum, 6.2 ft³/s (0.18 m³/s) Sept. 26, 1964; minimum gage height, 2.28 ft (0.695 m) Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,240 ft³/s (35.1 m³/s) Mar. 6, gage height, 6.40 ft (1.951 m); minimum, 45 ft³/s (1.27 m³/s) Sept. 28, 29, 30; minimum gage height, 2.67 ft (0.814 m) July 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	110	122	286	139	164	518	383	124	125	72	125
2	46	109	120	305	142	177	519	366	126	129	76	118
3	47	109	130	280	142	209	520	393	123	123	75	113
4	49	109	156	270	139	476	533	446	120	130	73	104
5	50	109	172	260	126	889	524	461	119	138	81	69
6	64	107	164	250	137	1130	503	437	119	132	85	67
7	66	108	158	240	134	1160	503	416	119	124	80	65
8	66	108	158	230	127	1080	494	390	123	116	75	64
9	63	106	166	230	130	995	574	363	124	110	73	63
10	59	105	154	220	129	895	717	342	124	106	74	62
11	56	103	156	210	128	767	717	327	118	124	74	59
12	56	101	151	200	122	679	703	317	114	185	70	59
13	55	101	144	190	133	642	687	316	110	169	67	59
14	56	103	139	180	131	605	662	308	106	159	65	56
15	58	117	137	180	125	567	622	298	102	148	62	56
16	64	117	136	170	125	513	588	288	99	124	60	54
17	140	125	133	160	136	495	553	274	94	68	64	54
18	241	139	132	160	140	476	517	260	90	63	106	53
19	211	141	131	150	139	460	487	247	89	58	153	52
20	189	134	129	150	141	444	453	237	89	48	149	51
21	152	128	133	150	139	425	427	227	89	50	144	49
22	105	124	136	150	134	407	404	200	83	49	135	49
23	105	130	134	150	133	399	374	100	81	49	134	49
24	105	137	131	150	139	391	293	99	78	52	162	49
25	105	137	128	150	144	378	323	110	74	53	165	48
26	113	130	122	150	135	362	359	114	72	55	140	47
27	116	127	118	149	177	326	375	113	70	52	131	47
28	115	124	116	147	163	222	375	113	76	59	127	46
29	113	119	121	145	---	247	371	114	84	68	133	45
30	112	122	120	144	---	357	372	117	106	77	143	45
31	111	---	162	144	---	481	---	122	---	79	135	---
TOTAL	2937	3544	4309	5950	3829	16818	15067	8298	3045	3022	3183	1877
MEAN	94.7	118	139	192	137	543	502	268	102	97.5	103	62.6
MAX	241	141	172	305	177	1160	717	461	126	185	165	125
MIN	46	101	116	144	122	164	293	99	70	48	60	45
CFSM	.32	.40	.47	.66	.47	1.85	1.71	.92	.35	.33	.35	.21
IN.	.37	.45	.55	.76	.49	2.14	1.91	1.05	.39	.38	.40	.24
CAL YR 1978 TOTAL	101101		MEAN 277	MAX 1910	MIN 45	CFSM .95	IN 12.84					
WTR YR 1979 TOTAL	71879		MEAN 197	MAX 1160	MIN 45	CFSM .67	IN 9.13					

LOCATION.--Lat 42°03'20", long 85°18'30", in NW¼ sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi (6.8 km) southwest of Athens, and 5.0 mi (8.0 km) downstream from Pine Creek.

PERIOD OF RECORD.--October 1966 to current year.

REMARKS.--Records fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 1,120 ft³/s (31.7 m³/s) June 29, 1978, gage height, 6.47 ft (1.972 m); minimum, 21 ft³/s (0.59 m³/s) July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft (0.113 m) Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 652 ft³/s (18.5 m³/s) Mar. 6, gage height, 4.17 ft (1.271 m); minimum, 40 ft³/s (1.13 m³/s) Sept. 24; minimum gage height, 0.79 ft (0.241 m) Oct. 2, 3.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	82	96	140	100	150	401	336	115	108	87	86
2	63	80	92	165	100	170	406	321	113	117	95	83
3	64	79	110	195	100	210	401	328	110	120	96	78
4	65	79	120	170	100	340	376	349	107	133	96	74
5	72	77	130	150	100	550	352	348	106	145	103	71
6	106	78	135	140	100	636	345	326	103	148	110	6
7	120	82	140	130	100	635	321	295	105	136	114	65
8	121	87	140	120	100	590	305	262	108	125	115	60
9	118	88	135	120	100	540	320	231	106	116	111	58
10	108	86	130	115	100	493	343	208	104	106	109	56
11	96	83	130	115	100	443	339	195	108	98	105	54
12	85	80	125	115	100	389	330	189	108	93	99	53
13	78	80	125	115	100	343	321	190	103	88	94	53
14	73	86	125	110	100	351	301	195	100	86	91	51
15	72	88	120	110	100	350	277	195	97	83	86	50
16	75	87	120	110	100	319	252	189	93	79	81	49
17	80	91	115	110	100	300	231	178	89	74	84	48
18	81	104	115	110	100	300	214	167	85	68	104	48
19	80	111	115	110	100	309	198	157	83	65	114	46
20	76	107	115	105	100	315	186	146	83	62	124	44
21	75	101	120	105	100	310	177	139	86	61	125	45
22	73	95	120	105	105	294	171	132	83	60	120	43
23	77	99	120	105	105	276	165	125	80	59	113	42
24	79	109	115	105	110	262	169	124	78	57	108	42
25	83	113	115	105	115	250	207	123	76	58	102	42
26	94	109	115	100	115	231	246	123	75	60	98	42
27	102	102	110	100	120	213	290	119	73	57	93	42
28	103	101	110	100	135	200	320	112	76	60	90	41
29	99	100	110	100	---	211	323	113	78	64	91	42
30	91	98	115	100	---	288	331	113	99	69	92	41
31	86	---	125	100	---	365	---	115	---	81	90	---
TOTAL	2661	2762	3708	3680	2905	10633	8624	6143	2830	2736	3140	1617
MEAN	85.8	92.1	120	119	104	343	287	198	94.3	88.3	101	53.9
MAX	121	113	140	195	135	636	406	349	115	148	125	86
MIN	63	77	92	100	100	150	165	112	73	57	81	41
CFSM	.53	.57	.74	.74	.64	2.12	1.77	1.22	.58	.55	.62	.33
Std.	.61	.63	.95	.85	.67	2.44	1.98	1.41	.65	.63	.72	.37
CAL YR 1978	TOTAL	50129	MEAN	137	MAX	1110	MIN	60	CFSM	.85	IN	11.51
WTR YR 1979	TOTAL	51439	MEAN	141	MAX	63						

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04097170 PORTAGE RIVER NEAR VICKSBURG, MI

LOCATION.--Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, on right bank 15 ft (5 m) upstream from bridge on W Avenue, 2.4 mi (3.9 km) east of Vicksburg.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--March 1946 to September 1951, October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 839.94 ft (256.014 m) National Geodetic Vertical Datum of 1929. Mar. 13, 1946 to Sept. 30, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 61.2 ft³/s (1.733 m³/s), 12.19 in/yr (310 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 356 ft³/s (10.1 m³/s) Apr. 7, 1947, gage height, 5.66 ft (1.725 m); minimum, 9.8 ft³/s (0.28 m³/s) Aug. 2, 3, 1977, gage height, 3.04 ft (0.927 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 217 ft³/s (6.15 m³/s) Mar. 6, 7, gage height, 5.21 ft (1.588 m); maximum gage height, 5.27 ft (1.606 m) Jan. 3, backwater from ice; minimum discharge, 29 ft³/s (0.82 m³/s) Sept. 29, 30, gage height, 3.47 ft (1.058 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	69	63	80	64	57	162	132	63	54	37	39
2	74	68	64	90	63	60	163	127	62	52	37	38
3	73	66	67	100	62	68	166	140	60	50	36	38
4	72	65	73	90	61	109	163	150	58	54	36	37
5	72	64	75	82	61	195	162	141	57	56	37	37
6	82	64	75	75	60	214	165	133	56	54	38	36
7	89	66	75	70	59	217	161	124	56	52	37	35
8	88	65	76	66	58	209	156	117	64	50	36	35
9	86	63	73	64	56	202	167	111	78	49	36	34
10	83	62	70	62	55	195	165	106	70	47	38	33
11	82	61	68	62	54	185	156	115	67	46	38	33
12	81	60	67	62	53	170	156	146	63	44	37	32
13	79	60	67	62	52	162	157	144	59	43	36	32
14	76	62	66	62	50	163	151	139	56	43	36	33
15	75	61	65	62	49	157	144	135	53	42	35	32
16	77	60	64	62	48	145	137	126	51	41	34	32
17	76	61	64	62	48	139	129	118	49	40	36	32
18	74	65	63	62	48	139	122	110	47	39	44	32
19	72	65	62	63	48	139	116	103	45	38	43	32
20	70	64	62	63	48	136	109	98	48	37	44	31
21	68	62	63	64	49	134	104	91	53	36	48	31
22	67	61	61	64	50	129	102	84	51	36	45	31
23	69	64	61	64	51	126	97	81	50	35	44	31
24	68	66	60	65	51	129	96	78	48	35	43	30
25	67	66	60	65	52	127	102	74	46	34	42	30
26	76	64	58	65	52	122	112	70	45	34	42	30
27	78	64	57	65	53	117	127	67	43	33	41	31
28	76	64	56	65	54	111	127	66	44	34	41	30
29	74	63	56	64	---	113	126	65	44	34	41	30
30	72	63	58	64	---	141	129	63	51	36	41	30
31	71	---	69	64	---	160	---	64	---	38	40	---
TOTAL	2344	1908	2018	2110	1509	4470	4129	3318	1637	1316	1219	987
MEAN	75.6	63.6	65.1	68.1	53.9	144	138	107	54.6	42.5	39.3	32.9
MAX	89	69	76	100	64	217	167	150	78	56	48	39
MIN	67	60	56	62	48	57	96	63	43	33	34	30
CFSM	1.11	.93	.96	1.00	.79	2.11	2.02	1.57	.80	.62	.58	.48
IN	1.28	1.04	1.10	1.15	.82	2.44	2.25	1.81	.89	.72	.66	.54
CAL YR 1978 TOTAL	24042		MEAN 65.9	MAX 215	MIN 29	CFSM .97	IN 13.11					
WTR YR 1979 TOTAL	26965		MEAN 73.9	MAX 217	MIN 30	CFSM 1.08	IN 14.71					

LOCATION.--Lat 41°56'25", long 85°38'00", in SW₄ SE₄ sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft (76 m) downstream from Rocky River, and at mile 112 (180 km).

PERIOD OF RECORD.--May 1953 to current year.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft (238.152 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

AVERAGE DISCHARGE.--26 years, 1,093 ft³/s (30.95 m³/s), 10.99 in/yr (279 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,810 ft³/s (165 m³/s) Mar. 7, 1976, gage height, 9.08 ft (2.768 m); minimum daily, 78 ft³/s (2.21 m³/s) Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s (234 m³/s) Apr. 27, 1950, gage height, 10.6 ft (3.23 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,230 ft³/s (120 m³/s) Mar. 9, gage height, 7.69 ft (2.344 m); minimum, 370 ft³/s (10.5 m³/s) Sept. 19, gage height, 2.55 ft (0.777 m); minimum daily, 390 ft³/s (11.0 m³/s) Sept. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	739	754	805	1160	860	1380	2640	2510	1120	1040	570	851
2	694	750	924	1430	840	1360	2830	2430	1160	1140	672	835
3	690	745	961	1400	840	1290	2890	2470	1040	1100	838	762
4	685	736	1000	1500	820	1660	2840	2470	1010	1190	676	782
5	698	731	1110	1450	840	2700	2760	2490	995	1280	725	769
6	769	710	1240	1400	860	3730	2740	2550	801	1270	722	656
7	866	681	1320	1300	860	4050	2680	2500	989	1200	828	597
8	976	742	1260	1200	840	4110	2650	2350	1080	1110	718	575
9	962	775	1220	1290	820	4190	2650	2200	1160	977	831	583
10	865	761	1060	1100	800	4050	2700	2100	1240	929	751	627
11	830	738	974	1050	800	3790	2780	2100	1260	909	822	633
12	831	722	1020	1000	820	3600	2830	2110	1160	683	775	619
13	1020	681	1090	1000	820	3470	2860	2100	1110	826	636	513
14	984	660	1140	1000	840	3170	2820	1990	1070	669	636	475
15	913	756	1040	1000	840	2990	2690	1970	1030	672	632	490
16	854	755	1060	1000	820	2950	2600	1900	958	887	615	484
17	790	751	1050	1000	800	2800	2540	1830	654	685	668	477
18	770	800	992	980	760	2710	2410	1560	641	583	783	481
19	758	815	915	940	740	2640	2220	1470	871	588	949	427
20	761	845	939	920	689	2620	2240	1530	815	747	1020	393
21	569	884	958	900	729	2440	2020	1410	966	568	1010	442
22	529	845	960	880	974	2320	1990	1560	957	499	1010	442
23	562	867	958	880	993	2530	1930	1420	730	511	1070	390
24	617	958	960	860	954	2300	1860	1270	660	550	1010	524
25	573	914	956	860	928	2220	1890	1250	625	524	884	459
26	649	872	941	860	945	2170	2170	1190	797	499	951	455
27	716	930	905	840	1010	2070	2220	1110	598	489	1060	467
28	750	928	822	840	1060	1990	2250	1040	674	500	927	451
29	762	928	857	860	---	1920	2230	855	754	505	994	431
30	761	868	863	860	---	2100	2360	966	1030	519	845	402
31	755	---	989	860	---	2400	---	1060	---	569	892	---
TOTAL	23698	23942	31329	32530	23902	83720	74290	55761	27955	24218	25520	16492
MEAN	764	798	1011	1049	754	2701	2476	1799	932	781	823	550
MAX	1020	958	1320	1500	1060	4190	2890	2550	1260	1280	1070	851
MIN	529	660	805	840	689	1290	1860	855	598	489	570	390
CFSM	.57	.59	.75	.78	.63	2.00	1.83	1.33	.69	.58	.61	.41
IN	.65	.66	.86	.90	.66	2.31	2.05	1.54	.77	.67	.70	.45
CAL YR 1978	TOTAL	449757	MEAN	1232	MAX	4720	MIN 305	CFSM .91	IN 12.39			
WTR YR 1979	TOTAL	443357	MEAN	1215	MAX	4190	MTN 390	CFSM .90	IN 12.22			

LOCATION.--Lat 41°53'18", long 85°24'34", in NW¼ SW¼ sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft (3 m) upstream from bridge on State Highway 66, 3.0 mi (4.8 km) upstream from unnamed tributary, and 3.0 mi (4.8 km) southeast of Nottawa.

PERIOD OF RECORD.--October 1962 to current year.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 523 ft³/s (14.8 m³/s) Mar. 6, 1976, gage height, 5.66 ft (1.725 m); minimum, 11 ft³/s (0.31 m³/s), Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft (0.539 m) Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 422 ft³/s (12.0 m³/s) Mar. 6, gage height, 5.29 ft (1.612 m); minimum, 28 ft³/s (0.79 m³/s) July 23, 24; minimum gage height, 2.13 ft (0.649 m) July 24.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	40	60	104	58	90	185	171	81	83	45	65
2	30	41	60	110	58	100	195	166	79	89	53	62
3	29	40	66	100	57	105	193	176	77	82	53	59
4	29	40	74	90	56	172	187	177	73	81	56	56
5	31	40	82	85	56	314	183	181	70	79	53	54
6	35	41	84	80	55	412	177	181	67	76	50	52
7	37	43	84	75	55	405	174	172	66	71	51	50
8	37	43	85	71	54	364	172	160	70	66	57	48
9	35	43	83	70	54	307	183	148	69	64	54	46
10	33	42	80	68	54	265	194	138	70	61	51	44
11	32	42	77	68	54	269	214	131	72	57	47	43
12	31	41	75	68	54	220	227	128	69	53	44	42
13	30	41	75	68	54	193	221	129	67	50	43	41
14	29	47	73	68	54	181	212	127	64	47	42	40
15	29	52	71	68	54	200	199	125	61	45	38	39
16	32	53	70	67	54	166	187	120	58	43	37	38
17	33	57	69	66	54	158	174	115	55	41	40	37
18	33	61	68	64	54	153	163	108	52	38	60	36
19	32	63	67	64	55	152	153	104	50	36	70	35
20	32	62	67	63	57	151	144	106	51	33	90	34
21	31	60	70	62	58	149	138	101	52	31	90	34
22	31	58	71	62	60	145	133	97	52	30	86	33
23	33	60	71	62	62	143	129	92	51	29	84	33
24	34	64	58	62	64	143	129	90	49	28	84	32
25	35	64	66	62	67	141	141	88	46	29	80	32
26	39	63	64	61	70	137	152	86	43	33	74	32
27	41	62	64	60	74	132	162	85	40	34	70	32
28	42	62	65	60	80	128	171	84	39	38	70	32
29	42	61	66	60	---	133	172	82	41	40	71	31
30	42	60	68	59	---	154	174	80	64	41	71	31
31	41	---	77	59	---	172	---	81	---	44	69	---
TOTAL	1050	1546	2220	2186	1636	5954	5238	3829	1798	1572	1883	1243
MEAN	33.9	51.5	71.6	70.5	58.4	192	175	124	59.9	50.7	60.7	41.4
MAX	42	64	85	110	80	412	227	181	81	89	90	65
MIN	29	40	60	59	54	90	129	80	39	28	37	31
CFSM	.32	.49	.68	.67	.55	1.81	1.65	1.17	.57	.48	.57	.39
IN.	.37	.54	.78	.77	.57	2.09	1.84	1.34	.63	.55	.66	.44
CAL YR 1978	TOTAL	33043	MEAN	90.5	MAX	444	MIN	23	CFSM	.85	IN	11.60
WTR YR 1979	TOTAL	30155	MEAN	82.6	MAX	412	MIN	28	CFSM	.78	IN	10.58

STREAMS TRIBUTARY TO LAKE MICHIGAN

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW¼NW¼ sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) downstream from dam for Lime Lake, 30 ft (9 m) upstream from bridge on Orland Road, and 0.7 mile (1.1 km) northwest of Panama.

DRAINAGE AREA.--17.5 mi² (45.3 km²), of which 3.68 mi² (9.53 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft (289.560 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--10 years, 6.63 ft³/s (0.188 m³/s), 5.14 in/yr (131 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34 ft³/s (0.96 m³/s) Mar. 5, 1976, gage height, 4.59 ft (1.399 m); no flow at times during 1971 and 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 19 ft³/s (0.54 m³/s) Apr. 30, gage height, 3.94 ft (1.201 m); minimum daily, 0.42 ft³/s (0.012 m³/s) Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.44	2.1	5.5	3.4	5.0	5.0	11	17	4.8	4.5	1.4	2.0
2	.45	2.1	5.4	3.5	5.0	5.0	11	16	5.0	4.1	1.6	1.8
3	.50	2.2	6.1	3.5	5.0	5.3	11	17	4.8	4.0	1.5	1.7
4	.48	2.4	5.5	3.6	5.0	7.1	11	16	4.6	5.0	1.6	1.6
5	.57	2.6	4.6	3.6	4.9	8.1	11	15	4.1	4.6	1.8	1.5
6	.71	2.5	5.9	3.7	4.9	8.4	9.6	15	4.1	4.2	1.8	1.4
7	.67	2.7	6.2	3.8	4.9	8.6	9.8	14	4.4	3.9	1.7	1.3
8	.62	10	6.4	4.0	4.9	8.6	11	14	4.7	3.6	1.7	1.1
9	.68	15	6.4	4.0	4.7	8.9	13	13	4.8	3.9	1.9	.98
10	.61	13	6.1	4.0	4.7	9.3	13	13	4.7	3.7	2.0	.92
11	.65	12	6.0	4.0	4.9	9.1	14	13	4.0	3.4	1.9	.89
12	.61	11	5.9	4.0	5.0	8.9	16	13	3.5	3.1	1.7	.87
13	.73	10	5.7	4.2	5.0	8.9	15	12	3.2	2.9	1.4	.85
14	.68	9.9	5.6	4.8	5.0	9.0	15	12	2.8	2.7	1.3	.75
15	.73	9.3	5.4	4.8	4.9	8.8	14	11	2.5	2.6	1.2	.74
16	.71	8.8	5.3	4.9	4.9	8.5	14	10	2.3	2.5	1.2	.70
17	.73	9.4	5.1	5.0	4.9	8.4	13	9.7	2.1	2.3	1.4	.71
18	.81	8.9	5.0	5.0	4.8	8.4	14	8.9	2.0	2.1	1.9	.74
19	.84	8.1	5.0	5.0	4.8	8.4	14	7.9	1.9	1.9	2.0	.74
20	.94	7.7	5.0	5.2	4.7	8.6	15	7.1	1.7	1.8	2.7	.67
21	1.0	7.4	3.9	5.2	4.9	8.5	15	6.1	1.5	1.7	2.8	.69
22	1.1	6.9	2.7	5.2	5.0	8.5	16	5.8	1.4	1.6	2.6	.69
23	1.2	6.9	2.7	5.2	5.1	8.5	15	5.4	1.2	1.5	2.6	.69
24	1.4	6.3	2.8	5.3	5.2	8.2	16	5.4	1.2	1.5	2.4	.68
25	1.5	6.1	2.8	5.3	5.1	7.7	17	5.6	1.1	1.4	2.1	.64
26	1.9	5.9	2.8	5.3	5.0	7.6	17	5.2	1.1	1.4	2.1	.66
27	2.0	5.8	2.8	5.2	5.0	7.6	17	4.9	1.3	1.3	1.9	.69
28	2.0	5.6	2.7	5.2	4.9	8.3	18	4.7	1.1	1.3	1.9	.67
29	2.0	5.9	2.8	5.2	---	9.4	18	4.5	2.2	1.3	2.0	.68
30	2.0	5.5	3.0	5.0	---	12	18	4.8	4.7	1.3	2.0	.42
31	2.0	---	3.1	5.1	---	11	---	4.9	---	1.3	2.1	---
TOTAL	31.26	212.0	144.2	141.2	138.1	258.6	422.4	311.9	88.8	82.4	58.2	28.27
MEAN	1.01	7.07	4.65	4.55	4.93	8.34	14.1	10.1	2.96	2.66	1.88	.94
MAX	2.0	15	6.4	5.3	5.2	12	18	17	5.0	5.0	2.8	2.0
MIN	.44	2.1	2.7	3.4	4.7	5.0	9.6	4.5	1.1	1.3	1.2	.42
CFSM	.06	.40	.27	.26	.28	.48	.81	.58	.17	.15	.11	.05
IN.	.07	.45	.31	.30	.29	.55	.90	.66	.19	.18	.12	.06

CAL YR 1978 TOTAL 2384.01 MEAN 6.53 MAX 19 MIN .12 CFSM .37 IN 5.07
WTR YR 1979 TOTAL 1917.33 MEAN 5.25 MAX 18 MIN .42 CFSM .30 IN 4.08

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW¼ sec. 6, T.8 S., R.12 W., Michigan meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft (152 m) upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi (0.6 km) downstream from Michigan Power Co. hydroelectric plant, 4 mi (6 km) upstream from Pigeon River, and at mile 96 (154 km).

DRAINAGE AREA.--1,866 mi² (4,833 km²).

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft (230.22 m) Michigan Power Co. datum. Prior to Oct. 1, 1951, at site 0.4 mi (0.6 km) upstream at datum 4.2 ft (1.28 m) higher.

REMARKS.--Records good except those for the winter period, which are poor. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--56 years, 1,541 ft³/s (43.64 m³/s), 11.21 in/yr (285 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 27, 1950, gage height, 10.76 ft (3.280 m), present datum; minimum daily, 39 ft³/s (1.10 m³/s) Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,310 ft³/s (150 m³/s) Mar. 9, gage height, 6.90 ft (2.103 m); minimum, 84 ft³/s (2.38 m³/s) Sept. 26, gage height, 1.12 ft (0.341 m); minimum daily, 526 ft³/s (14.9 m³/s) Sept. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1230	1130	1200	1660	1450	1880	3390	3300	1660	1840	965	1390
2	1240	1170	1320	2060	1400	1960	3620	3260	1740	1760	976	1280
3	1190	1210	1360	1870	1400	2010	3650	3360	1640	1430	1340	1310
4	1090	1170	1590	1910	1350	2150	3770	3330	1700	2110	1030	1070
5	1070	1150	1640	2210	1250	3230	3660	3310	1420	1840	1070	1480
6	1180	1180	1600	2300	1050	4330	3590	3320	1410	1800	1460	1150
7	1250	1040	1820	2290	1400	5010	3540	3370	1420	1690	1190	1090
8	1270	1120	2070	2100	1400	5050	3540	3220	1540	1670	1200	926
9	1290	1190	1800	1900	1300	5220	3510	3130	1490	1530	1110	996
10	1630	1070	1500	1700	1250	5230	3550	2930	1620	1480	1520	1350
11	1220	1150	1430	1650	1250	4940	3610	2900	1890	1610	1530	1310
12	1270	1090	1670	1550	1300	4710	3720	3110	1690	1280	1250	1140
13	1290	929	1660	1450	1350	4460	3750	3070	1680	1070	1010	1160
14	1280	1200	1680	1400	1200	4330	3800	2940	1620	1270	965	984
15	1490	1410	1760	1300	1100	3930	3730	2880	1520	1210	1050	1060
16	1420	1050	1420	1400	1150	3840	3550	2810	1360	1050	1020	620
17	1330	1430	1490	1300	1150	3770	3510	2620	1370	1260	1090	526
18	1190	1300	1710	1350	1150	3450	3380	2610	1000	981	956	690
19	1300	1300	1590	1400	1150	3500	3140	2450	1230	768	1450	692
20	1180	1280	1420	1400	1100	3480	3000	2240	1240	867	1730	712
21	1070	1370	1470	1400	1050	3410	2940	2290	1490	822	1780	864
22	896	1350	1600	1400	1300	3180	2820	2010	1390	868	1620	905
23	998	1220	1340	1500	1550	3250	2740	2070	1110	1080	1670	626
24	771	1330	1240	1550	1550	3270	2710	2020	1100	844	1700	742
25	859	1410	1450	1500	1360	3100	2600	1850	1020	845	1510	815
26	1020	1390	1660	1500	1530	2920	2910	1570	1160	837	1300	711
27	1020	1520	1250	1450	1510	2900	3050	1790	873	807	1590	780
28	1190	1400	1540	1450	1840	2820	3120	1830	1200	703	1840	715
29	1240	1370	1260	1500	---	2790	3060	1630	1130	644	1530	700
30	1270	1370	1240	1500	---	2800	3160	1510	1700	953	1480	716
31	1140	---	1390	1500	---	3180	---	1630	---	1170	1510	---
TOTAL	36884	37299	47170	50450	36840	110100	100120	80360	42413	38089	41442	28510
MEAN	1190	1243	1522	1627	1316	3552	3337	2592	1414	1229	1337	950
MAX	1630	1520	2070	2300	1840	5230	3800	3370	1890	2110	1840	1480
MIN	771	929	1200	1300	1050	1880	2600	1510	873	644	956	526
CFSM	.64	.67	.82	.87	.71	1.90	1.79	1.39	.76	.66	.72	.51
IN.	.74	.74	.94	1.01	.73	2.19	2.00	1.60	.85	.76	.83	.57
CAL YR 1978 TOTAL	663891			1819	5290	579		.98		13.24		
WTR YR 1979 TOTAL	649677			1780	5230	526		.95		12.95		

STREAMS TRIBUTARY TO LAKE MICHIGAN

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE¼NW¼ sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from bridge on County Road 750 North, 1,200 ft (366 m) downstream from Page ditch, 0.7 mile (1.1 km) south of Indiana-Michigan State line, and 1.2 miles (1.9 km) northwest of Scott.

DRAINAGE AREA.--361 mi² (935 km²), of which 53.9 mi² (139.6 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft (248.412 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--11 years, 333 ft³/s (9.431 m³/s), 12.53 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft³/s (50.4 m³/s) Mar. 5, 1976, gage height, 7.07 ft (2.155 m); minimum daily, 42 ft³/s (1.19 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,340 ft³/s (37.9 m³/s) Mar. 5, gage height, 6.15 ft (1.875 m); minimum daily, 114 ft³/s (3.23 m³/s) Sept. 28, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	135	139	182	387	150	200	685	524	270	328	135	253
2	134	138	185	433	145	230	683	502	264	272	159	240
3	137	137	210	400	145	361	701	541	255	245	157	232
4	141	137	225	360	145	748	725	611	246	246	148	225
5	146	137	245	325	145	1270	743	590	236	248	197	217
6	180	138	230	295	145	1170	739	545	227	226	195	210
7	189	144	240	280	145	999	698	521	230	211	200	202
8	176	146	250	240	145	966	683	500	251	203	237	190
9	164	140	245	225	145	968	738	484	240	204	278	182
10	154	139	240	210	140	980	799	467	232	199	343	180
11	149	137	240	200	145	959	767	467	240	192	310	175
12	149	135	230	195	145	886	768	467	226	185	268	168
13	151	138	225	190	145	872	787	470	215	179	255	177
14	151	155	220	180	145	832	768	458	208	176	237	196
15	150	158	215	175	145	787	730	440	199	170	227	160
16	146	151	210	175	145	716	700	416	189	161	210	150
17	140	163	208	170	145	666	668	394	181	147	205	145
18	142	194	205	165	145	637	629	374	177	140	255	141
19	136	184	205	165	150	626	605	356	174	135	263	135
20	141	170	205	165	155	605	575	345	181	134	318	131
21	142	164	210	165	170	570	548	329	194	129	343	129
22	140	161	208	160	180	541	526	316	182	127	310	127
23	145	174	202	160	200	530	500	299	172	126	295	124
24	149	187	200	160	190	534	491	294	165	123	295	121
25	146	177	195	155	180	518	533	290	160	143	283	120
26	160	169	190	155	180	491	560	269	153	146	270	119
27	162	172	190	150	180	468	550	272	147	136	260	116
28	152	174	185	150	185	455	545	270	146	128	255	114
29	145	168	190	150	---	486	543	266	169	124	255	115
30	143	200	205	150	---	584	529	264	307	122	268	114
31	141	---	245	150	---	672	---	271	---	125	263	---
TOTAL	4636	4726	6635	6640	4380	21327	19516	12612	6236	5430	7694	4908
MEAN	150	158	214	214	156	688	651	407	208	175	248	164
MAX	189	200	250	433	200	1270	799	611	307	328	343	253
MIN	134	135	182	150	140	200	491	264	146	122	135	114
CFSM	.42	.44	.59	.59	.43	1.91	1.80	1.13	.58	.49	.69	.45
IN.	.48	.49	.68	.68	.45	2.20	2.01	1.30	.64	.56	.79	.51

CAL YR 1978 TOTAL 126342 MEAN 346 MAX 1530 MIN 128 CFSM .96 IN 13.02
WTR YR 1979 TOTAL 104740 MEAN 287 MAX 1270 MIN 114 CFSM .80 IN 10.79

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE¼NW¼ sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft (396 m) downstream from Boyd ditch, 1.7 miles (2.7 km) upstream from Hustin ditch, and 3.1 miles (5.0 km) downstream from Waldron Lake.

DRAINAGE AREA.--142 mi² (368 km²).

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 miles (5.0 km) upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft (268.261 m) National Geodetic Vertical Datum of 1929 (levels by State of Indiana, Department of Natural Resources).

REMARKS.--Records good except those for winter period, which are fair. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--8 years, 125 ft³/s (3.540 m³/s), 11.95 in/yr (304 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 682 ft³/s (19.3 m³/s) Apr. 7, 1978, gage height, 7.41 ft (2.258 m); minimum daily, 2.4 ft³/s (0.068 m³/s) Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 420 ft³/s (11.9 m³/s) Mar. 11, gage height, 6.68 ft (2.036 m); minimum daily, 11.0 ft³/s (0.31 m³/s) June 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	33	39	78	46	100	290	184	79	75	23	37
2	96	30	45	98	45	135	290	180	76	77	27	36
3	100	36	65	75	43	178	284	191	73	67	28	34
4	124	45	77	68	39	309	271	202	69	64	28	34
5	147	49	78	65	35	383	259	205	66	60	36	33
6	166	50	73	63	36	408	247	205	66	42	40	31
7	180	50	76	60	37	415	241	204	65	40	38	29
8	185	46	81	58	37	417	238	200	69	39	40	27
9	182	40	77	56	37	417	249	193	66	45	51	26
10	174	38	73	55	37	415	253	186	62	47	55	24
11	162	34	52	53	37	407	254	181	62	46	58	25
12	140	34	35	51	37	397	261	182	61	42	55	24
13	114	36	44	50	37	390	260	182	57	40	49	23
14	89	49	56	49	37	386	254	181	51	38	44	21
15	74	52	57	48	38	374	247	177	47	35	40	18
16	70	47	52	48	38	362	238	170	43	32	37	17
17	54	50	47	48	39	350	228	162	38	28	38	17
18	42	54	47	48	39	340	219	155	32	24	45	16
19	38	53	47	47	40	330	209	148	29	22	46	16
20	40	42	50	47	43	320	199	141	27	19	50	15
21	42	34	50	47	46	306	187	134	30	17	54	15
22	42	30	47	47	50	294	176	124	28	16	51	20
23	46	34	45	47	55	286	167	113	26	15	48	38
24	45	34	46	47	62	277	161	105	22	18	46	51
25	42	36	45	47	76	268	163	100	19	31	43	57
26	50	36	42	47	89	256	165	91	17	33	41	61
27	47	41	39	47	80	246	170	86	11	30	40	68
28	44	39	30	47	70	239	176	84	12	27	40	73
29	40	40	35	47	---	247	180	80	16	24	40	73
30	36	38	40	47	---	268	181	80	45	23	40	72
31	32	---	57	47	---	281	---	80	---	23	38	---
TOTAL	2749	1230	1647	1682	1305	9801	6717	4706	1364	1139	1309	1031
MEAN	88.7	41.0	53.1	54.3	46.6	316	224	152	45.5	36.7	42.2	34.4
MAX	185	54	81	98	89	417	290	205	79	77	58	73
MIN	32	30	30	47	35	100	161	80	11	15	23	15
CFSM	.63	.29	.37	.38	.33	2.23	1.58	1.07	.32	.26	.30	.24
IN.	.72	.32	.43	.44	.34	2.57	1.76	1.23	.36	.30	.34	.27

CAL YR 1978 TOTAL 48091.0 MEAN 132 MAX 677 MIN 3.0 CFSM .93 IN 12.60
WTR YR 1979 TOTAL 34680.0 MEAN 95.0 MAX 417 MIN 11 CFSM .67 IN 9.09

STREAMS TRIBUTARY TO LAKE MICHIGAN

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from River Avenue bridge at Goshen, 0.4 mile (0.6 km) upstream from Rock Run, and at mile 16.1 (25.9 km).

DRAINAGE AREA.--594 mi² (1,538 km²).

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft (234.522 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--48 years, 502 ft³/s (14.22 m³/s), 11.48 in/yr (292 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,440 ft³/s (154 m³/s) Apr. 4, 1950, gage height, 10.15 ft (3.094 m); maximum gage height, 10.33 ft (3.149 m) July 10, 1951, Mar. 5, 1979; minimum daily discharge, 7.0 ft³/s (0.20 m³/s) Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,800 ft³/s (51.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0500	*4850 137	*10.33 3.149

Minimum daily discharge, 124 ft³/s (3.51 m³/s) July 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	201	158	211	713	210	450	1390	896	324	268	151	242
2	203	156	199	786	210	560	1180	823	309	316	204	231
3	208	157	235	508	205	760	1080	987	297	297	214	228
4	205	155	338	450	190	2610	1030	1330	281	264	210	217
5	211	161	332	405	165	4470	1140	1120	268	246	228	214
6	232	170	294	365	180	2890	1050	916	267	221	231	207
7	237	188	299	335	185	2330	948	824	272	204	238	204
8	237	198	322	315	185	2130	913	763	303	184	260	194
9	238	194	336	290	185	2000	1220	722	288	217	288	181
10	230	190	250	270	185	1880	1420	693	272	221	413	181
11	224	171	200	260	185	1640	1200	695	276	210	388	175
12	220	165	210	255	185	1530	1360	735	264	204	320	160
13	215	169	235	245	185	1410	1480	772	257	197	264	160
14	210	181	269	240	190	1380	1270	763	246	178	253	162
15	202	196	286	235	190	1340	1090	727	235	178	228	160
16	193	192	292	230	195	1190	989	660	224	175	224	160
17	184	222	257	225	195	1090	925	589	253	168	228	148
18	178	234	238	225	200	1050	866	554	253	154	253	145
19	161	227	227	220	205	1050	815	527	246	142	324	136
20	152	224	233	220	210	1040	777	509	249	148	652	133
21	148	218	244	220	225	977	743	482	246	142	592	127
22	144	206	237	220	245	908	721	446	221	136	422	133
23	149	214	222	220	270	902	678	426	207	127	367	142
24	149	213	226	220	300	978	672	409	197	124	371	148
25	154	209	228	220	400	958	722	394	194	166	347	156
26	172	205	210	220	490	857	840	376	181	175	320	160
27	170	209	180	215	400	792	944	358	175	160	328	166
28	166	203	150	215	370	770	929	342	175	156	332	181
29	163	194	190	215	---	922	889	331	166	151	312	194
30	161	193	225	210	---	1400	862	327	184	145	288	197
31	163	---	318	210	---	1620	---	324	---	145	246	---
TOTAL	5880	5772	7693	9177	6540	43884	30143	19820	7330	5818	9496	5242
MEAN	190	192	248	296	234	1416	1005	639	244	188	306	175
MAX	238	234	338	786	490	4470	1480	1330	324	316	652	242
MIN	144	155	150	210	165	450	672	324	166	124	151	127
CFSM	.32	.32	.42	.50	.39	2.38	1.69	1.08	.41	.32	.52	.30
IN.	.37	.36	.48	.57	.41	2.75	1.89	1.24	.46	.36	.59	.33

CAL YR 1978	TOTAL	188203	MEAN	516	MAX	4310	MIN	115	CFSM	.87	IN	11.79
WTR YR 1979	TOTAL	156795	MEAN	430	MAX	4470	MIN	124	CFSM	.72	IN	9.82

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW¼NE¼ sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft (61 m) downstream from mouth of Elkhart River, 200 ft (61 m) upstream from Main Street bridge in Elkhart, 2,000 ft (610 m) downstream from Christiana Creek, and 0.5 mile (0.8 km) downstream from Elkhart Hydroelectric Plant.

DRAINAGE AREA.--3,370 mi² (8,728 km²).

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile (1.3 km) downstream at different datum from September 1924 to March 1926 are available in the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft (213.360 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. The flow is regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--32 years, 3,075 ft³/s (87.08 m³/s), 12.39 in/yr (315 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,400 ft³/s (521 m³/s) Apr. 5, 1950, gage height, 27.82 ft (8.480 m); minimum daily, 336 ft³/s (9.52 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,700 ft³/s (360 m³/s) Mar. 5, gage height, 25.00 ft (7.620 m); minimum daily, 1,090 ft³/s (30.9 m³/s) Sept. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2310	1620	1920	3420	2300	3380	6740	5740	2870	3290	1600	2510
2	2000	1650	1950	3810	2300	2910	6660	5670	2950	3030	1640	2140
3	1830	1700	2150	3040	2250	3840	6620	6010	2810	2630	1920	2150
4	1710	1680	2570	3130	2200	6550	6530	6400	2810	2760	1870	1890
5	1640	1630	2440	3640	2150	11400	6570	6170	2590	2890	1720	2320
6	1840	1680	2740	3880	2100	10600	6470	5880	2400	2810	2240	2020
7	1190	1970	2600	3450	2100	10100	6200	5720	2580	2530	2010	1800
8	1830	1870	3050	3100	2150	9810	6100	5500	2720	2510	2000	1570
9	1930	1810	2850	2850	2200	9610	6620	5280	2610	2530	2100	1640
10	2290	1580	2620	2600	2300	9510	6770	4990	2700	2280	2510	1910
11	1840	1690	2120	2450	2200	8830	6670	5100	3000	2450	2920	1880
12	1880	1600	2890	2300	2100	8380	7020	5340	2770	2090	2420	1790
13	1910	1690	2670	2400	2000	8160	7090	5300	2690	1810	2100	1710
14	1910	1240	2540	2300	2100	7920	6970	5150	2560	1990	1910	1770
15	1950	1860	2590	2150	2200	7430	6700	4960	2490	1960	1960	1710
16	2190	1650	2290	2300	2100	6970	6360	4780	2200	1690	1840	1330
17	1830	2070	2340	2300	2050	6740	6120	4460	2210	1900	1950	1150
18	1830	2020	2410	2500	2000	6400	5900	4290	1970	1720	1910	1110
19	1870	1980	2420	2400	1950	6260	5570	4090	1790	1360	2250	1270
20	1820	2460	2280	2400	1900	6040	5200	3890	2000	1440	3500	1240
21	1630	2340	2270	2450	2050	6040	5140	3650	2160	1360	3400	1400
22	1610	1520	2330	2400	2250	5740	4920	3530	2300	1400	3150	1510
23	1410	1610	2280	2400	2470	5710	4740	3420	1820	1590	2900	1170
24	1460	1990	1910	2400	3490	5910	4730	3330	1790	1420	2830	1110
25	1390	2080	2170	2400	2890	5660	4790	3180	1790	1420	2640	1300
26	1540	2060	2370	2400	2980	5320	5210	2940	1750	1430	2350	1480
27	1590	2190	2050	2400	3010	5080	5630	2930	1680	1380	2520	1090
28	1760	2160	1930	2400	3100	4960	5680	3070	1700	1250	2710	1520
29	1790	2020	1870	2400	---	5240	5590	2840	2070	1190	2720	1210
30	1780	2030	2310	2350	---	6170	5620	2710	2440	1470	2480	1300
31	1640	---	2360	2350	---	6570	---	2760	---	1720	2380	---
TOTAL	55200	55450	73290	82770	64890	213240	180930	139080	70220	61300	72450	48000
MEAN	1781	1848	2364	2670	2318	6879	6031	4486	2341	1977	2337	1600
MAX	2310	2460	3050	3880	3490	11400	7090	6400	3000	3290	3500	2510
MIN	1190	1240	1870	2150	1900	2910	4730	2710	1680	1190	1600	1090
CFSM	.53	.55	.70	.79	.69	2.04	1.79	1.33	.70	.59	.69	.48
IN.	.61	.61	.81	.91	.72	2.35	2.00	1.54	.78	.68	.80	.53

CAL YR 1978 TOTAL 1201870 MEAN 3293 MAX 12000 MIN 1010 CFSM .98 IN 13.27
WTR YR 1979 TOTAL 1116820 MEAN 3060 MAX 11400 MIN 1090 CFSM .91 IN 12.33

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101500 ST. JOSEPH RIVER AT NILES, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°49'45", long 86°15'35", in SW¼ sec. 26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft (30 m) upstream from Main Street Bridge at Niles, 0.6 mi (1.0 km) downstream from dam at French Paper Co., 1 mi (2 km) upstream from Dowagiac River, and at mile 44 (71 km).

DRAINAGE AREA.--3,666 mi² (9,495 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft (192.944 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, at datum 2.00 ft (0.610 m) higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft (15 m) upstream from present site (gage heights referred to NGVD). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi (1.8 km) downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi (13 km) downstream from base gage at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--49 years, 3,169 ft³/s (89.75 m³/s), 11.74 in/yr (298 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 ft³/s (572 m³/s) Apr. 5, 1950, gage height, 15.10 ft (4.602 m), present datum; minimum daily, 420 ft³/s (11.9 m³/s) Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14,300 ft³/s (405 m³/s) Mar. 6, gage height, 12.36 ft (3.767 m); minimum daily, 1,290 ft³/s (36.5 m³/s) June 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2270	1930	2330	3400	2720	3770	7750	6380	3150	3820	2200	3100
2	2490	1970	2470	3700	2560	3510	7200	6130	3310	2970	2160	2800
3	2370	1900	2340	3500	2320	4000	7350	6610	3070	3210	2030	2600
4	1990	2060	2730	3700	2600	7500	6940	7340	3190	2900	2490	2600
5	2120	2090	3450	4100	2210	13700	7280	6970	3200	3800	2330	2500
6	2290	2030	3340	4200	2300	12900	6970	6390	2550	3010	2450	2410
7	2210	2200	3190	3900	2120	11300	6740	6220	3060	2880	2550	2270
8	1650	2340	3880	3500	2430	10900	6610	5870	3260	2830	2230	2300
9	2130	2120	3860	3300	2450	10400	7190	5730	3140	2890	2640	2050
10	2280	2200	3440	3100	2430	10400	7350	5570	3050	2610	3010	1650
11	2670	1720	3200	2800	2490	9430	7460	5200	3200	2760	3490	2490
12	2140	2070	2980	2600	2230	8960	7700	5910	3320	2590	2890	2230
13	2180	1990	3690	2700	2100	8700	8270	5860	2880	2320	2880	2050
14	2440	1880	3130	2300	2390	8480	7220	5700	3050	2290	1970	2330
15	2210	1720	2840	2200	2510	7940	7270	5440	2940	2380	2400	1650
16	2830	2240	2980	2600	2080	7260	6770	5140	2870	2100	2460	2000
17	2130	2270	2550	2500	2220	7270	6630	5040	2470	2220	2390	1540
18	2320	2440	2800	2900	2110	6740	6330	4510	3100	2080	2560	1590
19	2140	2320	2930	2830	2320	6240	6130	4590	2590	1880	2330	1640
20	2270	2410	3000	2660	1990	6320	5720	4450	2660	1700	3560	1580
21	1930	2970	2600	2580	2460	6490	5480	3910	2470	1860	3700	1720
22	1930	2210	2490	2580	2150	6150	5460	4120	2950	1680	3800	1710
23	2130	1650	2940	2500	2530	5720	5160	3670	2430	1870	3500	1700
24	1730	2250	2460	2760	3200	6340	5130	3980	2240	2020	3600	1510
25	1810	2440	2330	2480	3330	6350	5370	3120	2070	1710	3700	1650
26	2030	2390	2550	2640	3080	5670	5700	3550	1290	1910	3100	1780
27	1920	2370	2810	2550	3250	5620	6650	3050	2230	1780	2600	1480
28	1990	2550	2330	2620	3170	5470	6400	3430	1800	1770	3000	1930
29	2140	2370	2660	2580	---	5420	6200	3270	2590	1520	3500	1420
30	2370	2490	2360	2770	---	6930	6300	3170	2860	1800	3000	1710
31	2340	---	3000	2590	---	7650	---	3180	---	1940	3000	---
TOTAL	67450	65590	89660	91140	69750	233530	198730	153500	82990	73100	87520	59990
MEAN	2176	2186	2882	2940	2491	7533	6624	4952	2766	2358	2823	2000
MAX	2830	2970	3880	4200	3330	13700	8270	7340	3320	3820	3800	3100
MIN	1650	1650	2330	2200	1990	3510	5130	3050	1290	1520	1970	1420
CFSM	.59	.60	.79	.80	.68	2.06	1.81	1.35	.76	.64	.77	.55
IN.	.68	.67	.91	.92	.71	2.37	2.02	1.56	.84	.74	.89	.61
COL YR 1978 TOTAL	1315870	MEAN	3605	MAX	13000	MIN	1210	CFSM	.98	IN	13.35	
WTR YR 1979 TOTAL	1272950	MEAN	3488	MAX	13700	MIN	1290	CFSM	.95	IN	12.92	

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED
WATER QUALITY RECORDS

PERIOD OF RECORD.--February to September 1979.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February to September 1979.

WATER TEMPERATURE: February to September 1979.

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements at 1700 hours by a local observer.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 603 micromhos Feb. 12, 1979, minimum daily, 310 micromhos, Mar. 4, 1979.

WATER TEMPERATURES: Maximum daily recorded, 20.5°C, June 11, 1979, minimum, daily recorded, 0.0°C, Feb. 13, 14, 15 1979.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 603 micromhos Feb. 12, minimum daily, 310 micromhos Mar. 4.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED SATUR- ATION	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER CAC03)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
FER 12...	1530	2200	578	7.7	1.0	13.8	98	580	1200	280	60
MAR 05...	1630	14000	311	7.8	.5	14.1	100	K3000	>5000	140	32
APR 02...	1530	7320	464	7.8	8.0	11.3	97	9200	8500	230	59
MAY 23...	1030	3650	540	8.1	19.0	9.4	103	K2000	K140	270	57
JUN 27...	1000	2290	530	8.5	22.5	8.6	100	810	220	260	40
AUG 01...	1000	2320	515	8.3	24.0	7.2	86	K5400	440	250	54
SEP 06...	1030	2700	520	8.4	23.0	8.4	101	6400	180	260	49

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
FER 12...	78	21	13	.3	9	2.0	270	0	221	8.6	53
MAR 05...	39	9.9	5.9	.2	8	3.5	130	0	107	3.3	28
APR 02...	63	18	9.6	.3	8	2.5	210	0	172	5.3	51
MAY 23...	74	20	10	.3	7	1.7	260	0	213	3.3	51
JUN 27...	69	21	13	.4	10	1.7	250	8	218	1.3	50
AUG 01...	66	21	13	.4	10	1.7	240	0	197	1.9	47
SEP 06...	70	20	11	.3	8	1.6	250	2	208	1.6	46

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE
RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE MICHIGAN
04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)
FFR 12...	25	.1	8.7	354	334	2100	1.5	.70	--	.40
MAR 05...	12	.1	4.4	186	167	7030	1.6	.68	--	2.5
APR 02...	21	.1	6.9	314	276	6210	2.7	.21	--	.77
MAY 23...	22	.1	2.1	379	309	3740	1.0	.06	.07	.94
JUN 27...	25	.2	2.3	336	313	2080	.95	.08	.10	.91
AUG 01...	25	.1	3.3	324	296	2030	.94	.19	.23	.91
SEP 06...	24	.1	4.4	327	306	2380	.78	.39	.47	.71

DATE	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
FER 12...	1.1	2.6	12	.04	--	.02	4.2	12	71	100
MAR 05...	3.2	4.8	21	.39	--	.10	9.8	132	4990	100
APR 02...	.98	3.7	16	.22	--	.13	--	28	553	100
MAY 23...	1.0	2.0	8.9	.07	.21	.00	--	20	197	100
JUN 27...	.99	1.9	8.6	.09	.28	.01	7.2	28	173	100
AUG 01...	1.1	2.0	9.0	.10	.31	.01	--	23	144	100
SEP 06...	1.1	1.9	8.3	.08	.25	.00	7.5	26	190	100

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
APR 02...	1530	2	1	100	0	0	0	10	10	0
AUG 01...	1000	2	1	100	60	0	0	10	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
APR 02...	0	17	7	760	50	14	1	70	10	.5
AUG 01...	0	6	5	440	0	8	4	20	1	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
APR 02...	.5	0	0	2	0	50	20	10	.6
AUG 01...	<.5	0	0	0	0	30	2	7.5	--

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE	TIME	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT (G/SQ M)	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT (G/SQ M)	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
AUG 01...	1000	31.3	1.73	2.44	22.7	.000

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					---	565	488	538	569	579	570	589
2					---	561	489	542	558	571	565	569
3					---	312	493	521	560	571	568	563
4					---	310	496	532	558	571	571	563
5					---	---	498	537	563	571	575	566
6					---	---	500	537	567	575	575	587
7					---	---	500	515	563	565	575	574
8					---	---	482	507	564	569	572	576
9					---	---	502	523	563	567	572	574
10					---	---	501	507	563	567	577	568
11					---	---	494	535	563	567	567	576
12					603	---	493	516	542	574	578	590
13					601	---	493	544	---	577	574	565
14					600	---	497	566	---	576	579	579
15					601	---	524	543	---	567	579	572
16					588	---	523	544	---	565	579	565
17					595	---	525	542	---	571	572	570
18					595	---	523	542	---	568	563	560
19					591	495	532	562	---	569	568	574
20					562	498	537	564	---	565	568	585
21					566	496	536	560	---	563	567	560
22					561	495	532	541	---	563	565	550
23					565	490	514	541	---	563	565	560
24					564	480	514	562	---	568	570	572
25					564	491	521	566	---	569	570	560
26					562	498	527	566	---	565	570	582
27					562	500	532	565	---	569	572	565
28					564	488	512	567	---	565	570	570
29					---	494	516	566	---	565	570	571
30					---	491	513	565	---	572	564	573
31					---	481	---	565	---	567	571	---
MEAN							510	545		569	571	571

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					---	.5	7.5	10.5	19.5			
2					---	1.0	8.0	10.5	19.5			
3					---	1.0	8.5	11.0	19.5			
4					---	1.0	7.5	12.5	19.0			
5					---	---	8.5	13.5	19.5			
6					---	---	6.5	15.0	20.0			
7					---	---	7.0	16.0	20.0			
8					---	---	4.5	17.0	19.5			
9					---	---	5.0	19.5	19.5			
10					---	---	6.0	19.0	20.0			
11					---	---	7.5	18.5	20.5			
12					.5	---	10.0	18.5	20.0			
13					.0	---	11.5	18.5	---			
14					.0	---	11.0	19.0	---			
15					.0	---	11.0	19.0	---			
16					.5	---	10.0	19.5	---			
17					1.0	---	10.0	19.5	---			
18					1.0	---	10.5	19.0	---			
19					.5	8.0	14.0	18.0	---			
20					1.0	8.0	14.5	18.0	---			
21					.5	8.5	13.0	19.0	---			
22					1.0	7.5	16.5	19.0	---			
23					.5	7.0	16.5	18.5	---			
24					.5	7.5	15.0	19.5	---			
25					1.0	7.0	15.5	19.0	---			
26					1.0	6.0	14.5	19.0	---			
27					2.0	5.5	13.5	20.0	---			
28					1.5	5.0	12.0	19.5	---			
29					---	5.0	11.0	19.5	---			
30					---	9.0	10.0	19.0	---			
31					---	9.0	---	19.5	---			
MEAN							10.5	17.5				

STREAMS TRIBUTARY TO LAKE MICHIGAN

175

04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE¼ sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft (9 m) upstream from bridge on Indian Lake Road, 0.3 mi (0.5 km) west of Sumnerville.

DRAINAGE AREA.--255 mi² (660 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft (211.111 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 277 ft³/s (7.845 m³/s), 14.75 in/yr (375 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) June 26, 1968, gage height, 8.78 ft (2.676 m); minimum, 86 ft³/s (2.44 m³/s) Sept. 10, 1964; minimum gage height, 2.57 ft (0.783 m) Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,070 ft³/s (30.3 m³/s) Mar. 5, gage height, 7.97 ft (2.429 m); minimum, 169 ft³/s (4.79 m³/s) Sept. 27, gage height, 3.36 ft (1.024 m).

DISCHARGE, IN CUHIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	237	276	290	558	301	341	639	508	297	409	228	286
2	231	272	294	505	297	345	628	468	287	363	304	274
3	244	270	324	393	294	370	631	615	278	332	283	261
4	252	266	404	403	281	793	571	613	267	374	264	247
5	264	264	383	380	277	1050	548	523	257	382	329	239
6	386	269	355	348	274	991	504	476	255	335	352	231
7	434	291	343	341	296	887	475	443	322	312	307	224
8	389	281	339	329	284	790	491	419	687	290	281	216
9	348	273	327	303	259	732	591	399	632	275	267	210
10	320	267	308	314	268	683	539	385	523	264	309	205
11	302	263	305	292	268	598	509	380	490	252	322	201
12	291	259	305	302	264	537	571	382	438	242	281	198
13	280	260	308	300	256	533	551	386	389	237	261	198
14	284	301	303	297	265	623	500	408	359	234	257	195
15	309	290	298	276	262	559	464	419	333	227	243	188
16	343	278	293	309	257	503	440	391	311	219	229	185
17	329	288	289	311	228	506	423	367	294	208	247	183
18	310	312	287	303	238	555	411	350	287	202	374	179
19	296	298	286	300	238	623	401	341	280	193	370	177
20	285	285	288	304	237	594	394	340	275	188	348	175
21	276	278	312	310	251	534	388	324	278	186	356	174
22	268	273	302	308	291	495	390	313	262	177	319	175
23	275	295	291	306	339	496	381	310	252	175	304	173
24	281	314	288	316	429	517	388	308	243	175	296	172
25	280	299	290	308	407	484	473	302	233	186	286	173
26	347	290	290	310	373	455	526	291	227	188	275	172
27	347	293	273	310	357	437	535	283	218	178	269	171
28	321	291	260	309	347	431	541	278	214	191	265	171
29	302	285	267	305	---	499	514	274	250	232	319	172
30	292	290	300	302	---	714	524	280	425	232	338	172
31	283	---	387	303	---	738	---	300	---	242	303	---
TOTAL	9406	8471	9579	10255	8138	18413	14941	11876	9863	7700	9186	5997
MEAN	303	282	309	331	291	594	498	383	329	248	296	200
MAX	434	314	404	558	429	1050	639	615	687	409	374	286
MIN	231	259	260	276	228	341	381	274	214	175	228	171
CFSM	1.19	1.11	1.21	1.30	1.14	2.33	1.95	1.50	1.29	.97	1.16	.78
IN.	1.37	1.24	1.40	1.50	1.19	2.69	2.18	1.73	1.44	1.12	1.34	.87

CAL YR 1978 TOTAL 113406 MEAN 311 MAX 740 MIN 162 CFSM 1.22 IN 16.54
WTR YR 1979 TOTAL 123825 MEAN 339 MAX 1050 MIN 171 CFSM 1.33 IN 18.06

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW¼ SE¼ sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft (12 m) upstream from bridge on Coloma Road, 0.8 mi (1.3 km) east of Riverside.

DRAINAGE AREA.--390 mi² (1,010 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft (179.466 m) National Geodetic Vertical Datum of 1929. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 433 ft³/s (12.26 m³/s), 15.08 in/yr (383 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,830 ft³/s (80.1 m³/s) Mar. 9, 1979, gage height, 10.11 ft (3.082 m); minimum, 99 ft³/s (2.80 m³/s) July 5, 1964, gage height, 2.66 ft (0.811 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,830 ft³/s (80.1 m³/s) Mar. 9, gage height, 10.11 ft (3.082 m); minimum, 282 ft³/s (7.99 m³/s) Sept. 30, gage height, 4.35 ft (1.326 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	365	424	473	480	480	804	933	858	415	549	415	426
2	349	407	473	540	480	709	938	870	416	541	416	411
3	345	392	483	580	470	722	1060	909	411	527	409	396
4	346	413	526	620	460	1030	1110	958	401	598	397	380
5	353	435	569	640	460	1970	1090	915	390	731	425	368
6	393	433	569	650	450	1740	1050	878	379	764	469	356
7	446	435	562	580	450	1680	982	858	378	704	484	339
8	460	428	560	540	440	2520	938	838	432	657	465	338
9	463	420	560	510	440	2740	916	814	527	610	454	332
10	464	416	550	490	430	2230	898	764	612	558	461	327
11	474	411	540	490	430	1900	872	737	665	491	476	321
12	486	402	560	480	420	1540	886	707	704	440	463	317
13	478	394	560	470	420	1270	926	667	734	408	440	315
14	448	399	553	470	420	1220	954	640	731	392	433	325
15	430	403	539	470	410	1160	916	620	698	378	435	328
16	433	402	521	470	400	1050	884	604	637	360	410	322
17	439	407	505	480	400	996	855	588	568	348	391	315
18	418	419	493	490	390	985	819	572	505	339	451	314
19	402	427	483	500	380	1010	773	541	450	330	515	317
20	397	422	475	500	370	1010	734	514	404	321	527	308
21	393	418	479	500	380	971	707	498	392	315	534	310
22	381	419	479	500	400	940	695	481	386	307	547	300
23	371	436	469	500	430	928	667	462	379	303	553	304
24	374	457	464	500	480	931	642	445	373	301	553	299
25	381	463	463	500	560	922	642	435	362	303	557	295
26	404	456	440	500	640	884	680	426	349	306	557	293
27	430	457	420	500	700	846	755	418	340	309	538	289
28	435	465	400	500	785	821	781	417	338	334	515	289
29	428	470	410	500	---	825	796	402	389	377	502	287
30	425	472	420	490	---	914	822	393	496	375	483	284
31	427	---	440	490	---	981	---	408	---	406	454	---
TOTAL	12838	12802	15438	15930	12975	38249	25721	19637	14261	13682	14729	9805
MEAN	414	427	498	514	463	1234	857	633	475	441	475	327
MAX	486	472	569	650	785	2740	1110	958	734	764	557	426
MIN	345	392	400	470	370	709	642	393	338	301	391	284
CFSM	1.06	1.10	1.28	1.32	1.19	3.16	2.20	1.62	1.22	1.13	1.22	.84
IN.	1.22	1.22	1.47	1.52	1.24	3.65	2.45	1.87	1.36	1.31	1.40	.94
CAL YR 1978 TOTAL	170551		MEAN 467	MAX 1210	MIN 254	CFSM 1.20	IN 16.27					
WTR YR 1979 TOTAL	206067		MEAN 565	MAX 2740	MIN 284	CFSM 1.45	IN 19.66					

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04102700 BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW¼ sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft (15 m) upstream from bridge on 66th Street, 4.9 mi (7.9 km) northwest of Bangor.

DRAINAGE AREA.--83.6 mi² (216.5 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 104 ft³/s (2.945 m³/s), 16.89 in/yr (429 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,320 ft³/s (37.4 m³/s) Apr. 19, 1975, gage height, 13.16 ft (4.011 m); minimum, 20 ft³/s (0.57 m³/s) Sept. 28, 1966, gage height, 1.83 ft (0.558 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	1000	*1,090 30.9	*12.18 3.712	Mar. 31	0400	412 11.7	7.63 2.326
Mar. 14	2300	468 13.3	8.15 2.484				

Minimum discharge, 29 ft³/s (0.82 m³/s) Sept. 18, 19, 25, 26; minimum gage height, 1.99 ft (0.607 m) Sept. 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	72	74	100	95	85	120	337	234	60	102	45	43
2	68	72	98	110	85	140	292	204	59	86	44	41
3	68	70	108	125	85	156	291	232	53	70	42	40
4	69	68	172	200	85	468	259	280	51	74	41	38
5	72	68	187	300	85	1040	234	242	50	79	51	38
6	90	66	173	260	85	848	206	205	50	66	65	37
7	110	66	156	220	85	720	177	171	52	57	56	36
8	123	66	143	190	85	657	172	144	82	52	53	35
9	119	65	130	160	85	623	255	122	137	49	50	34
10	104	65	120	140	85	574	248	107	150	46	58	33
11	90	65	110	120	85	490	222	105	158	44	60	33
12	80	68	100	110	85	425	250	106	130	43	53	33
13	72	80	100	100	85	362	250	105	105	41	47	32
14	70	110	100	95	80	428	220	108	85	41	46	32
15	75	100	100	95	80	428	192	107	73	41	43	32
16	86	88	100	95	80	329	163	101	65	39	41	32
17	84	92	100	95	80	292	142	92	59	38	43	31
18	78	115	98	95	80	301	126	85	53	37	84	31
19	72	100	97	95	80	363	113	80	50	37	79	30
20	67	90	95	95	80	385	105	78	48	37	81	31
21	64	86	110	95	80	335	103	74	48	36	86	31
22	61	86	110	95	80	291	115	71	46	36	77	31
23	61	92	105	90	85	262	112	68	44	35	68	30
24	64	110	101	90	90	256	107	66	42	36	61	31
25	65	98	96	90	95	250	125	64	41	38	60	30
26	99	94	91	90	100	225	206	61	39	38	58	29
27	114	93	83	90	110	198	301	59	38	37	52	30
28	105	93	85	90	115	178	281	57	42	38	49	30
29	92	92	85	90	---	188	269	56	63	37	48	31
30	86	97	80	90	---	340	252	57	160	39	47	31
31	78	---	90	90	---	400	---	60	---	47	46	---
TOTAL	2558	2529	3423	3795	2420	12072	6125	3601	2133	1496	1734	996
MEAN	82.5	84.3	110	122	86.4	389	204	116	71.1	48.3	55.9	33.2
MAX	123	115	187	300	115	1040	337	280	160	102	86	43
MIN	61	65	80	90	80	120	103	56	38	35	41	29
CFSM	.99	1.01	1.32	1.46	1.03	4.65	2.44	1.39	.85	.58	.67	.40
IN.	1.14	1.13	1.52	1.69	1.08	5.37	2.73	1.60	.95	.67	.77	.44

CAL YR 1978	TOTAL	45738	MEAN	125	MAX	737	MIN	32	CFSM	1.50	IN	20.35
WTR YR 1979	TOTAL	42882	MEAN	117	MAX	1040	MIN	29	CFSM	1.40	IN	19.08

STREAMS TRIBUTARY TO LAKE MICHIGAN

04103500 KALAMAZOO RIVER AT MARSHALL, MI

LOCATION.--Lat 42°15'55", long 84°57'55", on line between sec.25 and 26, T.2 S., R.6 W., Calhoun County, Hydrologic Unit 04050003, on left bank at upstream side of bridge on U.S. Highway 27 at Marshall.

DRAINAGE AREA.--449 mi² (1,163 km²).

PERIOD OF RECORD.--October 1948 to current year. Monthly discharge only for October 1948, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 877.09 ft (267.337 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 11, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 312 ft³/s (8.836 m³/s), 9.44 in/yr (240 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,130 ft³/s (60.3 m³/s) Mar. 29, 1950, gage height, 8.20 ft (2.499 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 2, 1967; minimum gage height, 3.00 ft (0.914 m) May 16, 1963; minimum daily discharge, 31 ft³/s (0.88 m³/s) Aug. 16, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,250 ft³/s (35.4 m³/s) Mar. 7, gage height, 6.30 ft (1.920 m); minimum, 51 ft³/s (1.44 m³/s) Sept. 28, 29, gage height, 3.29 ft (1.003 m); minimum daily, 57 ft³/s (1.61 m³/s) Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	223	223	520	217	362	720	505	252	310	177	210
2	127	214	214	294	189	286	685	575	370	258	213	180
3	178	157	314	255	208	298	675	580	133	249	185	150
4	183	191	318	354	220	595	575	585	265	402	250	240
5	172	206	306	346	200	1070	575	600	262	366	387	202
6	211	229	382	370	180	1190	600	585	239	323	200	176
7	197	236	366	262	208	1170	422	406	252	381	252	201
8	194	191	330	255	229	1120	530	475	208	211	231	65
9	206	194	283	276	217	1000	600	434	191	232	287	139
10	229	206	242	214	175	890	595	326	283	228	284	169
11	170	191	265	262	175	790	630	358	245	224	260	192
12	180	185	286	200	178	695	615	402	258	193	250	197
13	223	180	262	242	183	660	550	302	226	220	200	184
14	82	150	269	197	191	550	570	358	217	209	160	211
15	242	170	233	211	249	550	555	338	223	185	170	57
16	214	200	338	197	180	610	430	314	149	188	170	107
17	217	220	191	223	175	505	520	390	214	209	180	225
18	200	250	245	236	172	362	358	314	223	114	250	163
19	203	250	217	208	172	515	490	262	208	230	300	165
20	194	250	233	265	189	422	354	255	217	187	260	164
21	194	250	294	203	272	560	382	302	189	174	250	139
22	178	230	265	276	194	354	322	249	138	136	250	74
23	233	230	226	189	226	450	318	262	203	126	250	135
24	276	230	236	211	310	515	370	255	142	221	260	177
25	229	240	258	214	283	525	330	255	172	206	250	180
26	189	250	217	217	239	283	520	249	180	176	230	184
27	236	260	226	223	283	398	585	279	206	186	210	163
28	236	270	242	211	346	394	402	374	175	62	210	100
29	272	255	183	262	---	426	580	206	220	148	210	78
30	258	269	242	186	---	480	590	272	279	268	230	134
31	217	---	330	214	---	700	---	245	---	228	220	---
TOTAL	6360	6577	8236	7793	6060	18725	15448	11312	6539	6850	7236	4761
MEAN	205	219	266	251	216	604	515	365	218	221	233	159
MAX	276	270	382	520	346	1190	720	600	370	402	387	240
MIN	82	150	183	186	172	283	318	206	133	62	160	57
CFSM	.46	.49	.59	.56	.48	1.35	1.15	.81	.49	.49	.52	.35
IN.	.53	.54	.68	.65	.50	1.55	1.28	.94	.54	.57	.60	.39
CAL YR 1978 TOTAL	111759		MEAN 306	MAX 1200	MIN 53	CFSM .68	IN 9.26					
WTR YR 1979 TOTAL	105897		MEAN 290	MAX 1190	MIN 57	CFSM .65	IN 8.77					

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW¼ sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft (107 m) upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--241 mi² (624 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft (250.924 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--46 years (water years 1931, 1935-79), 198 ft³/s (5.607 m³/s), 11.16 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft³/s (103 m³/s) Apr. 7, 1947, gage height, 4.48 ft (1.366 m), from floodmark; minimum, 22 ft³/s (0.62 m³/s) Aug. 14, 1934; minimum gage height, about -0.5 ft (-.152 m) in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,070 ft³/s (58.6 m³/s) Mar. 7, gage height, 3.11 ft (0.948 m); minimum, 50 ft³/s (1.42 m³/s) Sept. 30, gage height, 0.59 ft (0.180 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	121	145	216	135	223	539	532	163	185	78	89
2	93	116	138	193	130	234	674	513	159	194	81	83
3	91	111	146	183	130	253	682	503	150	196	81	78
4	94	109	163	160	130	350	647	495	141	232	79	75
5	98	106	177	180	120	555	618	486	133	228	84	74
6	111	106	190	180	110	1410	584	482	129	200	100	71
7	118	111	211	250	125	1970	538	458	128	171	93	69
8	119	112	220	250	130	1900	524	421	143	143	86	67
9	117	111	204	220	120	1600	543	379	153	119	81	66
10	112	111	160	190	120	1320	594	340	164	108	86	65
11	105	110	172	170	120	1080	733	313	181	105	85	63
12	99	107	185	160	120	1030	750	311	177	118	78	62
13	96	105	185	150	120	916	692	311	161	109	72	60
14	93	108	176	140	120	795	646	316	146	104	70	60
15	92	108	168	140	120	602	602	314	129	104	67	61
16	107	109	162	140	120	640	544	296	112	98	64	57
17	126	117	159	130	130	634	484	278	105	91	71	56
18	127	129	156	130	120	562	432	257	100	85	106	55
19	115	137	152	140	110	504	384	235	93	77	125	55
20	124	142	150	140	110	477	351	215	93	71	124	55
21	124	145	151	140	120	465	326	200	110	69	129	55
22	119	138	149	140	127	453	305	185	108	68	128	62
23	115	137	169	140	138	440	288	173	103	67	129	52
24	115	144	172	140	160	420	281	167	96	65	140	52
25	119	149	164	140	174	404	292	162	91	64	127	54
26	125	154	139	140	187	382	322	159	87	66	113	54
27	132	159	142	140	201	366	351	155	84	65	104	54
28	134	155	116	140	213	346	401	155	86	65	97	55
29	134	145	137	140	---	344	464	155	103	65	97	54
30	132	148	138	140	---	370	509	153	152	70	100	53
31	126	---	169	140	---	420	---	158	---	76	93	---
TOTAL	3506	3760	5065	5002	3760	21465	15100	9277	3780	3478	2968	1866
MEAN	113	125	163	161	134	692	503	299	126	112	95.7	62.2
MAX	134	159	220	250	213	1970	750	532	181	232	140	89
MIN	91	105	116	130	110	223	281	153	84	64	64	52
CFSM	.47	.52	.68	.67	.56	2.87	2.09	1.24	.52	.47	.40	.26
IN.	.54	.58	.78	.77	.58	3.31	2.33	1.43	.58	.54	.46	.29
CAL YR 1978	TOTAL	68069	MEAN 186	MAX 1210	MIN 57	CFSM .77	IN 10.51					
WTR YR 1979	TOTAL	79027	MEAN 217	MAX 1970	MIN 52	CFSM .90	IN 12.20					

STREAMS TRIBUTARY TO LAKE MICHIGAN

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW¼ sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft (6 m) upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi² (2,134 km²).

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi (7.6 km) downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft (549 m) upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records poor. No gage-height record March 6-12. Diurnal fluctuation, below 1,500 ft³/s (42.5 m³/s), caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 648 ft³/s (18.35 m³/s), 10.68 in/yr (271 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft³/s (206 m³/s) Apr. 7, 1947, gage height, 9.13 ft (2.783 m), site and datum then in use; minimum, 50 ft³/s (1.42 m³/s) Sept. 22, 1939, site then in use; minimum daily, 86 ft³/s (2.44 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,050 ft³/s (86.4 m³/s) Mar. 7, from correlation with nearby stations; minimum daily, 166 ft³/s (4.70 m³/s) Sept. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	390	414	526	954	450	740	1480	1360	498	620	450	400
2	370	407	491	810	450	730	1630	1270	519	564	430	370
3	330	382	548	548	450	701	1650	1470	556	519	420	350
4	320	334	665	612	430	1230	1580	1370	352	780	400	340
5	330	352	683	790	400	1790	1460	1340	456	700	450	330
6	370	388	730	850	390	2700	1450	1320	435	670	500	310
7	400	428	760	820	420	3000	1370	1110	456	620	480	300
8	420	414	720	710	421	2900	1240	1110	470	540	450	290
9	410	388	683	629	414	2800	1450	1120	442	440	470	290
10	400	388	556	604	421	2700	1460	910	477	410	470	280
11	370	382	548	505	376	2400	1540	880	519	400	470	280
12	340	238	638	519	382	2100	1640	932	477	400	450	334
13	330	208	629	470	370	1810	1590	965	470	400	400	340
14	320	435	548	463	382	1740	1390	830	421	380	350	322
15	320	394	556	421	382	1350	1450	900	394	370	330	298
16	360	394	564	442	435	1450	1250	870	370	370	330	166
17	420	477	564	456	428	1460	1220	830	280	360	340	232
18	440	505	484	456	588	1270	1100	770	352	350	400	310
19	400	519	526	470	376	1230	987	701	334	350	470	310
20	420	512	505	470	358	1230	1030	629	352	340	550	304
21	430	456	548	498	394	1210	740	556	407	330	500	250
22	420	435	572	456	477	1160	850	656	292	310	500	232
23	410	491	526	505	505	1080	750	456	262	290	500	178
24	400	512	540	470	564	1110	780	540	286	300	520	226
25	420	540	512	477	612	1150	932	526	280	320	500	286
26	440	526	519	491	580	998	1020	505	256	330	470	328
27	450	533	470	477	596	840	1220	505	286	330	440	316
28	460	533	414	491	620	870	1230	533	310	340	440	268
29	460	519	498	470	---	1020	1220	526	435	280	420	202
30	450	526	498	470	---	1120	1430	498	572	320	420	190
31	430	---	647	460	---	1380	---	505	---	400	420	---
TOTAL	12230	13030	17668	17264	12671	47269	38139	26493	12016	13133	13740	8632
MEAN	395	434	570	557	453	1525	1271	855	401	424	443	288
MAX	460	540	760	954	620	3000	1650	1470	572	780	550	400
MIN	320	208	414	421	358	701	740	456	256	280	330	166
CFSM	.48	.53	.69	.68	.55	1.85	1.54	1.04	.49	.52	.54	.35
IN.	.55	.59	.80	.78	.57	2.13	1.72	1.20	.54	.59	.62	.39
CAL YR 1978 TOTAL	210843		MEAN 578	MAX 2200	MIN 203	CFSM .70	IN 9.52					
WTR YR 1979 TOTAL	232285		MEAN 636	MAX 3000	MIN 166	CFSM .77	IN 10.49					

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW¼ sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft (5 m) downstream from bridge on EF Road, and 1.3 mi (2.1 km) north of Augusta.

DRAINAGE AREA.--38.9 mi² (100.8 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 42.4 ft³/s (1.201 m³/s), 14.80 in/yr (376 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 560 ft³/s (15.9 m³/s) June 27, 1978, gage height, 3.41 ft (1.039 m); minimum, 8.9 ft³/s (0.25 m³/s) Jan. 26, 1978, result of freezeup; minimum gage height, 0.65 ft (0.198 m) Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 154 ft³/s (4.36 m³/s) June 9, gage height, 2.64 ft (0.805 m); minimum, 16 ft³/s (0.45 m³/s) Dec. 28, result of freezeup; minimum gage height, 0.88 ft (0.268 m) Sept. 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	36	37	55	42	47	83	68	42	114	34	39
2	32	36	37	48	42	48	80	62	40	104	36	38
3	33	36	43	45	42	50	74	73	38	79	34	37
4	35	37	51	43	40	77	67	78	38	85	36	36
5	36	37	46	42	41	103	65	71	37	89	42	35
6	43	37	39	40	41	102	64	63	36	73	46	34
7	45	40	37	37	43	91	61	57	44	57	43	33
8	40	38	37	36	44	82	65	53	75	48	39	32
9	37	37	37	38	42	78	74	50	121	43	38	31
10	36	37	36	37	40	74	71	47	101	40	44	29
11	36	36	37	36	39	64	67	61	95	37	43	29
12	36	37	37	37	39	59	70	69	78	38	39	29
13	36	36	37	38	40	59	66	68	62	46	37	29
14	35	45	36	37	42	63	63	64	52	47	36	29
15	35	43	36	35	40	59	59	61	48	45	34	28
16	43	39	36	36	38	55	55	55	43	42	33	27
17	43	41	36	38	37	54	52	50	40	39	40	27
18	39	46	36	37	37	58	50	47	37	36	54	26
19	37	43	36	36	37	65	49	44	36	34	53	26
20	37	38	36	37	38	67	48	43	41	33	52	26
21	36	37	37	36	42	63	50	41	49	31	48	26
22	36	37	37	36	45	59	52	40	44	30	45	26
23	37	42	36	40	46	58	50	39	42	30	46	26
24	37	43	36	42	55	60	50	39	38	30	49	26
25	37	43	36	41	50	61	56	39	35	31	48	26
26	43	40	36	41	45	58	69	37	34	31	46	26
27	45	38	36	42	45	55	72	37	32	30	43	25
28	40	38	33	42	47	54	80	38	38	29	41	23
29	37	37	36	40	---	60	80	38	48	29	41	21
30	37	38	37	41	---	78	76	39	94	32	41	21
31	36	---	45	41	---	86	---	42	---	34	40	---
TOTAL	1167	1168	1168	1230	1179	2047	1918	1613	1558	1466	1301	866
MEAN	37.6	38.9	37.7	39.7	42.1	66.0	63.9	52.0	51.9	47.3	42.0	28.9
MAX	45	46	51	55	55	103	83	78	121	114	54	39
MIN	32	36	33	35	37	47	48	37	32	29	33	21
CFSM	.97	1.00	.97	1.02	1.08	1.70	1.64	1.34	1.33	1.22	1.08	.74
IN.	1.12	1.12	1.12	1.18	1.13	1.96	1.83	1.54	1.49	1.40	1.24	.83

CAL YR 1978 TOTAL 15788 MEAN 43.3 MAX 454 MIN 17 CFSM 1.11 IN 15.10
WTR YR 1979 TOTAL 16681 MEAN 45.7 MAX 121 MIN 21 CFSM 1.18 IN 15.95

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106000 KALAMAZOO RIVER AT COMSTOCK, MI

LOCATION.--Lat 42°17'05", long 85°30'50", in NE¼ sec.19, T.2 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on River Street in Comstock, 0.2 mi (0.3 km) downstream from Comstock Creek.

DRAINAGE AREA.--1,010 mi² (2,620 km²), approximately.

PERIOD OF RECORD.--April to August 1931, October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1933-36. WSP 1387: 1933, 1934(M), 1935, 1936(M), 1938(M), 1940(M), 1941.

GAGE.--Water-stage recorder. Datum of gage is 759.12 ft (231.380 m) National Geodetic Vertical Datum of 1929. Prior to November 1945, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--47 years (water years 1933-79), 845 ft³/s (23.93 m³/s), 11.36 in/yr (289 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,910 ft³/s (196 m³/s) Apr. 8, 1947, gage height, 7.94 ft (2.420 m); minimum, 119 ft³/s (3.37 m³/s) May 29, 1958, gage height, 0.09 ft (0.027 m); minimum daily, 185 ft³/s (5.24 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,810 ft³/s (108 m³/s) Mar. 8, gage height, 5.23 ft (1.594 m); minimum, 290 ft³/s (8.21 m³/s) Sept. 17, gage height, 0.69 ft (0.210 m); minimum daily, 345 ft³/s (9.77 m³/s) Sept. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	611	714	821	1140	731	1050	1710	1630	785	1050	750	638
2	589	632	813	1050	718	1000	1770	1600	768	1010	720	557
3	531	627	808	677	696	1280	1860	1650	792	920	665	465
4	574	627	885	715	665	1840	1850	1690	644	1020	617	508
5	661	608	946	905	585	2140	1780	1640	633	1190	655	537
6	724	620	950	1020	601	2640	1760	1590	664	1120	884	587
7	848	684	1070	1120	711	3500	1700	1520	800	913	779	533
8	789	730	1030	1050	714	3770	1630	1340	1050	855	714	518
9	728	686	988	968	610	3490	1640	1240	808	847	668	486
10	716	658	886	956	616	2820	1710	1250	833	694	738	373
11	647	645	814	895	662	2410	1730	1250	894	699	752	385
12	618	634	841	790	652	2290	1780	1330	873	713	682	483
13	612	517	901	765	624	2160	1810	1320	823	722	570	480
14	614	486	868	750	639	1840	1730	1250	765	660	507	457
15	602	611	841	744	642	1660	1620	1210	719	683	536	467
16	602	660	824	717	657	1710	1570	1180	592	688	520	455
17	700	734	856	744	702	1640	1410	1110	582	619	546	345
18	720	810	797	750	583	1550	1390	1010	574	628	802	351
19	675	807	717	758	596	1650	1280	1010	595	604	892	490
20	687	800	772	748	606	1520	1250	893	668	509	803	460
21	688	799	784	773	687	1510	1180	887	709	561	771	442
22	673	734	818	790	843	1500	1010	820	666	555	772	420
23	679	736	817	771	831	1460	1040	814	590	597	769	393
24	660	785	795	799	837	1370	1060	807	551	490	798	408
25	704	811	783	776	815	1380	1160	801	457	489	767	399
26	807	837	758	785	876	1410	1270	784	497	539	727	383
27	789	876	713	777	847	1250	1400	693	522	629	672	377
28	741	858	643	783	885	1130	1520	742	571	576	647	412
29	741	833	716	766	---	1210	1510	879	771	520	651	405
30	741	824	792	757	---	1490	1580	826	1060	428	703	384
31	738	---	932	755	---	1520	---	790	---	608	670	---
TOTAL	21209	21383	25979	25794	19631	57190	45710	35556	21256	22136	21747	13598
MEAN	684	713	838	832	701	1845	1524	1147	709	714	702	453
MAX	848	876	1070	1140	885	3770	1860	1690	1060	1190	892	638
MIN	531	486	643	677	583	1000	1010	693	457	428	507	345
CFSM	.68	.71	.83	.82	.69	1.83	1.51	1.14	.70	.71	.70	.45
IN.	.78	.79	.96	.95	.72	2.11	1.68	1.31	.78	.82	.80	.50
CAL YR 1978	TOTAL	320016	MEAN 877	MAX	3400	MIN 370	CFSM .87	IN 11.79				
WTR YR 1979	TOTAL	331189	MEAN 907	MAX	3770	MIN 345	CFSM .90	IN 12.20				

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE¼ sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 25 ft (8 m) upstream from bridge on Lovers Lane, and 3.0 mi (4.8 km) south of Kalamazoo.

DRAINAGE AREA.--22.4 mi² (58.0 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft (248.375 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi (3.2 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 40.1 ft³/s (1.136 m³/s), 24.31 in/yr (617 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) June 26, 1978, gage height, 4.49 ft (1.369 m); minimum, 8.0 ft³/s (0.23 m³/s) Jan. 19, 1965, gage height, 0.88 ft (0.268 m), result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 85 ft³/s (2.41 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	1600	110 3.12	2.95 0.899	June 20	1800	106 3.00	2.90 0.884
Mar. 29	1800	93 2.63	2.75 0.838	June 30	1100	115 3.26	3.00 0.914
May 3	0600	99 2.80	2.82 0.860	July 4	1000	106 3.00	2.90 0.884
June 7	2300	*150 4.25	*3.35 1.021				

Minimum discharge, 24 ft³/s (0.68 m³/s) Sept. 28, gage height, 1.64 ft (0.500 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	37	43	55	38	42	52	54	50	60	42	30
2	35	37	41	46	38	43	63	52	44	52	43	29
3	38	37	48	43	37	51	55	78	42	50	38	29
4	36	34	50	42	35	95	52	60	44	78	39	29
5	41	33	45	41	37	74	52	55	42	59	47	30
6	55	38	44	40	38	59	48	48	44	53	42	30
7	45	38	43	38	39	55	45	51	73	48	38	30
8	40	37	42	39	36	54	49	52	89	45	38	29
9	38	37	39	38	37	60	53	50	56	48	37	28
10	37	36	37	35	37	54	48	51	51	49	49	30
11	38	34	39	36	35	46	50	56	49	49	37	30
12	36	33	41	38	38	47	56	55	48	47	34	30
13	38	36	42	38	38	52	51	51	49	44	36	31
14	38	40	42	36	37	58	46	55	48	41	37	31
15	38	37	42	37	34	49	43	52	46	40	34	30
16	44	37	38	37	34	49	44	49	44	39	32	29
17	40	42	39	35	33	49	46	49	42	38	43	29
18	41	36	41	32	32	55	47	52	42	37	51	29
19	42	34	39	32	34	62	46	49	42	37	37	31
20	42	37	43	32	37	57	48	45	66	38	55	31
21	39	41	43	31	42	52	49	46	52	38	39	31
22	38	41	42	33	42	51	46	47	45	37	35	29
23	41	46	39	37	51	57	47	47	41	39	39	27
24	36	41	39	38	46	51	54	46	38	38	36	28
25	39	41	37	37	39	45	63	46	40	42	32	29
26	44	40	39	38	40	44	67	43	42	42	31	27
27	38	41	39	39	42	43	58	40	43	41	32	28
28	36	42	39	35	41	46	59	40	48	39	31	27
29	35	42	40	36	---	65	51	43	61	38	33	26
30	37	43	44	37	---	76	61	50	101	51	32	26
31	37	---	57	37	---	67	---	49	---	47	32	---
TOTAL	1216	1148	1296	1168	1067	1708	1549	1561	1522	1404	1181	873
MEAN	39.2	38.3	41.8	37.7	38.1	55.1	51.6	50.4	50.7	45.3	38.1	29.1
MAX	55	46	57	55	51	95	67	78	101	78	55	31
MIN	34	33	37	31	32	42	43	40	38	37	31	26
CAL YR 1978	TOTAL	13775	MEAN 37.7	MAX 195	MIN 25							
WTR YR 1979	TOTAL	15693	MEAN 43.0	MAX 101	MIN 26							

LOCATION.--Lat 42°14'07", long 85°38'54", in SE¼ sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi (3.4 km) southeast of Oshtemo.

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft (264.829 m) Kalamazoo County Road Commission datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 8.13 ft³/s (0.230 m³/s), 8.49 in/yr (216 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft³/s (0.74 m³/s) Aug. 31, 1975, gage height, 2.15 ft (0.655 m); minimum, 2.0 ft³/s (0.057 m³/s) Aug. 2, 3, 4, 1977; minimum gage height, 1.08 ft (0.329 m) July 23, 24, 27, 28, 29, Aug. 2, 3, 4, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 13 ft³/s (0.37 m³/s) Aug. 20, gage height, 1.73 ft (0.527 m); minimum, 3.0 ft³/s (0.085 m³/s) June 19, 27, 28, gage height, 1.18 ft (0.360 m).

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.3	7.8	6.4	7.5	5.8	6.2	8.4	6.8	4.8	8.2	9.6	5.9
2	7.3	7.7	6.4	7.2	5.8	6.5	8.4	6.4	4.8	7.5	10	5.7
3	7.7	7.7	6.9	6.8	5.8	7.0	8.2	7.5	4.7	6.4	10	5.5
4	7.8	7.8	7.3	6.5	5.8	9.3	7.7	7.7	4.5	7.7	9.8	5.3
5	8.2	7.7	6.9	6.0	5.8	11	7.8	7.1	4.3	7.7	10	5.2
6	9.3	7.8	6.8	5.8	5.6	10	7.3	6.4	4.1	7.1	10	5.0
7	10	8.2	6.6	5.4	5.4	9.1	6.4	5.9	5.5	6.2	10	4.8
8	10	8.2	6.6	5.8	5.4	8.4	6.4	5.7	9.5	5.7	9.5	4.8
9	9.3	8.0	6.2	5.5	5.4	8.0	6.8	5.3	9.6	5.2	9.3	4.7
10	8.9	7.8	5.9	4.3	5.4	7.8	6.4	5.2	9.1	5.0	9.8	4.7
11	8.4	7.7	5.9	5.0	5.4	7.1	6.2	5.3	7.7	4.7	9.6	4.5
12	7.8	7.5	5.5	5.4	5.4	6.8	6.9	5.7	6.6	4.5	9.3	4.5
13	7.8	7.5	5.5	5.4	5.6	6.6	6.9	5.9	5.9	4.3	9.1	4.5
14	7.7	7.7	5.5	5.4	5.4	6.9	6.4	6.0	5.5	4.3	8.9	4.5
15	7.7	7.5	5.5	5.4	5.0	6.8	5.9	6.2	5.0	4.1	8.7	4.5
16	8.0	7.3	5.5	5.6	5.0	6.4	5.7	5.9	4.5	4.0	8.4	4.3
17	8.0	7.7	5.5	5.4	5.0	6.4	5.5	5.7	4.5	3.8	8.9	4.3
18	8.0	7.7	5.5	5.0	4.6	6.6	5.3	5.2	4.3	3.8	11	4.5
19	8.0	7.7	5.5	5.0	4.8	7.3	5.2	4.8	4.0	3.6	11	4.3
20	7.8	7.1	5.5	5.0	5.2	7.8	5.2	4.8	4.3	3.6	12	4.3
21	7.5	6.9	5.7	5.0	5.8	7.7	5.2	4.7	4.5	3.6	12	4.3
22	7.3	6.9	5.5	5.4	6.3	7.3	5.5	4.5	4.0	3.5	11	4.3
23	7.3	7.1	5.5	5.6	7.2	7.3	5.3	4.5	3.8	3.6	11	4.1
24	7.5	7.3	5.5	5.6	6.8	7.5	5.3	4.5	3.6	4.3	11	4.1
25	7.8	7.1	5.5	5.6	6.4	7.3	6.0	4.5	3.6	6.8	10	4.3
26	8.2	6.6	5.3	5.7	5.8	6.9	6.8	4.3	3.6	7.1	9.8	4.3
27	8.2	6.6	5.2	5.8	6.0	6.6	6.8	4.3	3.6	7.3	8.6	4.3
28	8.0	6.8	5.2	5.8	6.2	6.4	6.8	4.3	3.6	7.7	6.8	4.3
29	8.0	6.4	5.2	5.8	---	7.5	6.6	4.3	4.7	8.0	6.6	4.5
30	7.7	6.6	5.5	5.8	---	9.1	6.9	4.5	7.7	8.7	6.4	4.5
31	7.7	---	8.0	5.8	---	9.1	---	4.8	---	9.5	6.0	---
TOTAL	250.2	222.4	183.5	175.3	158.1	234.7	194.2	168.7	155.9	177.5	294.1	138.8
MEAN	8.07	7.41	5.92	5.65	5.65	7.57	6.47	5.44	5.20	5.73	9.49	4.63
MAX	10	8.2	8.0	7.5	7.2	11	8.4	7.7	9.6	9.5	12	5.9
MIN	7.3	6.4	5.2	4.3	4.6	6.2	5.2	4.3	3.6	3.5	6.0	4.1
CFSM	.62	.57	.46	.44	.44	.58	.50	.42	.40	.44	.73	.36
IN.	.72	.64	.53	.50	.45	.67	.56	.48	.45	.51	.84	.40
CAL YR 1978	TOTAL	2616.6	MEAN									

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE¼ sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft (9 m) upstream from culvert on Oakland Drive, 2.5 mi (4.0 km) upstream from mouth, and 3.7 mi (6.0 km) southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi² (48.4 km²).

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft (261.546 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. At times flow is affected by ground-water withdrawals. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 10.0 ft³/s (0.283 m³/s), 7.25 in/yr (184 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft³/s (1.16 m³/s) Apr. 19, 1975, gage height, 3.32 ft (1.012 m); minimum, 1.0 ft³/s (0.028 m³/s) Aug. 9, 1964; minimum gage height, 0.88 ft (0.268 m) July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 23 ft³/s (0.65 m³/s) June 8, gage height, 2.94 ft (0.896 m); minimum, 4.1 ft³/s (0.12 m³/s) July 18, gage height, 2.28 ft (0.695 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.8	8.7	8.6	11	8.5	9.5	13	11	11	16	9.2	12
2	9.0	8.7	8.7	10	8.5	9.5	14	11	11	15	10	11
3	9.5	8.7	9.1	10	8.5	12	13	13	10	13	10	10
4	10	8.4	9.8	9.4	8.0	19	12	13	9.9	15	10	9.8
5	11	8.4	9.4	9.0	8.5	21	12	11	9.4	15	11	9.8
6	13	8.5	9.2	8.5	8.5	19	11	11	9.2	14	12	9.8
7	13	8.7	9.3	8.0	8.5	18	11	11	12	13	11	9.5
8	13	8.7	9.3	8.5	8.0	16	11	10	22	12	11	9.5
9	12	8.7	9.5	8.0	8.0	15	12	9.8	18	11	11	9.5
10	12	8.7	8.6	7.0	8.0	14	11	9.8	16	11	12	9.5
11	11	8.6	8.4	7.5	8.0	13	10	10	15	11	12	9.7
12	11	8.4	8.4	8.0	8.0	12	11	11	13	9.8	12	9.7
13	11	8.5	7.9	8.0	8.5	12	11	11	12	9.2	12	9.2
14	11	8.9	7.9	8.0	8.0	13	10	10	11	8.6	11	9.2
15	10	8.2	7.7	8.0	7.5	12	9.0	11	11	7.0	11	9.2
16	11	8.0	7.6	8.5	7.5	12	9.4	10	10	6.8	11	9.0
17	11	8.2	7.6	8.0	7.5	11	8.8	9.8	9.5	6.7	11	9.0
18	11	8.5	7.4	7.5	7.0	11	8.6	9.7	9.1	5.0	14	8.9
19	11	8.2	7.4	7.5	7.5	12	8.3	9.5	8.1	8.7	14	8.4
20	11	8.0	7.6	7.5	8.0	12	7.9	9.5	8.2	8.4	18	8.4
21	10	7.9	8.0	7.5	9.0	12	8.2	9.4	8.6	7.8	19	8.1
22	10	7.7	8.9	8.0	9.5	11	8.8	9.2	8.3	7.3	16	8.1
23	10	8.5	7.8	8.5	11	11	8.9	9.0	7.9	6.8	15	7.9
24	10	9.0	7.6	8.5	10	11	7.9	8.7	7.4	6.8	15	8.1
25	9.7	9.0	8.1	8.5	9.5	11	11	8.2	6.8	7.0	14	8.0
26	11	8.7	8.4	8.5	9.0	11	12	7.9	6.8	6.8	13	8.1
27	11	9.1	7.4	9.0	9.5	10	12	7.8	7.0	6.5	13	7.9
28	10	9.2	7.3	8.5	9.5	9.6	12	7.7	7.3	6.4	13	7.9
29	10	8.7	6.8	8.5	---	11	11	8.3	9.5	6.9	13	7.9
30	9.6	8.7	7.5	8.5	---	15	11	9.2	17	7.7	14	7.9
31	9.3	---	12	8.5	---	15	---	10	---	8.9	13	---
TOTAL	331.9	256.2	259.2	260.4	237.5	400.6	316.8	307.5	322.0	295.1	391.2	271.0
MEAN	10.7	8.54	8.36	8.40	8.48	12.9	10.6	9.92	10.7	9.52	12.6	9.03
MAX	13	9.2	12	11	11	21	14	13	22	16	19	12
MIN	9.0	7.7	6.8	7.0	7.0	9.5	7.9	7.7	6.8	5.0	9.2	7.9
CFSM	.57	.46	.45	.45	.45	.69	.57	.53	.57	.51	.67	.48
IN.	.66	.51	.52	.52	.47	.80	.63	.61	.64	.59	.78	.54
CAL YR 1978	TOTAL	3139.5	MEAN	8.60	MAX	25	MIN	3.0	CFSM	.46	IN	6.25
WTR YR 1979	TOTAL	3649.4	MEAN	10.0	MAX	22	MIN	5.0	CFSM	.54	IN	7.26

LOCATION.--Lat 42°16'27", long 85°34'35", in NW¼ NE¼ sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft (15 m) upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 miles (2.4 km) upstream from mouth.

DRAINAGE AREA.--46.8 mi² (121.2 km²).

WATER-DISCHARGE RECORDS

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft (232.105 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for period of no gage-height record, Mar. 17 to Apr. 29, which are fair. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 5.0 mi (8.0 km) upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (16.4 m³/s) sometime in July 1954 from rating curve extended above 165 ft³/s (4.67 m³/s), gage height, 5.25 ft (1.60 m) caused by momentary gate opening of millpond; maximum gage height, 5.44 ft (1.658 m) June 26, 1978; minimum discharge, 2.0 ft³/s (0.057 m³/s) May 8, 1956, gage height, 1.50 ft (0.457 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 283 ft³/s (8.01 m³/s) June 7, gage height, 4.37 ft (1.332 m); minimum, 8.4 ft³/s (0.24 m³/s) Oct. 1, gage height, 1.66 ft (0.506 m); minimum daily, 30 ft³/s (0.85 m³/s) Sept. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	41	52	70	45	49	64	66	60	76	46	40
2	42	42	50	51	45	50	72	63	55	61	46	37
3	46	41	62	47	45	70	66	101	52	57	42	36
4	43	40	64	45	43	110	60	74	50	99	44	36
5	49	40	57	45	43	95	60	66	50	65	60	37
6	72	45	55	43	45	75	58	60	50	58	44	30
7	54	44	53	39	46	72	54	59	93	54	47	35
8	50	43	54	39	45	70	56	59	158	50	42	39
9	47	43	50	40	43	74	60	57	76	50	41	34
10	45	43	48	40	45	66	58	57	71	50	70	35
11	45	40	48	39	42	62	58	66	61	49	46	35
12	43	40	50	40	42	60	64	67	60	49	40	35
13	43	44	50	42	42	67	60	61	56	47	40	37
14	43	47	49	40	46	71	56	65	53	44	42	36
15	50	45	50	37	42	62	52	61	49	41	39	33
16	53	44	48	37	43	58	54	58	48	40	36	32
17	50	53	46	40	40	58	56	57	45	38	52	32
18	50	45	48	39	40	60	54	57	41	37	68	32
19	52	43	47	39	39	70	54	57	42	36	50	33
20	48	43	51	40	43	66	54	55	79	37	85	35
21	48	48	51	39	47	64	56	53	64	37	60	35
22	47	48	48	39	49	60	56	53	48	36	49	35
23	53	60	47	45	58	64	52	54	48	36	56	33
24	41	50	46	45	54	64	60	54	43	35	53	32
25	46	48	48	44	47	55	70	53	43	40	45	34
26	50	50	43	44	48	52	78	53	45	38	43	33
27	44	50	45	46	49	50	72	50	46	38	41	34
28	43	51	44	45	49	52	68	49	53	38	40	33
29	43	50	45	43	---	60	64	50	82	36	50	33
30	42	52	53	44	---	88	74	60	140	55	43	31
31	42	---	72	43	---	80	---	58	---	50	42	---
TOTAL	1465	1373	1574	1329	1265	2054	1820	1853	1861	1477	1502	1032
MEAN	47.3	45.8	50.8	42.9	45.2	66.3	60.7	59.8	62.0	47.6	48.5	34.4
MAX	72	60	72	70	58	110	78	101	158	99	85	40
MIN	41	40	43	37	39	49	52	49	41	35	36	30
CAL YR 1978	TOTAL	16554	MEAN	45.4	MAX	387	MIN	25				
WTR YR 1979	TOTAL	18605	MEAN	51.0	MAX	158	MIN	30				

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: April 1972 to August 1974, August 1975 to current year.

INSTRUMENTATION.--Temperature recorder April 1972 to August 1974, August 1975 to current year.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 29.5°C July 21, 1972, minimum, 0.0°C Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 26.0°C June 15, 16; minimum recorded, 0.5°C Dec. 10, 11.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	17.5	15.5	16.5	11.5	9.0	10.5	8.0	4.0	5.5	10.5	9.0	9.5
2	18.0	14.5	16.5	13.0	9.5	11.0	8.5	4.5	6.5	14.5	7.0	9.5
3	17.5	16.0	17.0	13.0	9.5	11.5	8.0	3.5	5.5	---	---	---
4	16.5	15.5	15.5	14.5	11.5	13.0	9.0	4.0	5.5	---	---	---
5	15.5	15.0	15.0	14.5	12.0	13.0	7.0	5.0	6.5	---	---	---
6	14.5	13.5	14.0	13.0	10.0	11.5	8.0	5.0	7.0	---	---	---
7	13.5	13.0	13.5	12.0	9.0	10.0	8.0	5.5	6.5	---	---	---
8	13.5	12.0	12.5	11.0	8.0	9.0	9.0	4.0	6.0	---	---	---
9	16.0	11.5	13.0	11.0	8.0	9.5	10.5	4.0	6.0	---	---	---
10	18.5	13.0	15.5	12.0	9.5	10.5	6.5	.5	2.0	---	---	---
11	16.0	15.0	15.5	11.5	9.0	10.0	7.0	.5	3.0	---	---	---
12	15.5	14.5	15.0	9.0	7.0	8.0	10.0	6.5	8.0	---	---	---
13	15.0	13.5	14.5	12.0	6.5	8.5	9.5	7.5	8.5	---	---	---
14	17.0	11.5	13.5	14.0	8.5	10.5	11.5	7.5	9.5	---	---	---
15	16.0	11.0	11.5	12.0	8.0	9.5	9.0	4.5	7.0	---	---	---
16	14.5	10.5	11.5	11.5	7.5	9.0	11.5	7.0	9.5	---	---	---
17	15.5	10.5	13.5	11.0	8.0	9.0	12.0	7.5	10.0	4.5	3.5	4.5
18	17.0	12.0	14.5	11.0	7.5	8.5	12.5	7.0	9.5	4.5	4.0	4.5
19	16.0	13.0	14.5	12.0	6.5	8.0	13.0	6.5	9.0	4.5	4.0	4.0
20	14.5	12.0	13.0	9.5	5.0	7.0	14.0	10.5	12.0	5.5	4.0	5.0
21	16.0	13.0	14.5	10.5	6.0	8.0	12.0	7.5	11.0	5.5	5.0	5.5
22	15.5	14.0	15.0	10.5	7.0	8.5	12.5	5.0	9.0	5.5	5.0	5.0
23	15.5	12.5	13.5	10.5	6.5	8.0	16.0	8.5	12.0	6.0	5.0	5.5
24	12.0	10.0	11.5	8.5	6.0	7.0	19.5	10.0	13.0	6.0	5.5	5.5
25	12.0	9.5	10.5	9.0	6.0	7.0	14.0	7.5	10.5	5.5	5.0	5.5
26	13.5	11.0	12.0	8.0	4.5	6.0	11.0	6.5	8.0	6.0	5.5	5.5
27	13.5	9.5	11.5	6.5	3.0	4.5	18.5	7.5	11.0	7.0	6.0	6.5
28	12.0	10.0	11.0	10.0	4.0	6.0	17.5	7.0	12.5	7.5	5.5	6.0
29	12.0	9.0	10.0	6.5	3.5	4.5	14.0	6.5	9.0	5.5	5.0	5.0
30	12.5	8.0	10.5	7.5	4.5	6.0	13.0	7.0	11.5	6.5	5.5	5.5
31	12.5	10.0	11.5	---	---	---	13.0	10.0	11.5	6.5	5.5	6.0
MONTH	18.5	8.0	13.5	14.5	3.0	9.0	19.5	.5	8.5			

STREAMS TRIBUTARY TO LAKE MICHIGAN
04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	6.5	5.5	5.5	9.0	7.5	8.5	12.5	9.5	11.0	15.0	9.0	11.5
2	7.0	6.0	6.5	9.0	6.5	8.0	10.5	8.0	9.0	17.5	12.5	15.0
3	6.5	5.5	6.0	8.5	7.0	8.0	9.5	5.5	7.0	14.5	12.5	13.5
4	6.5	4.5	5.0	7.5	5.0	6.0	9.5	6.5	7.5	14.0	13.0	13.0
5	5.0	3.0	4.5	5.0	3.5	4.0	9.5	7.5	8.5	14.5	12.0	13.0
6	6.0	4.0	5.0	6.5	3.5	4.5	9.0	6.5	7.5	17.0	13.0	15.0
7	6.5	5.0	5.5	7.0	5.5	6.5	12.0	8.5	9.5	21.5	15.0	18.0
8	6.0	5.0	5.5	9.0	6.5	7.0	12.5	9.5	11.0	24.0	17.5	21.5
9	4.5	3.5	4.0	8.5	6.5	7.0	14.5	9.0	10.0	25.0	20.0	23.0
10	5.0	4.0	4.5	7.0	5.5	6.0	16.0	14.0	15.0	24.5	21.5	23.0
11	5.0	4.5	5.0	6.0	4.0	5.0	16.5	13.0	14.5	23.5	20.0	21.5
12	5.0	4.0	4.5	9.0	4.5	7.0	15.5	10.5	12.5	19.0	15.5	16.5
13	5.5	4.5	5.0	7.5	6.5	6.5	---	---	---	20.0	13.5	16.5
14	5.0	4.5	5.0	7.5	6.5	7.0	---	---	---	18.5	16.5	17.5
15	5.5	4.5	5.0	7.0	5.5	6.0	---	---	---	19.5	16.0	17.5
16	5.0	3.5	4.0	9.0	7.0	8.0	---	---	---	20.5	15.5	18.0
17	4.5	3.0	4.0	11.0	9.0	9.5	12.5	9.0	10.5	20.0	16.5	18.5
18	3.5	2.5	3.0	9.5	9.0	9.0	16.5	10.5	13.5	23.5	18.0	20.5
19	4.0	2.5	3.0	11.5	8.5	9.5	17.0	12.0	14.5	22.0	19.5	20.5
20	5.0	3.5	4.0	14.0	9.5	12.0	18.5	13.5	16.5	22.0	17.0	19.5
21	6.0	4.5	5.5	14.0	11.0	12.5	16.5	14.0	15.5	21.0	17.0	19.0
22	7.5	5.5	6.5	12.0	8.0	9.5	19.5	13.5	16.5	21.5	16.5	19.0
23	7.5	6.5	6.5	8.0	6.5	7.0	20.0	12.5	17.0	18.5	16.0	16.5
24	6.5	4.5	5.5	8.5	6.5	7.0	18.5	16.0	17.0	16.0	13.5	14.0
25	6.0	4.0	5.0	9.0	7.5	8.5	17.0	15.5	16.5	16.0	12.0	14.0
26	5.5	3.0	4.0	10.5	8.0	9.5	16.5	13.0	15.0	16.5	14.5	15.5
27	8.0	5.5	6.5	11.0	8.5	9.5	15.5	12.0	13.5	17.5	14.0	15.5
28	8.5	6.0	7.0	12.5	10.5	11.5	14.0	11.0	12.0	17.5	15.5	16.5
29	---	---	---	11.0	9.0	10.0	12.5	9.5	11.0	20.5	15.0	17.5
30	---	---	---	9.0	8.5	9.0	11.5	9.5	10.5	20.5	16.0	17.5
31	---	---	---	12.0	8.0	9.0	---	---	---	18.0	15.5	16.5
MONTH	8.5	2.5	5.0	14.0	3.5	8.0				25.0	9.0	17.0
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	17.0	20.0	18.5	19.5	18.5	19.0	22.0	21.5	21.5	23.0	21.5	22.0
2	17.0	21.0	19.0	21.5	17.5	19.5	---	---	---	22.5	21.5	22.0
3	18.0	23.0	20.0	23.5	19.0	21.0	---	---	---	23.0	21.0	22.0
4	19.0	24.0	21.5	22.0	19.5	21.0	---	---	---	22.5	20.5	21.5
5	20.0	23.5	22.0	22.5	17.0	19.5	---	---	---	22.0	19.0	20.5
6	20.0	24.0	22.0	22.0	18.5	20.0	---	---	---	23.0	20.0	21.5
7	18.0	23.5	21.0	23.0	19.0	21.0	---	---	---	22.0	19.0	20.0
8	20.0	22.5	21.0	24.0	20.0	22.0	---	---	---	20.0	16.0	18.0
9	21.5	24.0	22.5	24.5	21.0	22.5	---	---	---	20.0	16.0	18.0
10	24.5	20.5	22.5	24.0	20.5	22.0	---	---	---	21.5	17.5	19.5
11	21.5	18.0	20.0	24.5	21.0	22.5	---	---	---	23.0	19.5	21.0
12	22.0	19.0	20.5	24.0	22.0	23.0	---	---	---	23.0	19.5	21.5
13	23.5	19.5	21.5	23.5	22.0	23.0	---	---	---	21.5	20.0	21.0
14	24.5	20.0	22.5	22.5	21.5	22.0	---	---	---	20.0	17.5	18.5
15	26.0	21.5	23.5	23.5	22.0	22.5	---	---	---	18.5	16.0	17.5
16	26.0	21.5	24.0	24.0	20.5	22.5	---	---	---	19.5	15.5	18.0
17	25.0	21.5	23.5	22.5	20.0	21.5	---	---	---	20.0	16.5	19.0
18	23.5	20.5	21.5	22.5	19.0	21.0	---	---	---	20.0	17.5	19.0
19	24.5	19.0	21.5	22.5	18.5	21.0	---	---	---	19.0	16.0	17.5
20	22.0	19.5	21.0	23.0	19.0	21.0	---	---	---	18.0	14.5	16.5
21	24.5	21.0	22.5	23.5	20.0	22.0	---	---	---	18.0	16.5	17.5
22	24.5	21.0	22.5	23.5	20.0	21.5	---	---	---	17.5	15.0	16.5
23	22.5	19.5	21.0	24.0	20.0	22.5	---	---	---	17.0	14.0	16.0
24	22.5	18.0	20.5	23.5	21.5	22.5	---	---	---	18.0	14.5	16.5
25	21.0	19.0	20.0	22.5	21.0	21.5	---	---	---	19.5	16.5	18.0
26	21.5	19.5	20.5	23.5	19.0	21.5	---	---	---	20.0	16.0	18.0
27	21.5	21.0	21.0	24.5	20.0	22.5	---	---	---	19.5	16.0	18.0
28	22.5	21.0	21.5	23.5	21.5	22.5	---	---	---	20.0	16.5	18.5
29	22.5	20.5	21.0	22.5	19.5	20.5	---	---	---	20.0	17.0	19.0
30	20.5	18.5	19.5	22.5	21.0	21.5	23.0	19.5	21.5	20.0	18.0	18.5
31	---	---	---	22.0	21.5	21.5	23.5	21.0	22.0	---	---	---
MONTH	26.0	18.0	21.5	24.5	17.0	21.5				23.0	14.0	19.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

189

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE¼ sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft (12 m) upstream from bridge on State Highway 89, 2.1 mi (3.4 km) downstream from Swan Creek, 4.0 mi (6.4 km) downstream from Calkins Dam, and 6.1 mi (9.8 km) east of Fennville.

DRAINAGE AREA.--1,600 mi² (4,144 km²), approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam near Allegan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft (178.768 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi (6.4 km) upstream at NGVD (levels by city of Allegan).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Mar. 31 to May 1, which are fair. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936, by Calkins Dam and powerplant, 4.0 mi (6.4 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--49 years, 1,391 ft³/s (39.39 m³/s), 11.81 in/yr (300 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft³/s (496 m³/s) Apr. 11, 1947, gage height, 606.76 ft (184.940 m), site and datum then in use; minimum daily, 50 ft³/s (1.42 m³/s) Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,120 ft³/s (173 m³/s) Mar. 6, gage height, 12.66 ft (3.859 m); minimum, 641 ft³/s (18.2 m³/s) July 28, gage height, 5.72 ft (1.743 m); minimum daily, 715 ft³/s (20.2 m³/s) Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1050	1770	1780	1500	1560	1520	2900	2690	1520	2070	992	1100
2	1070	1560	1760	2000	1390	1350	3100	2600	1580	2290	1010	1170
3	1220	1040	1430	1700	830	1880	3300	2610	1160	2210	1440	1340
4	1200	911	1110	1470	1240	2300	3400	3020	1170	1800	1400	1290
5	1210	1220	1460	955	1570	4750	3200	3100	1480	1800	1010	786
6	1300	1360	1790	1460	1390	5730	3200	2720	1630	1800	1080	822
7	1650	1100	1790	1500	792	4480	3100	2610	1140	1840	1080	816
8	1850	1100	1780	1670	1230	3840	3000	2410	1500	1920	1450	1230
9	1730	1250	1570	1500	1640	4580	3000	2390	2090	1520	1490	1280
10	1400	1430	1450	1600	1570	5450	3100	2260	2230	1120	1050	797
11	1080	1090	1770	1800	1200	4760	3100	2030	1970	1390	1080	823
12	1400	1070	1610	1900	877	4630	3200	2010	1890	1560	1100	822
13	1580	1090	1130	1400	1310	3880	3200	2000	1710	1060	1110	815
14	1100	1100	1450	1300	1600	3490	3200	2150	1140	939	1110	1480
15	1090	1200	1770	1200	1430	4210	3000	2360	1510	1030	1110	2020
16	1440	881	1760	900	850	3020	2900	2230	1620	1080	1040	2760
17	1320	1320	1400	1200	850	3150	2700	2020	1130	1050	976	2690
18	865	1540	1310	1400	1200	3010	2500	1790	1160	1050	944	1370
19	1310	1460	1590	1400	1500	2750	2400	1530	1180	1060	984	922
20	1460	1340	1140	1400	850	3130	2300	1920	1110	1030	1640	923
21	1090	1340	1730	1200	1290	2500	2300	1630	1130	985	2100	897
22	1290	1340	1490	1200	1680	2630	2000	1470	1500	964	1790	866
23	1330	1340	1340	1500	1710	2770	1900	1790	1510	905	1540	855
24	1100	1560	1550	1400	1540	2790	1900	1500	1110	990	1410	857
25	1280	922	1360	1400	1200	2450	2000	1170	1100	1060	906	857
26	1240	1470	1590	1400	1720	2400	2200	1460	1100	997	1430	844
27	1320	1800	775	1300	1700	2390	2500	1770	1090	797	1850	784
28	1500	1630	1260	949	1730	2380	2500	1600	1100	771	1310	829
29	1100	935	1710	1390	---	2260	2600	1380	1130	844	849	909
30	846	1350	1560	1700	---	2120	2600	1160	1560	924	1330	715
31	1250	---	950	1580	---	2700	---	1160	---	1030	1500	---
TOTAL	39671	38519	46165	44274	37449	99300	82300	62540	42250	39886	39111	33669
MEAN	1280	1284	1489	1428	1337	3203	2743	2017	1408	1287	1262	1122
MAX	1850	1800	1790	2000	1730	5730	3400	3100	2230	2290	2100	2760
MIN	846	881	775	900	792	1350	1900	1160	1090	771	849	715
CFSM	.80	.80	.93	.89	.84	2.00	1.71	1.26	.88	.80	.79	.70
IN.	.92	.90	1.07	1.03	.87	2.31	1.91	1.45	.98	.93	.91	.78
CAL YR 1978	TOTAL	560150	MEAN	1535	MAX	8330	MIN	643	CFSM	.96	IN	13.02
WTR YR 1979	TOTAL	605134	MEAN	1658	MAX	5730	MIN	715	CFSM	1.04	IN	14.07

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE¼ sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi (4.0 km) northeast of Hopkins.

DRAINAGE AREA.--71.4 mi² (184.9 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Feb. 18 to Mar. 26, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 56.2 ft³/s (1.592 m³/s), 10.69 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft³/s (33.4 m³/s) June 26, 1978, gage height, 9.56 ft (2.914 m); minimum not determined; minimum daily, 9.2 ft³/s (0.26 m³/s) Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.89 ft (0.576 m) Aug. 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	unknown	*870 24.6	unknown	Mar. 20	unknown	310 8.78	unknown
Mar. 14	unknown	350 9.91	unknown	Apr. 28	2000	352 9.97	7.03 2.143

Minimum discharge, 19 ft³/s (0.54 m³/s) Sept. 27, 28, 29, 30, gage height, 2.27 ft (0.692 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	41	47	64	35	45	186	146	40	157	27	36
2	45	40	44	70	34	60	138	118	38	111	28	33
3	46	40	49	80	34	110	124	192	37	74	26	32
4	49	39	87	90	34	250	106	178	35	72	27	30
5	57	38	72	100	34	700	103	123	34	61	33	30
6	138	38	63	85	34	550	98	98	33	51	34	29
7	125	38	59	75	34	450	88	84	35	45	31	27
8	90	37	58	66	34	370	105	74	54	42	28	26
9	70	36	56	60	33	330	161	68	53	40	29	25
10	61	35	56	55	33	300	116	63	64	37	37	25
11	56	34	54	50	33	270	96	62	85	36	38	24
12	52	33	53	45	32	250	131	63	63	35	31	24
13	49	34	57	42	32	220	181	63	52	34	28	23
14	46	45	55	41	32	280	130	71	45	33	28	23
15	45	45	53	40	32	210	97	68	42	32	27	23
16	56	40	52	39	32	180	82	61	38	31	25	22
17	60	45	53	39	32	180	75	56	36	30	26	22
18	54	68	51	38	31	190	70	52	34	29	60	21
19	50	55	49	38	31	210	66	50	34	27	63	21
20	47	46	48	37	31	250	63	50	33	26	57	21
21	46	42	68	37	31	200	64	48	34	25	59	21
22	44	40	63	37	31	170	71	45	32	25	48	20
23	43	56	55	37	31	150	66	44	31	25	47	20
24	44	73	52	36	31	120	63	43	30	25	48	20
25	43	59	50	36	31	110	132	42	29	27	42	20
26	59	50	44	36	33	95	200	41	28	28	37	20
27	60	47	45	36	35	85	206	40	27	26	35	19
28	53	46	50	35	40	82	280	40	27	27	34	19
29	47	44	52	35	---	98	306	40	40	26	46	19
30	45	50	52	35	---	250	214	39	187	27	55	19
31	43	---	58	35	---	278	---	41	---	30	42	---
TOTAL	1771	1334	1705	1549	920	7043	3818	2203	1350	1294	1176	714
MEAN	57.1	44.5	55.0	50.0	32.9	227	127	71.1	45.0	41.7	37.9	23.8
MAX	138	73	87	100	40	700	306	192	187	157	63	36
MIN	43	33	44	35	31	45	63	39	27	25	25	19
CFSM	.80	.62	.77	.70	.46	3.18	1.78	1.00	.63	.58	.53	.33
IN.	.92	.70	.89	.81	.48	3.67	1.99	1.15	.70	.67	.61	.37

CAL YR 1978	TOTAL	22658	MEAN 62.1	MAX 675	MIN 16	CFSM .87	IN 11.80
WTR YR 1979	TOTAL	24877	MEAN 68.2	MAX 700	MIN 19	CFSM .96	IN 12.96

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE¼ sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi (12.7 km) downstream from Rabbit River, 17.6 mi (28.3 km) downstream from gaging station near Fennville and 2.9 mi (4.7 km) upstream from mouth.

DRAINAGE AREA.--2,020 mi² (5,230 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February 1974 to current year.

WATER TEMPERATURES: May 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since Nov. 1, 1975.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis.

Interruptions in the daily record were due to malfunctions of the instrument. Water-discharge measurement made at time of sampling. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and were analyzed by Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum (water years 1974-75, 1979), 738 micromhos Dec. 10, 1978; minimum recorded (water years 1974-75, 1978-79), 172 micromhos Sept. 18, 1978.

WATER TEMPERATURES: Maximum recorded (water years 1977-79), 31.5°C July 20, 1977, minimum (water years 1978, 1979), 0.0°C on many days during winter period.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 738 micromhos Dec. 10; minimum, 211 micromhos Oct. 25.

WATER TEMPERATURES: Maximum, 27.0°C July 12, 13, 15, 23; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (MG/L)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)
OCT											
23...	1515	1730	576	8.2	13.0	8.6	82	K53	281	280	59
NOV											
16...	1030	1620	596	8.0	4.0	9.2	74	K53	750	280	59
DEC											
14...	1030	1050	623	8.1	1.0	12.8	91	40	K1460	260	43
JAN											
12...	1130	1940	624	7.8	.0	9.8	68	K100	130	280	58
FEB											
13...	1300	734	581	7.9	.0	10.4	71	144	390	270	45
MAR											
06...	1700	4920	449	7.8	.5	9.1	64	--	--	190	36
APR											
03...	1500	3740	450	8.0	8.5	8.2	71	65	150	210	46
MAY											
21...	1530	2320	540	8.6	17.5	13.6	142	K12	<4	250	33
JUN											
25...	1400	717	565	8.2	21.0	8.0	88	K55	K18	260	35
JUL											
30...	1300	2260	550	8.2	24.0	7.3	88	62	170	250	44
SEP											
04...	1445	1840	520	8.2	22.0	9.0	105	100	330	230	38

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
23...	74	24	20	.5	13	2.4	270	0	221	2.7	52
NOV											
16...	72	24	22	.6	15	2.4	270	0	221	4.3	49
DEC											
14...	68	21	22	.6	16	2.2	260	0	213	3.3	48
JAN											
12...	74	23	21	.5	14	2.2	270	0	221	6.8	51
FEB											
13...	72	21	19	.5	13	1.9	270	0	221	5.4	46
MAR											
06...	52	15	17	.5	16	2.3	190	0	156	4.8	36
APR											
03...	56	17	14	.4	13	2.5	200	0	164	3.2	43
MAY											
21...	69	20	17	.5	13	1.9	250	10	222	1.1	43
JUN											
25...	68	21	21	.6	15	1.9	270	0	221	2.7	47
JUL											
30...	65	21	24	.7	17	1.9	250	0	205	2.5	43
SEP											
04...	61	20	21	.6	16	1.9	240	0	197	2.4	42

STREAMS TRIBUTARY TO LAKE MICHIGAN
04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 23...	35	.2	8.3	361	349	1690	.85	.13	--	.62	.75
NOV 16...	35	.2	8.2	350	346	1530	.84	.21	--	.76	.97
DEC 14...	38	.2	9.0	357	337	1010	.97	.21	--	.46	.67
JAN 12...	35	.2	9.8	359	349	1880	1.0	.27	--	.71	.98
FEB 13...	34	.2	10	364	337	721	.91	.38	--	.72	1.1
MAR 06...	25	.1	6.9	266	248	3530	.98	.26	--	.84	1.1
APR 03...	23	.1	6.5	293	261	2960	1.1	.16	--	.67	.83
MAY 21...	29	.2	2.4	381	316	2390	.34	.05	.06	1.5	1.5
JUN 25...	34	.2	7.6	358	334	693	.73	.07	.08	.79	.86
JUL 30...	37	.2	4.3	--	320	1950	.38	.08	.10	1.3	1.4
SEP 04...	33	.2	1.2	343	300	1700	.34	1.0	1.2	.00	.99

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDEED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDEED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 23...	.15	.60	1.6	7.1	.12	--	.07	--	18	84	100
NOV 16...	.23	.74	1.8	8.0	.10	--	.05	5.3	9	39	100
DEC 14...	.05	.62	1.6	7.3	.06	--	.05	6.1	7	20	100
JAN 12...	--	--	2.0	8.8	.07	--	.04	--	5	26	100
FEB 13...	--	--	2.0	8.9	.08	--	.06	8.8	6	12	100
MAR 06...	--	--	2.1	9.2	.12	--	.03	7.2	26	345	100
APR 03...	--	--	1.9	8.5	.14	--	.07	--	20	202	100
MAY 21...	--	--	1.8	8.1	.13	.40	.02	9.8	22	138	100
JUN 25...	--	--	1.6	7.0	.16	.49	.06	11	15	29	100
JUL 30...	--	--	1.8	7.9	.18	.55	.05	--	25	153	100
SEP 04...	--	--	1.3	5.9	.14	.43	.05	--	22	109	100

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 23...	1515	2	1	100	100	1	--	<10	0	3
JAN 12...	1130	1	1	100	100	0	0	10	0	0
APR 03...	1500	2	1	100	0	0	0	10	10	1
JUL 30...	1300	2	2	100	70	0	1	30	20	0

DATE	COPALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 23...	1	8	4	590	30	10	--	70	60	<.5
JAN 12...	0	5	2	370	80	15	4	50	40	<.5
APR 03...	0	9	2	1800	100	12	0	120	40	.5
JUL 30...	0	6	5	700	10	11	10	110	3	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C)
OCT 23...	<.5	0	0	0	--	10	0	6.3	2.5
JAN 12...	<.5	0	0	0	0	30	0	6.7	.4
APR 03...	.5	0	0	0	0	30	10	8.1	.7
JUL 30...	<.5	0	0	0	0	30	0	8.3	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN
04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED.

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	AROCLOR TOT. IN BOT MAT 1254 PCB SERIES (UG/KG)	AROCLOR TOT. IN BOT MAT 1242 PCB SERIES (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	CHLOR- DANE, TOTAL (UG/L)	CHLOR- DANE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 16...	1030	ND	--	14	22	ND	ND	ND	ND	ND	ND
FEB 13...	1300	ND	--	--	--	ND	--	ND	--	ND	--
MAY 21...	1530	ND	ND	--	--	ND	ND	ND	ND	ND	ND

DATE	DDT, TOTAL (UG/L)	DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- AZINON, TOTAL (UG/L)	DI- AZINON, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- ELDRIN, TOTAL (UG/L)	DI- ELDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ETHION, TOTAL (UG/L)
NOV 16...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB 13...	ND	--	ND	--	ND	--	ND	--	ND	--	ND
MAY 21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	ETHION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR, EPOXIDE TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR, EPOXIDE TOTAL (UG/L)	HEPTA- CHLOR, EPOXIDE TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	MALA- THION, TOTAL (UG/L)	MALA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 16...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB 13...	--	ND	--	ND	ND	--	--	ND	--	ND	--	--
MAY 21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	METHYL TRI- THION, TOTAL (UG/L)	METHYL TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	PARA- THION, TOTAL (UG/L)	PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOXA- PHENE, TOTAL (UG/L)	TOXA- PHENE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOTAL TRI- THION (UG/L)	TOTAL TRI- THION IN BOT- TOM MA- TERIAL (UG/KG)
NOV 16...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB 13...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND--NOT DETECTED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 16...	1030	24	--	1.65	2.36	4.10	1.74
FEB 13...	1300	32	--	.160	.240	.050	.000
MAY 21...	1530	49	54.0	3.15	4.09	17.4	.520

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 7,77 1535	MAR 9,78 1100	MAY 1,78 1515	JUN 5,78 1545				
TOTAL CELLS/ML	27000	11000	43000	100000				
DIVERSITY: DIVISION	1.5	0.4	0.6	1.5				
..CLASS	1.5	0.4	0.6	1.7				
..ORDER	2.2	1.4	1.0	1.9				
...FAMILY	2.8	1.4	1.1	2.5				
....GENUS	2.8	1.9	1.1	3.0				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....COELASTRACEAE								
.....COELASTRUM	* 0	--	--	--	--	--	4600	4
....HYDRODICTYACEAE								
.....PEDIASTRUM	1100	4	--	--	--	--	--	--
....MICRACTINIACEAE								
.....GOLENKINTIA	--	--	--	--	720	2	--	--
....MICRACTINIUM	1600	6	--	--	--	--	5900	6
....OOCYSTACEAE								
.....ANKISTRODESMUS	370	1	190	2	--	--	2900	3
....CHODATELLA	--	--	--	--	--	--	650	1
....DICTYOSPHAERIUM	--	--	--	--	--	--	--	--
....FRANCEIA	--	--	--	--	--	--	--	--
....KIRCHNERIELLA	--	--	--	--	--	--	* 0	--
....OOCYSTIS	--	--	54	1	--	--	1300	1
....SELENASTRUM	180	1	* 0	--	--	--	980	1
....TETRAEDRON	--	--	--	--	--	--	--	--
....TREUBARIA	--	--	--	--	--	--	--	--
....SCENEDESMACEAE								
.....ACTINASTRUM	--	--	--	--	--	--	10000	10
.....CRUCIGENIA	--	--	--	--	--	--	--	--
....SCENEDESMUS	1800	7	54	1	2200	5	13000	12
....TETRADESMUS	--	--	--	--	--	--	--	--
....TETRASTRUM	* 0	--	--	--	--	--	1300	1
....TETRASPORALES								
....PALMELLACEAE								
....SPHAEROCYSTIS	--	--	--	--	--	--	--	--
....VOLVOCALES								
....CHLAMYDOMONADACEAE								
.....CHLAMYDOMONAS	--	--	* 0	--	3900	9	1600	2
....PHACOTACEAE								
.....PHACOTUS	--	--	--	--	--	--	--	--
....ZYGNEMATALES								
....DESMIDIACEAE								
....STAUSTRUM	--	--	--	--	--	--	--	--
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
....COSCINODISCACEAE								
.....CYCLOTELLA	2700	10	81	1	34000# 80		42000# 41	
....MELOSIRA	* 0	--	* 0	--	--	--	1300	1
....SKELETONEMA	--	--	--	--	--	--	--	--
...PENNALES								
....ACHNANTHACEAE								
.....ACHNANTHES	--	--	* 0	--	--	--	--	--
....DIATOMACEAE								
.....DIATOMA	180	1	--	--	--	--	--	--
....FRAGILARIACEAE								
.....ASTERIONELLA	730	3	--	--	1800	4	--	--
....FRAGILARIA	--	--	54	1	--	--	--	--
....SYNEDRA	* 0	--	--	--	--	--	650	1
....GOMPHONEMATACEAE								
.....GOMPHONEMA	180	1	--	--	--	--	--	--
....NAVICULACEAE								
.....NAVICULA	370	1	81	1	--	--	--	--
....NITZSCHIA								
.....NITZSCHIA	550	2	* 0	--	--	--	1300	1
....SURIPELLACEAE								
.....CYMATOPLURA	180	1	--	--	--	--	--	--
....SURIPELLA	--	--	* 0	--	--	--	--	--
..CHRYSOPHYCEAE								
...CHRYSOMONADALES								
....OCHROMONADACEAE								
.....DINOBYRON	--	--	--	--	--	--	3600	3
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
....CRYPTOMONADACEAE								
.....CRYPTOMONAS	370	1	--	--	--	--	650	1

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 7,77 1535		MAR 9,78 1100		MAY 1,78 1515		JUN 5,78 1545	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAF								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	3800#	35	--	-	--	-
....ANACYSTIS	--	-	1300	12	--	-	11000	10
...HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	67	1	--	-	--	-
....OSCILLATORIA	--	-	5000#	47	--	-	--	-
...RIVULARIACEAE								
...RAPHIDIOPSIS	5900#	21	--	-	--	-	--	-
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	11000#	40	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	*	0	--	-	--	-
....PHACUS	*	0	--	-	--	-	--	-
....TRACHELOMONAS	180	1	--	-	--	-	980	1

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM. MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 20,78 1200	AUG 14,78 1515	SEP 11,78 1545			
TOTAL CELLS/ML	39000	130000	69000			
DIVERSITY: DIVISION	1.4	1.0	1.0			
..CLASS	1.4	1.0	1.0			
...ORDER	2.1	1.1	1.0			
...FAMILY	2.3	1.3	1.5			
....GENUS	2.9	2.0	2.2			
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
...COELASTRACEAE						
....COELASTRUM	--	-	--	-	5800	8
...HYDRODICTYACEAE						
....PEDIATRUM	--	-	--	-	--	-
...MICRACTINIACEAE						
....GOLENKINIA	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	1300	3	1100	1	--	-
....CHODATELLA	--	-	1100	1	--	-
....DICTYOSPHAERIUM	--	-	--	-	1400	2
....FRANCEIA	--	-	*	0	--	-
....KIRCHNERIELLA	1900	5	--	-	2500	4
....OOCYSTIS	570	1	2800	2	--	-
....SELENASTRUM	*	0	--	-	--	-
....TETRAEDRON	--	-	*	0	--	-
....TREUBARIA	--	-	--	-	360	1
...SCENEDESMACEAE						
....ACTINASTRUM	1100	3	--	-	--	-
....CRUCIGENIA	570	1	--	-	--	-
....SCENEDESMUS	3400	9	22000#	17	12000#	18
....TETRADESMUS	--	-	2200	2	--	-
....TETRASTRUM	--	-	*	0	--	-
...TETRASPORALES						
...PALMELLACEAE						
....SPHAEROCYSTIS	14000#	36	--	-	--	-
...VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	3300	3	--	-
...PHACOTACEAE						
....PHACOTUS	--	-	1100	1	--	-
...ZYGNEMATALES						
...DESMIDIACEAE						
....STAUSTRUM	290	1	--	-	--	-
CHRYSTOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	8500#	22	78000#	60	32000#	46
....MELOSIRA	2900	7	--	-	14000#	21
....SKELETONEMA	--	-	15000	11	--	-
...PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-
...GOMPHONEMACEAE						
....GOMPHONEMA	--	-	--	-	--	-
...NAVICULACEAE						
....NAVICULA	--	-	--	-	--	-
...NITZSCHACEAE						
....NITZSCHIA	290	1	--	-	--	-
...SURIPELLACEAE						
....CYMATOPLEURA	--	-	--	-	--	-
....SURIPELLA	--	-	--	-	--	-
...CHRYSTOPHYCEAE						
..CHRYSOMONADALES						
...OCHROMONADACEAE						
....DINOBYRON	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
....CRYPTOMONADACEAE						
.....CRYPTOMONAS	1600	4	2200	2	--	-

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 20,78 1200		AUG 14,78 1515		SEP 11,78 1545	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	--	-
....ANACYSTIS	2200	6	--	-	720	1
..HORMOGONALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-
..RIVULARIACEAE						
....RAPHIDIOPSIS	--	-	--	-	--	-
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	*	0	--	-	360	1
....PHACUS	--	-	--	-	--	-
....TRACHELOMONAS	*	0	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	493	389	447	601	578	588	622	588	607	506	471	484
2	513	473	494	608	593	599	661	628	646	567	510	548
3	516	264	313	611	590	605	668	343	500	583	568	578
4	408	296	345	616	603	609	595	410	525	602	586	592
5	416	257	318	613	598	608	498	397	454	605	599	602
6	325	242	281	618	613	616	585	434	519	609	584	600
7	341	278	304	633	618	626	613	567	595	599	579	589
8	391	328	349	636	623	628	657	566	612	621	596	608
9	429	382	405	643	628	635	710	663	687	621	606	614
10	487	432	453	653	638	645	738	706	721	637	624	630
11	496	474	488	658	651	653	723	671	695	650	604	639
12	505	482	492	658	650	655	704	446	591	653	637	646
13	539	504	519	658	289	451	647	462	569	635	613	627
14	542	458	499	513	341	453	677	585	629	653	619	637
15	516	283	387	587	520	551	611	408	469	658	643	650
16	405	282	320	616	592	607	438	345	404	641	491	619
17	470	384	420	622	399	508	465	355	412	632	583	613
18	507	474	490	584	532	566	549	475	514	636	458	588
19	526	498	511	607	585	599	584	555	573	641	598	628
20	559	496	528	613	607	610	590	319	462	590	522	560
21	570	543	556	614	608	612	441	348	403	576	560	566
22	578	566	571	615	609	610	458	381	420	610	577	597
23	587	579	583	621	436	482	516	470	490	608	583	594
24	589	577	581	592	503	554	519	319	444	587	569	577
25	582	211	394	618	603	610	482	377	460	603	590	599
26	384	220	300	619	609	615	514	486	499	597	576	585
27	476	389	425	625	611	620	548	523	537	576	562	569
28	555	477	513	636	626	628	554	526	543	568	557	564
29	570	532	560	658	398	565	554	510	541	578	569	574
30	583	553	569	616	467	598	407	354	367	591	569	580
31	585	566	579	---	---	---	460	361	399	602	576	591
MONTH	589	211	451	658	289	590	738	319	525	658	458	595
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	607	593	601	448	444	446	---	---	---	422	406	416
2	608	591	598	452	450	451	---	---	---	414	404	410
3	605	598	601	454	447	451	491	451	474	409	400	403
4	603	589	594	452	434	446	508	490	498	406	397	402
5	604	587	595	473	419	438	504	438	491	402	396	400
6	605	598	601	483	443	465	510	493	506	406	396	399
7	603	592	598	---	---	---	515	503	510	403	390	397
8	597	583	591	---	---	---	513	506	509	406	393	399
9	613	588	594	---	---	---	509	502	505	417	399	407
10	615	600	607	---	---	---	509	500	504	425	412	416
11	612	605	608	---	---	---	504	496	501	466	421	439
12	610	598	606	---	---	---	493	479	485	480	464	471
13	607	596	601	---	---	---	495	484	489	491	476	479
14	619	604	612	---	---	---	497	484	492	511	489	496
15	635	620	627	---	---	---	493	484	488	503	490	499
16	640	629	635	---	---	---	483	477	481	486	417	457
17	645	629	635	---	---	---	479	471	475	460	419	436
18	646	634	639	---	---	---	487	475	480	479	453	464
19	662	643	651	---	---	---	486	476	482	500	476	488
20	671	659	663	---	---	---	491	478	484	528	467	499
21	660	448	473	---	---	---	495	487	492	542	520	532
22	566	467	510	---	---	---	494	485	490	552	536	546
23	459	416	423	---	---	---	496	484	491	560	553	557
24	563	424	473	---	---	---	494	486	491	565	559	561
25	612	527	576	---	---	---	487	476	480	567	560	563
26	626	468	552	---	---	---	483	472	478	562	550	555
27	628	499	572	---	---	---	473	464	469	563	551	556
28	642	439	568	---	---	---	465	451	458	574	566	571
29	---	---	---	---	---	---	452	434	443	582	572	577
30	---	---	---	---	---	---	430	420	426	586	573	581
31	---	---	---	---	---	---	---	---	---	577	561	568
MONTH	671	416	586							586	390	482

STREAMS TRIBUTARY TO LAKE MICHIGAN
04108690 KALAMAZOO RIVER AT SAUGATUCK, MI---CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	574	562	569	536	521	530	561	547	555	474	432	453
2	580	566	573	553	534	543	563	551	557	542	474	504
3	586	577	583	555	548	552	563	551	557	591	543	556
4	593	578	586	552	541	546	559	546	553	593	486	527
5	593	582	586	546	533	538	557	544	551	534	520	527
6	595	583	589	538	531	534	547	524	536	567	530	549
7	603	582	594	537	528	532	539	526	532	586	572	579
8	590	574	581	541	531	536	542	526	535	583	574	579
9	580	561	572	541	533	536	539	530	535	578	557	568
10	565	558	561	538	529	534	539	523	530	559	547	551
11	564	550	555	536	526	531	539	513	526	551	543	546
12	557	545	552	535	526	531	527	512	519	548	544	546
13	558	546	552	536	530	533	523	508	515	547	528	539
14	555	545	550	531	522	527	512	506	509	531	524	526
15	553	543	547	527	517	522	516	509	513	529	523	526
16	556	548	552	530	522	525	514	506	511	534	528	531
17	561	555	558	532	527	530	513	480	494	539	533	536
18	562	554	558	531	530	531	474	465	469	542	539	540
19	562	555	558	533	527	531	466	447	458	542	536	540
20	563	545	557	540	531	535	458	428	441	545	538	542
21	565	550	556	546	533	538	454	421	433	547	542	546
22	569	563	567	545	534	539	460	445	451	546	540	544
23	571	564	567	545	532	538	444	429	436	551	545	547
24	578	569	573	540	533	537	452	431	440	553	547	550
25	586	575	581	538	534	537	444	432	437	558	553	555
26	583	576	581	542	533	537	442	427	435	559	553	556
27	584	578	582	558	538	547	450	436	442	549	540	545
28	584	571	579	557	539	547	460	445	451	559	546	553
29	583	545	566	555	544	548	455	442	448	560	555	557
30	548	521	535	552	533	544	468	444	456	570	560	562
31	---	---	---	551	540	544	476	443	462	---	---	---
MONTH	603	521	567	558	517	537	563	421	493	593	432	543

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	17.5	15.0	16.0	11.0	7.0	9.5	.5	.0	.5	.0	.0	.0
2	17.0	15.0	16.5	11.0	7.5	9.5	.5	.0	.5	.0	.0	.0
3	17.0	9.5	11.5	11.0	8.0	10.0	---	---	---	.0	.0	.0
4	13.5	11.5	12.0	12.5	10.5	11.0	---	---	---	.0	.0	.0
5	13.5	7.0	10.0	13.5	11.0	12.0	---	---	---	.0	.0	.0
6	9.5	7.0	8.5	12.5	9.5	11.0	---	---	---	.0	.0	.0
7	10.0	7.0	8.5	10.5	7.0	9.0	.0	.0	.0	.0	.0	.0
8	11.5	8.0	9.5	9.5	6.5	8.0	.0	.0	.0	.0	.0	.0
9	11.5	9.0	10.5	10.5	7.0	8.5	.5	.0	.0	.0	.0	.0
10	13.5	10.5	12.0	10.5	7.0	9.0	.5	.5	.5	.0	.0	.0
11	14.0	12.0	13.0	9.5	8.0	8.5	.5	.0	.5	.0	.0	.0
12	13.5	12.5	13.0	8.0	6.0	7.0	---	---	---	.0	.0	.0
13	13.5	11.5	12.5	6.0	2.0	3.5	---	---	---	.0	.0	.0
14	12.5	10.0	11.0	5.0	2.5	4.5	.0	.0	.0	.0	.0	.0
15	10.5	4.5	7.5	6.0	3.0	5.0	.0	.0	.0	.0	.0	.0
16	9.0	4.0	6.0	6.5	2.5	5.0	.0	.0	.0	.0	.0	.0
17	11.0	6.5	8.5	5.5	3.5	5.0	.0	.0	.0	.0	.0	.0
18	11.0	9.0	10.0	6.0	5.0	5.5	1.0	.0	.5	.0	.0	.0
19	11.0	9.5	10.0	6.0	4.5	5.5	.5	.0	.0	.0	.0	.0
20	12.0	8.5	10.5	5.0	3.0	4.0	---	---	---	.0	.0	.0
21	14.0	10.0	12.0	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
22	14.0	12.0	13.0	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
23	13.5	11.5	12.5	3.5	1.0	2.5	.0	.0	.0	.0	.0	.0
24	12.5	9.5	11.0	3.0	3.0	3.0	1.0	.0	.0	.0	.0	.0
25	10.0	3.5	6.5	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0
26	8.0	3.5	6.0	3.5	1.5	3.0	.0	.0	.0	.0	.0	.0
27	11.0	7.0	9.0	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
28	11.0	7.5	9.5	1.5	.0	1.0	1.0	.0	.5	.0	.0	.0
29	10.5	7.0	9.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
30	11.0	6.5	9.0	.5	.0	.5	1.0	.0	.5	.0	.0	.0
31	11.0	9.0	10.0	---	---	---	1.5	.0	.5	.0	.0	.0
MONTH	17.5	3.5	10.5	13.5	.0	5.5				.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	---	---	---	---	---	---	12.5	7.5	10.0
2	.0	.0	.0	---	---	---	---	---	---	14.0	10.0	12.5
3	.0	.0	.0	---	---	---	10.5	8.0	9.5	14.0	13.0	13.5
4	.0	.0	.0	---	---	---	8.0	7.0	7.5	13.5	11.5	12.0
5	.0	.0	.0	---	---	---	8.0	6.0	7.0	13.0	10.0	11.5
6	.0	.0	.0	.5	.0	.0	5.5	2.0	3.5	16.0	11.5	13.5
7	.0	.0	.0	.0	.0	.0	5.5	2.0	4.0	19.5	14.5	17.0
8	.0	.0	.0	.0	.0	.0	5.0	3.5	4.0	22.5	17.5	20.0
9	.0	.0	.0	---	---	---	6.5	3.0	4.5	23.0	19.5	21.5
10	.0	.0	.0	---	---	---	8.0	3.5	6.0	24.5	22.0	23.0
11	.0	.0	.0	---	---	---	6.5	5.0	5.5	24.0	20.0	22.5
12	.0	.0	.0	---	---	---	12.0	5.5	9.0	20.0	16.0	17.5
13	.0	.0	.0	---	---	---	12.5	10.5	11.5	18.5	14.5	16.5
14	.0	.0	.0	---	---	---	13.5	9.0	11.0	19.0	16.0	17.5
15	.0	.0	.0	---	---	---	11.0	9.0	10.0	19.5	16.5	17.5
16	.5	.0	.0	---	---	---	12.5	8.0	10.0	19.5	16.0	18.0
17	.5	.0	.5	---	---	---	13.5	9.0	11.5	19.0	16.0	17.5
18	.5	.5	.5	---	---	---	14.5	10.0	12.0	20.0	16.0	18.0
19	.5	.5	.5	---	---	---	14.5	10.5	13.0	19.5	17.5	18.5
20	1.0	.5	.5	---	---	---	16.0	12.0	14.0	19.0	16.0	17.5
21	1.0	.0	.0	---	---	---	14.5	12.0	14.0	18.5	16.0	17.5
22	.0	.0	.0	---	---	---	15.0	10.5	13.0	18.0	14.5	16.5
23	---	---	---	---	---	---	17.0	13.0	15.0	18.0	16.0	17.0
24	---	---	---	---	---	---	17.0	15.0	16.0	16.0	14.5	15.5
25	.5	.0	.5	---	---	---	17.5	16.0	16.5	15.5	13.5	14.5
26	1.0	.0	.5	---	---	---	16.5	14.0	15.5	16.0	13.5	14.5
27	1.0	.0	.5	---	---	---	15.0	12.0	13.5	16.5	13.5	15.0
28	---	---	---	---	---	---	12.5	10.0	11.5	17.5	14.5	16.0
29	---	---	---	---	---	---	12.0	9.0	10.5	18.0	14.5	16.5
30	---	---	---	---	---	---	10.0	8.0	9.0	18.0	16.0	16.5
31	---	---	---	---	---	---	---	---	---	17.5	14.5	16.0
MONTH										24.5	7.5	16.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	18.0	17.0	17.5	21.5	19.5	20.5	25.0	23.5	24.0	24.0	22.5	23.5
2	19.5	16.5	18.0	22.0	18.0	20.0	25.0	22.5	23.5	24.0	22.5	23.5
3	21.5	17.5	19.0	23.0	20.0	21.5	25.5	23.0	24.5	24.0	22.5	23.5
4	21.5	19.0	20.5	23.0	21.0	22.0	25.0	23.5	24.5	23.5	21.5	22.0
5	22.0	19.5	21.0	22.5	19.5	21.0	24.5	23.5	24.0	23.0	21.0	22.0
6	23.5	20.0	21.5	22.0	19.5	21.0	25.5	22.5	23.5	23.5	22.0	22.5
7	23.0	22.0	22.5	23.0	20.0	21.5	26.0	23.5	25.0	23.0	21.0	22.0
8	24.5	21.5	23.0	24.0	21.0	22.5	26.0	25.0	25.5	21.0	19.0	20.0
9	24.5	23.5	23.5	25.0	22.5	23.5	25.5	23.5	24.5	20.0	17.5	19.0
10	23.5	20.0	22.5	25.0	23.0	24.0	25.5	23.5	24.5	20.0	18.0	19.0
11	22.0	17.5	20.0	26.5	24.0	25.0	24.5	22.0	23.0	20.5	18.5	19.5
12	22.5	19.5	21.0	27.0	25.0	26.0	23.5	20.5	22.5	22.0	20.5	21.0
13	23.0	20.0	21.5	27.0	25.5	26.0	23.0	21.0	21.5	22.0	21.0	21.5
14	24.0	20.5	22.5	26.5	25.0	26.0	21.0	19.5	20.5	21.0	19.5	20.0
15	24.5	22.0	23.5	27.0	25.5	26.0	20.5	18.0	19.5	19.5	17.5	18.5
16	25.5	22.5	24.0	26.5	25.5	26.0	21.0	18.5	19.5	19.5	17.5	18.5
17	24.5	22.5	23.5	25.5	23.5	24.5	20.5	18.5	19.0	20.0	17.5	19.0
18	23.0	21.0	22.0	24.5	22.5	23.5	19.5	18.5	19.0	19.5	17.5	18.5
19	22.5	19.0	21.0	25.0	22.5	23.5	20.5	19.0	19.5	18.5	17.0	17.5
20	23.5	20.5	22.0	25.0	23.0	24.0	20.5	20.0	20.0	17.5	15.5	17.0
21	24.5	22.0	23.0	25.5	23.0	24.5	21.5	19.0	20.0	17.5	17.0	17.0
22	24.5	22.5	23.5	25.5	23.5	24.5	21.0	19.5	20.5	17.0	15.5	16.5
23	23.5	20.5	21.5	27.0	24.5	25.5	22.0	20.0	21.0	16.5	15.0	16.0
24	21.5	18.5	20.0	26.0	25.0	25.5	22.5	21.0	21.5	16.5	15.0	16.0
25	22.0	18.5	20.5	25.5	24.0	24.5	22.0	20.0	21.0	17.5	15.5	16.5
26	22.5	19.5	21.5	24.5	22.5	23.5	22.0	20.0	21.0	18.0	16.0	17.0
27	23.0	20.0	22.0	25.5	23.0	24.5	21.5	20.0	20.5	18.5	16.5	17.5
28	24.5	22.0	23.0	26.0	24.5	25.0	22.0	20.5	21.0	19.0	17.0	18.0
29	24.0	22.5	23.0	25.5	24.0	25.0	22.5	20.5	21.5	19.5	18.0	18.5
30	22.5	21.0	22.0	25.0	23.5	24.5	23.0	21.0	22.0	19.5	18.5	19.0
31	---	---	---	25.0	24.0	24.5	24.0	22.0	23.0	---	---	---
MONTH	25.5	16.5	21.5	27.0	18.0	24.0	26.0	18.0	22.0	24.0	15.0	19.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108800 MACATAWA RIVER NEAR ZEELAND, MI
(Formerly published as Black River near Zeeland)

LOCATION.--Lat 42°46'40", long 86°01'06", in NW¼ sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft (6 m) upstream from bridge on State Road, 0.2 mi (0.3 km) downstream from South Branch, and 2.5 mi (4.0 km) south of Zeeland.

DRAINAGE AREA.--65.8 mi² (170.4 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 590 ft (180 m) from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 62.5 ft³/s (1.770 m³/s), 12.90 in/yr (328 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,180 ft³/s (118 m³/s) Mar. 4, 1979, gage height, 14.06 ft (4.285 m); minimum, 0.9 ft³/s (0.025 m³/s) Aug. 24, 1962; minimum gage height, 1.79 ft (0.546 m) Sept. 30, Oct. 3, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,180 ft³/s (118 m³/s) Mar. 4, gage height, 14.06 ft (4.285 m), only peak above base of 900 ft³/s (25.5 m³/s); minimum, 4.9 ft³/s (0.139 m³/s) Sept. 29; minimum gage height, 1.94 ft (0.591 m), July 22, 27, 29, 30, Sept. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	18	66	50	38	56	130	86	10	44	6.0	11
2	24	17	37	90	38	58	162	54	9.7	19	6.0	10
3	57	15	70	150	38	150	122	411	9.1	12	6.0	9.4
4	111	15	339	90	37	1540	73	144	8.8	24	6.3	8.8
5	177	14	115	45	36	3380	72	62	8.5	16	7.8	8.5
6	493	14	74	45	35	1800	66	44	8.5	10	7.5	8.5
7	263	14	58	44	34	1010	45	34	9.1	8.8	6.3	8.0
8	151	13	57	44	33	657	133	29	11	8.3	6.0	7.5
9	78	12	56	44	32	591	253	25	35	8.0	6.0	7.3
10	54	12	55	44	32	383	84	22	74	7.8	52	7.0
11	40	11	54	44	31	204	56	22	75	8.8	17	6.8
12	34	10	54	44	31	144	213	21	28	8.3	8.0	6.5
13	29	16	128	43	30	201	92	20	17	7.8	6.8	6.5
14	25	235	122	43	30	784	51	21	13	7.5	7.0	6.5
15	25	70	84	43	29	354	39	19	11	7.0	6.3	6.5
16	195	34	111	43	28	132	33	17	9.7	6.8	5.8	6.0
17	92	39	120	42	28	224	29	16	8.8	6.3	6.5	5.8
18	48	77	99	42	28	537	26	15	8.8	6.0	27	5.8
19	36	36	69	42	28	570	24	15	8.3	6.0	14	5.8
20	30	23	53	41	28	283	23	16	11	6.0	88	5.6
21	25	18	197	41	29	132	22	14	14	5.8	122	5.6
22	21	15	90	40	29	102	21	13	9.7	5.6	129	5.5
23	19	108	50	40	30	120	20	13	8.3	5.6	711	5.5
24	19	119	40	39	32	243	20	12	7.8	5.6	365	5.5
25	19	43	39	39	37	195	31	11	7.5	5.8	101	5.6
26	152	28	27	39	43	77	122	10	7.0	6.0	39	5.5
27	85	21	24	38	47	62	92	10	6.8	5.8	27	5.5
28	40	19	22	38	50	67	429	11	6.8	5.6	22	5.6
29	27	21	20	38	---	196	231	10	16	5.5	19	5.3
30	22	125	25	38	---	712	171	10	190	6.0	16	5.5
31	19	---	35	38	---	510	---	11	---	6.8	13	---
TOTAL	2442	1212	2390	1501	941	15474	2885	1218	648.2	292.5	1860.3	202.9
MEAN	78.8	40.4	77.1	48.4	33.6	499	96.2	39.3	21.6	9.44	60.0	6.76
MAX	493	235	339	150	50	3380	429	411	190	44	711	11
MTN	19	10	20	38	28	56	20	10	6.8	5.5	5.8	5.3
CFSM	1.20	.61	1.17	.74	.51	7.58	1.46	.60	.33	.14	.91	.10
IN.	1.38	.69	1.35	.85	.53	8.75	1.63	.69	.37	.17	1.05	.11

CAL YR 1978 TOTAL 35797.5 MEAN 98.1 MAX 2060 MIN 3.9 CFSM 1.49 IN 20.24
WTR YR 1979 TOTAL 31066.9 MEAN 85.1 MAX 3380 MTN 5.3 CFSM 1.29 IN 17.56

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi (2 km) north of Jackson, 2.2 mi (3.5 km) upstream from Portage River, and at mile 216 (348 km).

DRAINAGE AREA.--174 mi² (451 km²).

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft (274.320 m) Fargo Engineering Co. datum. Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills above station. Flow includes about 17 ft³/s (0.48 m³/s) as sewage effluent from the city of Jackson, which originates from ground water sources. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 119 ft³/s (3.370 m³/s), 9.29 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft³/s (30.3 m³/s) June 25, 1937, gage height, 13.50 ft (4.115 m); maximum gage height, 15.44 ft (4.706 m) June 25, 1968; minimum discharge, 9.2 ft³/s (0.26 m³/s) Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 404 ft³/s (11.4 m³/s) Mar. 10, gage height, 10.99 ft (3.350 m); minimum, 27 ft³/s (0.76 m³/s) Feb. 18, Sept. 30; minimum gage height, 8.27 ft (2.521 m) Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	47	120	175	133	150	236	165	141	82	77	50
2	42	47	73	154	137	144	216	121	128	116	121	43
3	51	46	97	150	63	174	206	177	67	116	175	42
4	47	97	98	171	50	231	204	192	69	147	191	50
5	63	98	143	159	58	236	209	188	67	126	162	53
6	115	101	149	87	58	274	203	185	64	63	158	47
7	89	51	152	72	58	335	144	190	68	55	184	51
8	39	48	177	75	60	364	171	190	67	52	160	42
9	44	47	106	70	58	375	219	212	61	66	132	36
10	44	47	59	67	53	396	257	203	56	73	93	43
11	45	42	81	65	48	355	264	176	57	123	69	43
12	45	37	87	122	55	335	267	128	53	104	56	43
13	44	48	84	80	59	304	259	102	52	59	64	66
14	39	63	86	55	107	276	227	102	50	51	63	56
15	41	50	135	63	135	243	200	100	51	46	58	41
16	81	50	85	64	70	231	202	92	46	53	55	33
17	107	84	67	66	48	219	201	139	40	52	82	42
18	104	118	70	65	44	201	196	132	48	50	110	43
19	51	110	71	116	49	195	189	75	48	48	127	41
20	45	109	79	136	51	195	181	64	49	45	141	42
21	40	62	161	114	57	194	168	69	58	38	140	42
22	36	57	138	116	71	210	143	66	47	36	137	37
23	50	80	77	70	161	136	105	68	37	42	124	32
24	45	61	63	63	91	128	108	87	33	42	75	39
25	52	60	61	62	68	129	161	143	38	63	64	43
26	72	113	55	62	69	178	170	134	39	48	56	42
27	110	129	57	61	73	177	168	130	38	42	63	41
28	99	131	61	55	89	174	180	92	51	35	63	40
29	42	83	65	62	---	200	164	89	73	31	66	35
30	40	72	75	64	---	210	183	142	98	68	62	31
31	47	---	140	68	---	243	---	145	---	55	58	---
TOTAL	1810	2188	2972	2809	2073	7216	5801	4098	1794	2027	3186	1289
MEAN	58.4	72.9	95.9	90.6	74.0	233	193	132	59.8	65.4	103	43.0
MAX	115	131	177	175	161	396	267	212	141	147	191	66
MIN	35	37	55	55	44	128	105	64	33	31	55	31
CFSM	.34	.42	.55	.52	.43	1.34	1.11	.76	.34	.38	.59	.25
IN.	.39	.47	.64	.60	.44	1.54	1.24	.88	.38	.43	.68	.28
CHL YR 1978	TOTAL	42170	MEAN 116	MAX 470	MIN 26	CFSM .67	IN 9.02					
WTR YR 1979	TOTAL	37263	MEAN 102	MAX 396	MIN 31	CFSM .59	IN 7.97					

STREAMS TRIBUTARY TO LAKE MICHIGAN

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'25", in NE¼ sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft (122 m) upstream from bridge on Petrieville Highway, 2 mi (3 km) northeast of Eaton Rapids, 2.5 mi (4.0 km) downstream from Spring Brook, 25 mi (40 km) upstream from Red Cedar River at mile 178 (286 km).

DRAINAGE AREA.--661 mi² (1,712 km²).

PERIOD OF RECORD.--October 1950 to current year. Gage-height record for flood seasons collected in this vicinity 1905-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1707: 1951(M).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft (259.897 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant at Smithville and mills at Eaton Rapids. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 454 ft³/s (12.86 m³/s), 9.33 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,500 ft³/s (99.1 m³/s) Feb. 21, 1971; maximum gage height, 8.19 ft (2.496 m) June 28, 1968; minimum discharge, 14 ft³/s (0.40 m³/s) Dec. 20, 1962, Oct. 14, 1966; minimum gage height, 0.67 ft (0.204 m) Dec. 20, 1962; minimum daily discharge, 21 ft³/s (0.59 m³/s) Oct. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft (2.484 m), discharge, 3,860 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,280 ft³/s (64.6 m³/s) Mar. 6, gage height, 6.40 ft (1.951 m); minimum, 20 ft³/s (0.57 m³/s) July 28, 29, Sept. 14; minimum gage height, 0.72 ft (0.219 m) July 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	63	193	312	540	250	386	1010	786	340	261	155	173
2	196	222	262	616	260	373	1070	763	365	388	193	92
3	188	206	333	580	260	403	1080	781	358	365	188	190
4	171	137	351	500	280	1470	1040	799	334	361	299	137
5	127	123	443	450	278	2180	975	781	303	360	320	133
6	180	241	374	480	262	2240	950	776	224	365	326	133
7	82	269	412	500	260	2040	900	758	231	341	326	133
8	166	222	433	520	258	1920	880	727	239	316	314	120
9	220	178	349	420	257	1700	1010	691	239	233	317	155
10	186	173	443	370	247	1530	1040	655	245	229	307	118
11	164	155	384	330	193	1320	1050	642	237	225	278	103
12	180	133	312	300	210	1280	1070	632	238	235	203	103
13	164	201	348	290	230	1330	1060	632	237	234	144	135
14	68	209	370	270	210	1220	1030	628	229	229	164	90
15	63	188	310	260	190	1140	985	570	171	226	183	137
16	231	188	324	240	210	1070	935	467	164	220	155	121
17	203	206	328	250	260	995	980	475	164	146	155	129
18	217	246	302	250	240	970	844	423	178	150	227	121
19	212	304	321	250	230	935	799	411	146	159	212	120
20	272	315	286	250	210	910	709	439	148	206	239	94
21	196	299	246	270	250	900	740	339	152	69	305	96
22	114	282	272	260	330	876	718	325	159	81	324	100
23	225	249	327	270	300	844	686	226	206	155	294	105
24	159	288	323	330	330	826	660	266	66	148	312	110
25	164	341	307	310	390	804	646	327	131	137	279	115
26	203	282	254	280	380	763	646	327	146	131	188	100
27	225	291	234	270	360	714	665	347	148	144	146	95
28	222	306	292	250	333	696	691	369	155	87	157	95
29	226	320	371	250	---	696	722	450	157	98	188	75
30	225	300	220	250	---	866	768	324	240	144	188	65
31	180	---	262	250	---	950	---	325	---	142	217	---
TOTAL	5494	7067	10105	10656	7468	34347	26262	16461	6350	6585	7303	3493
MEAN	177	236	326	344	267	1108	875	531	212	212	236	116
MAX	272	341	443	616	390	2240	1080	799	365	388	326	190
MIN	63	123	220	240	190	373	646	226	66	69	144	65
CFSM	.27	.36	.49	.52	.40	1.68	1.32	.80	.32	.32	.36	.18
IN.	.31	.40	.57	.60	.42	1.93	1.48	.93	.36	.37	.41	.20
Cal YR 1978 TOTAL	146562	MEAN 402	MAX 1990	MIN 43	CFSM .61	IN 8.25						
WTR YR 1979 TOTAL	141591	MEAN 388	MAX 2240	MIN 63	CFSM .59	IN 7.97						

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LOCATION.--Lat 42°40'59", long 84°13'09", in NE¼ sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank 20 ft (6 m) upstream from bridge on State Highway 52, 1.5 mi (2.4 km) upstream from Squaw Creek, and 3.5 mi (5.6 km) east of Williamston.

PERIOD OF RECORD.--July 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 870 ft (265 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 990 ft³/s (28.0 m³/s) Mar. 5, 6, 1976, gage height, 7.60 ft (2.316 m); minimum, 5.1 ft³/s (0.14 m³/s) Sept. 12, 1978, gage height, 2.03 ft (0.619 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft (3.173 m) Apr. 19, and a discharge of 2,640 ft³/s (74.8 m³/s) Apr. 20.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 914 ft³/s (25.9 m³/s) Mar. 7, gage height, 7.41 ft (2.259 m); maximum gage height, 7.50 ft (2.286 m) Mar. 6, backwater from ice; minimum discharge, 11 ft³/s (0.31 m³/s) Sept. 22, gage height, 2.19 ft (0.668 m).

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	22	32	90	33	52	253	127	42	93	21	20
2	13	23	36	130	33	54	268	123	40	116	31	19
3	13	24	33	110	33	60	249	133	38	119	37	18
4	13	23	44	90	33	250	278	165	34	111	39	17
5	14	23	50	85	33	600	264	176	32	94	36	16
6	15	23	50	75	33	800	250	169	29	72	33	15
7	15	24	48	60	33	860	230	149	23	56	29	15
8	15	24	46	50	33	702	220	126	30	45	26	15
9	15	24	46	42	33	625	271	103	38	39	24	15
10	15	23	54	39	33	563	311	87	35	36	27	15
11	15	23	55	36	32	500	318	81	36	34	26	14
12	16	22	41	34	30	420	325	74	33	33	24	14
13	15	22	40	32	29	370	342	75	31	31	22	14
14	15	23	43	30	28	320	342	72	28	30	21	14
15	15	24	40	28	28	282	342	68	26	29	20	14
16	20	25	36	28	29	226	330	64	24	26	19	14
17	23	27	36	28	30	193	311	58	23	24	20	15
18	23	31	35	28	31	178	284	52	23	23	26	15
19	23	30	33	28	32	181	251	49	22	22	26	14
20	22	31	34	29	30	179	216	46	22	20	26	14
21	21	30	39	30	30	172	179	44	22	19	25	14
22	20	28	40	31	30	161	146	41	22	18	24	13
23	20	30	37	32	35	147	125	40	21	17	23	13
24	23	34	37	33	38	136	112	42	21	18	22	13
25	25	35	36	33	41	128	104	48	19	18	20	13
26	25	35	35	33	45	118	103	51	19	19	19	13
27	25	34	31	32	50	106	109	51	19	18	18	13
28	25	32	30	31	52	99	112	50	20	21	18	13
29	24	32	31	31	---	101	114	49	23	20	21	13
30	23	32	33	31	---	170	119	47	39	19	23	13
31	22	---	45	32	---	238	---	44	---	21	22	---
TOTAL	581	813	1226	1421	950	8991	6911	2504	839	1261	768	438
MEAN	18.7	27.1	39.5	45.8	33.9	290	230	80.8	28.0	40.7	24.8	14.6
MAX	25	35	55	130	52	860	342	176	42	119	39	20
MIN	13	22	30	28	28	52	103	40	19	17	18	13
CFSM	.12	.17	.24	.28	.21	1.78	1.41	.50	.17	.25	.15	.09
IN.	.13	.19	.28	.32	.22	2.05	1.58	.57	.19	.29	.18	.10
CAL YR 1978	TOTAL	26453.0	MEAN	72.5	MAX	823	MIN	6.2	CFSM	.45	IN	6.04
WTR YR 1979	TOTAL	26703.0	MEAN	73.2	MAX	860	MIN	13	CFSM	.45	IN	6.09

STREAMS TRIBUTARY TO LAKE MICHIGAN

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E½ sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft (5 m) upstream from bridge on Clark Road, 3.5 mi (5.6 km) north of Dansville, and 7.2 mi (11.6 km) upstream from mouth.

DRAINAGE AREA.--16.3 mi² (42.2 km²).

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft (270.992 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, May 24 to June 24, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 10.3 ft³/s (0.292 m³/s), 8.58 in/yr (218 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft³/s (27.2 m³/s) Apr. 19, 1975, gage height, 12.18 ft (3.712 m), from flood mark, rating curve extended above 610 ft³/s (17.3 m³/s); minimum, 0.04 ft³/s (0.001 m³/s) Sept. 8, 9, 12, 1978, gage height, 2.58 ft (0.786 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 493 ft³/s (14.0 m³/s) Mar. 4, gage height 8.93 ft (2.722 m), only peak above base of 100 ft³/s (2.83 m³/s); minimum, 0.08 ft³/s (0.002 m³/s) Sept. 18; minimum gage height, 2.62 ft (0.799 m) Sept. 18, 19, 20, 24, 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.76	1.7	2.8	4.2	3.6	9.0	33	17	2.6	13	1.1	.63
2	.64	1.6	3.2	23	3.7	17	40	14	2.5	8.4	2.3	.57
3	.63	1.6	4.4	16	3.7	30	36	22	2.3	5.7	1.9	.50
4	.74	1.6	12	10	3.7	302	27	22	2.2	4.6	1.5	.46
5	.77	1.6	9.5	8.3	3.7	296	24	18	2.0	3.6	2.4	.45
6	1.1	1.5	7.4	7.7	3.7	126	25	15	1.9	2.8	1.8	.41
7	1.3	1.7	6.7	7.0	3.7	79	21	12	1.9	2.3	1.3	.39
8	1.2	1.7	6.6	6.0	3.7	72	29	10	2.0	1.9	1.1	.37
9	1.0	1.6	6.3	5.0	3.7	61	81	8.6	2.2	1.8	1.0	.34
10	.95	1.6	6.0	4.3	3.7	49	50	8.7	2.5	1.7	1.1	.18
11	.87	1.5	5.3	3.8	3.6	34	34	9.9	2.5	2.4	.94	.16
12	.82	1.4	5.2	3.5	3.5	29	42	8.7	2.2	2.7	.75	.15
13	.78	1.5	5.1	3.0	3.3	25	37	9.0	2.0	1.9	.62	.19
14	.74	1.7	4.6	2.5	3.2	32	32	8.1	1.7	1.7	.59	.20
15	.75	1.7	4.5	2.6	3.2	25	25	7.8	1.5	2.3	.54	.15
16	2.1	1.6	4.2	2.7	3.2	22	21	6.8	1.4	1.4	.50	.12
17	3.6	2.1	4.1	2.8	3.2	18	17	5.9	1.3	1.1	.73	.11
18	2.7	4.7	4.4	2.8	3.2	23	15	5.3	1.2	.96	1.0	.09
19	2.2	3.8	4.2	2.9	3.2	24	13	4.7	1.1	.86	1.0	.11
20	1.9	3.1	4.4	3.0	3.3	22	12	4.5	1.1	.74	.88	.11
21	1.7	2.7	5.8	3.1	3.5	20	11	4.0	1.2	.65	.80	.12
22	1.6	2.6	6.1	3.2	3.7	18	10	3.6	1.1	.56	.74	.14
23	1.5	3.5	4.8	3.3	4.0	17	9.8	3.4	1.1	.53	.72	.14
24	1.8	5.6	4.6	3.5	4.5	17	9.1	3.3	1.0	.52	.72	.13
25	1.8	4.6	4.0	3.5	5.0	15	9.9	3.3	.90	.55	.65	.13
26	2.3	3.9	4.2	3.5	5.5	14	11	3.2	.87	.68	.59	.18
27	2.7	3.5	3.6	3.5	6.5	12	12	3.1	.82	.95	.63	.19
28	2.4	3.2	4.1	3.5	7.5	13	14	3.1	.88	.89	.76	.21
29	2.1	3.2	3.6	3.5	---	15	16	3.0	1.6	.83	1.0	.22
30	1.8	3.2	4.3	3.5	---	48	17	2.8	4.0	.87	.94	.26
31	1.8	---	16	3.6	---	49	---	2.7	---	1.0	.72	---
TOTAL	47.05	75.3	172.0	196.6	110.0	1533.0	733.8	253.7	51.57	69.89	31.32	7.41
MEAN	1.52	2.51	5.55	6.34	3.93	49.5	24.5	8.18	1.72	2.25	1.01	.25
MAX	3.6	5.6	16	42	7.5	302	81	22	4.0	13	2.4	.63
MIN	.63	1.4	2.8	2.5	3.2	9.0	9.1	2.7	.82	.52	.50	.09
CFSM	.09	.15	.34	.39	.24	3.04	1.50	.50	.11	.14	.06	.02
IN.	.11	.17	.39	.45	.25	3.50	1.67	.58	.12	.16	.07	.02

CAL YR 1978 TOTAL 2970.53 MEAN 8.14 MAX 168 MIN .05 CFSM .50 IN 6.78
WTR YR 1979 TOTAL 3281.64 MEAN 8.99 MAX 302 MIN .09 CFSM .55 IN 7.49

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LOCATION.--Lat 42°40'33", long 84°21'50", in SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft (9 m) downstream from bridge on Meridian Road, 2.1 mi (3.4 km) upstream from mouth, and 4.2 mi (6.8 km) west of Williamston.

PERIOD OF RECORD.--June 1954 to current year.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Apr. 18, 1975, gage height, 9.99 ft (3.045 m), from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of computation of peak flow through culvert and over-road embankment; minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft (0.335 m), caused by unusual regulation; minimum natural discharge, 0.02 ft³/s (0.001 m³/s) July 27, 1965, gage height, 1.18 ft (0.360 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 421 ft³/s (11.9 m³/s) Mar. 4, gage height, 5.79 ft (1.765 m), only peak above base of 120 ft³/s (3.40 m³/s); minimum, 0.04 ft³/s (0.001 m³/s) Sept. 27, gage height 1.23 ft (0.375 m).

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.24	.38	.57	23	.87	2.1	17	7.0	.99	2.6	.21	.17
2	.23	.37	.55	10	.85	2.4	20	5.8	.91	2.2	.53	.15
3	.26	.36	.50	6.0	.88	4.7	18	12	.83	1.4	.35	.14
4	.20	.36	2.4	4.0	.84	228	12	11	.75	1.1	.26	.13
5	.30	.36	2.3	3.3	.83	125	9.4	7.5	.71	.89	.34	.13
6	.31	.36	1.9	3.1	.91	61	10	6.2	.68	.69	.32	.12
7	.32	.38	1.5	2.5	.87	47	7.6	5.2	.67	.59	.23	.11
8	.29	.38	1.5	2.1	.75	45	14	4.4	.79	.54	.18	.11
9	.27	.36	1.4	1.6	.80	38	46	3.7	.84	.51	.19	.11
10	.25	.32	1.2	1.4	.75	29	30	3.4	.96	.50	.42	.10
11	.23	.32	1.1	1.2	.75	17	18	3.2	.96	.46	.35	.10
12	.23	.32	1.2	1.2	.75	11	32	3.0	.81	.45	.23	.09
13	.21	.32	1.2	1.2	.75	11	22	2.9	.67	.42	.19	.09
14	.24	.38	1.1	1.1	.75	18	15	2.6	.59	.38	.18	.09
15	.25	.36	1.0	1.1	.76	8.8	10	2.4	.53	.35	.16	.08
16	.68	.34	1.0	1.0	.76	6.8	7.8	2.1	.47	.31	.14	.07
17	.68	.46	1.0	1.0	.75	6.3	6.5	1.9	.44	.26	.21	.07
18	.48	.66	.95	.96	.75	8.2	5.6	1.7	.42	.23	.30	.06
19	.44	.50	.89	.96	.70	9.1	4.9	1.6	.38	.21	.28	.10
20	.42	.44	1.0	1.0	.70	7.8	4.5	1.5	.42	.19	.25	.07
21	.40	.42	1.9	1.0	.74	6.8	4.1	1.4	.47	.18	.23	.06
22	.37	.42	1.8	1.0	.79	6.1	3.7	1.3	.39	.17	.18	.06
23	.36	.63	1.6	.97	.95	5.7	3.5	1.3	.37	.16	.19	.07
24	.41	.75	1.5	1.0	1.0	5.3	3.3	1.3	.35	.16	.19	.06
25	.40	.63	1.4	.89	1.2	4.9	3.7	1.3	.32	.21	.15	.06
26	.48	.60	1.2	.91	1.3	4.4	4.2	1.2	.31	.21	.13	.06
27	.50	.60	1.0	.91	1.5	3.8	5.0	1.2	.29	.21	.14	.05
28	.44	.60	.67	.91	1.7	3.9	5.1	1.2	.29	.29	.16	.05
29	.42	.56	.88	.90	---	5.0	5.5	1.1	.33	.23	.31	.06
30	.41	.58	1.1	.88	---	38	7.1	1.0	.86	.19	.44	.06
31	.42	---	5.1	.90	---	29	---	1.0	---	.23	.26	---
TOTAL	11.24	13.52	42.91	77.99	24.95	799.1	355.5	102.4	17.80	16.52	7.70	2.68
MEAN	.36	.45	1.38	2.52	.89	25.8	11.9	3.30	.59	.53	.25	.089
MAX	.68	.75	5.1	23	1.7	228	46	12	.99	2.6	.53	.17
MIN	.21	.32	.55	.88	.70	2.1	3.3	1.0	.29	.16	.13	.05
CFSM	.04	.05	.15	.27	.10	2.76	1.27	.35	.06	.06	.03	.01
IN.	.04	.05	.17	.31	.10	3.18	1.42	.41	.07	.07	.03	.01
CAL YR 1976	TOTAL	1617.79	MEAN	4.43	MAX	123	MIN	.08	CFSM	.47	IN	6.44
WTR YR 1979	TOTAL	1472.31	MEAN	4.03	MAX	228	MIN	.05	CFSM	.43	IN	5.86

STREAMS TRIBUTARY TO LAKE MICHIGAN

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW¼ sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi (6.4 km) upstream from Sycamore Creek, and 5.6 mi (9.0 km) upstream from mouth.

DRAINAGE AREA.--355 mi² (919 km²).

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft (251.274 m) National Geodetic Vertical Datum of 1929. August 1902 to December 1903 nonrecording gage at site 0.8 mi (1.3 km) downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft (76 m) upstream at present datum.

REMARKS.--Records good. Occasional regulation at low flow by mill at Williamston, 16 mi (26 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--49 years, 204 ft³/s (5.777 m³/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft³/s (168 m³/s) Apr. 20, 1975, gage height, 11.95 ft (3.642 m); minimum, 3 ft³/s (0.08 m³/s) July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft (4.08 m), discharge, 8,000 ft³/s (277 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,980 ft³/s (56.1 m³/s) Mar. 6, gage height, 7.07 ft (2.155 m); minimum, 18 ft³/s (0.51 m³/s) Sept. 22, 23-30; minimum gage height, 3.10 ft (0.945 m) Sept. 26-30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	49	57	194	65	105	555	264	95	219	34	34
2	34	49	49	258	65	105	530	261	92	250	60	32
3	42	55	67	208	67	120	550	303	84	219	65	31
4	38	55	82	177	65	415	545	347	72	194	72	29
5	32	53	97	177	67	1220	490	347	67	166	69	28
6	34	55	117	152	67	1830	453	323	65	142	65	26
7	34	60	92	123	67	1930	427	299	62	120	57	26
8	34	62	100	105	65	1690	407	264	62	100	49	26
9	34	60	74	95	67	1490	530	236	67	82	44	26
10	32	65	65	84	67	1130	665	219	82	74	60	26
11	31	65	65	79	65	930	680	219	79	77	49	24
12	32	60	87	74	62	740	650	212	77	74	42	23
13	31	60	82	72	57	645	655	198	69	69	38	21
14	31	65	72	62	57	590	630	188	65	62	36	21
15	32	60	72	55	57	515	595	177	57	57	34	21
16	44	65	72	55	57	431	550	163	55	55	32	21
17	40	74	69	55	60	387	490	149	49	51	38	24
18	44	67	65	57	62	363	440	138	44	42	42	24
19	47	79	62	57	65	367	399	132	42	40	42	21
20	44	79	67	57	60	371	355	123	49	38	42	20
21	42	77	72	60	60	351	315	105	49	38	42	20
22	42	72	74	62	60	335	283	100	44	36	40	20
23	44	87	67	65	69	315	254	92	40	34	38	18
24	38	77	57	65	77	295	226	95	38	32	38	18
25	44	67	49	65	82	275	222	97	36	31	36	18
26	51	67	44	65	92	261	240	100	36	32	34	18
27	51	65	62	65	100	240	244	100	34	32	32	18
28	51	62	53	62	105	230	240	102	34	42	32	18
29	49	55	60	62	---	230	244	100	47	34	42	18
30	49	62	65	62	---	355	261	100	212	36	42	18
31	49	---	102	65	---	530	---	97	---	34	40	---
TOTAL	1236	1928	2218	2694	1909	18791	13125	5650	1904	2512	1386	688
MEAN	39.9	64.3	71.5	93.4	68.2	606	438	182	63.5	81.0	44.7	22.9
MAX	51	87	117	258	105	1930	680	347	212	250	72	34
MIN	31	49	44	55	57	105	222	92	34	31	32	18
CFSM	.11	.18	.20	.26	.19	1.71	1.23	.51	.18	.23	.13	.07
IN.	.13	.20	.23	.30	.20	1.97	1.33	.59	.20	.26	.15	.07

CAL YR 1978 TOTAL 50369 MEAN 138 MAX 1630 MIN 14 CFSM .39 IN 5.28
WTR YR 1979 TOTAL 54241 MEAN 149 MAX 1930 MIN 18 CFSM .42 IN 5.68

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04112850 SYCAMORE CREEK NEAR HOLT, MI

LOCATION.--Lat 42°38'25", long 84°28'58", in SW¼ SW¼ sec.18, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 15 ft (5 m) downstream from bridge on Holt Road, and 1.5 mi (2.4 km) east of Holt.

DRAINAGE AREA.--80.6 mi² (208.8 km²).

PERIOD OF RECORD.--April 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,110 ft³/s (59.8 m³/s) Apr. 19, 1975, gage height, 10.00 ft (3.048 m); minimum, 3.8 ft³/s (0.11 m³/s) Sept. 29, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Mar. 5, gage height, 8.55 ft (2.606 m); minimum, 3.8 ft³/s (0.11 m³/s) Sept. 29; minimum gage height, 1.71 ft (0.521 m) Sept. 23, 24, 25, 26, 27, 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	14	19	136	20	29	189	123	28	43	11	8.8
2	9.7	13	20	150	21	30	164	104	26	34	18	8.3
3	10	13	23	140	21	76	163	115	24	26	13	7.6
4	11	13	48	100	21	541	147	148	21	23	12	7.2
5	11	13	54	60	20	970	123	126	21	18	15	8.8
6	14	12	45	50	20	516	120	98	21	17	12	8.8
7	15	14	37	40	20	254	110	81	19	14	10	6.9
8	13	14	37	30	19	230	103	71	19	13	11	6.9
9	11	13	31	27	18	210	210	61	19	12	8.8	6.0
10	11	13	30	25	18	200	250	54	19	14	10	6.0
11	11	12	31	24	17	200	201	58	26	12	9.4	5.8
12	10	11	28	23	16	198	187	58	23	14	8.3	7.8
13	9.6	11	28	22	16	177	149	60	21	12	6.3	5.6
14	8.8	14	24	20	16	175	167	54	19	13	7.8	5.4
15	8.8	14	26	18	16	154	136	51	16	11	8.8	5.3
16	19	13	24	17	16	127	111	49	16	10	7.2	5.0
17	28	16	24	17	16	108	93	45	14	9.7	9.6	4.8
18	22	28	24	17	16	108	80	40	13	11	14	4.9
19	19	24	23	18	16	120	72	36	14	11	11	5.6
20	17	21	25	18	16	118	66	35	15	9.0	10	6.2
21	15	19	36	19	17	105	60	33	16	9.7	10	4.7
22	14	17	30	19	17	96	57	33	13	8.3	10	5.4
23	14	21	29	20	18	89	55	30	13	8.3	9.0	4.2
24	16	30	27	21	20	81	53	32	13	9.7	12	4.1
25	15	28	25	21	22	75	58	35	11	8.6	8.8	4.2
26	18	24	22	20	25	68	69	31	10	10	7.9	5.0
27	20	21	20	20	27	60	45	29	11	8.8	7.8	4.0
28	19	19	19	20	28	58	86	29	10	10	7.9	5.7
29	16	18	20	19	---	62	108	31	13	8.3	13	3.9
30	15	18	24	19	---	146	112	31	24	8.1	16	4.0
31	15	---	53	20	---	202	---	32	---	11	12	---
TOTAL	445.9	511	906	1170	533	5583	3629	1813	528	427.5	329.6	176.9
MEAN	14.4	17.0	29.2	37.7	19.0	180	121	58.5	17.6	13.8	10.6	5.90
MAX	28	30	54	150	28	970	250	148	28	43	18	8.8
MIN	8.8	11	19	17	16	29	53	29	10	8.1	7.2	3.9
CFSM	.18	.21	.36	.47	.24	2.23	1.50	.73	.22	.17	.13	.07
CV	.21	.24	.42	.54	.25	2.58	1.67	.84	.24	.20	.15	.08
CL YR 1978	TOTAL	14498.7	MEAN	39.7	MAX	478	MIN	4.8	CFSM	.49	IN	6.69
WT YR 1979	TOTAL	16052.9	MEAN	44.0	MAX	970	MIN	3.9	CFSM	.55	IN	7.41

STREAMS TRIBUTARY TO LAKE MICHIGAN

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW¼ sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft (9 m) upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi (3.2 km) downstream from Red Cedar River, and at mile 152 (245 km).

DRAINAGE AREA.--1,230 mi² (3,180 km²), approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft (245.526 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi (2.9 km) downstream at datum 2.42 ft (0.738 m) lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 824 ft³/s (23.34 m³/s), 9.10 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft³/s (694 m³/s) Mar. 26, 1904, gage height, 18.60 ft (5.669 m), datum then in use, from rating curve extended above 15,000 ft³/s (425 m³/s); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 9, 1963, gage height, 0.85 ft (0.259 m); minimum daily, 20 ft³/s (0.57 m³/s) Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,280 ft³/s (150 m³/s) Mar. 7, gage height, 9.98 ft (3.042 m); minimum, 12 ft³/s (0.340 m³/s) Sept. 15, gage height, 1.26 ft (0.384 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	130	201	476	886	387	538	1950	1380	505	693	162	318
2	102	307	400	1090	385	639	2050	1340	510	701	453	187
3	279	215	550	805	375	681	2050	1430	526	782	278	150
4	243	282	574	708	442	1890	2030	1500	473	689	435	198
5	206	244	628	643	388	3840	1860	1450	427	601	574	171
6	278	164	762	693	372	4990	1810	1380	425	619	430	152
7	181	351	584	705	392	5220	1610	1280	347	571	466	183
8	172	389	675	755	354	4850	1640	1230	367	493	466	178
9	225	257	605	623	388	4630	1970	1130	334	439	471	139
10	298	242	428	522	349	3570	2290	1040	409	362	570	223
11	213	219	540	488	315	2840	2190	1040	373	458	417	90
12	133	190	515	383	292	2500	2220	1060	370	391	345	150
13	260	245	586	430	323	2530	2170	991	404	413	286	156
14	219	365	463	380	353	2340	2140	998	330	333	174	129
15	118	261	505	373	334	2060	1950	920	344	300	251	85
16	230	265	439	342	277	1910	1800	831	187	357	345	204
17	181	391	503	363	304	1730	1670	727	298	249	318	143
18	342	329	489	356	413	1670	1550	735	199	216	399	149
19	269	370	447	356	355	1610	1500	643	263	219	402	86
20	342	427	551	355	353	1610	1240	698	230	218	291	204
21	243	427	445	394	317	1570	1300	631	289	277	453	120
22	274	402	385	360	351	1510	1170	496	179	163	471	136
23	176	517	446	378	509	1460	1170	490	290	163	476	155
24	323	375	509	495	466	1390	1100	390	239	189	408	161
25	207	445	502	449	466	1350	1070	431	185	199	444	165
26	278	465	415	395	615	1280	1120	578	169	179	273	137
27	266	448	395	382	593	1110	1210	520	151	235	269	134
28	297	443	275	354	545	1200	1210	593	177	273	180	134
29	360	466	392	402	---	1120	1280	553	428	173	363	98
30	258	454	392	367	---	1540	1320	641	1230	153	309	90
31	321	---	609	374	---	1960	---	522	---	264	269	---
TOTAL	7424	10156	15455	15608	11013	67138	49650	27648	10658	11372	11448	4625
MEAN	239	339	499	503	393	2166	1655	892	355	367	369	154
MAX	360	517	762	1090	615	5220	2290	1500	1230	782	574	318
MIN	102	164	275	342	277	538	1070	390	151	153	162	85
CFSM	.19	.28	.41	.41	.32	1.76	1.35	.73	.29	.30	.30	.13
IN.	.22	.31	.47	.47	.33	2.03	1.50	.84	.32	.34	.35	.14

CAL YR 1978 TOTAL 238275 MEAN 653 MAX 4380 MIN 86 CFSM .53 IN 7.21
WTR YR 1979 TOTAL 242195 MEAN 664 MAX 5220 MIN 85 CFSM .54 IN 7.32

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LOCATION.--Lat 42°45'20", long 84°39'10", in SE¼ SW¼ sec.3, T.4 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on left bank 15 ft (5 m) downstream from bridge on Willow Highway, 0.4 mi (0.6 km) upstream from mouth, and 2.6 mi (4.2 km) west of Lansing.

* PERIOD OF RECORD.--January 1975 to current year.

REMARKS.--Records fair except those for the winter period and those for period of no gage-height record, Jan. 17 to Apr. 2, which are poor. Several observations of water temperature were made during the year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 220 ft³/s (6.23 m³/s) Mar. 4, from gage readings by local engineering firm, gage height, 4.70 ft (1.433 m), only peak above base of 80 ft³/s (2.27 m³/s); no flow Sept. 25, 26; minimum gage height, 0.38 ft (0.116 m), Sept. 26.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	.53	1.3	25	1.8	5.0	20	11	1.4	30	.40	.30
2	.15	.46	2.0	15	1.8	8.0	19	8.3	1.5	14	1.3	.18
3	.14	.46	4.9	10	1.8	15	15	17	1.3	8.0	.50	.10
4	.20	.46	11	6.7	1.9	180	12	12	1.0	5.8	1.9	.08
5	.27	.51	5.0	5.0	1.9	120	13	9.3	.99	3.9	2.3	.10
6	.35	2.3	4.1	4.0	1.9	60	16	7.8	.80	2.7	.58	.12
7	.50	1.0	3.1	3.3	1.9	40	12	6.5	1.1	2.1	.25	.10
8	.45	.60	2.9	3.0	1.8	35	17	5.4	3.3	1.7	.08	.07
9	.38	.55	2.5	2.5	1.8	30	27	4.6	1.7	1.5	.30	.05
10	.33	.46	2.1	2.1	1.8	25	18	5.2	4.8	1.3	7.5	.05
11	.33	.44	1.8	1.8	1.7	20	14	5.4	2.3	2.5	.78	.05
12	.32	.42	1.6	1.6	1.7	15	19	6.6	1.2	2.1	.35	.07
13	.33	2.2	1.6	1.4	1.6	12	15	5.5	1.4	1.2	.40	.10
14	.32	8.1	1.5	1.3	1.6	15	12	4.8	.80	.89	.25	.08
15	.27	1.8	1.5	1.3	1.6	13	9.5	4.3	.89	.68	.35	.04
16	6.5	1.2	1.5	1.3	1.6	11	7.9	3.5	.45	.50	.30	.03
17	1.0	8.4	1.5	1.4	1.6	9.0	6.6	3.3	.40	.45	4.2	.04
18	.59	3.9	1.5	1.4	1.6	10	5.6	2.9	.45	.45	2.7	.05
19	.54	1.9	1.5	1.5	1.6	12	4.9	2.8	.30	.79	.45	.06
20	.51	1.5	1.5	1.5	1.7	11	4.6	2.5	3.5	.45	.50	.05
21	.51	1.1	1.5	1.6	1.8	10	5.4	2.3	1.2	.45	.30	.07
22	.51	1.0	1.5	1.6	2.0	9.0	4.6	1.8	.45	.35	.25	.10
23	2.3	8.1	1.4	3.0	2.0	8.5	3.9	1.8	.35	.99	1.4	.07
24	.65	3.8	1.4	7.4	2.2	8.0	3.7	1.8	.30	.40	1.1	.01
25	1.5	2.2	1.4	4.5	2.4	7.5	6.6	1.7	.25	1.2	.25	.00
26	3.4	1.6	1.4	2.0	2.7	7.0	8.4	1.6	.25	.58	.22	.00
27	1.2	1.4	1.4	1.8	3.0	6.0	7.1	1.5	.25	.40	.22	.07
28	.85	1.6	1.4	1.8	4.0	6.5	12	2.3	.35	2.9	.22	.07
29	.65	2.4	1.5	1.7	---	8.0	11	1.6	4.3	.45	2.5	.08
30	.58	2.1	2.0	1.7	---	10	14	1.6	57	1.9	.58	.03
31	.64	---	15	1.8	---	22	---	1.6	---	.87	.22	---
TOTAL	26.47	62.49	84.3	120.0	54.8	748.5	344.8	148.3	94.28	91.50	32.65	2.22
MEAN	.85	2.08	2.72	3.87	1.96	24.1	11.5	4.78	3.14	2.95	1.05	.074
MAX	6.5	8.4	15	25	4.0	180	27	17	57	30	7.5	.30
MIN	.14	.42	1.3	1.3	1.6	5.0	3.7	1.5	.25	.35	.08	.00
CFSM	.07	.17	.23	.32	.16	1.99	.95	.40	.26	.24	.09	.006
IN.	.08	.19	.26	.37	.17	2.30	1.06	.46	.29	.28	.10	.01
CAL YR 1978	TOTAL	1475.30	MEAN	4.04	MAX	76	MIN	.02	CFSM	.33	IN	4.54
WTR YR 1979	TOTAL	1810.31	MEAN	4.96	MAX	180	MIN	.00	CFSM	.41	IN	5.57

STREAMS TRIBUTARY TO LAKE MICHIGAN

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'20", long 84°54'45", in NW¼ sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi (1.6 km) south of Portland, 1.9 mi (3.1 km) upstream from Looking Glass River, and at mile 115 (185 km).

DRAINAGE AREA.--1,385 mi² (3,587 km²).

PERIOD OF RECORD.--August 1952 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft (214.884 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Aug. 16 to Sept. 20, which are fair. Slight diurnal fluctuation caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--27 years, 903 ft³/s (25.57 m³/s), 8.85 in/yr (225 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft³/s (351 m³/s) Apr. 21, 1975, gage height, 12.98 ft (3.956 m); minimum, 38 ft³/s (1.08 m³/s) Oct. 10, 1963; minimum daily, 58 ft³/s (1.64 m³/s) Oct. 9, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,030 ft³/s (171 m³/s) Mar. 7, gage height, 10.10 ft (3.078 m); minimum daily discharge, 170 ft³/s (4.81 m³/s) Sept. 9, 17, 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	275	378	501	994	440	630	2350	1740	576	1650	279	300
2	235	282	513	1000	440	700	2360	1710	568	1040	229	300
3	192	354	454	950	440	741	2420	1710	557	919	430	280
4	327	275	553	850	470	1730	2350	1850	559	873	326	270
5	332	339	528	750	500	4730	2260	1850	519	773	472	260
6	310	335	684	800	450	5570	2220	1750	485	657	549	250
7	374	220	781	830	440	6000	2000	1850	462	662	429	240
8	252	403	671	850	430	5850	1850	1500	453	597	461	220
9	260	426	720	750	420	5470	2210	1380	472	531	459	170
10	271	319	633	650	450	4790	2550	1300	407	492	527	190
11	374	304	502	550	380	3780	2530	1230	500	426	557	220
12	265	281	587	456	350	3090	2700	1280	444	527	411	210
13	245	287	557	490	370	2880	2530	1280	426	449	368	200
14	301	335	632	450	400	3070	2550	1160	430	440	324	210
15	290	428	519	430	400	2640	2350	1150	330	378	220	200
16	238	329	541	410	370	2280	2160	1050	405	346	215	200
17	349	341	496	400	330	2120	1940	901	263	385	260	170
18	276	496	540	410	400	1990	1870	850	331	317	300	200
19	397	403	532	410	450	2030	1690	804	257	271	350	180
20	351	435	503	410	400	1930	1620	753	325	269	380	170
21	413	478	633	450	380	1810	1350	809	365	270	350	230
22	319	475	510	430	370	1750	1480	670	358	298	300	205
23	349	474	455	450	580	1690	1300	608	255	249	350	181
24	276	613	505	500	550	1610	1290	577	299	191	450	204
25	388	447	506	550	540	1560	1290	496	296	235	430	214
26	312	436	532	500	650	1450	1290	535	234	265	400	221
27	374	512	449	450	700	1310	1480	629	233	237	360	205
28	345	501	355	420	650	1230	1530	596	195	285	370	194
29	369	489	373	470	---	1300	1680	653	268	317	330	195
30	420	511	532	440	---	1540	1740	634	1450	245	290	176
31	317	---	577	440	---	2410	---	661	---	227	300	---
TOTAL	9798	11969	17152	17944	12750	79681	59140	33706	12777	14822	11476	6465
MEAN	316	399	553	579	455	2570	1971	1089	426	478	370	216
MAX	420	613	751	1000	700	6000	2700	1850	1450	1650	557	300
MIN	192	220	305	400	330	639	1290	496	195	191	215	170
CFSM	.23	.29	.40	.42	.33	1.86	1.42	.79	.31	.35	.27	.16
IN	.20	.32	.46	.45	.34	2.14	1.59	.91	.34	.40	.31	.17
CAL YR 1978	TOTAL	276231	MEAN	757	MAX	5000	MIN	140	CFSM	.55	IN	7.42
WTR YR 1979	TOTAL	267740	MEAN	758	MAX	5000	MIN	170	CFSM	.57	IN	7.73

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of highway bridge, 1.5 mi (2.4 km) northeast of Eagle and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--281 mi² (728 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1587: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft (227.713 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft³/s (1.42 m³/s). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 171 ft³/s (4.843 m³/s), 8.26 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft³/s (81.0 m³/s) Apr. 5, 1947, gage height, 7.70 ft (2.347 m), from graph based on gage readings, from rating curve extended above 1,900 ft³/s (53.8 m³/s); maximum gage height, 9.9 ft (3.02 m) Mar. 7, 1956, from high-water mark, backwater from ice; minimum discharge, 10 ft³/s (0.28 m³/s) July 28, 1965, gage height, 1.01 ft (0.308 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,240 ft³/s (63.4 m³/s) Mar. 4, gage height, 6.84 ft (2.085 m); minimum 21 ft³/s (0.59 m³/s) Sept. 29; minimum gage height, 1.22 ft (0.372 m) Sept. 21, 22, 23, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	36	60	120	52	85	307	257	69	179	37	34
2	31	36	62	110	52	85	290	248	67	151	36	33
3	32	35	64	100	52	222	292	263	64	129	36	32
4	34	35	66	95	56	1040	238	264	59	120	40	30
5	34	35	70	85	52	1750	299	250	56	115	48	29
6	38	36	70	90	52	976	320	250	53	111	44	28
7	37	36	70	95	50	671	311	247	51	103	41	27
8	35	35	69	100	50	440	320	243	56	92	38	27
9	35	36	70	85	50	482	360	239	58	81	37	26
10	35	36	70	75	48	522	349	235	55	71	40	26
11	34	36	71	65	45	536	330	240	57	63	36	27
12	34	36	70	55	40	588	370	231	52	57	34	26
13	34	36	66	52	45	615	356	219	50	53	34	26
14	33	49	62	50	48	672	342	198	48	51	33	26
15	32	48	60	48	43	599	333	180	46	47	31	25
16	38	48	56	46	40	629	330	164	42	43	31	24
17	37	51	56	46	43	564	327	149	40	40	33	24
18	37	57	54	46	52	541	322	137	38	38	39	23
19	37	55	54	47	50	517	317	126	36	37	37	23
20	35	53	52	48	47	477	313	115	36	36	40	23
21	34	52	50	49	45	442	306	106	40	36	41	22
22	34	52	48	50	50	409	294	97	36	36	39	22
23	35	59	46	51	55	385	275	91	37	34	38	22
24	35	63	45	65	60	365	259	87	36	33	39	26
25	34	61	44	60	70	345	265	83	34	34	36	25
26	41	60	43	55	75	321	265	77	33	42	36	24
27	40	61	43	52	80	295	261	75	31	37	36	22
28	38	59	43	52	85	278	254	76	31	54	35	22
29	37	63	45	52	---	269	256	74	38	46	37	22
30	37	58	50	52	---	320	264	73	161	41	38	22
31	37	---	60	52	---	365	---	72	---	39	35	---
TOTAL	1096	1413	1809	2048	1487	15806	9181	5172	1510	2049	1155	768
MEAN	35.4	47.1	58.4	66.1	53.1	510	306	167	50.3	66.1	37.3	25.6
MAX	41	63	80	120	85	1750	370	264	161	179	48	34
MIN	31	35	43	46	40	85	254	72	31	33	31	22
CFSM	.13	.17	.21	.24	.19	1.82	1.09	.59	.13	.24	.13	.09
IN.	.15	.19	.24	.27	.20	2.09	1.22	.68	.20	.27	.15	.10

CAL YR 1978 TOTAL 40449 MEAN 111 MAX 1180 MIN 19 CFSM .40 IN 5.35
WTR YR 1979 TOTAL 43494 MEAN 119 MAX 1750 MIN 22 CFSM .42 IN 5.76

STREAMS TRIBUTARY TO LAKE MICHIGAN

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft (15 m) upstream from Pine Creek, and 0.8 mi (1.3 km) upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi² (1,124 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft (195.858 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, May 1 to June 19, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 250 ft³/s (7.080 m³/s), 7.82 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft³/s (184 m³/s) Mar. 20, 1948; maximum gage height, 11.22 ft (3.420 m) Mar. 20, 1948, from floodmark, backwater from ice; minimum discharge, 4.4 ft³/s (0.12 m³/s) Aug. 13, 1965, gage height, 1.62 ft (0.494 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft (4.21 m), from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,080 ft³/s (58.9 m³/s) Mar. 11, gage height, 8.55 ft (2.606 m); minimum, 4.5 ft³/s (0.13 m³/s) Sept. 25, 26; minimum gage height, 1.85 ft (0.564 m) Sept. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	55	54	53	41	60	924	370	70	117	18	23
2	28	54	52	58	42	64	973	380	66	156	16	22
3	26	52	51	73	43	68	954	390	64	174	17	21
4	26	49	53	77	44	80	891	400	62	183	18	20
5	29	45	54	78	44	300	800	410	58	178	20	18
6	29	43	55	79	43	550	719	390	54	167	23	16
7	30	41	58	75	42	841	711	370	50	152	20	15
8	30	38	56	70	40	1200	670	350	49	137	19	15
9	30	37	54	65	39	1690	632	330	49	122	18	14
10	29	37	52	58	38	2000	628	310	48	102	18	14
11	27	36	50	50	37	2060	642	290	48	84	20	14
12	25	36	49	45	36	1890	670	280	48	72	20	13
13	26	34	49	43	35	1710	719	260	48	61	18	12
14	26	35	50	42	35	1750	739	240	48	53	18	11
15	26	39	49	40	35	1650	723	220	48	47	18	9.5
16	32	40	49	39	36	1520	674	200	47	42	16	10
17	45	40	49	38	37	1380	613	170	47	35	16	11
18	49	47	49	39	36	1330	553	150	46	29	18	9.8
19	47	52	48	39	39	1380	497	130	46	25	19	8.3
20	50	54	46	40	39	1390	454	110	42	22	21	6.0
21	63	52	45	40	40	1310	416	100	64	21	22	6.3
22	60	49	41	41	42	1200	382	90	76	20	21	6.0
23	64	50	45	42	45	1070	348	80	71	19	20	5.1
24	81	52	48	44	50	965	323	70	60	18	27	5.1
25	76	58	49	43	55	868	307	60	52	17	35	5.3
26	86	61	45	42	55	759	299	65	44	17	36	5.1
27	77	59	40	42	57	677	315	70	37	18	33	6.3
28	68	57	40	41	59	607	336	75	34	20	29	7.3
29	59	55	42	40	---	557	350	78	36	20	26	8.0
30	52	54	45	40	---	583	362	80	55	19	26	8.3
31	49	---	48	40	---	747	---	75	---	18	25	---
TOTAL	1379	1411	1515	1556	1186	32256	17629	6593	1567	2165	671	345.4
MEAN	44.5	47.0	48.9	50.2	42.4	1041	588	213	52.2	69.8	21.6	11.5
MAX	86	61	58	79	59	2060	978	410	76	183	36	23
MIN	25	34	40	38	35	60	299	60	34	17	16	5.1
CFSM	.10	.11	.11	.12	.10	2.40	1.36	.49	.12	.16	.05	.03
IN.	.12	.12	.13	.13	.10	2.76	1.51	.57	.13	.19	.06	.03

CAL YR 1978 TOTAL 72389.6 MEAN 198 MAX 3610 MIN 8.2 CFSM .46 IN 6.20
WTR YR 1979 TOTAL 68273.4 MEAN 187 MAX 2060 MIN 5.1 CFSM .43 IN 5.85

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW¼ sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft (5 m) downstream from bridge on State Highway 66 at Ionia, 2.7 mi (4.3 km) downstream from Prairie Creek, and at mile 87 (140 km).

DRAINAGE AREA.--2,840 mi² (7,360 km²), approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft (187.568 m) National Geodetic Vertical Datum of 1929. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below about 5,000 ft³/s (142 m³/s) caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--28 years (water years 1952-79), 1,857 ft³/s (52.59 m³/s), 8.88 in/yr (226 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft³/s (609 m³/s) Apr. 1, 1960, gage height, 23.43 ft (7.141 m); minimum, 40 ft³/s (1.13 m³/s) May 13, 1968, gage height, 5.61 ft (1.710 m); minimum daily, 109 ft³/s (3.09 m³/s) July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 11,900 ft³/s (337 m³/s) Mar. 8, gage height, 19.99 ft (6.093 m); minimum, 179 ft³/s (5.07 m³/s) Sept. 20, gage height, 6.57 ft (2.002 m); minimum daily, 220 ft³/s (6.23 m³/s) Sept. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	514	204	855	1290	860	1300	5440	3430	986	3540	438	514
2	498	258	880	1900	840	1450	5240	3280	915	2660	470	530
3	454	261	810	1600	840	1650	5070	3340	365	1890	466	486
4	436	249	840	1700	840	2650	4860	3520	770	1830	538	458
5	605	240	952	1600	820	5750	4610	3420	805	1710	510	450
6	620	350	1360	1500	820	8530	4580	3340	750	1520	785	442
7	605	478	1040	1400	800	11100	4330	3130	840	1420	725	426
8	610	422	1050	1350	800	11500	3990	2890	875	1050	625	418
9	534	620	805	1250	800	10300	4190	2750	715	1120	615	292
10	498	660	900	1150	780	9770	4480	2530	1080	950	640	340
11	540	600	950	1050	760	8950	4630	2440	1090	850	645	380
12	570	482	1000	950	760	7800	4540	2470	1430	815	640	383
13	510	538	1070	900	760	7010	4910	2590	885	765	502	340
14	458	558	1150	850	740	6990	4680	2350	986	845	575	358
15	530	605	725	820	720	7120	4530	2150	575	725	446	343
16	558	730	915	820	720	6480	4190	2090	900	558	438	354
17	546	790	715	800	720	5920	3840	1860	815	562	446	286
18	585	720	755	800	720	5520	3590	1710	635	546	518	333
19	554	640	810	800	720	5530	3350	1620	462	538	645	347
20	670	715	825	800	720	5670	3200	1560	575	446	670	220
21	640	780	880	820	740	5560	3050	1480	755	458	650	380
22	645	855	974	840	780	5150	2750	1340	695	442	490	350
23	600	790	775	860	840	4860	2680	1340	700	454	615	333
24	595	920	795	860	920	4560	2510	1090	554	365	830	319
25	566	968	825	860	1000	4190	2650	1050	570	406	800	309
26	675	855	855	880	1100	3970	2620	825	546	422	680	343
27	645	785	885	880	1150	3660	3050	980	514	450	625	336
28	670	998	765	860	1200	3330	3130	980	470	502	665	343
29	640	755	680	860	---	3080	3260	968	454	530	534	326
30	670	855	730	860	---	3680	3420	1060	2100	550	498	270
31	319	---	905	850	---	4860	---	1100	---	462	530	---
TOTAL	17566	18661	27506	32970	23270	177890	117670	64683	24412	29381	18454	11009
MEAN	567	629	887	1064	831	5738	3922	2087	814	948	595	367
MAX	675	998	1300	1900	1200	11500	5440	3520	2100	3540	845	530
MIN	319	240	680	890	720	1300	2510	825	454	365	438	220
CFS/M	.20	.22	.31	.38	.29	2.02	1.38	.74	.29	.33	.21	.13
IN	.25	.25	.36	.43	.30	2.33	1.54	.85	.32	.38	.24	.14
CAL YR 1978 TOTAL	530669		MEAN	1454	MAX	12800	MIN	215	CFS/M	.51	IN	6.95
WTR YR 1979 TOTAL	563674		MEAN	1544	MAX	11500	MIN	220	CFS/M	.54	IN	7.38

STREAMS TRIBUTARY TO LAKE MICHIGAN

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW¼ sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, and 0.5 mi (0.8 km) south of Smyrna.

DRAINAGE AREA.--528 mi² (1,368 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft (222.361 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 431 ft³/s (12.21 m³/s), 11.09 in/yr (282 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft³/s (87.8 m³/s) Apr. 22, 1967, gage height, 7.27 ft (2.216 m), caused by momentary release of water from storage above station; maximum gage height, 8.26 ft (2.518 m) Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft³/s (0.21 m³/s) Sept. 9, 1953; minimum daily, 70 ft³/s (1.98 m³/s) Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,260 ft³/s (35.7 m³/s) Mar. 23, gage height, 5.44 ft (1.658 m); maximum gage height, 6.78 ft (2.067 m) Jan. 2, backwater from ice; minimum discharge, 63 ft³/s (1.78 m³/s) June 27, gage height, 2.84 ft (0.866 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	221	253	353	450	300	329	1120	806	316	365	146	217
2	242	244	323	500	300	337	1170	801	308	343	176	222
3	255	237	324	540	300	354	1150	876	296	320	172	219
4	260	232	365	560	300	529	1090	906	288	312	153	215
5	291	231	361	550	290	668	1030	952	284	298	167	195
6	341	234	357	580	290	721	968	981	277	273	185	173
7	351	233	314	560	290	801	905	961	284	228	182	229
8	346	231	351	540	290	852	874	903	328	189	174	230
9	333	228	324	500	280	925	860	826	313	205	169	215
10	317	224	317	450	280	968	826	751	378	216	183	196
11	304	222	344	420	270	867	790	687	426	229	209	195
12	291	220	365	390	260	918	779	641	415	203	226	182
13	278	236	390	350	260	946	773	602	386	189	222	147
14	267	318	341	330	260	947	757	577	354	185	186	169
15	262	339	350	320	260	825	737	546	329	183	179	179
16	286	328	343	310	260	848	715	510	306	178	175	208
17	292	334	334	310	260	901	678	473	285	176	197	188
18	289	360	330	300	260	914	634	434	273	168	214	184
19	283	372	308	300	260	987	589	419	257	167	235	178
20	269	373	309	300	260	1060	562	410	254	142	253	152
21	258	366	353	300	260	1150	535	401	279	140	246	154
22	253	361	319	300	270	1200	516	386	317	144	240	155
23	249	368	329	300	280	1230	500	369	299	155	212	142
24	250	378	329	300	290	1220	492	359	274	145	279	145
25	248	387	326	300	300	1190	542	350	262	156	274	148
26	267	363	270	300	320	1140	602	338	252	152	258	148
27	266	374	279	300	337	1060	643	329	204	147	256	147
28	261	371	290	300	328	1000	690	328	225	165	255	146
29	256	365	310	300	---	954	725	328	263	245	249	144
30	250	366	340	300	---	1020	793	324	315	236	211	144
31	252	---	340	300	---	1080	---	316	---	164	202	---
TOTAL	8588	9168	10350	11890	7915	27941	23046	17890	9047	6418	6485	5366
MEAN	277	306	334	384	283	901	768	577	302	207	209	179
MAX	351	387	390	580	337	1230	1170	981	426	365	279	230
MIN	221	220	270	300	260	329	492	316	204	140	146	142
CFSM	.53	.58	.63	.73	.54	1.71	1.46	1.09	.57	.39	.40	.34
IN.	.61	.65	.73	.84	.56	1.97	1.62	1.26	.64	.45	.46	.38

CAL YR 1978 TOTAL 134898 MEAN 370 MAX 1620 MIN 148 CFSM .70 IN 9.50
WTR YR 1979 TOTAL 144110 MEAN 395 MAX 1230 MIN 140 CFSM .75 IN 10.15

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LOCATION.--Lat 42°36'57", Long 85°14'11", in SE¼ sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi (1.0 km) downstream from Cedar Creek, 2.0 mi (3.2 km) downstream from Thornapple Lake, and 3.2 mi (5.1 km) southeast of Hastings.

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft (239.789 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--35 years, 309 ft³/s (8.751 m³/s), 10.90 in/yr (277 mm/yr).

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 6,810 ft³/s (193 m³/s) Apr. 7, 1947, gage height, 10.20 ft (3.109 m), from graph based on gage readings; minimum, 33 ft³/s (0.93 m³/s) Aug. 10, 1964, gage height, 2.71 ft (0.826 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,290 ft³/s (93.2 m³/s) Mar. 8, gage height, 8.11 ft (2.472 m); minimum, 84 ft³/s (2.38 m³/s) Sept. 24, 25, gage height, 2.88 ft (0.878 m).

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	154	167	230	360	211	305	1160	1010	207	490	118	176
2	152	161	226	404	202	305	1240	969	204	645	120	155
3	149	158	220	392	200	321	1230	927	197	655	121	144
4	152	155	234	402	204	490	1160	906	183	580	120	133
5	150	152	312	423	207	1310	1060	865	178	470	126	126
6	180	152	349	428	212	2350	980	801	166	384	135	122
7	201	159	355	411	188	3090	922	721	172	309	130	118
8	203	160	339	392	196	3220	884	560	228	253	123	114
9	192	158	319	367	180	2960	915	565	350	224	120	110
10	179	156	277	327	170	2560	1000	500	460	200	123	107
11	167	151	256	301	170	2160	1050	460	451	184	129	106
12	150	148	274	260	166	1840	1090	495	420	178	123	103
13	151	146	277	245	165	1610	1110	530	356	172	115	102
14	144	172	270	232	166	1460	1080	530	235	161	111	100
15	141	209	262	230	164	1350	1000	520	238	152	108	98
16	156	215	256	224	160	1230	904	485	210	144	104	96
17	172	208	250	214	160	1120	795	442	191	139	106	94
18	176	226	246	221	160	1020	704	397	172	133	145	92
19	174	256	241	215	160	980	626	361	158	126	173	92
20	170	256	233	213	161	972	566	343	158	121	183	90
21	164	236	247	213	158	954	521	317	188	116	190	90
22	159	218	274	215	164	909	507	297	210	114	175	90
23	158	216	246	217	175	856	487	273	194	109	160	88
24	157	247	276	218	200	812	456	261	175	107	163	86
25	156	279	263	216	234	778	432	242	161	109	164	86
26	175	281	247	214	265	737	540	224	146	116	152	88
27	197	268	230	214	285	689	643	214	139	114	140	88
28	203	250	189	216	297	643	760	210	133	111	133	88
29	196	239	193	220	---	621	893	207	152	109	142	88
30	185	230	210	221	---	699	971	200	289	109	192	88
31	175	---	264	221	---	919	---	204	---	115	196	---
TOTAL	5259	6029	8141	8646	5400	39270	25746	15036	6776	6949	4340	3158
MEAN	170	201	263	279	193	1267	858	485	226	224	140	105
MAX	203	281	355	428	297	3220	1240	1010	460	655	196	176
MIN	141	146	189	213	158	305	466	200	133	107	104	86
CFSM	.44	.52	.68	.73	.50	3.29	2.23	1.26	.59	.58	.36	.27
1%	.51	.58	.79	.84	.52	3.79	2.49	1.45	.65	.67	.42	.33

CAL YR 1978	TOTAL	102747	MEAN	281	MAX	1800	MIN	74	CFSM	.73	IN	9.93
WTR YR 1979	TOTAL	134750	MEAN	359	MAX	3220	MIN	86	CFSM	.96	IN	13.02

STREAMS TRIBUTARY TO LAKE MICHIGAN

04118000 THORNAPPLE RIVER NEAR CALEDONIA, MI

LOCATION.--Lat 42°48'40", long 85°29'00", in NW¼ sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft (61 m) downstream from LaBarge powerplant, 2.3 mi (3.7 km) northeast of Caledonia, and 3.3 mi (5.3 km) downstream from Coldwater River.

DRAINAGE AREA.--773 mi² (2,002 km²).

PERIOD OF RECORD.--October 1930 to September 1938, October 1951 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1931-36. WSP 1307: 1931-37.

GAGE.--Water-stage recorder. Datum of gage is 676.31 ft (206.139 m) Consumers Power Co. datum. Oct. 1, 1930 to Sept. 30, 1938, non recording gage at same site and at National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 1, 1958, large diurnal fluctuation at low and medium flow caused by powerplant above station; occasional fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 570 ft³/s (16.1 m³/s), 10.01 in/yr (254 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,290 ft³/s (178 m³/s) May 10, 1956, gage height, 10.79 ft (3.289 m); maximum gage height, 10.96 ft (3.341 m) Apr. 22, 1975; minimum discharge, 1.0 ft³/s (0.028 m³/s) May 28, 1968, gage height, 1.40 ft (0.427 m), result of regulation during bridge construction.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1947, reached a stage of 14.4 ft (4.39 m) from information by powerplant operator.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,070 ft³/s (144 m³/s) Mar. 9, gage height, 9.86 ft (3.005 m); minimum, 153 ft³/s (4.33 m³/s) Sept. 26, gage height, 2.76 ft (0.841 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	441	361	458	587	470	600	1860	1650	483	1300	303	413
2	374	378	444	580	450	630	1930	1620	479	1330	311	391
3	414	383	460	600	450	656	1940	1650	466	1310	295	374
4	417	382	514	650	460	1310	1890	1630	449	1220	308	325
5	427	365	603	750	470	2470	1770	1530	438	1070	383	325
6	508	349	640	850	480	3500	1630	1410	390	910	356	288
7	530	350	665	840	450	4220	1500	1280	444	775	284	328
8	527	365	666	800	420	4790	1420	1160	576	662	304	306
9	532	335	643	770	390	4960	1490	1040	808	592	317	255
10	500	356	618	720	380	4760	1500	948	1030	489	362	318
11	460	333	615	650	380	4180	1510	915	1190	482	355	235
12	411	361	561	580	380	3560	1620	870	1050	451	326	271
13	423	330	561	540	380	3150	1690	884	910	432	328	258
14	378	374	557	520	380	2880	1640	900	783	362	287	265
15	417	388	549	500	380	2370	1550	919	672	384	281	295
16	412	417	536	480	380	2160	1420	867	552	395	287	225
17	431	427	532	470	370	1980	1270	814	520	331	286	258
18	436	446	521	470	370	1960	1140	765	467	323	382	238
19	456	453	509	460	370	1950	1020	666	413	336	403	254
20	420	463	514	460	370	1930	937	643	435	310	463	251
21	391	438	555	460	370	1800	882	613	569	342	472	240
22	407	449	575	470	400	1640	844	588	552	256	441	253
23	400	451	590	470	430	1530	791	551	524	277	419	237
24	371	498	586	470	480	1460	723	544	471	308	470	294
25	392	482	572	470	520	1370	830	535	436	288	438	178
26	386	520	537	470	560	1270	953	494	373	285	397	220
27	442	516	539	470	570	1180	1100	480	380	292	383	239
28	444	494	500	470	590	1100	1320	488	387	295	339	315
29	445	467	512	470	---	1060	1530	481	366	280	358	225
30	429	462	539	480	---	1310	1610	460	1010	294	405	255
31	415	---	535	480	---	1610	---	494	---	314	415	---
TOTAL	13436	12393	17208	17457	12100	69346	41310	27889	17623	16695	11159	8329
MEAN	433	413	555	563	432	2237	1377	900	587	539	360	278
MAX	532	520	666	850	590	4960	1940	1650	1190	1330	472	413
MIN	371	330	444	460	370	600	723	460	366	256	281	178
CFSM	.56	.53	.72	.73	.56	2.89	1.78	1.16	.76	.70	.47	.36
IN.	.65	.60	.83	.84	.58	3.34	1.99	1.34	.85	.80	.54	.40
CAL YR 1978 TOTAL	210485		MEAN 577	MAX 3080	MIN 167	CFSM .75	IN 10.13					
WTR YR 1979 TOTAL	264945		MEAN 726	MAX 4960	MIN 178	CFSM .94	IN 12.75					

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°05'00", long 85°35'30", in NE¼ sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of highway bridge, 2.2 mi (3.5 km) upstream from mouth, and 3.0 mi (4.8 km) southwest of Rockford.

DRAINAGE AREA.--234 mi² (606 km²).

PERIOD OF RECORD.--February 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 625.2 ft (190.56 m) National Geodetic Vertical Datum of 1929 (levels by Blass Survey Co.). Prior to Aug. 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 228 ft³/s (6.457 m³/s), 13.23 in/yr (336 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,540 ft³/s (100 m³/s) Mar. 6, 1976, gage height, 9.29 ft (2.832 m); minimum, 28 ft³/s (0.79 m³/s) Jan. 22, 1967, gage height, 3.41 ft (1.039 m); minimum daily, 49 ft³/s (1.39 m³/s) Aug. 27, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Mar. 7, gage height, 7.64 ft (2.329 m); minimum, 88 ft³/s (2.49 m³/s) Sept. 24, gage height, 3.79 ft (1.155 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	155	153	197	182	160	210	1060	619	193	272	122	128
2	150	148	177	185	160	230	902	563	193	267	122	123
3	162	144	193	185	160	247	704	650	190	237	116	118
4	162	141	202	210	160	546	611	747	185	234	115	110
5	173	140	198	240	160	690	545	809	179	213	128	107
6	225	141	204	260	160	1230	503	673	174	201	134	105
7	228	139	192	260	160	1420	465	531	173	186	130	104
8	240	136	194	250	160	1280	460	448	190	170	122	103
9	238	135	177	230	170	1070	450	398	226	159	115	102
10	237	133	161	220	170	903	419	361	296	161	147	100
11	230	132	167	210	170	749	390	339	305	171	174	100
12	213	130	176	200	170	631	400	326	304	173	173	100
13	190	148	213	190	170	537	383	323	274	157	150	98
14	173	177	211	180	170	613	369	316	241	147	136	98
15	164	170	206	170	170	636	356	300	206	142	130	97
16	179	178	201	170	170	580	341	287	183	133	121	96
17	170	199	194	170	170	554	326	272	167	129	127	93
18	168	220	188	170	170	623	309	259	155	122	139	91
19	170	211	176	160	170	784	293	249	148	117	146	91
20	170	212	172	160	170	994	280	244	206	112	147	91
21	166	214	197	160	170	987	270	231	256	110	141	90
22	161	213	199	160	180	826	264	228	303	109	146	90
23	151	228	191	160	180	712	254	232	352	109	173	90
24	145	224	188	160	180	675	251	226	409	119	171	90
25	148	216	184	160	180	690	359	217	338	129	175	90
26	162	216	172	160	190	661	404	210	273	130	169	90
27	159	218	166	160	200	555	473	204	226	128	160	91
28	163	215	187	160	200	490	571	202	196	125	163	90
29	166	201	209	160	---	459	587	199	256	119	160	91
30	166	210	191	160	---	576	625	197	283	119	150	91
31	159	---	182	160	---	824	---	196	---	121	138	---
TOTAL	5547	5342	5869	5762	4800	21982	13625	11056	7080	4821	4440	2958
MEAN	179	178	189	186	171	709	454	357	236	156	143	98.6
MAX	240	228	213	260	200	1420	1060	809	409	272	175	128
MIN	145	130	161	160	160	210	251	196	148	109	115	90
CFSM	.77	.76	.81	.80	.73	3.03	1.94	1.53	1.01	.67	.61	.42
IN.	.88	.85	.93	.92	.76	3.49	2.17	1.76	1.13	.77	.71	.47
CAL YR 1978 TOTAL	79094		MEAN 217	MAX 1040	MIN 87	CFSM .93	IN 12.57					
WT YR 1979 TOTAL	93282		MEAN 256	MAX 1420	MIN 90	CFSM 1.09	IN 14.83					

STREAMS TRIBUTARY TO LAKE MICHIGAN

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE¼ sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft (152 m) upstream from bridge on Fulton Street, 1.7 mi (2.7 km) upstream from Plaster Creek, and at mile 41 (66 km).

DRAINAGE AREA.--4,900 mi² (12,700 km²), approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft (178.521 m) National Geodetic Vertical Datum of 1929 (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft (152 m) downstream and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi (1.6 km) downstream at datum 2.99 ft (0.911 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--53 years, 3,537 ft³/s (100.2 m³/s), 9.80 in/yr (249 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904, gage height, 19.5 ft (5.94 m), from graph based on gage readings, site then in use; minimum daily, 381 ft³/s (10.8 m³/s) Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,500 ft³/s (496 m³/s) Mar. 10, gage height, 15.41 ft (4.697 m); minimum, 931 ft³/s (26.4 m³/s) Sept. 21, 26, gage height, 2.71 ft (0.826 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1710	1550	2110	1810	2100	2900	9140	7040	2280	4270	1370	1470
2	1640	1450	2060	2030	2100	3300	9620	6980	2210	5390	1280	1460
3	1640	1710	2030	3000	2100	3760	9640	7760	2110	4730	1240	1350
4	1640	1450	2130	3500	2100	5440	9330	7950	2080	4260	1260	1340
5	1660	1340	2130	3500	2000	8380	8950	7410	1980	3830	1440	1260
6	2030	1320	2460	3500	2000	9420	8520	6390	1920	3410	1480	1250
7	2060	1140	2630	3500	1900	10400	8120	6580	1930	2960	1570	1220
8	2030	1250	2380	3400	1900	12000	7790	6220	2180	2640	1550	1200
9	2080	1340	2380	3300	1900	14600	7630	5530	2620	2330	1460	1170
10	1910	1410	1640	3200	1900	16500	7560	5380	2920	2190	1520	1100
11	1830	1690	2010	3000	1800	17400	7580	5100	3570	2050	1530	1140
12	1810	1620	2280	2700	1800	16500	7840	4810	3370	1950	1610	1060
13	1780	1620	2630	2500	1800	15100	8120	4780	3650	1920	1530	1140
14	1660	1730	2540	2300	1800	13500	8140	4840	2670	1800	1340	1100
15	1660	1730	2560	2100	1800	12300	7820	4620	2120	1820	1380	1090
16	1710	1780	2160	2000	1800	11600	7480	4360	2070	1720	1240	1080
17	1710	1910	2230	2000	1800	11000	7030	4140	2140	1560	1240	1050
18	1740	2110	2030	2000	1800	10600	6470	3770	2080	1500	1340	1020
19	1780	2080	2180	2000	1800	10500	6040	3410	1890	1420	1490	1020
20	1760	2110	2180	2000	1800	10400	5620	3150	1860	1410	1640	1070
21	1780	2030	2280	2000	1800	10300	5370	3030	2020	1340	1750	1020
22	1810	2030	2330	2000	1900	10000	5170	2860	2180	1270	1780	1040
23	1780	2180	2310	2000	2000	9580	4880	2700	2220	1260	1820	1050
24	1690	2180	2130	2100	2100	9210	4700	2560	2220	1350	1680	1070
25	1730	2260	2060	2100	2300	8820	5090	2360	2040	1400	1800	1060
26	1810	2280	1910	2100	2500	8180	5400	2280	1930	1280	1800	967
27	1830	2210	1620	2100	2600	7530	5630	2110	1890	1280	1700	1060
28	1830	2130	2000	2100	2700	7010	5250	2160	1760	1470	1590	1030
29	1880	2230	2000	2100	---	6690	6720	2180	1980	1390	1570	1000
30	1810	2080	2000	2100	---	7210	6950	2180	2350	1380	1450	960
31	1730	---	1900	2100	---	8360	---	2260	---	1440	1430	---
TOTAL	55520	53950	67280	76140	55900	308490	214500	136900	68240	68020	46880	33847
MEAN	1791	1798	2170	2456	1996	9951	7153	4416	2275	2194	1512	1128
MAX	2080	2280	2630	3500	2700	17400	9640	7950	3650	5390	1820	1470
MIN	1640	1140	1620	1810	1800	2900	4700	2110	1760	1260	1240	960
CFSM	.37	.37	.44	.50	.41	2.03	1.46	.90	.46	.45	.31	.23
IN.	.42	.41	.51	.58	.42	2.34	1.63	1.04	.52	.52	.36	.26
CAL YR 1978 TOTAL	1100436			3015	MAX 16800	MIN 884	CFSM .62	IN 8.35				
WFR YR 1979 TOTAL	1185767			3249	MAX 17400	MIN 960	CFSM .66	IN 9.00				

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04119300 GRAND RIVER AT EASTMANVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°00'53", long 85°57'21", in NE¼ NW¼ sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at bridge on 68th Avenue at Eastmanville, 1.1 mi (1.8 km) downstream from Deer Creek, and at mile 19.3 (31.1 km).

DRAINAGE AREA.--5,230 mi² (13,550 km²), approximately.

PERIOD OF RECORD.--February to September 1979.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February to September 1979.

WATER TEMPERATURES: February to September 1979.

REMARKS.--Specific conductance and water temperature records are based on once-daily measurements, by a local observer, between 1600 and 1900 hours. Water-discharge measurement made at time of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 1100 micromhos Mar. 2, 1979; minimum daily recorded, 404 micromhos Mar. 10, 1979.

WATER TEMPERATURES: Maximum daily, 27.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
FEB 14...	1430	1940	775	8.0	.0	13.0	90	K11	120	320	77
MAR 07...	1100	12500	492	8.0	1.0	13.2	95	--	--	180	38
APR 04...	1100	10000	515	8.1	6.5	11.1	92	160	210	250	76
MAY 07...	1100	8500	541	8.4	14.5	10.4	104	K25	K26	270	59
JUN 05...	1600	2310	650	8.5	21.5	9.0	102	88	K15	280	62
JUL 11...	0930	2250	592	8.6	24.5	11.3	136	K480	K28	260	71
AUG 07...	1130	1680	590	8.6	24.5	10.3	127	1750	K24	260	57
SEP 17...	1230	1180	620	8.2	19.5	7.6	83	140	K8	240	56

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
FEB 14...	88	25	31	.8	17	2.6	300	0	246	4.8	78
MAR 07...	48	14	22	.7	21	3.7	170	0	139	2.7	45
APR 04...	68	19	15	.4	11	2.9	210	0	172	2.7	61
MAY 07...	75	21	17	.4	12	2.4	250	6	215	1.7	64
JUN 05...	72	24	29	.8	18	2.6	250	8	218	1.3	71
JUL 11...	66	23	27	.7	18	2.8	210	10	189	.9	64
AUG 07...	63	24	30	.8	20	2.5	230	6	199	1.0	62
SEP 17...	60	23	29	.8	20	2.7	230	0	189	2.3	58

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE MICHIGAN
04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)
FEB 14...	51	.2	9.5	458	433	2400	1.5	.74	--	.56
MAR 07...	39	.1	5.4	289	261	9750	2.2	.45	--	.95
APR 04...	28	.1	8.0	348	306	9400	2.7	.18	--	.82
MAY 07...	35	.2	3.0	377	347	8650	1.5	.12	.15	1.1
JUN 05...	53	.2	1.4	424	384	2640	.63	.48	.58	1.1
JUL 11...	48	.2	1.5	403	346	2450	1.6	.10	.12	1.7
AUG 07...	48	.2	3.5	401	353	1820	.30	.22	.27	1.8
SEP 17...	52	.2	4.1	385	344	1230	.34	.65	.79	1.4

DATE	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
FEB 14...	1.3	2.8	12	.15	--	.10	2.7	7	37	100
MAR 07...	1.4	3.6	16	.20	--	.07	6.3	60	2030	100
APR 04...	1.0	3.7	16	.13	--	.07	--	32	864	100
MAY 07...	1.2	2.7	12	.13	.40	.02	13	20	459	100
JUN 05...	1.6	2.2	9.9	.25	.77	.05	11	23	143	100
JUL 11...	1.8	3.4	15	.20	.61	.02	--	31	188	100
AUG 07...	2.0	2.3	10	.17	.52	.01	4.4	28	127	100
SEP 17...	2.0	2.3	10	.23	.71	.08	--	20	64	100

STREAMS TRIBUTARY TO LAKE MICHIGAN
04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
APR 04...	1100	2	1	100	0	0	0	10	10	1
JUL 11...	0930	1	1	100	50	1	2	20	20	1

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
APR 04...	1	11	7	1300	450	13	4	60	30	.5
JUL 11...	0	8	5	510	10	6	0	80	3	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
APR 04...	.5	0	0	1	0	50	20	10	.4
JUL 11...	<.5	0	0	1	1	20	10	13	.1

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERI-PHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)
AUG 07...	1130	27	77.3	5.59	7.56	25.5	4.90

STREAMS TRIBUTARY TO LAKE MICHIGAN
04119300 GRAND RIVER AT EASTMANVILLE, MI

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					---	742	530	574	695	562	658	615
2					---	1100	525	586	683	532	658	612
3					---	771	538	560	684	577	658	613
4					---	601	539	554	676	560	610	631
5					---	477	563	569	692	562	611	631
6					---	486	570	591	698	590	610	674
7					---	500	581	595	608	582	607	651
8					---	427	586	601	619	579	623	646
9					---	408	570	617	622	567	618	642
10					---	404	580	621	614	609	625	635
11					---	440	592	638	580	663	620	654
12					---	438	588	642	609	666	627	675
13					---	463	586	648	602	663	598	675
14					738	477	571	639	605	663	610	678
15					739	489	584	643	659	656	639	652
16					751	489	596	653	658	654	630	653
17					755	500	605	666	679	654	630	621
18					755	506	613	662	655	656	597	670
19					746	504	623	673	702	665	597	670
20					755	499	627	653	565	663	602	645
21					763	500	629	661	689	664	607	646
22					800	505	635	664	692	664	607	643
23					743	518	635	670	657	651	514	658
24					837	526	642	682	631	647	515	658
25					778	543	605	698	662	672	593	658
26					740	545	609	699	660	549	595	658
27					736	548	614	698	690	549	594	680
28					1060	564	598	694	691	549	630	680
29					---	560	569	674	693	549	651	679
30					---	531	560	676	559	614	654	664
31					---	529	---	678	---	658	652	---
MEAN						535	589	641	651	616	614	652

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					---	2.0	8.0	10.5	17.0	20.0	25.0	23.0
2					---	2.0	7.0	10.5	18.0	20.0	25.0	23.0
3					---	2.0	7.0	12.0	20.0	21.0	25.0	23.0
4					---	3.0	7.0	12.0	20.0	22.0	25.0	23.0
5					---	3.0	7.0	12.0	22.0	22.0	25.0	24.0
6					---	3.0	5.0	14.0	23.0	22.0	24.0	24.0
7					---	2.0	4.0	15.0	23.0	23.0	24.0	22.0
8					---	2.0	4.5	17.0	23.0	23.0	25.0	20.0
9					---	2.0	4.5	20.0	23.0	25.0	25.0	20.0
10					---	2.0	5.0	21.0	23.0	24.0	25.0	19.0
11					---	2.0	5.0	21.0	20.0	27.0	25.0	19.0
12					---	2.0	9.0	19.0	21.0	27.0	25.0	20.0
13					---	2.0	9.0	19.0	22.0	26.0	23.0	21.0
14					.0	2.0	10.0	19.0	22.0	26.0	20.0	18.0
15					.0	2.0	10.0	18.0	24.0	26.0	20.0	19.0
16					.0	2.0	11.0	19.0	24.0	25.0	20.0	19.0
17					.0	2.5	11.0	19.0	24.0	25.0	19.0	19.0
18					.0	4.0	11.0	19.0	22.0	25.0	19.0	18.0
19					.0	5.0	12.0	19.0	23.0	24.0	19.0	18.0
20					.0	5.0	14.0	19.0	24.0	25.0	20.0	17.0
21					.0	7.0	14.0	19.0	23.0	25.0	21.0	17.0
22					.0	7.5	14.0	20.0	23.0	25.0	21.0	17.0
23					.0	9.0	15.0	18.0	23.0	25.0	22.0	17.0
24					.0	9.0	15.0	16.0	22.0	24.0	22.0	17.0
25					.0	7.0	15.0	15.0	22.0	24.0	21.0	17.0
26					.0	7.0	15.0	15.0	22.0	24.0	21.0	17.0
27					.0	10.0	14.5	15.0	23.0	24.0	21.0	18.0
28					.0	10.0	13.0	15.0	23.0	25.0	21.0	19.0
29					---	5.0	12.0	16.0	23.0	25.0	21.0	19.0
30					---	7.0	10.0	16.0	21.0	25.0	22.0	18.0
31					---	8.0	---	17.0	---	25.0	23.0	---
MEAN						4.5	10.0	16.5	22.0	24.0	22.5	19.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW¼ NW¼ sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft (3 m) downstream from bridge on county road, 0.5 mi (0.8 km) north of Vogel Center, and 3.5 mi (5.6 km) southeast of Falmouth.

DRAINAGE AREA.--243 mi² (629 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft (344 m), from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 127 ft³/s (3.597 m³/s), 7.10 in/yr (180 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Apr. 13, 1971, gage height, 6.33 ft (1.929 m); minimum, 29 ft³/s (0.82 m³/s) Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft³/s (9.91 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 25	0400	453 12.8	4.39 1.338	Apr. 28	0200	563 15.9	4.85 1.478
Apr. 1	0800	*641 18.2	*5.06 1.542				

Minimum discharge, 53 ft³/s (1.50 m³/s) Sept. 9, gage height, 2.49 ft (0.759 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	102	91	85	64	91	625	342	143	103	76	68
2	93	101	89	86	64	94	520	335	134	103	74	67
3	101	99	90	88	64	98	399	335	127	99	72	66
4	101	89	99	90	64	132	344	339	122	97	73	65
5	101	96	100	92	64	174	314	325	119	88	76	63
6	131	110	100	96	64	181	293	313	119	84	72	62
7	146	112	90	97	64	181	283	312	116	82	72	62
8	144	107	89	98	64	201	286	295	115	82	70	61
9	137	101	100	100	64	200	274	275	111	83	71	60
10	130	100	96	102	64	200	263	259	113	84	97	67
11	126	102	96	105	66	190	263	251	108	82	103	69
12	120	97	96	110	68	190	268	242	103	81	96	68
13	115	99	96	116	68	195	291	234	97	80	85	69
14	112	103	96	120	68	200	314	228	93	79	79	68
15	112	101	96	119	70	195	298	221	91	80	76	68
16	120	100	96	118	70	200	274	215	88	77	72	67
17	127	105	96	117	70	196	256	208	86	75	74	66
18	123	117	96	115	70	204	249	203	84	75	81	65
19	118	118	90	115	72	277	245	199	83	74	78	65
20	114	113	88	115	76	364	233	196	92	73	75	66
21	111	106	90	115	82	399	220	190	114	73	70	66
22	110	103	92	115	86	392	215	185	119	72	69	68
23	107	105	92	110	80	388	209	185	103	72	77	70
24	106	110	90	105	76	426	204	187	92	72	93	67
25	106	117	90	86	80	435	211	184	88	77	96	65
26	108	114	88	72	84	356	281	178	85	85	88	64
27	111	108	86	66	90	286	479	173	84	84	80	63
28	108	106	84	62	90	260	536	162	82	82	78	63
29	106	101	81	62	---	246	424	152	86	77	77	64
30	105	100	82	62	---	297	349	147	93	76	74	64
31	103	---	84	62	---	482	---	143	---	76	70	---
TOTAL	3546	3142	2849	3001	2006	7730	9420	7213	3090	2527	2444	1966
MEAN	114	105	91.9	96.8	71.6	249	314	233	103	81.5	78.8	65.5
MAX	146	118	100	120	90	482	625	342	143	103	103	70
MIN	93	89	81	62	64	91	204	143	82	72	69	60
CFSM	.47	.43	.38	.40	.30	1.03	1.29	.96	.42	.34	.32	.27
IN.	.54	.48	.44	.46	.31	1.18	1.44	1.10	.47	.39	.37	.30
CAL YR 1978	TOTAL	38610	MEAN 106	MAX 481	MIN 49	CFSM .44	IN 5.91					
WTR YR 1979	TOTAL	48934	MEAN 134	MAX 625	MIN 60	CFSM .55	IN 7.49					

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW¼ NE¼ sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft (152 m) downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi (0.6 km) upstream from Twin Creek, and at mile 123.9 (199.4 km).

DRAINAGE AREA.--1,450 mi² (3,760 km²) approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947 (M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft (298.009 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft (122 m) and 500 ft (152 m) upstream at present datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flow from dams above station.

AVERAGE DISCHARGE.--47 years, 994 ft³/s (28.15 m³/s), 9.31 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft³/s (221 m³/s) Mar. 29, 1976; maximum gage height, 14.42 ft (4.395 m) Apr. 9, 1959; minimum discharge observed, 164 ft³/s (4.64 m³/s) Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,220 ft³/s (148 m³/s) Apr. 2, gage height, 11.74 ft (3.578 m); minimum, 380 ft³/s (10.8 m³/s) Sept. 20, gage height, 6.61 ft (2.015 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	863	715	758	530	740	680	4920	2960	1200	915	472	513
2	823	702	699	620	730	680	5190	2910	1200	968	460	501
3	811	691	675	900	730	700	4960	3050	1170	969	451	484
4	825	689	727	880	720	1000	4540	3220	1140	976	452	475
5	862	675	734	850	720	1300	4180	3210	1070	958	468	466
6	1020	675	775	830	720	1650	3940	3070	981	914	454	459
7	1080	678	726	810	720	1910	3640	2920	908	872	439	448
8	1080	677	664	790	720	2100	3370	2800	885	836	431	438
9	1060	690	688	770	710	2320	3160	2650	887	797	425	432
10	1050	734	596	760	700	2400	2970	2540	898	776	518	429
11	1030	755	501	730	690	2500	2820	2460	874	755	618	432
12	1020	736	577	730	690	2200	2770	2430	860	742	590	430
13	991	729	702	750	680	2100	2830	2320	830	725	602	428
14	965	780	689	760	680	2350	2820	2170	827	698	596	423
15	947	765	674	790	680	2350	2750	2000	817	673	579	417
16	1010	755	690	800	680	2350	2640	1830	806	651	564	411
17	1000	795	628	800	670	2400	2520	1730	788	626	562	408
18	963	955	633	810	660	2750	2390	1670	762	609	558	401
19	932	956	568	820	660	3050	2260	1620	741	596	557	392
20	887	931	558	830	660	3290	2160	1580	752	580	545	387
21	852	902	640	820	660	3580	2070	1520	1260	566	531	388
22	823	879	687	820	660	3750	1980	1440	1330	553	517	388
23	802	875	709	820	660	3940	1890	1400	1170	545	535	396
24	772	893	663	810	690	4300	1820	1380	1090	548	556	415
25	757	904	672	800	720	4500	1860	1350	1010	545	553	427
26	777	898	707	800	760	4420	2250	1330	956	553	540	431
27	771	879	619	800	720	4160	2650	1310	909	546	550	432
28	758	862	567	780	700	3790	2790	1290	871	528	567	433
29	749	847	478	770	---	3470	2860	1270	858	512	557	434
30	739	814	547	760	---	3770	2900	1240	865	493	543	431
31	729	---	562	750	---	4690	---	1210	---	488	527	---
TOTAL	27748	23836	20113	24290	19530	84450	89900	63880	28715	21513	16317	12949
MEAN	895	795	649	784	698	2724	2997	2061	957	694	526	432
MAX	1080	956	775	900	760	4690	5190	3220	1330	976	618	513
MIN	729	675	478	530	660	680	1820	1210	741	488	425	387
CFSM	.62	.55	.45	.54	.48	1.88	2.07	1.42	.66	.48	.36	.30
IN.	.71	.61	.52	.62	.50	2.17	2.31	1.64	.74	.55	.42	.33
CAL YR 1978 TOTAL	340365			933	MAX 4470	MIN 337	CFSM .64	IN 8.73				
WTR YR 1979 TOTAL	433241			1187	MAX 5190	MIN 387	CFSM .82	IN 11.11				

STREAMS TRIBUTARY TO LAKE HURON

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04121500 MUSKOGON RIVER AT EVART, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: November 1956 to current year.

INSTRUMENTATION.--Temperature recorder since November 1956.

REMARKS.--Temperature recorder clock stopped Jan. 25 to Apr. 25 (range in temperature 0.0° to 3.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 28.0°C July 1, 1963, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 25.0°C July 16; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	11.5	6.5	5.5	.5	.5	.0	.0				
2	13.0	11.0	6.5	5.5	.5	.5	.0	.0				
3	12.0	12.0	7.0	5.5	.5	.0	.0	.0				
4	12.0	11.5	8.0	6.5	.0	.0	.0	.0				
5	12.0	11.0	9.0	8.0	.0	.0	.0	.0				
6	11.0	10.0	9.0	8.5	.0	.0	.0	.0				
7	10.0	9.5	8.5	7.0	.0	.0	.0	.0				
8	9.5	8.5	7.0	5.5	.0	.0	.0	.0				
9	8.5	8.0	6.5	6.0	.0	.0	.0	.0				
10	9.5	8.0	6.5	6.5	.0	.0	.0	.0				
11	9.5	9.5	6.5	6.0	.0	.0	.0	.0				
12	10.0	9.5	6.0	5.5	.0	.0	.0	.0				
13	10.0	9.5	5.5	5.0	.0	.0	.0	.0				
14	9.5	8.5	5.0	4.5	.0	.0	.0	.0				
15	8.5	8.0	4.5	4.5	.0	.0	.0	.0				
16	8.0	7.0	4.5	3.5	.0	.0	.0	.0				
17	7.0	6.5	3.5	3.5	.0	.0	.0	.0				
18	7.0	7.0	4.0	3.5	.0	.0	.0	.0				
19	8.0	7.0	4.0	3.5	.0	.0	.0	.0				
20	8.0	7.0	3.5	3.0	.0	.0	.0	.0				
21	9.0	8.0	3.0	1.5	.0	.0	.0	.0				
22	10.0	9.0	1.5	1.5	.0	.0	.0	.0				
23	10.0	9.0	1.5	1.5	.0	.0	.0	.0				
24	9.0	8.0	1.5	1.5	.0	.0	.0	.0				
25	8.0	7.0	1.5	1.5	.0	.0	---	---				
26	8.0	7.0	1.5	1.5	.0	.0	---	---				
27	8.5	7.0	1.5	1.0	.0	.0	---	---				
28	8.0	6.5	1.0	.5	.0	.0	---	---				
29	6.5	6.5	.5	.5	.0	.0	---	---				
30	6.0	5.5	.5	.5	.0	.0	---	---				
31	7.0	6.0	---	---	.0	.0	---	---				
MONTH	13.0	5.5	9.0	.5	.5	.0						

STREAMS TRIBUTARY TO LAKE MICHIGAN
04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	8.0	7.0	16.5	16.5	18.5	17.0	22.0	20.0	21.5	19.5
2	---	---	8.0	7.0	17.0	15.5	19.5	16.0	23.0	19.5	22.0	20.0
3	---	---	8.5	8.0	18.5	15.5	19.5	17.0	22.0	19.5	21.5	19.5
4	---	---	8.5	8.0	18.5	17.0	19.0	16.5	22.0	20.0	21.0	19.0
5	---	---	8.0	8.0	20.0	18.0	19.5	16.5	22.0	19.5	21.5	18.5
6	---	---	8.0	7.0	20.0	18.0	20.0	16.5	23.0	19.5	21.5	19.0
7	---	---	11.0	8.0	20.0	18.5	20.5	18.0	23.5	20.0	20.5	16.0
8	---	---	14.0	11.0	22.0	19.5	21.5	19.0	23.0	20.5	16.5	14.0
9	---	---	16.5	14.0	22.0	20.5	21.5	19.5	20.5	18.5	15.5	13.5
10	---	---	18.5	16.5	21.0	19.0	22.0	19.5	19.5	18.5	15.0	14.5
11	---	---	18.5	18.5	19.0	16.5	22.0	20.5	19.5	16.5	15.0	13.5
12	---	---	18.5	15.5	19.0	16.0	23.5	20.5	19.5	16.0	18.5	14.5
13	---	---	15.5	14.0	19.5	16.0	24.0	21.5	19.0	17.0	18.5	17.0
14	---	---	15.0	14.0	20.0	16.5	24.0	22.0	18.0	15.5	17.0	15.0
15	---	---	15.0	14.0	22.0	19.5	24.5	22.0	18.0	15.0	16.5	14.0
16	---	---	14.5	13.0	23.5	20.5	25.0	23.0	18.0	14.5	18.0	14.5
17	---	---	14.5	13.5	23.5	21.0	24.5	21.0	18.0	15.5	18.0	14.5
18	---	---	16.0	14.0	21.0	19.0	23.0	19.5	16.0	15.0	18.5	15.5
19	---	---	16.0	16.0	20.5	17.0	23.0	19.5	18.0	15.5	16.5	13.5
20	---	---	16.5	15.0	20.5	18.5	23.0	20.0	18.5	16.5	16.0	12.0
21	---	---	16.5	15.0	19.5	18.0	24.0	20.5	20.0	16.5	16.0	14.5
22	---	---	15.5	14.5	19.0	18.5	24.5	21.0	19.5	18.0	15.5	12.0
23	---	---	15.0	13.5	18.5	16.0	24.5	21.5	19.5	18.5	15.0	11.5
24	---	---	13.5	12.0	18.0	15.0	24.0	21.5	20.0	18.5	14.0	11.5
25	---	---	13.5	11.5	18.5	15.5	23.0	22.0	19.5	18.0	15.0	12.0
26	14.0	13.0	13.5	12.0	19.0	16.5	23.0	20.5	18.5	16.0	16.0	13.0
27	13.0	11.0	13.0	12.0	20.0	18.0	23.5	20.5	18.5	16.5	16.5	13.5
28	11.5	10.0	13.0	12.0	21.0	18.5	24.0	21.5	16.5	16.0	16.0	14.0
29	10.0	9.0	14.5	12.0	21.0	19.0	24.0	20.5	19.0	16.5	17.0	15.0
30	9.0	8.0	14.0	13.0	20.5	19.5	23.0	20.5	20.5	17.0	18.0	15.5
31	---	---	16.5	14.0	---	---	23.0	20.0	21.0	18.5	---	---
MONTH			18.5	7.0	23.5	15.0	25.0	16.0	23.5	14.5	22.0	11.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04121900 LITTLE MUSKIEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW¼ SW¼ sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi (0.8 km) downstream from Rustford Dam, and 5.2 mi (8.4 km) east of Morley.

DRAINAGE AREA.--138 mi² (357 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m), from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation by dams above station.

AVERAGE DISCHARGE.--13 years, 126 ft³/s (3,568 m³/s), 12.40 in/yr (315 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,010 ft³/s (28.6 m³/s) Aug. 31, 1975, gage height, 5.92 ft (1.804 m); minimum, 22 ft³/s (0.62 m³/s) July 21, 1979, gage height, 1.53 ft (0.466 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Jan. 4	1330	ice jam	*3.79 1.155	Mar. 31	0800	*455 12.9	3.70 1.128
Mar. 25	0030	415 11.8	3.50 1.067				

Minimum discharge, 22 ft³/s (0.62 m³/s) July 21, gage height, 1.53 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	91	103	105	60	88	410	315	105	91	51	69
2	95	91	100	150	74	88	351	280	104	88	51	67
3	101	90	99	210	80	90	310	329	100	79	49	66
4	113	91	101	200	90	150	276	343	98	86	57	63
5	114	116	101	190	100	265	254	289	96	83	74	61
6	133	123	100	185	100	250	250	253	93	75	67	61
7	129	116	97	175	100	230	229	231	90	74	62	58
8	113	111	100	170	100	230	222	208	90	71	60	59
9	104	107	98	160	100	235	210	193	91	67	59	59
10	101	104	103	155	100	225	201	183	116	69	108	58
11	98	101	110	145	100	195	194	195	111	71	107	58
12	97	99	100	150	100	185	221	199	97	67	90	58
13	94	106	99	150	100	185	254	180	90	70	74	58
14	92	133	99	150	105	210	221	147	87	71	70	57
15	93	120	98	150	105	220	188	136	86	69	67	57
16	124	108	97	155	105	210	176	130	80	65	63	56
17	129	125	97	155	110	210	167	126	77	63	80	55
18	151	174	95	160	110	277	159	123	76	62	88	54
19	137	154	94	160	110	379	154	122	73	59	79	55
20	105	131	94	155	110	393	149	127	79	57	73	55
21	92	116	97	155	115	379	120	121	97	53	72	53
22	91	112	96	150	120	365	113	117	89	54	70	54
23	91	117	94	150	125	378	108	115	83	47	79	53
24	90	138	94	145	130	406	109	118	80	46	88	52
25	93	129	96	145	130	397	202	113	77	51	79	53
26	109	119	98	145	125	327	265	110	73	54	73	52
27	105	112	100	140	120	258	275	110	71	52	72	51
28	99	109	100	140	110	233	268	111	71	52	82	51
29	95	107	105	110	---	235	257	110	81	49	81	53
30	93	108	102	60	---	337	317	107	92	50	75	50
31	92	---	95	60	---	440	---	106	---	53	72	---
TOTAL	3272	3458	3062	4630	2934	8070	6630	5347	2653	1998	2272	1706
MEAN	106	115	98.8	149	105	260	221	172	88.4	64.5	73.3	56.9
MAX	151	174	110	210	130	440	410	343	116	91	108	69
MIN	90	90	94	60	60	88	108	106	71	46	49	50
CFSM	.77	.83	.72	1.08	.76	1.88	1.60	1.25	.64	.47	.53	.41
IN.	.88	.93	.83	1.25	.79	2.18	1.79	1.44	.72	.54	.61	.46

CAL YR 1978	TOTAL	39657	MEAN	109	MAX	451	MIN	46	CFSM	.79	IN	10.69
WTR YR 1979	TOTAL	46032	MEAN	126	MAX	440	MIN	46	CFSM	.91	IN	12.41

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Aug. 20 to Sept. 20 (range in temperature 10.0 to 21.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 28.0°C Aug. 23, 1968, June 28, 1971; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 25.5°C July 16; minimum 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.0	8.0	6.0	1.0	1.0	.0	.0	.0	.0	2.5	.0
2	13.5	11.5	8.5	6.0	1.0	.0	.0	.0	.0	.0	2.5	2.0
3	13.5	13.0	9.0	6.5	1.0	.0	.0	.0	.0	.0	3.5	2.5
4	13.0	11.5	10.5	8.5	1.0	.5	.0	.0	.0	.0	3.5	1.5
5	13.0	12.0	11.0	8.5	1.5	.5	.0	.0	.0	.0	1.5	1.0
6	12.0	10.5	10.0	9.0	2.0	1.0	.0	.0	.0	.0	2.0	1.5
7	10.5	9.0	8.0	6.5	1.0	.0	.0	.0	.0	.0	3.0	2.0
8	10.0	8.0	6.5	5.0	.5	.0	.0	.0	.0	.0	4.0	2.5
9	9.0	7.5	8.0	6.0	.5	.0	.0	.0	.0	.0	3.5	2.5
10	12.5	9.0	7.5	6.5	.0	.0	.0	.0	.0	.0	2.5	1.5
11	12.0	10.5	7.0	6.0	.0	.0	.0	.0	.0	.0	2.5	2.0
12	12.0	11.0	6.5	5.5	1.0	.0	.0	.0	.0	.0	2.0	1.0
13	10.5	9.5	6.0	5.0	1.5	1.0	.0	.0	.0	.0	4.0	1.5
14	10.0	8.5	6.0	5.0	1.5	.0	.0	.0	.0	.0	4.0	1.5
15	8.0	7.0	6.0	4.5	1.5	.5	.0	.0	.0	.0	2.0	1.0
16	8.0	7.0	4.0	2.0	1.5	1.0	.0	.0	.0	.0	3.0	1.0
17	7.5	6.0	5.0	3.5	1.5	1.0	.0	.0	.0	.0	4.0	2.0
18	9.0	7.0	5.0	4.5	1.0	.5	.0	.0	.0	.0	6.0	4.0
19	9.0	8.0	4.5	3.5	1.0	.5	.0	.0	.0	.0	4.0	3.0
20	9.5	7.0	3.5	2.5	.5	.5	.0	.0	.0	.0	3.0	3.0
21	11.5	8.0	2.5	1.5	1.0	.5	.0	.0	.0	.0	5.5	3.0
22	12.5	10.5	3.0	2.0	1.5	1.0	.0	.0	.0	.0	7.0	4.0
23	12.5	9.0	3.0	2.5	1.0	.5	.0	.0	.0	.0	8.0	6.5
24	9.0	7.5	2.5	2.5	1.0	1.0	.0	.0	.0	.0	8.0	6.0
25	9.0	8.0	2.5	2.5	1.0	.5	.0	.0	.0	.0	6.0	2.0
26	9.0	8.5	2.5	2.0	.5	.0	.0	.0	.0	.0	2.0	1.0
27	9.5	7.5	2.0	1.5	.0	.0	.0	.0	.0	.0	4.0	1.0
28	9.0	6.5	1.5	1.0	.0	.0	.0	.0	.0	.0	4.0	3.0
29	7.5	6.0	1.5	.5	.0	.0	.0	.0	---	---	5.5	4.0
30	8.5	6.0	1.5	1.0	.0	.0	.5	.0	---	---	8.0	5.5
31	9.0	7.0	---	---	.0	.0	.5	.0	---	---	8.0	6.0
MONTH	14.5	6.0	11.0	.5	2.0	.0	.5	.0	.0	.0	8.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.0	4.5	9.0	6.5	15.5	14.0	16.5	15.5	21.0	18.0	---	---
2	4.5	4.0	10.0	8.0	15.5	11.0	21.0	14.5	21.5	16.5	---	---
3	6.5	3.0	10.5	10.0	18.0	12.0	19.0	16.0	21.5	17.0	---	---
4	6.5	5.5	10.5	8.0	17.5	13.0	21.0	15.5	20.0	17.0	---	---
5	5.5	3.5	9.5	7.0	19.5	14.5	20.5	14.5	20.5	16.5	---	---
6	4.0	2.0	11.5	7.5	19.5	14.0	21.5	14.5	21.5	16.5	---	---
7	5.0	2.0	15.5	10.0	17.5	16.0	22.0	15.5	22.5	18.0	---	---
8	4.5	3.0	17.5	13.5	20.5	16.5	22.5	17.0	21.5	18.0	---	---
9	5.5	2.5	18.5	14.5	20.0	18.0	22.0	17.5	17.5	15.5	---	---
10	6.5	2.5	19.0	15.5	18.5	15.5	23.0	17.0	19.5	17.5	---	---
11	6.0	4.5	16.0	14.5	16.5	13.0	23.0	18.0	19.5	16.0	---	---
12	8.0	4.0	14.5	11.5	18.0	12.5	24.0	19.0	19.5	14.5	---	---
13	10.5	8.0	12.0	8.5	19.0	12.5	24.5	19.0	18.0	16.0	---	---
14	10.5	8.0	13.0	9.5	20.5	14.5	24.5	20.5	17.5	14.5	---	---
15	9.0	7.5	12.5	10.0	23.0	17.5	23.5	20.5	18.5	13.5	---	---
16	9.0	6.5	13.5	8.0	23.5	18.0	25.5	20.0	17.5	12.5	---	---
17	11.0	6.5	13.0	9.0	21.0	18.5	24.5	19.0	16.5	14.0	---	---
18	12.0	7.0	16.0	11.0	19.5	15.5	20.5	17.5	16.5	14.0	---	---
19	12.5	8.0	14.5	11.0	21.0	14.0	22.5	15.5	18.5	14.5	---	---
20	14.0	9.0	14.0	9.0	19.0	16.5	22.0	15.5	---	---	---	---
21	13.0	10.5	13.0	10.0	20.5	16.5	23.0	16.0	---	---	15.5	12.5
22	14.5	9.0	12.5	8.5	21.5	17.5	23.0	17.0	---	---	14.0	10.5
23	15.5	10.0	12.0	10.0	19.5	14.5	23.5	18.0	---	---	13.5	9.5
24	14.0	11.0	10.0	8.5	20.0	14.0	23.0	18.5	---	---	13.5	10.0
25	12.5	12.0	12.0	7.5	20.5	14.0	21.5	19.0	---	---	15.5	11.5
26	13.0	12.5	11.5	9.0	21.5	15.0	19.5	17.0	---	---	15.5	11.5
27	12.5	9.5	11.0	9.0	20.5	17.0	22.5	16.5	---	---	16.0	12.0
28	11.5	8.5	11.5	9.0	21.5	16.0	24.0	19.0	---	---	16.5	12.5
29	9.5	7.0	14.5	9.0	20.0	17.0	22.5	17.5	---	---	17.0	14.0
30	9.5	7.5	14.0	11.0	18.0	16.0	21.0	18.0	---	---	18.0	14.5
31	---	---	15.5	11.0	---	---	23.0	17.5	---	---	---	---
MONTH	15.5	2.0	19.0	6.5	23.5	11.0	25.5	14.5				

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE¼ NE¼ sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft (183 m) downstream from Penoyer Creek and at mile 39.1 (62.9 km).

DRAINAGE AREA.--2,350 mi² (6,090 km²), approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft (190.753 m) National Geodetic Vertical Datum of 1929. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft (12.192 m) lower.

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, Nov. 29 to Mar. 9, which are poor. Flow regulated by powerplants above station, the largest of which are at Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--57 years (water years 1910-14, 1917-19, 1931-79), 1,961 ft³/s (55.54 m³/s), 11.33 in/yr (288 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft³/s (423 m³/s) Mar. 25, 1913; minimum, 52 ft³/s (1.47 m³/s) Oct. 2, 1965, gage height, 5.31 ft (1.618 m), result of regulation during pipeline repair; minimum daily, 330 ft³/s (9.35 m³/s) Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,100 ft³/s (173 m³/s) Apr. 2, gage height, 10.40 ft (3.170 m); minimum, 682 ft³/s (19.3 m³/s) July 20, Aug. 5, Sept. 16, 23, 24, gage height, 6.38 ft (1.945 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2040	1840	1950	1400	1950	2150	6050	3910	1450	2300	1510	1090
2	1840	1850	1800	1400	2050	2500	6040	4970	1850	2130	1050	1090
3	1860	1850	1450	1450	2300	3150	5910	4980	1950	1590	1060	1080
4	1850	1850	1550	1450	2200	3450	5670	4880	2260	1120	911	1110
5	1860	1470	1900	1450	1950	3600	5560	4550	2190	1420	838	1090
6	1880	1460	1950	1450	2050	3700	5570	4420	1080	1900	1050	1090
7	2030	1450	1950	1500	2300	3600	5520	3990	1970	1900	1050	1090
8	2240	1060	2000	1950	2200	3700	5330	3520	2710	1660	1330	1080
9	2070	1060	1700	2350	1900	4200	4860	3900	2120	1570	1050	1080
10	1850	1450	1400	2400	1900	4900	4160	3800	1090	1600	1300	1080
11	1840	2020	1400	2400	1900	4580	3950	3490	1080	1210	1740	1080
12	1840	2210	1400	2400	1900	4220	4190	3340	1660	1370	1240	1080
13	1830	2070	1400	2400	2000	3770	4640	2940	2260	1560	1170	1070
14	1760	1890	1400	2400	1950	4190	4470	2670	1720	1650	1200	957
15	1470	1630	1400	2400	1900	4500	4400	3650	1080	1330	1160	1060
16	2230	1350	1400	2200	1900	4460	4030	3460	1080	1510	1200	944
17	1600	1600	1450	1950	1900	4530	3640	2470	1450	1660	1330	953
18	2220	1870	1550	1900	1900	4510	3190	1720	1860	1340	1700	1070
19	2220	1860	1800	1950	1900	4890	2970	1100	1640	1080	1070	959
20	2020	2040	1800	1950	1900	5520	2960	1620	1460	976	1070	945
21	1600	2250	1700	1900	1900	5600	2880	2290	2290	962	1460	954
22	1310	2250	1400	1900	1950	5550	2510	2150	3050	1080	1450	918
23	1570	2270	1600	1950	2800	5710	2390	2090	2980	1400	1640	692
24	1830	2270	1950	2050	2000	5720	1740	2250	2410	1540	1850	723
25	1850	2080	2000	2350	1950	5720	1260	2240	1510	1090	1470	1080
26	1840	1880	2000	2350	1950	5730	3260	2040	1100	1100	1080	1070
27	1590	1640	1950	2350	2000	5260	5440	1920	1100	1070	1390	1080
28	1200	1360	1950	2000	1950	4380	4750	2250	1110	1070	1440	1070
29	1060	1550	1700	2300	---	4120	3990	2250	1610	1060	1430	1060
30	1290	1900	1300	2000	---	4910	3810	2250	2320	1070	1460	1060
31	1850	---	1400	2200	---	5780	---	1660	---	1390	1430	---
TOTAL	55540	53330	51600	62100	56450	138600	125140	92770	53340	43708	40129	30705
MEAN	1792	1778	1665	2003	2016	4471	4171	2993	1778	1410	1294	1024
MAX	2240	2270	2000	2400	2800	5780	6050	4980	3050	2300	1850	1110
MIN	1060	1060	1300	1400	1900	2150	1260	1100	1080	962	838	692
CFSM	.76	.76	.71	.85	.86	1.90	1.78	1.27	.76	.60	.55	.44
IN.	.88	.84	.82	.98	.89	2.19	1.98	1.47	.84	.69	.64	.49
CAL YR 1978	TOTAL	691149	MEAN	1894	MAX	5770	MIN	647	CFSM	.81	IN	10.94
WTR YR 1979	TOTAL	803412	MEAN	2201	MAX	6050	MIN	692	CFSM	.94	IN	12.72

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°19'05", long 86°02'11", in SW¼ NW¼ sec.30, T.11 N., R.14 W., Newago County, Hydrologic Unit 04060102, at bridge on Maple Island Road, 5 mi (8 km) southwest of Bridgeton, 13 mi (21 km) upstream from Muskegon Lake, and 20 mi (32 km) downstream from gaging station at Newago.

DRAINAGE AREA.--2,420 mi² (6,270 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to current year.

WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since November 1975.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Water-discharge measurements are made at times of monthly sampling. Interruptions in the record were due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum (water years 1975, 1978, 1979), 1550 micromhos Sept. 24, 1979; minimum (water years 1975, 1977-79), 69 micromhos May 3, 1979.

WATER TEMPERATURES: Maximum, 33.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 1550 micromhos Sept. 24; minimum, 69 micromhos May 3.

WATER TEMPERATURES: Maximum, 26.0°C Aug. 3, 6, 7; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER AS 100 ML)	HARD- NESS (MG/L CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
24...	1245	1790	356	8.3	11.5	10.0	93	750	480	170	22
NOV											
15...	1130	1820	387	8.1	7.0	11.2	93	K8	30	190	42
DEC											
13...	1300	1390	461	8.3	1.5	11.8	85	K7	110	180	23
JAN											
11...	1430	2470	441	8.1	.0	12.8	88	K10	K8	190	35
FEB											
15...	1130	1960	420	8.1	.0	13.0	90	K4	12	190	25
MAR											
08...	1000	5240	386	8.0	1.5	12.3	89	--	--	160	15
APR											
05...	1000	5540	250	8.5	3.5	12.2	94	K6	89	120	8
MAY											
08...	1000	3570	278	8.2	12.5	9.9	93	10	K8	150	22
JUN											
06...	1000	1660	307	8.4	18.5	8.9	96	K178	35	150	24
JUL											
09...	1500	1210	335	8.3	23.0	8.8	106	K12	K8	160	20
AUG											
08...	1115	1020	342	8.4	23.0	7.9	92	57	28	170	26
SEP											
18...	1000	910	364	8.4	17.5	8.7	92	15	K9	170	13

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
24...	45	15	9.0	.3	10	1.3	180	0	148	1.4	23
NOV											
15...	48	16	11	.4	11	1.1	180	0	148	2.3	25
DEC											
13...	47	15	11	.4	12	1.2	190	0	156	1.5	25
JAN											
11...	50	16	11	.3	11	1.1	190	0	156	2.4	18
FEB											
15...	51	15	12	.4	12	1.2	200	0	164	2.5	23
MAR											
08...	42	14	10	.3	12	1.1	180	0	148	2.9	22
APR											
05...	31	9.5	7.1	.3	12	1.5	120	6	108	.7	15
MAY											
08...	35	14	6.5	.2	9	1.3	150	0	123	1.5	16
JUN											
06...	40	11	8.4	.3	11	1.2	150	2	126	1.0	17
JUL											
09...	44	12	8.9	.3	11	1.1	170	0	139	1.4	12
AUG											
08...	46	13	9.8	.3	11	1.0	170	2	143	1.1	17
SEP											
18...	44	14	10	.3	11	1.0	180	4	154	1.2	19

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE MICHIGAN
04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 24...	18	.1	4.1	222	204	1070	.16	.01	--	.45	.46
NOV 15...	20	.1	5.6	230	215	1130	.22	.03	--	.34	.37
DEC 13...	21	.1	5.1	230	219	863	.33	.01	--	.31	.32
JAN 11...	21	.1	6.5	217	217	1450	.41	.03	--	.29	.32
FEB 15...	21	.1	8.5	238	230	1260	.50	.04	--	.33	.37
MAR 08...	18	.1	8.2	220	204	3110	.52	.10	--	.06	.16
APR 05...	13	.0	6.6	161	149	2410	.41	.06	--	.44	.50
MAY 08...	13	.1	5.0	171	165	1650	.23	.02	.02	.49	.51
JUN 06...	18	.1	3.9	198	175	887	.18	.02	.02	.33	.35
JUL 09...	18	.3	4.2	214	184	699	.11	.02	.02	.43	.45
AUG 08...	16	.1	4.7	216	193	595	.08	.01	.01	2.3	2.3
SEP 18...	19	.1	4.8	221	205	543	.01	.03	.04	.54	.57

DATE	NITRO- GEN,AM- MONIA + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 24...	.16	.30	.62	2.7	.06	--	.05	--	15	72	100
NOV 15...	.08	.29	.59	2.6	.02	--	.00	6.3	13	64	100
DEC 13...	.29	.03	.65	2.9	.00	--	.01	5.7	8	30	100
JAN 11...	--	--	.73	3.2	.01	--	.01	--	10	67	100
FEB 15...	--	--	.87	3.9	.00	--	.00	4.8	10	53	100
MAR 08...	--	--	.68	3.0	.03	--	.01	7.3	62	877	100
APR 05...	--	--	.91	4.0	.07	--	.07	--	--	--	--
MAY 08...	--	--	.74	3.3	.17	.52	.04	8.8	38	366	100
JUN 06...	--	--	.53	2.3	.03	.09	.00	9.8	19	85	100
JUL 09...	--	--	.56	2.5	.04	.12	.03	--	6	20	100
AUG 08...	--	--	2.4	11	.02	.06	.00	9.5	9	25	100
SEP 18...	--	--	.58	2.6	.02	.06	.01	3.3	8	20	100

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 24...	1245	1	1	100	100	1	1	<10	0	1
JAN 11...	1430	1	1	0	0	0	0	10	0	0
APR 05...	1000	2	1	0	0	0	0	10	10	1
JUL 09...	1500	1	1	0	20	0	1	30	20	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 24...	0	6	4	150	30	5	4	40	30	<.5
JAN 11...	0	4	1	260	30	12	4	0	0	<.5
APR 05...	1	6	2	600	90	130	1	40	7	.5
JUL 09...	0	2	1	200	50	1	2	30	20	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 24...	<.5	0	0	0	0	0	0	6.5	.8
JAN 11...	<.5	0	0	0	0	30	0	7.2	.2
APR 05...	.5	0	0	0	0	50	10	8.4	.4
JUL 09...	<.5	0	0	1	0	20	20	8.0	.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 15...	1130	19	--	54.7	58.2	14.4	3.00
SEP 18...	1000	42	895	41.5	56.9	17.2	8.45

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 8,77 1430	MAR 8,78 1330	MAY 2,78 1215	JUN 6,78 1445				
TOTAL CELLS/ML	2500	420	3600	920				
DIVERSITY: DIVISION	0.8	0.9	0.6	0.9				
..CLASS	0.8	0.9	0.7	1.3				
...ORDER	1.1	0.9	1.6	1.8				
...FAMILY	1.3	2.5	2.3	3.3				
....GENUS	1.4	2.5	2.7	3.5				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
....COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
....MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	100	3	--	-
....OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	75	2	43	5
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	14	2
....SELENASTRUM	--	-	--	-	--	-	--	-
....SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	50	1	110	13
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	50	1	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
..ZYGNEATALES								
...DESMIDIACEAE								
....COSMARIMUM	--	-	--	-	--	-	--	-
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	24	1	--	-	1700#	49	130	14
....MELOSTRA	370#	15	--	-	300	8	14	2
....STEPHANODISCUS	*	0	--	-	25	1	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	120	3	43	5
....COCCONEIS	*	0	--	-	--	-	43	5
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	18	1	7	2	--	-	57	6
...DIATOMACEAE								
....DIATOMA	97	4	110#	27	270	8	29	3
...FRAGILARIACEAE								
....ASTERTONELLA	24	1	--	-	--	-	--	-
....FRAGILARIA	--	-	*	0	--	-	72	8
....SYNEDRA	18	1	21	5	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	*	0	79#	19	50	1	--	-
...NAVICULACEAE								
....NAVICULA	43	2	86#	20	25	1	100	11
....NEIDIUM	--	-	--	-	75	2	--	-
...PINNULARIA	--	-	--	-	--	-	--	-
...NITZSCHIA								
....NITZSCHIA	*	0	14	3	--	-	160#	17
...SURIPELLACEAE								
....SURIPELLA	--	-	--	-	25	1	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	500	14	--	-
..CHRYSTOPHYCEAE								
...CHRYSONOMADALES								
...OCHROMONADACEAE								
....DINOBYRON	--	-	--	-	50	1	--	-
....OCHROMONAS	--	-	--	-	--	-	72	8
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	*	0	--	-	--	-	29	3

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 8,77 1430	MAR 8,78 1330	MAY 2,78 1215	JUN 6,78 1445
ORGANISM	CFLLS /ML PER- CENT	CELLS /ML PER- CENT	CELLS /ML PER- CENT	CELLS /ML PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)				
..CYANOPHYCEAE				
...CHROOCOCCALES				
...CHROOCOCCACEAE				
....AGMENELLUM	-- -	-- -	-- -	-- -
....ANACYSTIS	-- -	-- -	100 3	-- -
...HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	-- -	-- -	-- -	-- -
...OSCILLATORIACEAE				
....LYNGBYA	-- -	-- -	-- -	-- -
...OSCILLATORIA	-- -	86# 20	-- -	-- -
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....GOMPHOSPHAERIA	1800# 74	-- -	-- -	-- -
EUGLENOPHYTA (EUGLENOIDS)				
..EUGLENOPHYCEAE				
...EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	-- -	14 3	-- -	-- -
PYRRHOPHYTA (FIRE ALGAE)				
..DINOPHYCEAE				
...PERIDINIALES				
...CERATIACEAE				
....CERATIUM	-- -	-- -	-- -	-- -
...PERIDINIACEAE				
....PERIDINIUM	-- -	-- -	25 1	-- -

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 19,78 1330	AUG 15,78 1100	SEP 12,78 1345
TOTAL CELLS/ML	2900	11000	5100
DIVERSITY: DIVISION	1.4	0.9	1.3
..CLASS	1.4	1.0	1.4
..ORDER	1.6	1.7	2.2
...FAMILY	2.1	2.0	2.5
....GENUS	2.8	2.2	2.6

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
....CHARACIACEAE						
....SCHROEDERIA	--	-	* 0		--	-
....COELASTRACEAE						
....COELASTRUM	--	-	--	-	70	1
....MICRACTINIACEAE						
....GOLENKINIA	--	-	* 0		--	-
....MICRACTINIUM	--	-	--	-	--	-
....OOCYSTACEAE						
....ANKISTRODESMUS	29	1	* 0		* 0	
....KIRCHNERIELLA	29	1	--	-	--	-
....OOCYSTIS	460#	16	130	1	--	-
....SELENASTRUM	--	-	* 0		70	1
....SCENEDESMACEAE						
....CRUCIGENIA	170	6	--	-	--	-
....SCENEDESMUS	320	11	400	4	70	1
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CARTERIA	--	-	--	-	52	1
....CHLAMYDOMONAS	14	1	* 0		52	1
....PHACOTACEAE						
....PHACOTUS	--	-	66	1	52	1
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	--	-	* 0	
CHRYSOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	14	1	89	1	610	12
....MFLOSIRA	29	1	* 0		--	-
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	110	1	* 0	
....COCCONEIS	29	1	--	-	210	4
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	35	1
....CYMBELLA	--	-	110	1	87	2
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	990#	35	600	6	--	-
....SYNEDRA	290	10	--	-	52	1
...GOMPHONEMACEAE						
....GOMPHONEMA	--	-	* 0		* 0	
...NAVICULACEAE						
....NAVICULA	43	2	110	1	52	1
....NEIDIUM	--	-	--	-	* 0	
...PINNULARIA						
....NITZSCHIA	--	-	* 0		--	-
...NITZSCHIA						
....NITZSCHIA	14	1	* 0		87	2
...SURIPELLACEAE						
....SURIPELLA	--	-	--	-	--	-
...TARELLARIACEAE						
....TARELLARIA	--	-	--	-	--	-
..CHRYSOPHYCEAE						
...CHRYSOMONADALES						
...OCHROMONADACEAE						
....DINORRYON	--	-	--	-	--	-
....OCHROMONAS	--	-	110	1	52	1
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	66	1	52	1

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 19,78 1330		AUG 15,78 1100		SEP 12,78 1345	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	89	1	--	-
....ANACYSTIS	430#	15	6500#	60	2700#	53
...HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	2000#	18	--	-
...OSCILLATORIACEAE						
....LYNGBYA	--	-	180	2	--	-
...OSCILLATORIA	--	-	--	-	660	13
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)						
..DINOPHYCEAE						
...PERIDINIALES						
...CERATIACEAE						
....CERATIUM	--	-	--	-	*	0
...PERIDINIACEAE						
....PERIDINIUM	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	384	376	380	386	368	375	371	312	341	392	375	381
2	383	366	375	380	363	373	383	336	359	428	393	416
3	378	329	352	382	365	374	354	177	259	433	425	429
4	373	338	360	377	364	371	361	218	325	434	425	430
5	371	317	340	373	361	368	326	279	309	432	418	424
6	368	335	355	392	371	378	369	323	350	428	410	419
7	369	339	357	389	362	371	374	342	357	421	404	413
8	374	357	367	384	375	379	365	346	356	421	409	415
9	376	363	368	404	378	386	373	359	367	415	404	409
10	372	363	368	405	387	396	379	366	372	411	400	406
11	366	358	362	394	381	387	374	309	351	409	400	404
12	368	355	361	389	372	381	323	276	302	411	391	402
13	369	361	365	385	284	325	413	285	337	398	378	389
14	364	349	359	374	327	358	411	360	389	403	383	393
15	365	302	335	391	377	385	408	385	398	408	392	401
16	377	314	338	387	362	379	409	351	390	412	202	342
17	380	335	365	379	164	229	406	359	392	329	227	289
18	359	343	352	307	236	274	422	390	407	389	186	314
19	373	351	359	352	291	332	437	405	421	385	333	361
20	374	328	352	365	292	344	431	194	327	346	222	281
21	364	349	358	364	308	338	383	318	367	238	176	216
22	380	364	369	357	250	310	390	275	350	334	225	260
23	375	359	366	261	181	208	411	390	403	348	210	278
24	367	355	361	246	189	230	405	357	386	264	178	210
25	374	331	354	297	251	277	411	384	399	334	277	309
26	368	327	349	354	307	320	417	404	411	321	167	234
27	376	358	367	361	327	349	432	407	418	251	176	201
28	384	351	375	354	326	345	426	403	415	237	167	198
29	389	369	377	357	169	273	417	235	387	316	221	285
30	383	370	374	363	327	356	254	198	222	350	282	326
31	387	372	381	---	---	---	375	213	346	371	337	355
MONTH	389	302	361	405	164	339	437	177	362	434	167	342
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	394	340	372	470	425	445	213	111	166	226	87	145
2	400	341	381	467	427	440	113	103	109	235	108	206
3	390	357	374	443	209	333	199	108	159	194	69	112
4	393	374	384	243	213	231	262	193	213	211	193	201
5	414	394	401	368	248	281	258	233	252	228	205	211
6	407	375	393	388	275	349	255	250	252	225	200	205
7	389	373	383	397	349	390	299	122	225	240	200	217
8	404	381	395	397	386	391	134	127	130	251	242	246
9	420	405	413	389	333	373	253	110	133	253	244	247
10	416	407	411	397	347	390	267	246	250	253	249	251
11	418	408	412	401	391	396	275	135	222	266	245	252
12	413	403	407	402	381	391	244	109	170	256	251	253
13	413	401	407	397	386	393	257	188	215	261	255	257
14	415	398	406	394	378	385	266	233	239	264	259	262
15	420	391	406	392	376	382	257	231	236	289	263	275
16	419	394	409	404	375	388	253	223	231	274	257	267
17	435	403	422	493	373	433	261	217	229	266	258	261
18	434	416	425	459	374	405	264	215	234	270	258	265
19	430	417	424	491	427	467	265	215	236	328	266	297
20	429	249	354	575	456	526	262	208	234	332	295	313
21	317	189	217	601	566	580	259	206	227	318	283	300
22	380	241	305	597	546	571	250	216	228	320	281	298
23	302	180	207	613	314	423	256	216	234	320	289	306
24	408	241	323	509	257	333	249	235	242	304	276	289
25	449	417	432	592	511	558	258	104	152	329	273	298
26	470	433	450	618	567	595	184	82	114	321	267	292
27	479	438	452	636	498	588	224	174	205	324	269	294
28	476	439	452	632	336	546	213	98	132	342	279	308
29	---	---	---	338	114	224	200	99	161	333	277	299
30	---	---	---	118	104	111	111	89	104	333	284	306
31	---	---	---	159	116	132	---	---	---	339	296	313
MONTH	479	180	386	636	104	402	299	82	198	342	69	260

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	342	128	250				328	285	305	346	326	336
2	348	314	329				321	301	313	352	345	349
3	352	310	330				388	339	365	354	337	344
4	346	311	328				489	402	448	341	334	337
5	355	295	319				497	466	478	336	332	335
6	326	306	313				502	429	478	339	330	334
7	---	---	---				434	347	379	333	325	331
8	---	---	---				354	343	347	329	325	326
9	---	---	---				363	337	350	330	324	327
10	---	---	---				352	336	343	331	326	327
11	---	---	---				344	325	334	335	331	333
12	---	---	---				349	324	336	336	328	332
13	---	---	---				352	326	343	336	333	334
14	---	---	---				343	335	340	337	334	336
15	---	---	---				335	325	327	342	336	338
16	---	---	---				334	324	329	353	342	347
17	---	---	---				339	323	332	362	353	358
18	---	---	---				347	338	342	380	353	355
19	---	---	---				341	337	339	357	345	350
20	---	---	---				339	336	337	376	354	360
21	---	---	---				347	340	343	496	372	411
22	---	---	---				348	339	343	712	385	480
23	---	---	---				338	327	334	701	458	556
24	---	---	---				333	323	329	1550	470	557
25	---	---	---				330	321	325	1480	604	954
26	---	---	---				332	324	329	589	478	525
27	---	---	---				333	323	330	499	451	477
28	---	---	---				338	323	331	493	440	455
29	---	---	---				333	313	322	470	427	437
30	---	---	---				351	330	339	449	426	439
31	---	---	---				342	328	335	---	---	---
MONTH							502	285	349	1550	324	403

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	16.5	15.5	16.0	10.5	9.5	10.0	3.0	2.0	2.5	.0	.0	.0
2	16.0	14.5	15.5	10.5	9.0	10.0	2.5	1.5	2.0	.0	.0	.0
3	16.5	15.0	16.0	11.0	10.0	10.5	1.5	.0	.5	.0	.0	.0
4	15.0	14.5	15.0	11.5	10.5	11.0	2.0	.0	1.5	.0	.0	.0
5	16.5	14.0	15.5	12.0	11.0	11.5	2.0	.5	1.0	.0	.0	.0
6	15.5	13.0	14.5	11.5	10.0	11.0	3.0	2.0	2.5	.0	.0	.0
7	14.0	13.0	13.5	10.5	9.0	10.0	2.0	1.0	1.0	.0	.0	.0
8	13.5	13.0	13.0	9.5	8.0	9.0	2.0	1.0	1.5	.0	.0	.0
9	13.0	12.0	12.5	10.5	8.5	9.5	1.5	.5	1.0	.0	.0	.0
10	14.5	13.0	13.5	10.5	9.0	9.5	.5	.0	.0	.0	.0	.0
11	14.0	13.5	13.5	9.5	9.0	9.0	.5	.0	.0	.0	.0	.0
12	14.0	13.5	13.5	9.0	8.5	8.5	1.5	.0	.5	.0	.0	.0
13	13.0	12.5	13.0	12.0	8.5	10.5	2.0	1.0	1.5	.0	.0	.0
14	12.5	12.0	12.5	11.0	8.0	9.0	1.5	.5	1.0	.0	.0	.0
15	13.5	11.0	12.5	8.0	7.0	7.5	2.0	1.0	1.5	.0	.0	.0
16	13.0	11.0	12.0	7.0	6.0	6.5	1.5	.5	1.0	.0	.0	.0
17	12.5	10.5	11.5	6.5	2.5	4.5	1.5	1.0	1.0	.0	.0	.0
18	12.0	10.5	11.5	6.0	5.0	6.0	1.5	.5	1.0	.0	.0	.0
19	12.5	11.0	11.5	6.5	5.5	6.0	1.0	.5	.5	.0	.0	.0
20	12.0	10.5	11.0	6.0	5.0	5.5	.5	.0	.5	.0	.0	.0
21	12.5	11.5	12.0	5.5	5.0	5.5	1.0	.5	1.0	.0	.0	.0
22	13.5	12.5	13.0	5.5	5.0	5.5	1.0	.0	.5	.0	.0	.0
23	12.5	11.5	12.5	5.0	.0	2.5	1.0	.5	1.0	.0	.0	.0
24	12.5	10.5	11.0	4.5	3.0	4.0	1.0	1.0	1.0	.0	.0	.0
25	12.5	11.0	11.5	4.5	4.0	4.5	1.0	.0	.5	.0	.0	.0
26	12.5	10.5	11.5	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0
27	11.0	10.5	11.0	4.5	4.0	4.0	.0	.0	.0	.0	.0	.0
28	11.0	10.0	10.5	4.0	2.5	3.5	.0	.0	.0	.0	.0	.0
29	10.5	8.5	9.5	3.0	.0	1.5	.0	.0	.0	.0	.0	.0
30	10.5	8.5	9.5	3.5	2.5	3.0	.0	.0	.0	.5	.0	.0
31	11.0	10.0	10.5	---	---	---	.5	.0	.0	.5	.0	.5
MONTH	16.5	8.5	12.5	12.0	.0	7.0	3.0	.0	1.0	.5	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN
04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.5	.0	.0	1.5	.5	1.0	3.5	.5	2.5	11.0	6.0	8.5
2	.0	.0	.0	2.0	1.5	1.5	.5	.0	.5	11.5	10.0	11.0
3	.0	.0	.0	2.0	.0	1.0	4.0	.5	2.5	11.0	7.0	8.5
4	.0	.0	.0	.0	.0	.0	4.0	3.0	3.5	11.5	10.0	11.0
5	.0	.0	.0	.5	.0	.0	3.5	3.0	3.5	11.5	10.0	10.5
6	.0	.0	.0	1.5	.0	.5	3.0	2.0	2.5	13.0	11.0	12.0
7	.0	.0	.0	2.0	1.0	2.0	3.5	2.0	3.0	14.0	11.5	13.0
8	.0	.0	.0	2.0	1.0	1.5	3.5	3.0	3.0	15.5	13.5	14.5
9	.0	.0	.0	2.0	.5	1.0	4.0	2.5	3.5	16.0	14.0	15.5
10	.0	.0	.0	1.0	.5	1.0	4.5	3.0	4.0	17.0	15.0	16.0
11	.0	.0	.0	1.0	.0	.5	5.0	1.0	3.5	17.5	14.5	15.5
12	.0	.0	.0	1.5	.0	1.0	6.0	.5	3.0	15.5	13.5	14.5
13	.0	.0	.0	2.5	1.0	1.5	6.5	5.0	5.5	15.5	13.5	14.5
14	.0	.0	.0	2.5	.5	1.5	6.5	5.5	6.0	16.0	15.5	15.5
15	.0	.0	.0	1.0	.0	.5	7.0	5.5	6.0	16.5	14.5	15.5
16	.0	.0	.0	2.0	.0	1.0	7.0	6.0	6.5	16.0	15.5	16.0
17	.0	.0	.0	2.0	1.0	1.5	8.0	6.0	7.0	16.5	15.0	15.5
18	.0	.0	.0	3.5	1.0	2.0	9.0	6.5	8.0	17.5	16.0	16.5
19	.5	.0	.0	3.5	2.0	2.5	9.5	7.5	8.5	25.0	14.5	17.5
20	.5	.0	.0	2.5	1.5	2.0	10.5	8.5	9.5	19.0	15.5	17.0
21	.0	.0	.0	3.0	1.5	2.5	11.0	8.5	9.5	18.0	16.5	17.0
22	.0	.0	.0	3.5	1.5	2.5	11.5	8.5	10.0	17.5	16.5	17.0
23	.0	.0	.0	3.5	.0	1.0	11.5	10.5	11.0	18.0	16.5	17.5
24	.5	.0	.0	1.5	.0	.5	11.5	10.5	11.0	17.5	16.0	16.5
25	.5	.5	.5	2.0	1.0	1.5	11.5	7.0	9.0	17.5	16.0	17.0
26	.5	.5	.5	1.5	1.0	1.0	9.5	7.0	8.5	17.5	15.5	16.5
27	.5	.5	.5	2.5	.5	1.5	11.5	9.5	10.5	17.5	15.5	16.5
28	.5	.5	.5	2.5	.0	1.5	11.5	7.0	8.0	17.0	16.0	16.5
29	---	---	---	1.5	.0	.5	10.0	7.5	9.0	18.5	15.5	17.0
30	---	---	---	2.0	.0	.5	8.0	6.0	6.5	18.5	16.5	17.5
31	---	---	---	2.5	1.0	1.5	---	---	---	18.0	16.5	17.5
MONTH	.5	.0	.0	3.5	.0	1.0	11.5	.0	6.0	25.0	6.0	15.0
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	21.0	18.5	19.5				24.0	23.0	24.0	23.5	22.0	22.5
2	20.0	17.5	18.5				25.0	22.5	23.5	24.0	22.0	23.0
3	20.5	18.5	19.5				26.0	23.0	24.0	23.5	22.0	22.5
4	20.0	19.5	19.5				24.0	22.5	23.5	23.5	21.0	22.0
5	21.0	19.0	20.0				24.0	21.5	22.5	23.5	21.5	22.5
6	21.5	20.5	21.0				26.0	22.0	23.5	24.0	22.0	23.0
7	---	---	---				26.0	23.0	24.0	22.5	19.0	21.0
8	---	---	---				24.0	22.5	23.5	19.5	17.0	18.0
9	---	---	---				22.5	21.5	22.0	19.5	17.5	18.5
10	---	---	---				24.0	22.0	23.0	19.5	18.5	19.0
11	---	---	---				22.5	21.0	22.0	20.5	18.0	19.0
12	---	---	---				23.0	20.5	21.5	22.0	19.0	20.0
13	---	---	---				21.5	20.0	21.0	21.0	19.5	20.5
14	---	---	---				20.5	19.0	19.5	19.0	18.0	18.5
15	---	---	---				21.5	18.0	19.5	19.0	16.5	17.5
16	---	---	---				21.0	18.5	20.0	20.0	17.0	18.0
17	---	---	---				19.5	18.5	19.0	20.0	17.0	18.5
18	---	---	---				20.0	18.5	19.0	20.5	17.5	19.5
19	---	---	---				21.5	19.5	20.5	18.5	16.5	17.5
20	---	---	---				21.5	20.0	20.5	18.5	15.5	17.0
21	---	---	---				22.5	19.0	20.5	19.0	17.0	18.0
22	---	---	---				21.5	20.5	21.0	18.0	15.5	17.0
23	---	---	---				22.5	20.5	21.5	17.5	15.0	16.5
24	---	---	---				21.5	20.5	21.0	17.0	15.0	16.0
25	---	---	---				21.5	20.0	20.5	18.0	15.5	16.5
26	---	---	---				22.0	19.5	20.5	18.5	16.0	17.0
27	---	---	---				20.5	19.5	20.0	18.5	16.0	17.0
28	---	---	---				21.0	19.5	20.0	19.5	16.5	17.5
29	---	---	---				22.5	20.5	21.5	19.5	17.0	18.0
30	---	---	---				23.0	20.5	21.5	20.0	18.0	18.5
31	---	---	---				23.5	21.5	22.5	---	---	---
MONTH							26.0	18.0	21.5	24.0	15.0	19.0

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW¼ NW¼ sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi (2.4 km) upstream from Little Bear Creek, and 3.9 mi (6.3 km) northeast of Muskegon.

DRAINAGE AREA.--14.8 mi² (38.3 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft (179.832 m) Michigan Department of Natural Resources datum. Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow by dams and irrigation above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 15.8 ft³/s (0.447 m³/s), 14.50 in/yr (368 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,200 ft³/s (34.0 m³/s) Mar. 5, 1976, gage height, 11.00 ft (3.353 m), datum then in use; minimum, 1.0 ft³/s (0.028 m³/s) Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0200	ice jam	15.45 4.709	Mar. 30	1500	110 3.12	14.16 4.316
Mar. 7	0500	114 3.23	14.25 4.343	Apr. 26	1700	*120 3.40	14.41 4.392
Mar. 19	0200	113 3.20	14.23 4.337				

Minimum discharge, 2.4 ft³/s (0.068 m³/s) July 30, Sept. 18, 19, gage height, 10.29 ft (3.136 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	15	21	15	15	14	56	51	10	11	3.9	4.3
2	13	14	17	16	14	14	58	39	9.6	9.7	3.7	4.2
3	16	14	16	17	14	16	59	58	8.6	8.6	3.1	4.1
4	23	14	20	18	14	25	42	55	8.4	11	4.9	3.6
5	26	13	18	18	14	50	38	37	8.4	9.1	7.0	3.7
6	56	14	17	18	14	80	38	34	7.3	7.7	5.1	3.5
7	42	13	15	18	14	104	33	31	7.9	7.5	4.2	3.1
8	36	12	15	18	14	88	33	27	9.5	6.6	3.7	3.6
9	26	12	15	18	14	96	31	24	9.3	7.0	4.1	3.7
10	22	11	15	18	14	73	28	22	10	6.3	12	3.7
11	18	11	15	18	14	61	27	23	10	6.1	5.6	3.4
12	17	11	15	18	14	50	35	24	8.4	6.2	4.5	3.3
13	15	15	20	17	14	44	34	22	7.0	6.5	4.8	3.7
14	15	24	18	17	14	85	24	20	6.4	6.2	4.8	3.8
15	19	17	17	16	14	59	26	18	6.0	6.0	4.6	3.6
16	52	15	18	16	14	41	24	16	6.4	6.0	5.4	3.4
17	36	21	17	15	14	43	22	15	8.0	5.0	6.7	3.0
18	27	38	16	15	14	72	21	15	7.9	5.5	8.2	2.9
19	22	27	15	15	14	103	20	17	7.3	4.8	7.0	2.7
20	19	20	15	15	14	82	19	21	8.2	5.0	8.4	2.9
21	17	17	17	15	14	62	19	17	11	4.9	6.6	3.2
22	17	16	16	15	14	51	19	15	9.1	4.8	7.3	3.0
23	16	19	15	15	14	50	18	15	8.4	4.8	9.3	3.2
24	15	26	14	15	14	64	18	14	7.5	3.6	6.7	3.6
25	19	21	14	15	14	76	23	13	7.5	4.5	4.9	4.2
26	34	17	13	15	14	47	78	13	6.8	4.2	4.5	3.3
27	27	16	12	15	14	39	76	12	6.6	3.1	6.5	3.2
28	21	16	12	15	14	37	59	11	8.0	3.6	8.0	3.3
29	16	17	12	15	---	40	61	11	14	2.8	6.1	3.6
30	17	27	13	15	---	83	64	10	14	5.6	5.2	3.6
31	16	---	14	15	---	91	---	10	---	5.4	4.5	---
TOTAL	733	523	487	501	393	1840	1108	710	257.5	189.1	181.3	104.4
MEAN	23.6	17.4	15.7	16.2	14.0	59.4	36.9	22.9	8.58	6.10	5.85	3.48
MAX	56	38	21	18	15	104	78	58	14	11	12	4.3
MIN	13	11	12	15	14	14	18	10	6.0	2.8	3.1	2.7
CFSM	1.60	1.18	1.06	1.10	.95	4.01	2.49	1.55	.58	.41	.40	.24
IN.	1.84	1.31	1.22	1.26	.99	4.62	2.78	1.78	.65	.48	.46	.26

CAL YR 1978 TOTAL 6352.0 MEAN 17.4 MAX 113 MIN 2.8 CFSM 1.18 IN 15.96
WTR YR 1979 TOTAL 7027.3 MEAN 19.3 MAX 104 MIN 2.7 CFSM 1.30 IN 17.66

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE¼ NW¼ sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft (9 m) downstream from bridge on Fruitvale Road, 6.3 mi (10.1 km) downstream from North Branch, and 6.9 mi (11.1 km) northeast of Whitehall.

DRAINAGE AREA.--380 mi² (980 km²), approximately.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft (181.1 m) National Geodetic Vertical Datum of 1929. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage height record, Mar. 27 to Apr. 23, which are fair. Some regulation during low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 426 ft³/s (12.06 m³/s), 15.22 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft³/s (153 m³/s) Sept. 1, 1975, gage height, 7.46 ft (2.274 m); minimum, 163 ft³/s (4.62 m³/s) Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,000 ft³/s (56.6 m³/s) Apr. 1, from correlation with nearby station, maximum gage height, 6.19 ft (1.887 m) Mar. 6, backwater from ice; minimum discharge, 248 ft³/s (7.02 m³/s) Sept. 30, gage height, 1.70 ft (0.518 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	374	378	407	636	470	510	1800	1240	446	380	285	304
2	377	371	405	600	460	540	1600	1100	454	380	281	295
3	372	366	389	560	450	600	1500	1040	444	370	276	287
4	386	364	393	520	440	700	1300	1190	427	360	278	282
5	418	364	387	510	430	1000	1200	1100	418	350	309	278
6	469	365	377	510	420	1300	1100	944	412	340	322	277
7	643	360	370	510	430	1200	1050	895	404	330	299	271
8	721	357	361	520	440	1200	1000	843	402	325	287	263
9	640	350	372	520	460	1250	950	774	404	320	282	268
10	558	345	403	520	470	1270	900	719	409	310	320	268
11	494	340	418	510	480	1140	870	687	419	310	360	268
12	444	340	451	500	480	1050	850	676	422	307	328	267
13	417	345	476	500	480	964	850	676	398	307	310	265
14	395	370	413	500	480	939	850	644	381	304	304	266
15	391	398	380	500	480	900	880	615	371	301	295	265
16	423	394	372	500	470	870	800	583	360	297	286	262
17	493	390	368	500	470	830	760	556	355	289	292	258
18	546	413	361	490	460	820	730	533	349	286	325	255
19	497	484	352	490	450	1080	700	526	343	283	330	252
20	454	515	355	490	450	1440	670	533	346	279	318	252
21	422	471	351	490	460	1420	640	562	381	277	312	253
22	404	432	351	490	470	1370	620	556	441	275	306	250
23	391	414	345	490	480	1330	590	531	437	273	327	250
24	380	413	342	490	480	1410	570	508	413	271	344	251
25	384	436	330	490	490	1510	575	491	375	277	330	255
26	410	438	325	490	490	1340	679	477	370	284	312	255
27	455	418	320	490	500	1100	1610	465	365	284	320	253
28	475	402	310	490	500	1000	1480	458	360	280	371	252
29	440	394	330	490	---	1200	1260	455	370	278	374	251
30	410	397	370	490	---	1400	1240	451	380	280	353	249
31	391	---	493	480	---	1600	---	446	---	289	321	---
TOTAL	14074	11824	11677	15766	13040	34283	29624	21274	11856	9496	9757	7922
MEAN	454	394	377	509	466	1106	987	686	395	306	315	264
MAX	721	515	493	636	500	1600	1800	1240	454	380	374	304
MIN	372	340	310	480	420	510	570	446	343	271	276	249
CFSM	1.20	1.04	.99	1.34	1.23	2.91	2.60	1.81	1.04	.81	.83	.70
IN.	1.38	1.16	1.14	1.54	1.28	3.36	2.90	2.08	1.16	.93	.96	.78
CAL YR 1978 TOTAL	157865			MEAN 433	MAX 1190	MIN 229	CFSM 1.14	IN 15.45				
WTR YR 1979 TOTAL	190593			MEAN 522	MAX 1800	MIN 249	CFSM 1.37	IN 18.66				

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW¼ NW¼ sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft (6 m) upstream from highway bridge at south edge of Scottville, 1.4 mi (2.3 km) upstream from India Creek and 5.6 mi (9.0 km) downstream from Big South Branch.

DRAINAGE AREA.--709 mi² (1,836 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft (182.167 m) National Geodetic Vertical Datum of 1929. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi (7.2 km) upstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation at low flow.

AVERAGE DISCHARGE.--40 years, 660 ft³/s (18.69 m³/s), 12.64 in/yr (321 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft³/s (84.1 m³/s) July 1, 1969, gage height, 6.26 ft (1.908 m); minimum, 209 ft³/s (5.92 m³/s) Dec. 11, 1962, discharge measurement; minimum daily, 310 ft³/s (8.78 m³/s) Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,850 ft³/s (80.7 m³/s) Apr. 2, gage height, 5.75 ft (1.753 m); minimum, 402 ft³/s (11.4 m³/s) Sept. 28-30, gage height 1.80 ft (0.549 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	610	690	694	1200	860	940	2490	1850	786	689	468	502
2	608	676	672	1000	840	970	2790	1760	796	684	467	484
3	613	661	755	950	810	1050	2620	1740	792	665	462	472
4	622	652	761	920	780	1500	2260	1640	771	648	476	465
5	668	643	721	910	760	1670	2030	1560	759	629	503	457
6	870	641	674	920	750	1700	1820	1520	741	613	512	453
7	1050	637	654	940	770	1950	1690	1410	723	590	510	446
8	1230	634	631	960	810	1890	1610	1320	720	574	485	441
9	1280	625	651	950	840	1850	1530	1250	728	564	477	440
10	1210	618	1020	950	850	1880	1450	1190	734	555	546	440
11	1090	610	1830	940	850	1960	1380	1130	740	549	581	443
12	988	604	2040	930	850	1880	1320	1090	731	543	596	442
13	900	613	1260	930	850	1670	1280	1070	709	537	562	444
14	823	630	708	920	850	1550	1280	1050	686	537	534	444
15	781	652	684	910	840	1550	1330	1010	665	535	519	439
16	797	658	667	900	830	1440	1350	965	646	522	499	433
17	819	670	665	900	810	1350	1260	932	630	511	516	426
18	847	712	652	900	800	1360	1180	901	618	501	542	421
19	833	763	620	890	790	1580	1120	890	608	494	569	416
20	795	809	610	880	800	1940	1060	888	620	487	557	416
21	761	798	622	880	820	2140	1030	882	688	480	534	416
22	735	765	632	880	840	2170	1000	888	792	474	529	413
23	719	746	625	880	860	2140	967	877	943	470	613	410
24	703	742	615	880	860	2130	947	859	992	470	600	411
25	703	747	612	880	860	2170	950	841	846	481	611	412
26	726	754	590	880	870	2130	1200	827	734	492	579	411
27	749	739	580	890	880	1960	1520	813	684	502	543	407
28	771	721	600	890	900	1680	1950	805	653	494	533	404
29	755	709	722	890	---	1520	2290	801	645	480	540	403
30	728	705	815	880	---	1700	2040	793	666	472	540	404
31	706	---	956	880	---	2170	---	785	---	466	521	---
TOTAL	25490	20624	24338	28510	23230	53590	46744	34337	21846	16708	16524	13015
MEAN	822	687	785	920	830	1729	1558	1108	728	539	533	434
MAX	1280	809	2040	1200	900	2170	2790	1850	992	689	613	502
MIN	608	604	580	880	750	940	947	785	608	466	462	403
CFSM	1.16	.97	1.11	1.30	1.17	2.44	2.20	1.56	1.03	.76	.75	.61
IN.	1.34	1.08	1.28	1.50	1.22	2.81	2.45	1.80	1.15	.88	.87	.68
CAL YR 1978 TOTAL	264192		MEAN 724	MAX 2040	MIN 374	CFSM 1.02	IN 13.86					
WTR YR 1979 TOTAL	324956		MEAN 890	MAX 2790	MIN 403	CFSM 1.26	IN 17.05					

STREAMS TRIBUTARY TO LAKE MICHIGAN
04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: May 1968 to current year.

INSTRUMENTATION.--Temperature recorder since May 1968.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 21.0°C July 14, 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.5	5.5	4.5	.5	.5	.0	.0	.0	.0	.0	.0
2	13.0	12.0	5.5	5.0	.5	.0	.0	.0	.0	.0	.0	.0
3	12.5	12.5	5.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
4	12.5	12.5	7.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0
5	12.5	12.0	8.0	7.0	.0	.0	.0	.0	.0	.0	.0	.0
6	12.0	11.5	8.0	8.0	.0	.0	.0	.0	.0	.0	.0	.0
7	11.5	10.5	8.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0
8	10.5	10.0	6.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0
9	10.5	10.0	5.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0
10	10.0	10.0	6.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0
11	10.5	10.0	6.0	6.0	.0	.0	.0	.0	.0	.0	.0	.0
12	10.5	10.5	6.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0
13	10.5	10.0	5.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0
14	10.0	9.5	5.0	4.5	.5	.0	.0	.0	.0	.0	.0	.0
15	9.5	8.5	4.5	4.0	.5	.0	.0	.0	.0	.0	.0	.0
16	8.5	8.0	4.0	3.0	1.0	.5	.0	.0	.0	.0	.0	.0
17	8.0	7.0	3.5	3.0	1.0	1.0	.0	.0	.0	.0	1.0	.0
18	7.5	7.0	3.5	3.5	1.0	.5	.0	.0	.0	.0	3.0	1.0
19	7.5	7.5	3.5	3.5	.5	.0	.0	.0	.0	.0	3.0	3.0
20	7.5	7.0	3.5	3.0	.0	.0	.0	.0	.0	.0	3.0	3.0
21	7.5	7.5	3.0	2.0	.0	.0	.0	.0	.0	.0	3.5	3.0
22	7.5	7.5	2.0	2.0	.0	.0	.0	.0	.0	.0	5.0	3.5
23	7.5	7.0	2.0	2.0	.5	.0	.0	.0	.0	.0	6.0	5.0
24	7.0	5.5	2.0	1.5	.5	.5	.0	.0	.0	.0	7.0	5.0
25	6.0	5.5	1.5	1.5	.5	.5	.0	.0	.0	.0	5.0	4.0
26	6.5	6.0	1.5	1.5	.5	.0	.0	.0	.0	.0	4.0	3.5
27	6.5	6.0	1.5	1.5	.0	.0	.0	.0	.0	.0	3.5	2.5
28	6.0	5.5	1.5	1.0	.0	.0	.0	.0	.0	.0	3.5	3.5
29	5.5	3.0	1.0	1.0	.0	.0	.0	.0	---	---	5.0	3.5
30	5.0	4.0	1.0	.5	.0	.0	.0	.0	---	---	8.0	5.0
31	5.5	5.0	---	---	.0	.0	.0	.0	---	---	8.0	7.5
MONTH	13.0	3.0	8.0	.5	1.0	.0	.0	.0	.0	.0	8.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

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04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.5	7.0	9.5	8.0	14.0	13.0	19.0	17.5	19.0	18.0	18.5	17.5
2	7.0	6.5	9.5	9.5	14.5	12.5	18.5	16.0	19.0	17.5	18.5	18.0
3	7.0	6.5	10.5	9.5	16.0	13.5	18.5	17.0	19.0	18.0	18.5	17.5
4	7.0	7.0	11.0	9.5	16.0	14.5	18.0	17.0	19.5	18.5	18.0	16.0
5	7.0	6.5	11.0	9.5	16.5	15.0	18.0	17.0	18.5	17.0	17.0	16.0
6	6.5	5.5	12.5	10.0	17.0	15.0	18.0	16.0	18.5	17.0	17.0	16.0
7	6.0	6.0	15.0	12.5	17.0	16.5	18.5	16.5	19.0	18.5	17.0	15.0
8	6.0	6.0	15.5	15.0	17.0	16.5	19.5	17.5	19.0	18.5	15.0	13.0
9	6.0	5.5	15.5	15.5	17.5	17.0	19.5	18.0	18.5	17.0	13.0	12.0
10	7.5	6.0	16.0	15.0	17.5	16.0	20.0	18.5	17.0	17.0	13.0	12.5
11	8.0	7.5	16.0	13.0	16.5	14.5	20.0	19.5	17.0	15.5	13.5	13.0
12	11.0	8.0	13.0	10.5	16.5	14.5	20.5	19.0	16.5	14.5	15.5	13.5
13	12.5	11.0	11.0	9.0	17.0	14.5	20.5	19.5	16.5	15.5	15.5	15.0
14	12.5	12.0	11.5	9.5	18.5	16.0	21.0	19.5	15.5	15.0	15.0	13.5
15	12.0	11.5	12.0	10.5	19.5	18.0	21.0	19.0	15.5	14.5	13.5	12.5
16	12.5	12.0	12.0	10.0	20.5	19.0	20.0	19.0	15.5	13.5	13.5	12.5
17	13.5	12.0	12.0	10.0	20.5	19.5	20.0	19.0	15.0	14.0	13.5	13.0
18	13.5	12.5	13.0	11.0	20.0	17.5	19.0	17.5	14.5	14.0	14.0	13.5
19	13.5	12.0	13.0	12.5	18.5	16.5	19.5	18.0	15.0	14.0	14.0	12.0
20	13.5	12.5	12.5	10.5	18.5	17.5	19.5	18.0	15.0	15.0	12.5	11.0
21	13.5	13.5	12.5	10.5	18.5	17.5	19.5	18.0	16.5	15.0	12.5	12.5
22	14.0	12.5	12.0	10.0	19.0	17.5	20.0	19.0	16.5	16.0	12.5	11.0
23	14.0	13.0	10.5	10.0	17.5	16.0	20.0	19.0	17.0	16.0	11.5	10.5
24	13.5	12.5	11.0	9.5	17.0	15.5	19.5	18.5	17.0	17.0	12.0	11.0
25	13.0	12.5	11.5	9.5	17.5	15.5	18.5	18.5	17.0	16.5	12.5	11.5
26	13.0	11.0	11.5	9.5	18.5	16.0	18.5	17.5	16.5	15.5	12.5	12.0
27	11.5	10.0	10.0	9.5	19.0	18.0	19.0	17.5	15.5	15.5	13.0	12.5
28	11.0	10.0	11.5	10.0	19.5	18.0	19.5	18.0	15.5	15.0	13.5	13.0
29	10.0	9.0	13.5	10.0	19.5	18.5	19.5	18.0	16.5	16.0	14.0	13.5
30	9.0	8.0	13.0	11.5	19.0	17.5	19.5	18.0	17.5	16.0	14.5	14.0
31	---	---	13.5	11.5	---	---	19.0	19.0	18.5	17.0	---	---
MONTH	14.0	5.5	16.0	8.0	20.5	12.5	21.0	16.0	19.5	13.5	18.5	10.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE¼ NE¼ sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft (76 m) upstream from Wheeler Creek, 0.9 mi (1.4 km) north of Sherman, and at mile 60.8 (97.8 km).

DRAINAGE AREA.--900 mi² (2,331 km²).

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(m). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft (245 m), from river-profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--59 years (water years 1904-15, 1931, 1934-79), 1,057 ft³/s (29.93 m³/s), 15.95 in/yr (405 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft³/s (101 m³/s) Mar. 25, 1913, gage height, 7.1 ft (2.16 m), from graph based on gage readings, datum then in use; minimum daily, 540 ft³/s (15.3 m³/s) Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 2,310 ft³/s (65.4 m³/s) Apr. 1; minimum daily, 781 ft³/s (22.1 m³/s) Sept. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	860	850	860	850	900	1000	2310	1960	1050	955	850	960
2	880	850	850	840	890	1020	2280	1740	1030	994	844	950
3	900	860	830	800	890	1050	2260	1790	1020	982	841	931
4	940	850	840	790	880	1100	2080	1880	1010	961	850	919
5	1000	860	860	800	860	1400	1880	1790	1010	937	880	904
6	1300	860	850	820	920	1750	1700	1890	1000	916	880	895
7	1450	860	850	840	910	1700	1600	1910	1000	901	880	880
8	1400	860	840	850	870	1250	1510	1810	1020	895	850	865
9	1350	860	840	860	830	1200	1480	1740	1030	892	924	871
10	1250	850	850	850	870	1150	1450	1640	1060	883	1560	886
11	1200	850	840	840	860	1250	1440	1530	1090	886	1760	853
12	1100	850	840	840	880	1300	1470	1500	1090	880	1520	850
13	1000	860	860	900	850	1280	1600	1440	1070	868	1370	862
14	940	880	860	890	860	1320	1710	1380	1040	877	1260	856
15	940	900	860	880	860	1400	1680	1320	1030	880	1140	850
16	920	900	860	880	870	1420	1670	1270	1070	880	1060	856
17	910	900	860	880	870	1400	1610	1260	991	868	1030	835
18	900	930	860	880	880	1450	1510	1220	958	865	1020	832
19	890	1020	860	880	880	1650	1440	1190	946	853	997	820
20	880	980	830	890	890	1800	1400	1180	964	841	976	811
21	870	940	840	900	900	2200	1350	1150	1080	835	961	802
22	860	900	850	900	900	2200	1320	1120	1120	826	934	790
23	860	880	850	900	900	2000	1300	1120	1050	823	940	781
24	860	910	850	910	900	2100	1300	1140	1000	826	928	784
25	860	920	860	900	910	2200	1270	1160	967	850	931	808
26	880	920	850	900	920	1950	1550	1140	955	892	934	850
27	870	910	840	900	960	1760	2200	1130	943	892	940	805
28	870	880	810	900	990	1570	2270	1120	940	889	973	814
29	860	870	840	900	---	1510	2280	1100	934	886	1010	805
30	860	860	860	900	---	1760	2210	1080	937	880	1000	802
31	850	---	850	900	---	2260	---	1060	---	865	994	---
TOTAL	30510	26620	26300	26970	24900	48400	51130	43760	30405	27478	32037	25527
MEAN	984	887	848	870	889	1561	1704	1412	1014	886	1033	851
MAX	1450	1020	860	910	990	2260	2310	1960	1120	994	1760	960
MIN	850	850	810	790	830	1000	1270	1060	934	823	841	781
CFSM	1.09	.99	.94	.97	.99	1.73	1.89	1.57	1.13	.98	1.15	.95
IN.	1.26	1.10	1.09	1.11	1.03	2.00	2.11	1.81	1.26	1.14	1.32	1.06
CAL YR 1978 TOTAL	363753			997	MAX 2400	MIN 780	CFSM 1.11	IN 15.04				
WTR YR 1979 TOTAL	394037			MEAN 1080	MAX 2310	MIN 781	CFSM 1.20	IN 16.29				

04125500 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°12'11", long 85°47'58", in SW¼ NW¼ sec.20, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 500 ft (152 m) upstream from bridge on State Highway 37, 4.2 mi (6.8 km) northwest of Hoxeyville, 8.0 mi (12.9 km) east of Wellston, and 8.0 mi (12.9 km) upstream from mouth.

DRAINAGE AREA.--251 mi² (650 km²).

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 775 ft (236 m), by barometer.

REMARKS.--Records fair except those for periods of no gage-height record, Oct. 1 to Nov. 2 and May 8 to June 14, or doubtful gage-height record, Feb. 16 to May 8, which are poor. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 288 ft³/s (8.156 m³/s), 15.58 in/yr (396 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,440 ft³/s (69.1 m³/s) Aug. 6, 1956, gage height, 6.82 ft (2.079 m), from rating curve extended above 1,100 ft³/s (31.2 m³/s); minimum, 161 ft³/s (4.56 m³/s) Feb. 2, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 650 ft³/s (18.4 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 25	0100	1410 39.9	4.01 1.222	Apr. 1	--	*a1600 45.3	unknown

a Correlation with other stations.

Minimum discharge, 206 ft³/s (5.83 m³/s) Dec. 28, gage height, 1.73 ft (0.527 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	260	260	248	246	254	290	1400	560	292	306	252	254
2	270	255	241	241	253	305	1250	540	287	306	252	254
3	280	250	241	222	257	320	960	580	287	303	252	250
4	330	250	247	235	257	340	680	540	282	299	252	249
5	375	249	249	230	236	400	570	510	282	298	273	249
6	410	252	249	243	251	480	530	480	279	291	270	248
7	425	253	247	246	265	540	510	455	276	289	256	245
8	430	251	239	247	253	500	500	427	284	284	251	241
9	415	249	245	247	232	450	500	423	289	284	250	240
10	400	247	244	249	247	400	490	413	292	283	326	240
11	380	247	240	234	240	380	480	392	298	287	377	240
12	355	244	243	250	252	365	500	392	298	287	338	240
13	345	249	248	263	240	360	520	392	284	279	292	240
14	335	260	249	256	248	360	530	379	276	288	279	242
15	315	265	249	250	245	360	540	350	271	288	270	242
16	310	257	249	252	242	365	510	332	269	281	260	242
17	310	257	249	253	250	370	475	325	271	267	257	242
18	305	292	249	253	255	430	442	320	283	256	259	242
19	300	311	241	249	255	614	391	312	282	251	259	242
20	290	282	239	260	260	826	380	312	296	250	258	242
21	280	267	247	257	260	882	375	309	371	249	254	242
22	270	259	247	261	260	826	368	312	360	249	252	242
23	270	258	246	262	260	905	360	306	320	247	282	241
24	270	265	245	259	260	1140	416	309	305	248	383	240
25	270	274	247	257	260	1220	504	309	299	254	367	240
26	265	270	246	256	265	789	580	292	293	268	305	240
27	260	260	241	257	275	536	660	298	291	268	282	240
28	260	254	223	257	285	506	700	303	290	260	275	240
29	260	252	248	257	---	490	680	298	300	257	274	240
30	260	252	248	257	---	854	620	292	306	253	267	241
31	260	---	247	257	---	1200	---	292	---	252	260	---
TOTAL	9765	7791	7591	7763	7117	17803	17421	11754	8813	8482	8684	7290
MEAN	315	260	245	250	254	574	581	379	294	274	280	243
MAX	430	311	249	263	285	1220	1400	580	371	306	383	254
MIN	260	244	223	222	232	290	360	292	269	247	250	240
CFSM	1.26	1.04	.98	1.00	1.01	2.29	2.32	1.51	1.17	1.09	1.12	.97
IN.	1.45	1.15	1.13	1.15	1.05	2.64	2.58	1.74	1.31	1.26	1.29	1.08

CAL YR 1978	TOTAL	104718	MEAN	287	MAX	998	MIN	217	CFSM	1.14	IN	15.52
WTR YR 1979	TOTAL	120274	MEAN	330	MAX	1400	MIN	222	CFSM	1.32	IN	17.83

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW¼ NW¼ sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi (10.3 km) northeast of Manistee, 7.8 mi (12.6 km) upstream from Manistee Lake, and at mile 10.8 (17.4 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²), approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m), from river-profile map.

REMARKS.--Records fair except those for the winter period, which are poor. Flow regulated at all stages by Tippy hydroelectric power-plant 21 mi (34 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 1,996 ft³/s (56.53 m³/s), 15.23 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft³/s (202 m³/s) Mar. 30, 1976, gage height, 8.37 ft (2.551 m); maximum gage height, 9.15 ft (2.789 m) Feb. 12, 1955, backwater from ice; minimum daily discharge, 780 ft³/s (22.1 m³/s) Feb. 12, 1979, backwater from ice.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,980 ft³/s (141 m³/s) Mar. 23, gage height, 8.12 ft (2.475 m); maximum gage height, 8.69 ft (2.649 m) Jan. 25, backwater from ice; minimum daily discharge, 780 ft³/s (22.1 m³/s) Feb. 12, backwater from ice; minimum gage height, 4.23 ft (1.289 m) Sept. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1970	1940	2010	1600	1800	2050	4200	3600	2450	1570	1900	2160
2	1770	1820	1970	1550	1600	2200	4200	3930	2410	1600	1580	1490
3	1800	1700	1560	2000	2800	2250	4710	3330	1520	1900	1460	1490
4	1750	1700	1500	2100	1900	1750	3930	3370	1790	1710	1630	1650
5	1590	1550	1900	1650	1050	2000	3630	3600	2060	1740	1590	1750
6	1960	1120	2200	1300	1300	3000	3640	3370	2160	1700	1490	1480
7	2390	1650	2220	1700	1800	3300	3410	3470	2110	1770	1490	1400
8	2620	1790	2090	2200	1750	3300	3400	3570	2030	1560	1560	1430
9	2590	1530	1890	2500	2000	2800	2610	3500	2080	1390	1750	1780
10	2490	1410	1410	2200	1700	2300	2700	3210	1830	1800	2180	1530
11	2370	1310	1360	1450	1000	2010	2930	3280	1810	1670	2530	1700
12	2070	985	1690	2100	780	2420	3120	3360	2460	1680	2870	1640
13	1810	1020	1930	1800	2100	2410	3180	3080	2150	1550	3380	1790
14	1720	1630	1880	1700	2000	2300	3140	2260	1990	1680	3150	1630
15	1160	1610	2140	1650	2100	2530	3320	2420	1900	1420	2530	1510
16	1180	1610	2110	1900	2000	2630	3450	2780	2050	1420	2050	1270
17	1850	1550	1890	2100	1800	2640	3400	2900	1650	1690	1710	1500
18	1730	1730	1370	1900	880	2530	3110	2530	1620	1440	1850	1580
19	1770	1630	2020	2000	900	2710	3070	2420	1810	1600	1590	1720
20	1730	1540	2090	1700	1500	3230	3070	2110	1840	1660	1950	1600
21	1610	1840	1550	1450	1900	3670	2650	2120	1990	1480	1820	1590
22	1360	1810	1860	1450	2200	4460	1960	2390	2390	1770	1910	1820
23	1470	1800	1770	2000	1750	4280	1840	2490	2250	1590	1750	1290
24	1670	1690	1530	2950	1800	3560	2470	2260	1900	1600	2010	1170
25	1630	1840	1830	1550	1400	4050	2690	2350	1810	1750	1700	1720
26	1730	1670	1700	2200	1400	4210	2990	2220	1750	2190	1670	1740
27	1930	1640	1870	1400	2100	3840	3480	2090	1760	1210	1550	1400
28	1840	2000	2100	2000	1850	3420	3750	1650	1950	1370	1790	1550
29	1510	1830	1900	1750	---	3140	4060	2240	1630	1360	1820	1900
30	1280	1900	1600	2500	---	3220	3920	2350	2040	1090	1850	1570
31	1660	---	1500	2100	---	3410	---	2070	---	1370	2190	---
TOTAL	56010	48845	56440	58450	47160	91620	98030	86320	59190	49330	60300	47850
MEAN	1807	1628	1821	1885	1684	2955	3268	2785	1973	1591	1945	1595
MAX	2620	2000	2220	2950	2800	4460	4710	3930	2460	2190	3380	2160
MIN	1160	985	1360	1300	780	1750	1840	1650	1520	1090	1460	1170
CFSM	1.02	.92	1.02	1.06	.95	1.66	1.84	1.57	1.11	.89	1.09	.90
IN.	1.17	1.02	1.18	1.22	.99	1.91	2.05	1.80	1.24	1.03	1.26	1.00
CAL YR 1978 TOTAL	688705		MEAN	1887	MAX	4700	MIN 910	CFSM 1.06	IN 14.39			
WTR YR 1979 TOTAL	759545		MEAN	2081	MAX	4710	MIN 780	CFSM 1.17	IN 15.87			

04126520 MANISTEE RIVER AT MANISTEE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 44°15'02", long 86°19'09", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.1, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on U.S. Highway 31, in Manistee, and 1.3 mi (2.1 km) upstream from mouth.

DRAINAGE AREA.--2,000 mi² (5,180 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to current year.

WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since March 1977.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Water-discharge measurements are made at times of monthly sampling. Interruptions in the record were due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum daily, 236 micromhos, Apr. 6, 1976.

WATER TEMPERATURES: Maximum daily, 25.0°C July 20, 21, 1977; minimum daily, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum recorded, 733 micromhos Dec. 20; minimum, 289 micromhos May 16.

WATER TEMPERATURES: Maximum, 24.5°C July 14-16, 23; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (MG/L)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)
OCT											
18...	1000	2930	430	7.1	10.5	10.4	93	K820	55	190	51
NOV											
15...	1000	2590	480	7.8	6.0	11.9	95	K190000	3000	220	72
DEC											
06...	1000	3140	460	7.9	1.0	13.2	93	570	81	180	32
JAN											
10...	1000	E1720	540	7.5	.0	9.8	67	K920	150	220	69
FEB											
07...	1000	1470	473	7.6	.0	11.1	0	260	K58	200	43
MAR											
21...	0915	4010	360	7.6	1.5	12.5	89	E24000	E540	160	24
APR											
11...	0930	3000	377	7.6	4.5	12.6	97	71000	K1700	160	50
MAY											
09...	1000	3750	350	7.7	15.0	8.6	86	5400	175	150	29
JUN											
13...	0900	2660	450	8.1	17.5	8.7	91	774	250	190	52
JUL											
18...	1030	2270	370	8.0	19.5	8.1	88	K180	1000	160	12
AUG											
15...	0900	2800	396	8.0	16.5	8.0	82	240	100	180	32
SEP											
18...	1330	2380	500	7.9	18.5	9.2	99	100	20	210	50

E--ESTIMATED

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
18...	54	13	13	.4	13	1.5	170	0	140	22	15
NOV											
15...	62	15	16	.5	14	1.7	180	0	150	4.6	17
DEC											
06...	49	13	16	.5	16	1.3	180	0	150	3.6	15
JAN											
10...	62	15	15	.4	13	1.7	180	0	150	9.1	12
FEB											
07...	58	13	16	.5	0	1.4	190	0	160	7.6	15
MAR											
21...	44	11	9.7	.3	12	1.1	160	0	130	6.4	14
APR											
11...	47	9.5	11	.4	13	1.5	130	0	110	5.2	13
MAY											
09...	45	9.7	7.1	.3	9	1.3	150	0	120	4.8	11
JUN											
13...	57	12	11	.3	11	1.3	170	0	140	2.2	12
JUL											
18...	45	12	11	.4	13	.8	180	0	150	2.9	14
AUG											
15...	54	12	10	.3	11	1.1	180	0	150	2.9	13
SEP											
18...	61	13	16	.5	14	1.5	190	0	160	3.8	5.1

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 18...	37	.1	8.1	239	226	1890	.20	.04	--	.34	.38
NOV 15...	49	.1	7.6	262	257	1830	.27	.07	--	.26	.33
DEC 06...	40	.1	7.6	247	231	2090	.27	.05	--	--	--
JAN 10...	60	.1	9.1	297	264	--	.29	.07	--	.00	.00
FEB 07...	51	.1	8.8	265	257	1050	.32	.04	--	.14	.18
MAR 21...	26	.1	7.6	212	192	2300	.34	.02	--	.16	.18
APR 11...	41	.1	6.5	253	194	2050	.23	.04	.05	.30	.34
MAY 09...	26	.1	5.4	207	180	2100	.10	.02	.02	.54	.56
JUN 13...	45	.1	6.3	266	229	1910	.14	.02	.02	.60	.62
JUL 18...	18	--	6.0	--	196	1200	.15	.00	.00	.13	.13
AUG 15...	32	.1	8.1	256	219	1940	.10	.03	.04	.26	.29
SEP 18...	55	.1	7.3	281	253	1810	.10	.04	.05	.34	.38

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 18...	.06	.32	.58	2.6	.02	--	.02	--	9	71	100
NOV 15...	.09	.24	.60	2.7	.01	--	.00	6.8	4	28	100
DEC 06...	--	.24	--	--	.01	--	.01	6.2	6	51	100
JAN 10...	--	--	.29	1.3	.02	--	.00	--	--	--	--
FEB 07...	--	--	.50	2.2	.05	--	.04	5.0	5	20	100
MAR 21...	--	--	.52	2.3	.03	--	.02	8.1	12	130	100
APR 11...	--	--	.57	2.5	.04	.12	.03	--	16	130	100
MAY 09...	--	--	.66	2.9	.03	.09	.01	6.7	7	71	100
JUN 13...	--	--	.76	3.4	.06	.18	.05	5.0	5	36	100
JUL 18...	--	--	.28	1.2	.02	.06	.00	--	6	37	100
AUG 15...	--	--	.39	1.7	.06	.18	.04	5.3	5	38	100
SEP 18...	--	--	.48	2.1	.02	.06	.00	3.0	4	26	100

STREAMS TRIBUTARY TO LAKE MICHIGAN
04126520 MANISTEF RIVER AT MANISTEE, MI--CONTINUED

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 18...	1000	1	1	0	0	2	0	<10	0	6
JAN 10...	1000	1	1	0	0	--	1	10	0	--
APR 11...	0930	3	1	0	0	0	0	10	10	0
JUL 18...	1030	2	1	--	40	--	5	20	20	--

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 18...	1	11	5	250	190	19	7	30	30	<.5
JAN 10...	2	7	2	380	40	22	8	30	10	<.5
APR 11...	0	6	5	780	80	3	0	30	10	<.5
JUL 18...	2	3	2	2100	30	3	0	40	--	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 18...	<.5	0	0	--	1	20	10	6.5	.4
JAN 10...	<.5	0	0	0	0	20	0	5.8	.2
APR 11...	<.5	0	0	0	0	10	10	6.5	.2
JUL 18...	<.5	0	0	0	0	20	0	3.3	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	CHLOR- DANE, TOTAL (UG/L)	CHLOR- DANE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 15...	1000	ND	11	ND	.0	ND	0	ND	.0	ND	.0
FER 07...	1000	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 09...	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- AZINON, TOTAL (UG/L)	DI- AZINON, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- ELDRIN TOTAL (UG/L)	DI- ELDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 15...	ND	.0	ND	--	ND	.0	ND	.0	ND	--
FER 07...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 09...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR EPOXIDE TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	MALA- THION, TOTAL (UG/L)	MALA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 15...	ND	.0	ND	ND	--	.0	ND	.0	ND	--
FER 07...	ND	--	ND	ND	--	--	ND	--	ND	--
MAY 09...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	METHYL TRI- THION, TOTAL (UG/L)	METHYL TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	PARA- THION, TOTAL (UG/L)	PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOX- APHENE, TOTAL (UG/L)	TOX- APHENE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TRI- THION, TOTAL (UG/L)	TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 15...	ND	--	ND	--	ND	--	ND	0	ND	--
FER 07...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 09...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND--NOT DETECTED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON TOTAL CHROMO- FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON TOTAL CHROMO- FLUOROM (MG/M2)
NOV 15...	1000	28	--	.472	.709	.610	.000
FER 07...	1000	28	--	--	--	--	--
JUN 13...	0900	35	118	2.28	2.68	3.39	.860
AUG 15...	0900	28	72.7	.710	.790	1.10	.480

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 9,77 1340	MAR 15,78 1000	MAY 10,78 1015	JUN 14,78 0930
TOTAL CELLS/ML	220	41	300	760
DIVERSITY: DIVISION	1.5	0.9	1.3	0.7
..CLASS	1.7	0.9	1.3	1.1
..ORDER	2.1	0.9	1.9	1.8
...FAMILY	2.3	1.6	2.3	2.6
....GENUS	2.5	1.6	2.5	3.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	22	3
....MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	--	-
....OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	22	3
....TETRAEDRON	--	-	--	-	--	-	--	-
....SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	--	-	--	-
..TETRASPORALES								
...TETRASPORACEAE								
....TETRASPORA	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	37#	17	14#	33	--	-	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	38	13	--	-
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
....COSCINODISCACEAE								
....CYCLOTELLA	59#	28	--	-	19	6	160#	21
....MELOSIRA	7	3	--	-	--	-	160#	21
....STEPHANODISCUS	--	-	--	-	57#	19	--	-
...PENNALES								
....ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	14#	33	--	-	22	3
....CYMBELLACEAE								
....AMPHORA	7	3	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	76#	25	22	3
..DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	22	3
...FRAGILARIACEAE								
....ASTERIONELLA	7	3	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	7	3	14#	33	--	-	--	-
...NAVICULACEAE								
....NAVICULA	7	3	--	-	--	-	160#	21
....PINNULARIA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....Hantzschia	--	-	--	-	--	-	--	-
....NITZSCHIA	--	-	--	-	38	13	67	9
..CHRYSOPHYCEAE								
...CHRYSONOMADACEAE								
....MALLONADACEAE								
....MALLONAS	7	3	--	-	--	-	45	6
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	67	9

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 9,77 1340		MAR 15,78 1000		MAY 10,78 1015		JUN 14,78 0930	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-
...HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	74#	34	--	-	--	-	--	-
....SPIRULINA	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
..DINOPHYCEAE								
...GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	--	-	--	-
...PERIDINIALES								
...CERATIACEAE								
....CERATIUM	--	-	--	-	--	-	--	-
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	76#	25	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 13.78 0930	AUG 10.78 1030	SEP 13.78 0945
TOTAL CELLS/ML	3900	10000	2900
DIVERSITY: DIVISION	0.1	0.5	1.2
..CLASS	0.1	0.5	1.2
...ORDER	0.5	1.1	1.9
....FAMILY	0.6	1.4	2.5
.....GENUS	0.6	1.9	2.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
....CHARACIACEAE						
.....SCHROEDERIA	--	-	* 0		* 0	
....MICRACTINIACEAE						
.....MICRACTINIUM	--	-	360 3		--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	* 0		* 0		34 1	
....CHODATELLA	--	-	--	-	* 0	
....KIRCHNERIELLA	--	-	89 1		--	-
....SELENASTRUM	--	-	--	-	--	-
....TETRAEDRON	--	-	* 0		* 0	
...SCENEDESMACEAE						
....SCENEDESMUS	59 2		* 0		--	-
..TETRASPORALES						
...TETRASPORACEAE						
....TETRASPORA	--	-	--	-	46 2	
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CARTERIA	--	-	* 0		--	-
....CHLAMYDOMONAS	--	-	* 0		29 1	
...PHACOTACEAE						
....PHACOTUS	--	-	* 0		--	-
..ZYGNEMALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	--	-	--	-
CHRYSOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
....COSCINODISCACEAE						
.....CYCLOTELLA	--	-	--	-	110 4	
....MFLOSIRA	3600# 92		--	-	690# 24	
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES			* 0		--	-
....COCONEIS	44 1		--	-	* 0	
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	--	-
....CYMBELLA	* 0		--	-	* 0	
...DIATOMACEAE						
....DIATOMA	--	-	* 0		--	-
...FRAGILARIACEAE						
....ASTERIONELLA	120 3		--	-	80 3	
....FRAGILARIA	* 0		--	-	--	-
....SYNEDRA	--	-	--	-	80 3	
...GOMPHONEMACEAE						
....GOMPHONEMA	--	-	* 0		--	-
...NAVICULACEAE						
....NAVICULA	* 0		* 0		* 0	
....PINNULARIA	* 0		--	-	--	-
...NITZSCHACEAE						
....HANTZSCHIA	* 0		--	-	--	-
....NITZSCHIA	--	-	* 0		* 0	
..CHRYSOPHYCEAE						
...CHRYSOMONADALES						
....MALLOMONADACEAE						
.....MALLOMONAS	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
....CRYPTOMONADACEAE						
.....CRYPTOMONAS	--	-	--	-	--	-

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 13,78 0930		AUG 10,78 1030		SEP 13,78 0945	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	6900#	66	180	6
....ANACYSTIS	--	-	1200	11	98	3
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	820	8	570#	20
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	690	7	860#	30
...SPIRULINA	--	-	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)						
..DINOPHYCEAE						
...GYMNODINIALES						
...GYMNODINIACEAE						
....GYMNODINIUM	--	-	--	-	*	0
..PERIDINIALES						
...CERATIACEAE						
....CERATIUM	--	-	--	-	*	0
...GLENODINIACEAE						
....GLENODINIUM	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

[illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	---	---	---	441	363	396	402	334	360	390	332	357
2	---	---	---	453	379	402	405	326	357	370	326	348
3	---	---	---	462	346	392	478	348	382	424	317	350
4	---	---	---	449	346	381	514	344	388	383	329	349
5	---	---	---	412	331	364	512	348	398	393	335	355
6	---	---	---	404	338	364	536	333	378	394	330	357
7	---	---	---	375	328	352	429	335	364	431	336	357
8	---	---	---	398	323	354	467	354	397	391	336	363
9	---	---	---	519	360	410	526	336	380	471	344	376
10	---	---	---	465	335	384	404	334	368	644	357	406
11	---	---	---	390	326	353	426	314	347	462	352	383
12	---	---	---	495	337	391	396	327	349	437	352	376
13	---	---	---	432	316	356	419	336	373	464	325	371
14	449	374	399	446	325	370	454	323	375	397	336	359
15	565	357	407	475	328	366	388	321	347	395	337	367
16	475	371	412	385	314	346	381	334	350	407	351	375
17	496	374	424	388	325	356	395	330	347	429	358	381
18	585	398	466	440	303	337	429	334	356	413	350	375
19	442	385	412	416	321	356	391	326	350	408	350	373
20	607	372	434	429	320	352	453	318	352	399	355	375
21	503	375	423	357	317	339	368	318	337	412	353	380
22	465	371	408	377	319	343	374	317	341	398	347	373
23	482	381	435	378	318	339	398	322	350	406	353	378
24	469	370	402	372	322	344	385	313	343	413	368	388
25	467	367	410	377	334	355	371	319	341	397	372	384
26	472	359	407	374	337	356	390	315	343	395	349	368
27	548	374	451	404	331	359	377	324	355	381	346	362
28	537	382	440	441	338	372	370	321	342	383	358	369
29	486	349	404	396	328	357	456	324	376	406	352	374
30	418	350	373	575	343	408	386	313	344	425	361	388
31	---	---	---	494	345	382	361	318	337	---	---	---
MONTH				575	303	366	536	313	359	644	317	371

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	16.0	15.5	15.5	9.5	8.5	8.5	2.0	1.5	1.5	1.0	.0	.5
2	16.0	15.0	15.5	9.0	8.5	8.5	1.5	1.0	1.5	.5	.0	.0
3	16.0	15.0	15.5	10.0	8.5	9.0	1.5	1.0	1.0	.5	.0	.0
4	15.5	14.5	15.0	10.5	9.5	10.0	1.5	1.0	1.5	.5	.0	.5
5	14.5	14.0	14.5	10.5	10.0	10.0	1.5	1.0	1.0	.5	.0	.0
6	14.5	13.0	14.0	10.5	10.0	10.0	1.0	1.0	1.0	.5	.0	.0
7	13.0	12.0	12.0	9.5	8.0	9.0	1.0	1.0	1.0	.5	.0	.0
8	12.0	11.5	12.0	8.5	8.0	8.5	1.0	.5	1.0	.5	.0	.0
9	12.0	11.5	11.5	9.0	8.0	8.5	.5	.0	.5	.0	.0	.0
10	12.5	11.5	12.0	9.0	8.5	8.5	.0	.0	.0	.0	.0	.0
11	13.0	12.0	12.5	9.0	8.0	8.5	.0	.0	.0	.0	.0	.0
12	---	---	---	8.0	7.5	7.5	.5	.0	.5	.0	.0	.0
13	---	---	---	8.0	6.5	7.0	1.0	.5	.5	.0	.0	.0
14	12.0	11.0	11.5	---	---	---	1.0	.5	.5	.0	.0	.0
15	---	---	---	---	---	---	1.0	1.0	1.0	.5	.0	.0
16	---	---	---	---	---	---	1.5	1.0	1.0	.5	.0	.0
17	---	---	---	---	---	---	1.0	1.0	1.0	.5	.0	.0
18	---	---	---	---	---	---	1.0	.5	1.0	.5	.0	.0
19	---	---	---	---	---	---	1.0	.0	.5	.0	.0	.0
20	10.5	10.0	10.5	---	---	---	1.0	.0	.5	.5	.0	.0
21	11.0	10.5	11.0	---	---	---	1.0	1.0	1.0	.5	.0	.0
22	12.0	11.5	12.0	---	---	---	1.0	.5	1.0	.5	.0	.5
23	12.0	10.5	11.0	---	---	---	1.0	.5	1.0	.5	.0	.0
24	10.5	10.0	10.5	---	---	---	1.0	1.0	1.0	.5	.0	.5
25	10.5	10.0	10.5	---	---	---	1.0	1.0	1.0	.5	.0	.0
26	10.5	10.0	10.0	---	---	---	1.0	.5	.5	.5	.5	.5
27	10.5	9.5	10.0	---	---	---	1.0	.5	.5	.5	.5	.5
28	10.0	9.0	10.0	---	---	---	.5	.0	.5	.5	.5	.5
29	9.0	8.5	8.5	---	---	---	.5	.0	.5	.5	.0	.5
30	9.0	8.5	8.5	---	---	---	1.0	.5	.5	.5	.0	.0
31	10.0	9.0	9.5	---	---	---	1.0	.0	.5	.0	.0	.0
MONTH							2.0	.0	1.0	1.0	.0	.0

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	.5	.5	.5	---	---	---	11.0	8.5	9.5
2	.0	.0	.0	1.0	.5	.5	---	---	---	11.0	10.5	10.5
3	.0	.0	.0	1.0	1.0	1.0	---	---	---	11.0	10.0	10.5
4	.0	.0	.0	1.0	1.0	1.0	---	---	---	11.0	10.5	10.5
5	.0	.0	.0	1.0	1.0	1.0	---	---	---	10.5	9.5	10.0
6	.0	.0	.0	1.0	.5	1.0	---	---	---	11.0	8.5	10.0
7	---	---	---	1.0	.5	1.0	---	---	---	13.5	11.0	12.0
8	---	---	---	1.0	.5	1.0	---	---	---	16.5	13.5	15.0
9	---	---	---	1.0	.5	1.0	---	---	---	17.0	15.5	16.5
10	.5	.5	.5	1.0	.5	.5	---	---	---	18.5	15.0	17.0
11	.5	.5	.5	1.0	.5	.5	---	---	---	18.5	16.5	17.5
12	.5	.5	.5	1.0	.5	.5	6.0	4.5	5.0	16.5	14.0	15.0
13	.5	.5	.5	1.5	1.0	1.5	8.0	6.0	7.0	15.0	14.0	14.5
14	.5	.5	.5	1.5	1.0	1.5	8.0	7.0	7.5	15.5	14.5	15.0
15	.5	.5	.5	---	---	---	7.5	6.5	7.0	16.5	15.5	15.5
16	.5	.5	.5	---	---	---	7.5	6.5	7.0	16.0	15.0	15.5
17	.5	.0	.5	---	---	---	8.5	7.0	7.5	15.5	15.0	15.5
18	.5	.5	.5	---	---	---	9.0	8.0	8.5	17.0	15.0	15.5
19	.5	.0	.5	---	---	---	9.0	8.5	9.0	17.0	16.5	16.5
20	.5	.5	.5	---	---	---	10.0	9.0	9.5	16.5	15.5	16.0
21	1.0	.5	.5	---	---	---	10.5	10.0	10.5	16.5	15.5	16.0
22	.5	.5	.5	---	---	---	10.5	9.5	10.0	16.0	15.0	15.5
23	1.0	.5	1.0	---	---	---	12.0	10.5	11.5	15.5	14.5	15.0
24	1.0	.5	.5	---	---	---	12.5	11.5	12.0	15.5	14.0	14.5
25	.5	.5	.5	---	---	---	13.0	12.5	12.5	16.0	14.5	15.0
26	.5	.5	.5	---	---	---	13.0	12.0	12.5	15.5	14.5	15.0
27	.5	.5	.5	---	---	---	11.5	10.5	11.0	15.0	14.5	15.0
28	1.0	.5	.5	---	---	---	11.0	10.5	11.0	16.0	15.0	15.0
29	---	---	---	---	---	---	10.5	10.0	10.0	---	---	---
30	---	---	---	---	---	---	10.0	9.0	9.5	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

MONTH

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	---	---	---	20.0	19.0	19.5	22.0	21.5	21.5	21.0	21.0	21.0
2	---	---	---	19.5	18.5	18.5	22.5	21.5	21.5	21.5	21.0	21.0
3	---	---	---	20.0	19.0	19.5	23.0	22.0	22.5	21.5	21.0	21.5
4	---	---	---	20.0	18.5	19.5	22.5	22.0	22.5	21.0	20.0	20.5
5	---	---	---	20.0	19.0	19.5	22.5	21.5	22.0	21.0	20.5	20.5
6	---	---	---	20.5	19.5	19.5	22.0	21.5	21.5	21.0	20.5	21.0
7	---	---	---	21.0	19.5	20.5	23.5	21.0	22.0	21.0	19.0	20.0
8	---	---	---	21.5	20.5	21.0	22.5	22.0	22.5	19.0	18.0	18.5
9	---	---	---	22.0	20.0	21.0	22.0	21.0	21.5	18.5	17.5	18.0
10	---	---	---	22.5	21.0	21.5	21.5	20.5	21.0	18.5	18.0	18.0
11	---	---	---	23.0	22.0	22.0	21.0	20.0	20.5	18.0	17.5	18.0
12	---	---	---	23.5	21.5	22.5	20.5	19.5	20.0	19.5	18.0	18.5
13	---	---	---	24.0	21.5	23.0	20.5	19.5	20.0	19.5	19.0	19.5
14	20.0	18.5	19.0	24.5	23.0	23.5	19.5	18.0	18.5	19.0	18.0	18.0
15	21.0	20.0	20.5	24.5	23.0	23.5	18.5	17.5	18.0	18.0	17.5	17.5
16	22.0	21.0	21.5	24.5	22.0	23.5	19.0	17.5	18.0	18.0	17.5	18.0
17	21.5	20.5	21.0	22.5	21.5	23.0	18.5	18.0	18.0	18.5	18.0	18.0
18	20.5	19.5	20.0	22.5	21.5	22.0	18.5	17.5	18.0	18.5	18.0	18.0
19	20.5	19.0	19.5	23.0	21.5	22.5	19.0	18.0	18.5	18.0	17.0	17.5
20	20.5	20.0	20.5	23.5	22.5	23.0	20.0	19.0	19.0	17.5	16.5	17.0
21	21.0	20.5	20.5	23.5	22.0	23.0	20.5	19.0	19.5	17.5	17.0	17.0
22	21.0	19.5	20.5	24.0	23.0	23.5	20.5	19.5	20.0	17.0	16.0	16.5
23	19.0	18.0	18.5	24.5	23.0	23.5	20.5	20.0	20.5	16.5	16.0	16.0
24	19.0	18.0	18.0	24.0	23.5	24.0	21.0	20.5	20.5	16.5	16.0	16.0
25	19.0	18.0	18.5	23.5	22.5	23.5	20.5	20.0	20.0	16.5	16.0	16.0
26	20.0	18.5	19.0	22.5	21.5	22.0	20.0	19.0	19.5	16.5	16.0	16.5
27	21.0	19.0	20.0	22.5	21.5	22.0	20.0	19.0	19.5	17.0	16.0	16.5
28	21.5	19.5	20.5	23.0	22.0	22.5	20.0	19.0	19.5	17.0	16.5	17.0
29	21.5	20.5	21.0	23.0	22.0	22.5	20.5	19.0	19.5	17.5	17.0	17.0
30	21.0	20.0	20.5	23.0	21.0	22.5	21.0	20.0	20.5	17.0	17.0	17.0
31	---	---	---	23.0	22.0	22.5	21.0	20.0	20.5	---	---	---
MONTH				24.5	18.5	22.0	23.5	17.5	20.0	21.5	16.0	18.0

LOCATION.--Lat 44°38'18", long 85°31'10", in SE₄ NE₄ sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft (8 m) downstream from Brown's Bridge, 300 ft (91 m) downstream from East Creek, 0.9 mi (1.4 km) downstream from Brown's Bridge Dam, 1.0 mi (1.6 km) northeast of Mayfield, and 9.6 mi (15.4 km) southeast of Traverse City.

PERIOD OF RECORD.--June 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft (230 m), by barometer.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 0.9 mi (1.4 km) above station.

AVERAGE DISCHARGE.--27 years, 194 ft³/s (5.494 m³/s), 11.81 in/yr (300 mm/yr).

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 1,220 ft³/s (34.6 m³/s) Sept. 14, 1961, gage height, 6.90 ft (2.103 m); minimum, 30 ft³/s (0.85 m³/s) Jan. 15, 1965, gage height, 2.53 ft (0.771 m); minimum daily, 47 ft³/s (1.33 m³/s) Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 491 ft³/s (13.9 m³/s) May 6, gage height, 4.87 ft (1.484 m); minimum, 59 ft³/s (1.67 m³/s) Mar. 12, gage height, 2.76 ft (0.841 m); minimum daily, 122 ft³/s (3.46 m³/s) Nov. 7.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	194	159	158	150	145	421	337	194	207	165	180
2	152	192	158	157	150	144	456	292	206	205	162	180
3	157	182	161	151	150	146	412	303	207	200	169	180
4	158	190	161	148	150	214	351	300	209	199	171	168
5	170	188	160	146	148	247	347	307	218	196	169	152
6	251	188	159	148	154	238	315	431	213	175	179	152
7	292	122	157	148	152	230	292	384	213	156	185	151
8	272	135	159	152	149	219	291	344	213	155	182	150
9	227	135	157	153	149	203	264	308	224	164	192	151
10	201	140	157	152	151	200	250	289	225	183	343	158
11	199	148	153	149	150	196	282	286	239	214	279	162
12	199	148	148	152	150	149	257	285	235	196	263	154
13	197	150	148	152	149	158	307	281	239	139	222	147
14	195	153	148	151	150	195	306	281	245	141	207	143
15	194	151	150	151	150	197	303	288	225	142	190	138
16	180	150	150	151	148	198	351	262	206	140	176	138
17	164	173	150	150	148	197	394	218	205	140	153	144
18	163	194	150	148	148	222	306	208	200	141	140	150
19	162	188	147	145	148	269	235	201	196	142	140	149
20	186	171	150	140	148	290	252	198	194	168	155	150
21	194	155	149	140	148	305	262	198	237	178	159	151
22	193	155	149	146	148	312	260	213	214	192	160	153
23	170	157	150	150	148	337	258	255	203	171	169	152
24	152	166	150	150	150	388	262	272	200	144	176	145
25	157	167	150	150	149	380	257	263	176	142	176	134
26	166	163	155	152	149	351	318	242	164	142	176	134
27	161	162	158	152	148	318	403	241	164	161	175	135
28	160	161	157	152	148	309	396	241	164	178	183	134
29	158	161	158	152	---	308	361	210	186	181	184	136
30	168	161	158	151	---	377	353	188	196	178	182	140
31	196	---	158	150	---	419	---	188	---	163	181	---
TOTAL	5742	4900	4774	4647	4180	7861	9522	8314	6210	5233	5763	4511
WTR YR 1979	185	163	154	150	149	254	317	268	207	169	186	150
MAX	292	194	161	158	154	419	456	431	245	214	343	180
MIN	148	122	147	140	148	144	235	188	164	139	140	134
CFSM	.83	.73	.69	.67	.67	1.14	1.42	1.20	.93	.76	.83	.67
IN.	.96	.82	.80	.78	.70	1.31	1.59	1.39	1.04	.87	.96	.75
CAL YR 1978	TOTAL	67719	MEAN 186	MAX 414	MIN 122	CFSM .83	IN 11.30					
WTR YR 1979	TOTAL	71657	MEAN 196	MAX 456	MIN 122	CFSM .88	IN 11.95					

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW¼ NW¼ sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft (183 m) downstream from Webster Bridge, 4.2 mi (6.8 km) south of East Jordan and 4.5 mi (7.2 km) upstream from mouth.

DRAINAGE AREA.--67.6 mi² (175 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m), from topographic map. Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft (183 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Dec. 19 to Jan. 23, which are fair. Some regulation during the low flows by fish hatchery above station.

AVERAGE DISCHARGE.--13 years, 189 ft³/s (5.352 m³/s), 37.97 in/yr (964 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft³/s (38.5 m³/s) July 19, 1975, gage height, 6.51 ft (1.984 m); minimum, 109 ft³/s (3.09 m³/s) Mar. 1, 8, 1967, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 23	2300	491 13.9	4.87 1.484	Apr. 26	1400	675 19.1	5.23 1.594
Mar. 31	0100	*970 27.5	*5.77 1.759	May 3	1100	452 12.8	4.72 1.439
Apr. 13	0800	411 11.6	4.50 1.372	May 6	0800	447 12.7	4.71 1.436

Minimum discharge, 152 ft³/s (4.30 m³/s) Feb. 9, gage height, 2.97 ft (0.905 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	186	180	180	185	175	187	322	232	199	241	182	180
2	179	181	179	180	170	186	309	285	199	213	179	180
3	190	181	181	175	170	192	294	385	196	189	184	178
4	242	181	187	170	170	345	279	267	193	184	202	179
5	244	182	185	170	175	319	274	247	207	181	204	178
6	270	189	182	170	175	246	283	384	195	180	185	177
7	236	181	180	170	175	224	253	271	196	180	181	177
8	208	180	181	175	175	217	253	236	205	179	178	177
9	195	180	181	175	174	216	245	225	243	179	179	178
10	189	179	185	175	175	211	247	225	240	178	247	180
11	188	181	183	175	170	206	252	233	290	179	194	179
12	195	180	182	170	170	205	288	220	208	178	182	177
13	186	196	193	170	170	207	385	215	196	183	197	185
14	187	197	189	175	170	229	304	213	192	197	227	181
15	183	185	187	175	170	207	269	217	189	184	189	181
16	183	182	186	170	170	201	263	212	202	178	182	177
17	181	189	186	170	170	206	254	206	195	178	185	178
18	182	211	182	170	170	246	243	206	192	179	193	176
19	182	191	170	170	175	326	237	223	186	177	187	176
20	181	187	175	165	175	373	234	217	193	176	182	177
21	181	184	170	165	175	319	245	206	218	175	179	181
22	180	185	170	170	180	294	236	202	198	174	176	178
23	180	191	170	175	180	400	225	239	193	174	210	178
24	180	218	170	175	180	408	221	238	189	177	190	177
25	206	201	170	175	180	271	257	207	186	221	179	177
26	218	188	175	175	185	236	503	203	184	201	180	176
27	191	183	180	170	190	227	296	211	182	184	185	179
28	185	185	180	170	188	228	243	207	181	181	201	175
29	183	184	180	170	---	263	230	203	184	177	202	177
30	181	185	180	170	---	599	243	199	187	178	192	179
31	180	---	180	175	---	703	---	197	---	184	182	---
TOTAL	6052	5617	5579	5345	4902	8697	8187	7231	6018	5739	5915	5348
MEAN	195	187	180	172	175	281	273	233	201	185	191	178
MAX	270	218	193	185	190	703	503	385	290	241	247	185
MIN	179	179	170	165	170	186	221	197	181	174	176	175
CFSM	2.89	2.77	2.66	2.54	2.59	4.16	4.04	3.45	2.97	2.74	2.83	2.63
IN.	3.33	3.09	3.07	2.94	2.70	4.79	4.51	3.98	3.31	3.16	3.25	2.94

CAL. YR 1978 TOTAL 69704 MEAN 191 MAX 422 MIN 162 CFSM 2.83 IN 38.36
WTR YR 1979 TOTAL 74630 MEAN 204 MAX 703 MIN 165 CFSM 3.02 IN 41.07

STREAMS TRIBUTARY TO LAKE MICHIGAN
04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORDS.--

WATER TEMPERATURES; October 1966 to current year.

INSTRUMENTATION.--Temperature recorder since October 1966.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 20.0°C July 11, 1976; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum recorded, 13.5 June 1; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.0	9.0	5.0	4.0	2.0	1.5	---	---	.5	.5	1.0	1.0
2	9.0	8.0	4.0	4.0	1.5	1.5	---	---	.5	.5	1.0	1.0
3	9.0	8.5	5.0	4.0	1.5	1.0	---	---	.5	.5	2.0	1.0
4	9.0	9.0	6.5	5.0	1.0	1.0	---	---	.5	.5	2.0	2.0
5	9.0	9.0	7.0	6.0	1.0	1.0	---	---	.5	.5	2.0	2.0
6	9.0	8.0	7.0	6.0	1.0	1.0	---	---	.5	.0	2.0	2.0
7	8.0	7.5	6.5	5.0	1.0	1.0	---	---	.0	.0	2.0	1.5
8	7.5	7.5	5.0	4.5	1.0	1.0	---	---	.0	.0	2.5	1.5
9	7.5	6.5	---	4.5	1.0	.5	---	---	.0	.0	2.5	2.5
10	8.0	6.5	---	5.5	.5	.5	---	---	.0	.0	2.5	.5
11	8.5	8.0	---	5.5	.5	.5	---	---	.0	.0	.5	.0
12	8.5	8.5	---	4.5	1.0	.5	---	---	.0	.0	.0	.0
13	8.5	7.0	---	4.5	1.0	1.0	---	---	.0	.0	2.5	.0
14	7.0	6.0	---	4.5	1.0	1.0	---	---	.0	.0	2.5	.0
15	6.0	5.0	---	4.5	1.0	1.0	---	---	.0	.0	.0	.0
16	5.0	4.5	---	4.0	1.0	1.0	---	---	.0	.0	1.0	.0
17	4.5	4.5	4.5	4.0	1.0	1.0	---	---	.0	.0	3.0	1.0
18	5.5	4.5	4.5	4.5	1.0	1.0	---	---	.0	.0	3.0	3.0
19	5.5	5.5	4.5	3.5	1.0	.0	---	---	.0	.0	3.0	3.0
20	5.5	5.5	3.5	2.5	.0	.0	---	---	.0	.0	3.0	2.5
21	7.0	5.5	2.5	2.0	.0	.0	---	---	.0	.0	2.5	2.5
22	7.5	7.0	2.0	2.0	.5	.0	---	---	.0	.0	3.0	2.5
23	7.5	6.0	2.0	2.0	.5	.5	.5	.5	.0	.0	3.0	3.0
24	6.0	5.0	2.5	2.0	.5	.5	.5	.5	.5	.0	3.0	1.5
25	5.5	5.0	2.5	2.5	---	---	.5	.5	.5	.0	2.0	1.0
26	5.5	5.5	2.5	2.0	---	---	1.0	.5	.0	.0	1.0	.5
27	5.5	5.5	2.0	2.0	---	---	1.0	1.0	.0	.0	1.5	.5
28	5.5	5.0	2.0	2.0	---	---	1.0	1.0	1.0	.0	2.0	1.5
29	5.0	3.5	2.0	2.0	---	---	1.0	1.0	---	---	3.0	2.0
30	5.0	3.5	2.0	2.0	---	---	1.0	1.0	---	---	3.0	2.5
31	5.0	5.0	---	---	---	---	1.0	.5	---	---	2.5	2.0
MONTH	9.0	3.5		2.0					1.0	.0	3.0	.0

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

[illegible]

STREAMS TRIBUTARY TO LAKE HURON

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW¼ NE¼ sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft (5 m) upstream from county highway bridge, 3.2 mi (5.1 km) south of Rudyard.

DRAINAGE AREA.--184 mi² (477 km²).

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 245 ft³/s (6.938 m³/s), 18.08 in/yr (459 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft³/s (119 m³/s) June 18, 1975, gage height, 17.62 ft (5.371 m); minimum, 56 ft³/s (1.59 m³/s) July 28, 1977, gage height, 1.86 ft (0.567 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft³/s (1.42 m³/s) was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Oct. 5	2400	1,300 36.8	7.20 2.195	June 27	Unknown	2,140 60.6	10.57 3.222
Apr. 16	2400	3,010 85.2	13.71 4.179	July 1	2100	2,060 58.3	10.28 3.133
Apr. 26	1500	*3,040 86.1	*13.79 4.023				

Minimum daily discharge, 62 ft³/s (1.76 m³/s) Feb. 8-13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FFB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	513	131	125	76	66	70	1000	530	179	1130	210	171
2	315	126	120	76	66	70	980	436	177	1440	176	167
3	564	125	115	78	66	72	940	466	166	745	152	161
4	783	124	110	78	64	76	860	420	158	401	140	150
5	810	124	105	78	64	80	800	366	173	280	135	136
6	1100	145	100	78	64	86	780	356	172	232	129	126
7	875	149	98	78	64	88	750	342	160	201	407	119
8	561	139	96	78	62	90	720	322	157	179	417	111
9	367	136	94	78	62	90	700	625	154	161	257	106
10	288	131	90	76	62	90	640	460	233	149	207	146
11	251	129	88	74	62	86	620	355	398	139	180	216
12	646	127	86	74	62	82	600	299	255	132	154	196
13	475	123	86	74	62	80	900	264	199	125	144	176
14	317	175	84	74	64	80	1300	248	175	119	243	164
15	255	177	82	72	64	78	1920	271	164	128	225	147
16	226	163	80	70	64	78	2060	267	160	121	180	136
17	206	220	80	70	66	78	2400	238	155	113	153	125
18	197	589	78	68	66	80	2380	222	155	107	156	115
19	190	428	76	68	68	86	2270	313	155	102	157	110
20	181	266	74	68	68	100	2170	518	200	100	146	106
21	174	250	74	68	70	160	2110	520	500	99	131	105
22	167	225	72	68	70	300	1780	341	400	96	120	105
23	162	205	72	68	70	600	1480	338	300	94	114	102
24	154	190	72	68	70	760	1280	403	250	92	147	98
25	149	175	72	68	70	750	1520	294	230	251	149	96
26	147	165	72	66	70	730	2770	244	2000	320	133	95
27	143	155	74	66	70	700	2220	228	1550	230	122	94
28	145	145	74	66	70	640	1340	223	1160	237	117	93
29	137	135	74	66	---	600	921	211	602	197	115	91
30	131	130	76	66	---	750	685	200	362	165	185	91
31	130	---	76	66	---	900	---	183	---	214	190	---
TOTAL	10759	5502	2675	2222	1846	8530	40896	10503	11099	8099	5491	3854
MEAN	347	183	86.3	71.7	65.9	275	1363	339	370	261	177	128
MAX	1100	589	125	78	70	900	2770	625	2000	1440	417	216
MIN	130	123	72	66	62	70	600	183	154	92	114	91
CFSM	1.89	1.00	.47	.39	.36	1.50	7.41	1.84	2.01	1.42	.96	.70
IN.	2.18	1.11	.54	.45	.37	1.72	8.27	2.12	2.24	1.64	1.11	.78
CAL YR 1978	TOTAL	87453	MEAN 240	MAX 2190	MIN 72	CFSM 1.30	TN 17.68					
WTR YR 1979	TOTAL	111476	MEAN 305	MAX 2770	MIN 62	CFSM 1.66	IN 22.54					

STREAMS TRIBUTARY TO LAKE HURON

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04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE¼ NE¼ sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi (2.9 km) north of Wolverine, 2.8 mi (4.5 km) downstream from West Branch, and 9 mi (14 km) upstream from mouth.

DRAINAGE AREA.--170 mi² (440 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944 (M), 1948 (M). WSP 1727: 1951 (M).

GAGE.--Water-stage recorder. Altitude of gage is 740 ft (226 m), from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi (1.6 km) upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi (1.1 km) upstream at different datums.

REMARKS.--Water-discharge records good except those for the winter period and those for periods of no gage-height record, Dec. 4 to Jan. 16, Feb. 17 to Mar. 1, which are fair. Prior to July 1975 intermittent regulation at low flows by ponds 2.4 mi (3.9 km) above station.

AVERAGE DISCHARGE.--37 years, 218 ft³/s (6.174 m³/s), 17.41 in/yr (442 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Sept. 29, 1972, gage height, 3.72 ft (1.134 m); minimum, 94 ft³/s (2.66 m³/s) Jan. 19, 1971, result of freezeup; minimum daily, 113 ft³/s (3.20 m³/s) Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 886 ft³/s (25.1 m³/s) Mar. 31, gage height, 3.31 ft (1.009 m); minimum, 160 ft³/s (4.53 m³/s) July 22, 23, gage height, 1.69 ft (0.515 m); minimum gage height, 1.65 ft (0.503 m) Feb. 2, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	224	186	209	190	185	205	560	349	225	383	183	203
2	199	186	206	190	185	215	425	379	221	372	182	197
3	210	186	207	190	185	221	404	555	211	255	180	192
4	218	186	205	190	185	344	367	441	206	227	200	190
5	254	188	200	185	185	403	348	329	218	211	210	187
6	336	194	200	185	185	317	352	379	211	203	189	190
7	293	189	200	185	185	277	328	434	208	199	180	187
8	251	187	200	185	185	263	318	347	206	193	176	186
9	224	190	200	185	185	259	303	293	237	191	173	186
10	218	189	200	185	185	254	301	273	290	196	238	188
11	205	189	200	185	185	242	313	282	380	193	214	192
12	205	189	205	185	180	250	340	268	277	189	188	189
13	196	202	210	185	180	247	445	254	232	187	196	190
14	194	227	205	185	180	250	452	248	218	192	239	193
15	191	209	200	185	180	247	385	249	209	191	207	190
16	191	201	200	185	180	250	367	252	223	182	191	186
17	189	209	200	185	180	248	375	236	217	180	198	185
18	191	239	200	185	185	277	360	240	209	179	215	181
19	191	237	195	180	185	316	340	305	201	171	205	183
20	190	219	200	180	185	366	336	270	214	165	195	185
21	189	212	200	180	190	397	353	249	272	167	189	189
22	189	211	195	180	190	375	335	236	233	164	183	190
23	186	214	190	180	190	420	301	279	223	163	183	194
24	186	229	190	185	190	478	288	337	212	187	263	188
25	200	243	190	185	195	395	298	272	203	220	233	185
26	228	225	190	185	195	325	480	252	199	227	200	178
27	214	212	190	185	200	289	544	257	194	194	199	176
28	203	209	190	185	200	277	366	249	191	189	223	180
29	194	211	190	185	---	306	312	243	192	178	218	182
30	192	214	195	185	---	539	317	234	207	178	239	184
31	189	---	190	185	---	802	---	229	---	190	218	---
TOTAL	6540	6182	6152	5730	5220	10054	11013	9220	6739	6316	6307	5626
MEAN	211	206	198	185	186	324	367	297	225	204	203	188
MAX	336	243	210	190	200	802	560	555	380	383	263	203
MIN	186	186	190	180	180	205	288	229	191	163	173	176
CFSM	1.24	1.21	1.17	1.09	1.09	1.91	2.16	1.75	1.32	1.20	1.19	1.11
IN.	1.43	1.35	1.35	1.25	1.14	2.20	2.41	2.02	1.47	1.38	1.38	1.23

CAL YR 1978	TOTAL	80104	MEAN 219	MAX 575	MIN 152	CFSM 1.29	IN 17.53
WTR YR 1979	TOTAL	85099	MEAN 233	MAX 802	MIN 163	CFSM 1.37	IN 18.62

STREAMS TRIBUTARY TO LAKE HURON
04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: October 1958 to current year.

INSTRUMENTATION.--Temperature recorder since October 1958.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 24.0°C June 30, 1964; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 21.0°C June 15, July 27; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.0	9.0	6.5	6.0	1.5	1.5	.0	.0	.0	.0	.0	.0
2	9.0	8.5	6.5	6.0	1.5	1.5	.0	.0	.0	.0	.0	.0
3	10.5	10.5	6.5	6.0	1.5	1.5	.0	.0	.0	.0	.0	.0
4	10.5	10.0	8.5	6.5	1.5	1.5	.0	.0	.0	.0	.5	.0
5	10.0	9.5	8.0	7.0	1.5	1.5	.0	.0	.0	.0	.5	.0
6	9.5	8.5	8.0	7.5	1.5	1.5	.0	.0	.0	.0	1.0	.5
7	8.5	8.0	7.5	6.5	1.5	1.5	.0	.0	.0	.0	1.0	1.0
8	8.0	8.0	6.5	5.5	1.5	1.5	.0	.0	.0	.0	2.0	1.0
9	9.0	8.0	6.5	5.5	1.5	1.5	.0	.0	.0	.0	2.0	2.0
10	10.5	9.0	6.5	6.5	1.5	1.0	.0	.0	.0	.0	2.0	1.0
11	11.0	10.0	6.5	6.0	1.0	1.0	.0	.0	.0	.0	1.0	.5
12	11.0	10.0	6.0	5.5	1.0	1.0	.0	.0	.0	.0	.5	.0
13	10.0	9.0	5.0	5.0	1.0	1.0	.0	.0	.0	.0	2.5	.0
14	9.0	8.0	5.0	4.5	1.0	1.0	.0	.0	.0	.0	2.5	1.0
15	8.0	7.5	4.5	4.5	1.0	1.0	.0	.0	.0	.0	1.0	.5
16	7.5	7.5	4.5	4.0	1.0	1.0	.0	.0	.0	.0	1.5	.5
17	7.5	7.5	4.0	4.0	1.0	1.0	.0	.0	.0	.0	3.0	1.5
18	7.5	7.5	4.0	4.0	1.0	1.0	.0	.0	.0	.0	3.0	3.0
19	7.5	7.5	3.5	3.5	1.0	1.0	.0	.0	.0	.0	3.0	3.0
20	7.5	7.0	3.5	3.5	1.0	1.0	.0	.0	.0	.0	3.0	3.0
21	9.5	8.0	3.5	2.5	1.0	1.0	.0	.0	.0	.0	3.0	3.0
22	10.5	9.5	2.5	2.5	1.0	1.0	.0	.0	.0	.0	4.0	3.0
23	10.5	8.5	2.5	2.5	1.0	1.0	.0	.0	.0	.0	4.0	3.5
24	8.5	7.5	2.5	2.5	1.0	1.0	.0	.0	.0	.0	3.5	2.0
25	7.5	7.5	2.0	2.0	1.0	1.0	.0	.0	.0	.0	2.0	1.0
26	7.0	7.0	2.0	2.0	1.0	1.0	.0	.0	.0	.0	1.0	.5
27	7.5	7.0	2.0	2.0	1.0	1.0	.0	.0	.0	.0	2.0	.5
28	7.0	7.0	2.0	2.0	1.0	.0	.0	.0	.0	.0	2.0	1.5
29	7.0	5.5	1.5	1.5	.0	.0	.0	.0	---	---	3.0	2.0
30	6.5	5.5	1.5	1.5	.0	.0	.0	.0	---	---	3.0	2.5
31	6.5	6.5	---	---	.0	.0	.0	.0	---	---	2.5	1.5
MONTH	11.0	5.5	8.5	1.5	1.5	.0	.0	.0	.0	.0	4.0	.0

STREAMS TRIBUTARY TO LAKE HURON

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04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.0	1.0	7.0	5.0	17.0	14.5	14.5	14.5	16.5	15.0	15.0	13.0
2	3.0	2.5	7.0	6.0	16.5	12.5	17.5	14.0	18.5	15.5	15.5	14.0
3	4.0	2.0	6.0	6.0	17.5	13.5	17.5	14.5	18.0	16.5	15.5	13.0
4	3.5	3.5	6.0	5.0	18.0	14.5	17.5	14.5	18.0	16.0	13.0	11.0
5	3.5	3.0	6.0	5.5	17.5	15.0	15.0	14.0	17.0	15.5	14.5	11.5
6	3.0	3.0	5.5	5.0	16.5	13.5	17.5	14.0	17.5	14.5	15.0	13.0
7	3.5	1.0	10.0	5.0	18.0	15.0	17.5	14.5	18.5	16.0	14.5	11.5
8	2.5	2.0	13.5	9.5	18.0	16.0	18.0	15.0	18.5	16.5	11.5	9.0
9	3.5	2.0	14.0	13.0	18.0	16.0	18.0	15.5	18.0	14.5	9.0	8.0
10	4.0	2.5	14.0	12.0	16.0	15.0	18.0	15.5	15.0	14.0	9.5	8.5
11	4.0	3.0	15.5	13.5	15.5	14.0	19.0	16.5	16.0	14.0	9.5	8.5
12	4.5	4.0	15.5	13.0	16.0	13.0	20.0	16.5	15.5	13.5	11.5	9.0
13	4.5	4.5	13.0	11.0	16.0	13.0	20.0	17.5	15.5	14.5	11.5	10.5
14	4.5	4.0	14.0	11.5	17.5	14.0	19.5	17.5	14.5	13.0	10.5	8.5
15	4.5	4.5	14.0	11.5	21.0	16.5	19.5	16.5	14.5	12.0	9.0	8.0
16	5.5	4.5	13.5	11.0	20.0	18.0	19.5	17.0	14.5	12.5	9.5	8.0
17	6.5	4.5	14.0	11.0	20.0	16.5	17.5	14.5	14.0	13.0	11.0	8.5
18	7.0	5.0	16.0	12.5	17.0	14.0	17.5	14.0	14.0	13.0	11.0	10.0
19	7.5	5.5	15.5	14.0	18.0	14.0	17.5	14.5	15.5	12.0	10.0	8.0
20	9.0	6.0	15.0	12.5	17.5	15.5	19.0	16.0	16.0	14.5	8.0	8.0
21	9.0	7.5	14.5	12.0	17.5	15.5	19.5	16.0	17.0	14.0	9.0	8.0
22	9.0	6.0	13.5	11.0	17.5	14.0	20.0	17.0	17.0	14.5	9.0	7.5
23	10.5	7.5	12.0	11.0	14.0	12.5	20.0	17.5	13.0	12.0	7.5	7.0
24	11.0	8.0	13.5	11.0	15.0	12.5	20.0	17.5	14.0	12.5	8.5	7.0
25	11.0	10.5	14.0	11.0	16.0	12.5	19.5	18.0	14.0	12.5	10.0	9.0
26	11.0	8.5	13.5	12.0	17.0	13.0	19.5	16.5	12.5	10.0	10.0	8.0
27	9.5	7.0	12.0	11.0	18.5	15.5	21.0	16.5	12.0	11.5	10.5	8.5
28	8.5	7.5	12.0	11.5	18.5	15.0	19.5	16.5	11.5	11.0	11.0	9.5
29	7.0	6.0	14.5	11.0	17.5	15.5	19.0	16.0	12.5	11.5	11.0	10.0
30	7.0	6.0	15.5	12.0	16.5	14.5	19.0	16.0	14.0	12.0	11.0	10.0
31	---	---	17.5	13.5	---	---	17.0	16.5	14.0	11.5	---	---
MONTH	11.0	1.0	17.5	5.0	21.0	12.5	21.0	14.0	18.5	10.0	15.5	7.0

STREAMS TRIBUTARY TO LAKE HURON

04128500 INDIAN RIVER AT INDIAN RIVER, MI

LOCATION.--Lat 45°24'38", long 84°37'12", in NE¼ SW¼ sec.24, T.35 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank in Indian River, 500 ft (152 m) downstream from Burt Lake, and 2.3 mi (3.7 km) upstream from Mullett Lake.

DRAINAGE AREA.--583 mi² (1,510 km²).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1942(M), 1945(M), 1947.

GAGE.--Water-stage recorder. Datum of gage is 590.21 ft (179.896 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 12, 1942, nonrecording gage at site 100 ft (30 m) downstream. Auxiliary water-stage recorder 14.3 mi (23.0 km) downstream from base gage, near Cheboygan, datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by dam at Cheboygan. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 572 ft³/s (16.20 m³/s), 13.32 in/yr (338 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,250 ft³/s (35.4 m³/s) May 3, 4, 1979; maximum daily gage height, 5.58 ft (1.701 m) May 13, 14, 1960; minimum daily discharge, 212 ft³/s (6.00 m³/s) Sept. 2, 1970; minimum daily gage height, 3.34 ft (1.018 m) Oct. 21, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,250 ft³/s (35.4 m³/s) May 3, 4; maximum daily gage height, 5.33 ft (1.625 m), May 9; minimum daily discharge, 427 ft³/s (12.1 m³/s) Sept. 17, 20; minimum daily gage height, 3.55 ft (1.082 m) Mar. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	778	537	656	606	565	607	821	1200	1020	716	590	515
2	759	538	669	606	567	603	833	1210	996	704	565	513
3	739	547	671	598	567	601	852	1250	982	722	541	524
4	742	554	652	611	569	607	863	1250	962	743	542	517
5	741	556	660	607	575	604	872	1240	963	744	557	504
6	774	566	684	600	574	609	894	1240	932	733	539	508
7	783	552	686	605	579	610	902	1240	935	730	515	524
8	753	517	689	602	578	613	916	1230	921	734	534	498
9	730	549	682	603	578	607	925	1240	933	738	531	472
10	735	558	683	602	578	610	917	1240	940	734	550	487
11	704	567	678	598	578	609	921	1230	946	712	549	468
12	699	554	660	593	581	612	933	1230	930	704	538	467
13	710	540	676	589	580	618	952	1210	911	692	522	479
14	700	541	662	589	583	623	973	1210	882	663	559	484
15	681	534	652	582	588	631	993	1220	873	648	547	462
16	678	538	653	579	587	630	1010	1200	889	655	527	457
17	638	543	655	579	589	637	1030	1170	887	630	527	427
18	638	561	656	576	593	638	1040	1170	877	607	540	451
19	620	589	645	576	589	638	1060	1180	842	595	546	444
20	616	584	642	574	592	640	1070	1180	803	586	546	427
21	607	577	631	571	596	654	1090	1190	802	563	553	454
22	612	593	624	569	597	664	1100	1170	817	549	541	440
23	610	598	624	570	605	666	1110	1160	800	544	541	443
24	563	621	614	577	605	683	1110	1160	769	534	555	433
25	583	623	608	572	610	708	1120	1150	749	553	552	429
26	595	629	603	570	605	713	1170	1120	708	585	545	440
27	583	631	604	571	602	714	1200	1090	708	578	547	434
28	593	624	598	568	609	722	1200	1080	696	583	549	435
29	564	606	602	565	---	730	1200	1070	680	575	533	440
30	536	652	609	564	---	738	1220	1060	690	569	543	440
31	556	---	605	567	---	778	---	1020	---	588	536	---
TOTAL	20620	17179	20033	18139	16419	20117	30297	36610	25843	20011	16860	14016
MEAN	665	573	646	585	586	649	1010	1181	861	646	544	467
MAX	783	652	689	611	610	778	1220	1250	1020	744	590	524
MIN	536	517	598	564	565	601	821	1020	680	534	515	427
CFSM	1.14	.98	1.11	1.00	1.01	1.11	1.73	2.03	1.48	1.11	.93	.80
IN.	1.32	1.10	1.28	1.16	1.05	1.28	1.93	2.34	1.65	1.28	1.08	.89
CAL YR 1978	TOTAL	225304	MEAN 617	MAX 842	MIN 276	CFSM 1.06	IN 14.38					
WTR YR 1979	TOTAL	256144	MEAN 702	MAX 1250	MIN 427	CFSM 1.20	IN 16.34					

STREAMS TRIBUTARY TO LAKE HURON

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04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE¼ SW¼ sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi (17.9 km) east of Vanderbilt, and 26 mi (41.8 km) upstream from Mullett Lake.

DRAINAGE AREA.--63 mi² (160 km²), approximately.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 886.24 ft (270.126 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, Aug. 21 to Sept. 30, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi (5.6 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 78.1 ft³/s (2.212 m³/s), 16.83 in/yr (427 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) May 15, 1957, gage height, 6.80 ft (2.073 m), from floodmark, from rating curve extended above 500 ft³/s (14.2 m³/s), result of failure of Lansing Club Dam; minimum, 13 ft³/s (0.37 m³/s) Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 518 ft³/s (14.7 m³/s) Apr. 27, gage height, 5.41 ft (1.649 m); minimum, 29 ft³/s (0.82 m³/s) Mar. 16, gage height, 1.75 ft (0.533 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	90	64	65	68	62	74	210	135	70	119	59	65
2	67	60	66	68	62	77	139	148	72	148	59	62
3	72	60	66	68	62	82	133	248	67	89	62	63
4	87	66	65	68	62	113	119	189	63	72	73	61
5	91	60	64	68	62	155	117	115	72	61	80	58
6	141	69	66	67	62	114	110	142	69	61	82	58
7	115	61	67	67	62	92	109	184	66	61	81	57
8	87	63	65	67	62	84	94	138	67	57	54	56
9	80	60	65	67	63	82	98	106	70	56	56	56
10	72	66	66	67	63	84	93	96	108	62	81	56
11	68	63	64	68	64	73	97	90	172	72	79	56
12	68	60	65	68	64	84	109	96	103	76	63	56
13	72	67	67	67	64	76	159	78	83	49	65	55
14	64	75	66	67	64	86	183	85	71	47	82	57
15	63	69	66	66	64	90	143	84	70	48	75	58
16	69	66	70	66	64	98	130	102	62	58	63	56
17	61	71	66	66	65	60	146	79	64	52	64	55
18	66	82	68	66	66	91	131	80	82	52	76	55
19	66	82	69	65	67	102	123	84	82	53	73	56
20	60	76	68	65	68	125	129	80	56	53	63	56
21	65	66	68	65	68	151	133	82	97	54	61	55
22	61	74	65	65	70	138	125	77	89	51	59	54
23	67	70	64	64	72	160	109	96	75	54	60	53
24	62	75	65	64	72	207	93	131	71	99	72	52
25	64	78	65	64	72	167	113	85	63	87	84	51
26	77	74	68	64	73	111	229	91	64	94	75	52
27	71	72	70	63	74	103	302	78	55	70	71	52
28	68	67	72	63	74	87	138	85	55	69	74	52
29	64	73	71	63	---	101	109	77	62	59	77	52
30	64	67	70	62	---	197	108	73	60	61	76	52
31	64	---	68	62	---	384	---	73	---	60	71	---
TOTAL	2286	2056	2070	2038	1847	3648	4031	3307	2260	2104	2170	1677
MEAN	73.7	68.5	66.8	65.7	66.0	118	134	107	75.3	67.9	70.0	55.9
MAX	141	82	72	68	74	384	302	248	172	148	84	65
MIN	60	60	64	62	62	60	93	73	55	47	54	51
CFSM	1.17	1.09	1.06	1.04	1.05	1.87	2.13	1.70	1.20	1.08	1.11	.89
IN.	1.35	1.21	1.22	1.20	1.09	2.15	2.38	1.95	1.33	1.24	1.28	.99
CAL YR 1978 TOTAL	27434			MEAN 75.2	MAX 282	MIN 44	CFSM 1.19	IN 16.20				
WTR YR 1979 TOTAL	29494			MEAN 80.8	MAX 384	MIN 47	CFSM 1.28	IN 17.42				

STREAMS TRIBUTARY TO LAKE HURON

04129500 PIGEON RIVER AT AFTON, MI

LOCATION.--Lat 45°22'26", long 84°30'54", in NW¼ NE¼ sec.2, T.34 N., R.2 W., Cheboygan County, Hydrologic Unit 04070004, on downstream side of bridge on State Highway 68, 0.9 mi (1.4 km) west of Afton, 2.2 mi (3.5 km) downstream from Wilkes Creek, and 7 mi (11 km) upstream from Mullett Lake.

DRAINAGE AREA.--159 mi² (412 km²).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1945-46, 1950.

GAGE.--Nonrecording gage. Altitude of gage 675 ft (206 m), by barometer. Prior to Oct. 1, 1961, at various sites upstream at present datum.

REMARKS.--Records fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam 22 mi (35 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 141 ft³/s (3.993 m³/s), 12.04 in/yr (306 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft³/s (33.1 m³/s) Apr. 17, 1960, gage height, 6.80 ft (2.073 m), from high-water mark; maximum gage height, about 10.5 ft (3.20 m) Mar. 31, 1943, from floodmarks, backwater from ice; minimum discharge, 49 ft³/s (1.39 m³/s) Aug. 8, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 816 ft³/s (23.1 m³/s) Mar. 31, gage height, 6.38 ft (1.945 m); maximum gage height, 6.98 ft (2.128 m) Mar. 8, backwater from ice; minimum discharge, 75 ft³/s (2.12 m³/s) Oct. 20, gage height, 4.42 ft (1.347 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	133	105	118	92	90	105	700	265	158	246	97	107
2	124	103	133	92	90	105	464	313	160	288	91	103
3	112	97	114	92	90	110	340	454	156	270	93	103
4	112	91	135	92	90	110	316	438	149	186	101	101
5	137	103	135	92	90	115	300	333	149	146	114	97
6	177	101	116	92	90	390	291	300	144	129	116	95
7	214	97	129	92	90	330	273	340	142	118	114	93
8	174	97	140	92	90	270	243	340	140	116	101	93
9	131	99	129	91	90	240	211	276	146	109	89	93
10	120	103	129	90	90	220	219	240	158	114	105	93
11	99	99	129	90	90	215	219	230	208	107	120	93
12	109	99	140	90	90	210	250	214	248	122	112	95
13	99	101	145	89	91	205	310	196	211	112	103	93
14	114	109	140	89	92	200	340	191	172	97	105	91
15	107	114	137	90	92	200	310	186	153	93	109	95
16	101	114	130	90	93	210	290	191	156	91	112	89
17	95	118	120	90	93	230	307	189	144	93	105	89
18	97	137	110	90	94	240	294	179	144	89	114	89
19	97	137	105	90	94	270	285	211	146	89	112	89
20	87	126	100	90	95	290	262	216	153	87	105	93
21	93	97	96	90	96	310	267	204	179	87	103	91
22	101	101	94	90	97	333	267	189	191	87	97	91
23	91	101	94	90	98	340	254	184	177	85	99	91
24	97	129	94	90	99	402	235	224	158	97	103	89
25	101	131	96	90	100	340	224	230	144	129	124	87
26	107	124	98	90	102	260	265	181	165	131	112	89
27	118	116	100	90	105	230	464	191	214	120	107	91
28	122	118	100	90	105	220	406	189	129	109	114	89
29	109	118	100	90	---	300	262	181	116	103	122	89
30	112	107	97	90	---	400	251	172	137	95	120	89
31	105	---	94	90	---	739	---	162	---	97	118	---
TOTAL	3595	3292	3597	2805	2626	8139	9119	7409	4847	3842	3337	2790
MEAN	116	110	116	90.5	93.8	263	304	239	162	124	108	93.0
MAX	214	137	145	92	105	739	700	454	248	288	124	107
MIN	87	91	94	89	90	105	211	162	116	85	89	87
CFSM	.73	.69	.73	.57	.59	1.65	1.91	1.50	1.02	.78	.68	.59
IN.	.84	.77	.84	.66	.61	1.90	2.13	1.73	1.13	.90	.78	.65
CAL YR 1978 TOTAL	49956		MEAN 137	MAX 520	MIN 72	CFSM .86	IN 11.69					
WTR YR 1979 TOTAL	55398		MEAN 152	MAX 739	MIN 85	CFSM .96	IN 12.96					

STREAMS TRIBUTARY TO LAKE HURON

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04130000 CHEBOYGAN RIVER NEAR CHEBOYGAN, MI

LOCATION.--Lat 45°34'38", long 84°29'15", in SW $\frac{1}{4}$ sec.19, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, on right bank 300 ft (91 m) downstream from Mullett Lake, 2.4 mi (3.9 km) upstream from Black River, and 4.8 mi (7.7 km) south of Cheboygan.

DRAINAGE AREA.--865 mi² (2,240 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929. Auxiliary water-stage recorder 5.1 mi (8.2 km) downstream from base gage, in Cheboygan, datum of gage is 590.00 ft (179.832 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 30, 1967, nonrecording auxiliary gage in Cheboygan, 5.2 mi (8.4 km) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Flow regulated by dam in Cheboygan; prior to Dec. 31, 1965, flow affected by variable backwater from powerplant in Cheboygan 5.2 mi (8.4 km) below station and by Alverno powerplant.

AVERAGE DISCHARGE.--37 years, 824 ft³/s (23.34 m³/s), 12.94 in/yr (329 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,970 ft³/s (55.8 m³/s) May 22, 1979; maximum daily gage height, 3.27 ft (0.997 m) May 13, 14, 1960; minimum daily discharge, 90 ft³/s (2.55 m³/s) Mar. 29, 30, 1958; minimum daily gage height, 1.05 ft (0.320 m) Apr. 13, 14, 15, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,970 ft³/s (55.8 m³/s) May 22; maximum daily gage height, 2.89 ft (0.881 m) May 9; minimum daily discharge, 511 ft³/s (14.5 m³/s) Aug. 3; minimum daily gage height, 1.37 ft (0.418 m) Feb. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1060	705	1010	1000	940	1020	1460	1720	1410	879	718	609
2	988	697	1040	990	950	1020	1420	1730	1400	1020	554	606
3	898	736	1060	1000	950	1020	1390	1700	1410	1130	511	620
4	899	800	1050	1010	950	1020	1370	1730	1420	1150	530	619
5	919	797	1040	1000	950	1020	1380	1740	1430	1170	530	613
6	930	780	1090	1000	950	1040	1460	1730	1400	1160	527	627
7	936	744	1090	1000	960	1080	1450	1730	1390	1130	533	634
8	934	750	1080	1000	970	1140	1460	1740	1390	1140	604	627
9	932	754	1030	1000	980	1140	1480	1760	1400	1160	634	619
10	911	786	1030	990	980	1190	1490	1750	1370	1100	697	611
11	855	794	1000	980	980	1190	1500	1760	1390	925	770	585
12	811	793	955	980	980	1210	1510	1770	1410	911	759	585
13	825	773	963	980	980	1280	1490	1780	1360	892	741	560
14	833	726	978	970	980	1300	1490	1790	1370	748	741	571
15	827	685	965	970	980	1360	1500	1800	1340	740	765	553
16	836	778	966	970	990	1330	1500	1820	1360	756	753	556
17	786	853	975	960	990	1370	1500	1830	1370	756	743	538
18	713	848	978	960	990	1350	1500	1860	1390	752	749	547
19	759	859	1000	960	990	1330	1510	1870	1280	760	754	560
20	809	868	955	960	1000	1390	1580	1880	1220	724	751	566
21	810	866	880	950	1000	1610	1570	1940	1210	630	749	577
22	810	901	861	950	1000	1650	1640	1970	1210	639	755	576
23	748	915	864	950	1010	1590	1650	1640	1190	656	713	573
24	700	930	868	950	1010	1560	1660	1610	1170	656	646	568
25	766	945	865	950	1010	1580	1650	1620	1130	666	631	558
26	778	960	878	950	1010	1570	1690	1620	1000	758	634	554
27	720	962	950	950	1010	1560	1680	1620	927	733	637	550
28	735	989	973	944	1010	1540	1700	1620	938	756	639	546
29	732	951	977	935	---	1520	1710	1620	940	744	631	561
30	653	1000	980	942	---	1420	1720	1550	958	740	636	559
31	709	---	982	940	---	1440	---	1420	---	734	634	---
TOTAL	25622	24945	30333	30091	27500	40840	46110	53720	38183	26715	20669	17428
MEAN	827	832	978	971	982	1317	1537	1733	1273	862	667	581
MAX	1060	1000	1090	1010	1010	1650	1720	1970	1430	1170	770	634
MIN	653	685	861	935	940	1020	1370	1420	927	630	511	538
CFSM	.96	.96	1.13	1.12	1.14	1.52	1.78	2.00	1.47	1.00	.77	.67
IN.	1.10	1.07	1.30	1.29	1.18	1.76	1.98	2.31	1.64	1.15	.89	.75
CAL YR 1978	TOTAL	323388	MEAN	886	MAX	1620	MIN	370	CFSM	1.02	IN	13.91
WTR YR 1979	TOTAL	382156	MEAN	1047	MAX	1970	MIN	511	CFSM	1.21	IN	16.43

STREAMS TRIBUTARY TO LAKE HURON

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE¼ NE¼ sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft (122 m) downstream from Kleber Dam, 1,000 ft (305 m) upstream from Milligan Creek, 3.0 mi (4.8 km) northwest of Tower, and 10.8 mi (17.4 km) upstream from Black Lake.

DRAINAGE AREA.--313 mi² (811 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft (200.558 m) Stanley Engineering Co. datum. Prior to Aug. 1, 1949, at site 1 mi (1.6 km) upstream at different datum.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 400 ft (122 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 271 ft³/s (7.675 m³/s), 11.76 in/yr (299 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft³/s (66.3 m³/s) Apr. 17, 1960, gage height, 7.13 ft (2.173 m); minimum, 0.60 ft³/s (0.017 m³/s) Mar. 11, 1950; minimum daily, 4.0 ft³/s (0.11 m³/s) Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,420 ft³/s (40.2 m³/s) Mar. 31, gage height, 5.55 ft (1.692 m); minimum, 9.4 ft³/s (0.27 m³/s) Dec. 1, gage height, 1.16 ft (0.354 m); minimum daily, 129 ft³/s (3.65 m³/s) Dec. 21.

DISCHARGE, IN CURIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	284	214	208	219	193	201	1040	686	249	329	191	228
2	317	207	153	245	191	204	1190	650	328	557	230	229
3	278	216	180	183	194	220	1110	902	251	663	184	187
4	323	207	181	187	201	251	862	966	250	561	200	171
5	222	217	241	187	205	391	757	885	283	503	207	191
6	346	196	265	203	219	416	729	907	264	357	208	200
7	380	207	207	211	246	298	508	889	268	241	179	207
8	263	202	231	191	198	413	592	769	253	202	184	207
9	352	239	179	192	199	412	593	718	283	241	184	160
10	309	196	180	209	163	436	535	600	354	240	196	158
11	298	196	162	248	169	479	508	536	452	186	187	159
12	261	196	156	248	200	475	494	512	480	201	225	176
13	170	198	213	230	201	368	577	491	432	304	225	175
14	198	199	255	191	201	409	680	491	516	393	225	184
15	247	217	255	192	201	391	709	442	398	233	225	208
16	246	258	255	192	201	383	702	435	347	250	225	205
17	188	259	255	178	202	244	681	274	246	230	225	201
18	187	258	212	176	184	424	622	474	246	225	228	177
19	213	257	183	177	144	489	579	459	245	132	228	183
20	223	256	155	205	156	626	553	480	271	200	228	173
21	203	256	129	260	209	789	540	488	391	176	228	143
22	215	255	165	259	196	699	540	452	474	157	228	156
23	212	198	256	179	213	756	517	338	407	231	226	173
24	220	235	267	178	248	838	494	329	406	230	210	152
25	222	255	268	178	233	797	494	574	418	335	202	163
26	204	255	268	199	193	678	637	494	245	389	225	162
27	204	258	172	248	194	651	849	492	206	297	225	158
28	219	256	183	248	196	652	881	327	206	307	228	156
29	245	255	166	248	---	574	860	305	236	379	242	197
30	244	185	134	248	---	701	804	344	255	186	311	197
31	244	---	174	248	---	1250	---	392	---	194	243	---
TOTAL	7737	6803	6308	6557	5550	15915	20637	17101	9660	9129	6752	5436
MEAN	250	227	203	212	198	513	688	552	322	294	218	181
MAX	380	259	268	260	248	1250	1190	966	516	663	311	229
MIN	170	185	129	176	144	201	494	274	206	132	179	143
CFSM	.80	.73	.65	.68	.63	1.64	2.20	1.76	1.03	.94	.70	.58
IN.	.92	.81	.75	.78	.66	1.89	2.45	2.03	1.15	1.08	.80	.65
CAL YR 1978 TOTAL	98557			MEAN 270	MAX 1030	MIN 119	CFSM .86	IN 11.71				
WTR YR 1979 TOTAL	117585			MEAN 322	MAX 1250	MIN 129	CFSM 1.03	IN 13.97				

STREAMS TRIBUTARY TO LAKE HURON

275

04131500 RAINY RIVER NEAR OCQUEOC, MI

LOCATION.--Lat 45°24'30", long 84°10'45", in NE¼ NW¼ sec.22, T.35 N., R.2 E., Presque Isle County, Hydrologic Unit 04070005, on upstream side of highway bridge, 4.4 mi (7.1 km) west of Ocqueoc, and 5 mi (8 km) upstream from Black Lake.

DRAINAGE AREA.--85 mi² (220 km²), approximately.

PERIOD OF RECORD.--October 1952 to current year.

GAGE.--Nonrecording gage. Datum of gage is 674.85 ft (205.694 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 42.3 ft³/s (1.198 m³/s), 6.76 in/yr (172 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 946 ft³/s (26.8 m³/s) Apr. 18, 1960, gage height, 6.33 ft (1.929 m), from floodmark; minimum, 0.4 ft³/s (0.011 m³/s) Sept. 7, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 630 ft³/s (17.8 m³/s) Mar. 31, gage height, 5.26 ft (1.603 m); minimum, 3.4 ft³/s (0.096 m³/s) Sept. 30, gage height, 1.57 ft (0.479 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	13	20	9.6	8.4	20	502	208	42	86	24	10
2	32	13	21	9.4	8.4	38	376	227	37	108	18	8.5
3	31	13	22	9.2	8.4	80	334	322	36	102	17	7.6
4	34	13	20	9.0	8.4	94	296	344	32	81	17	6.7
5	37	13	20	8.6	8.4	110	244	278	29	65	18	6.4
6	42	14	14	8.4	8.4	125	203	268	24	52	18	5.6
7	49	14	15	8.4	8.4	125	175	278	24	41	14	5.6
8	45	13	16	8.4	8.4	120	176	240	21	34	13	5.6
9	40	13	16	8.4	8.4	115	168	208	37	30	12	5.6
10	36	12	17	8.4	8.4	105	151	175	72	28	18	5.3
11	33	11	17	8.4	8.4	100	143	151	70	24	16	4.9
12	31	12	16	8.2	8.4	98	147	132	64	41	14	4.9
13	29	18	16	8.2	8.4	98	164	121	67	59	14	4.9
14	26	18	15	8.2	8.4	100	171	110	66	50	18	4.4
15	24	17	13	8.2	8.4	105	172	105	64	42	18	4.0
16	22	18	12	8.2	8.6	105	165	101	65	33	15	4.0
17	21	19	11	8.2	8.8	111	164	94	59	26	15	4.0
18	20	21	11	8.2	9.0	140	157	94	54	22	20	3.8
19	21	22	12	8.4	9.2	178	150	117	43	20	18	3.6
20	19	20	12	8.4	9.4	228	147	116	45	17	17	3.6
21	16	16	12	8.2	9.6	284	147	102	81	14	15	3.6
22	14	14	12	8.2	10	300	140	83	86	13	12	3.8
23	15	16	12	8.2	10	348	132	86	76	12	11	3.8
24	15	17	12	8.2	11	362	121	95	65	13	11	3.8
25	15	19	12	8.4	12	278	141	86	57	25	12	3.6
26	20	18	12	8.4	13	254	246	78	46	40	12	3.5
27	22	18	11	8.4	14	264	326	71	39	54	16	3.6
28	20	20	11	8.4	16	226	286	67	33	50	16	3.8
29	18	19	10	8.4	---	210	220	58	31	41	16	3.6
30	17	20	10	8.4	---	292	196	53	32	31	13	3.4
31	15	---	10	8.4	---	482	---	48	---	29	12	---
TOTAL	820	484	440	262.0	266.6	5495	6160	4516	1497	1283	480	145.5
MEAN	26.5	16.1	14.2	8.45	9.52	177	205	146	49.9	41.4	15.5	4.85
MAX	49	22	22	9.6	16	482	502	344	86	108	24	10
MIN	14	11	10	8.2	8.4	20	121	48	21	12	11	3.4
CFSM	.31	.19	.17	.10	.11	2.08	2.41	1.72	.59	.49	.18	.06
IN.	.36	.21	.19	.11	.12	2.40	2.70	1.98	.66	.56	.21	.06
CAL YR 1978	TOTAL	14492.3	MEAN 39.7	MAX 410	MIN 2.2	CFSM .47	IN 6.34					
WTR YR 1979	TOTAL	21849.1	MEAN 59.9	MAX 502	MIN 3.4	CFSM .71	IN 9.56					

STREAMS TRIBUTARY TO LAKE HURON

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW¼ NE¼ sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi (2.8 km) upstream from mouth.

DRAINAGE AREA.--1,500 mi² (3,900 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1974 to current year.

WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water quality monitor since October 1976.

REMARKS.--In addition to water-quality monitor, samples were collected near monitor site by a local observer on an approximate twice-weekly basis. Interruptions in the record were due to malfunctions of the instrument. Flow regulated by dam 1,000 ft (305 m) downstream. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1976-79): Maximum, 424 micromhos Jan. 21, 1976; minimum, 262 micromhos Aug. 31, 1977.

WATER TEMPERATURES (water years 1976-79): Maximum, 27.0°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance values of 900 micromhos and 140 micromhos were observed on Apr. 24, 25, 1975 and Mar. 8, 1975, respectively.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum 351 micromhos Mar. 10; minimum, 277 micromhos July 25.

WATER TEMPERATURES: Maximum, 27.5°C July 15, 24; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED SATUR- ATION	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L AS CACO3)
OCT											
26...	1000	990	320	8.0	9.0	11.6	102	40	K14	160	21
NOV											
20...	1330	1760	330	7.8	4.0	12.6	95	26	28	170	22
DEC											
11...	1400	1380	304	7.7	.0	13.5	93	K4	K21	160	4
JAN											
16...	1400	1050	340	7.6	.0	14.1	96	K11	65	170	22
FEB											
12...	1400	--	360	7.9	.0	13.1	91	K2	K10	160	5
MAR											
12...	1200	1710	340	7.6	1.0	13.9	98	K5	K37	170	17
APR											
16...	1200	3310	300	7.8	4.5	12.8	99	K12	50	140	17
MAY											
18...	1030	3180	310	8.2	12.5	11.6	109	K2	K4	150	15
JUN											
19...	1330	1480	300	8.2	21.0	9.5	106	K25	K12	150	7
JUL											
13...	1000	1640	305	8.3	24.0	9.2	110	50	K14	150	8
AUG											
10...	0930	1080	288	8.0	22.0	8.1	93	54	K14	150	7
SEP											
14...	1000	756	296	7.9	17.0	8.8	92	140	94	160	9

E--ESTIMATED K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
26...	40	15	3.5	.1	4	1.0	170	0	140	2.7	14
NOV											
20...	46	14	3.6	.1	4	1.0	180	0	150	4.6	13
DEC											
11...	42	13	4.0	.1	5	.9	190	0	160	6.1	12
JAN											
16...	43	15	3.9	.1	5	.8	180	0	150	7.2	12
FEB											
12...	43	13	4.6	.2	6	.9	190	0	160	3.8	13
MAR											
12...	46	14	3.9	.1	5	.9	190	0	160	7.6	14
APR											
16...	38	11	3.2	.1	5	.8	150	0	120	3.8	12
MAY											
18...	42	12	3.5	.1	5	.8	170	0	140	1.7	12
JUN											
19...	42	12	3.4	.1	5	.7	180	0	150	1.8	10
JUL											
13...	41	11	3.3	.1	5	.7	170	0	140	1.4	9.0
AUG											
10...	42	12	3.6	.1	5	.7	180	0	150	2.9	12
SEP											
14...	43	12	3.7	.1	5	.7	180	0	150	3.6	9.1

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	CHLOROPHYTIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
OCT 26...	4.9	.1	7.7	171	170	457	.04	.00	--	.20	.20
NOV 20...	4.5	.1	7.8	182	179	865	.03	.01	--	.21	.22
DEC 11...	5.0	.1	8.8	186	179	693	.05	.01	--	.22	.23
JAN 16...	4.7	.2	8.3	181	177	513	.07	.01	--	.01	.02
FEB 12...	5.4	.1	8.0	188	182	--	.08	.02	--	.30	.32
MAR 12...	5.1	.1	8.6	195	186	900	.16	.00	--	.26	.26
APR 16...	3.7	.1	6.6	164	149	1470	.09	.00	.00	.12	.12
MAY 18...	4.2	.2	6.5	183	165	1570	.06	.00	.00	.22	.22
JUN 19...	4.2	.1	5.6	177	167	707	.02	.10	.12	.26	.36
JUL 13...	4.2	.1	5.7	183	159	810	.04	.01	.01	.27	.28
AUG 10...	4.4	.1	6.5	181	170	528	.01	.00	.00	.10	.10
SEP 14...	4.4	.1	6.7	174	169	355	.01	.03	.04	.42	.45

E--ESTIMATED

DATE	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE D.I.M. % FINER THAN .062 MM
OCT 26...	.01	.19	.24	1.1	.06	--	.06	--	2	5.3	100
NOV 20...	.02	.20	.25	1.1	.01	--	.01	9.2	1	4.8	100
DEC 11...	.05	.18	.28	1.2	.00	--	.00	4.6	2	7.5	100
JAN 16...	--	--	.09	.40	.01	--	.01	--	0	--	100
FEB 12...	--	--	.40	1.8	.00	--	.00	5.9	--	--	--
MAR 12...	--	--	.42	1.9	.01	--	.00	5.7	0	.00	100
APR 16...	--	--	.21	.93	.01	.03	.01	--	5	45	100
MAY 18...	--	--	.28	1.2	.03	.09	.02	12	5	43	100
JUN 19...	--	--	.38	1.7	.03	.09	.02	5.7	3	12	100
JUL 13...	--	--	.32	1.4	.02	.06	.01	--	2	8.9	100
AUG 10...	--	--	.11	.49	.07	.21	.06	5.8	6	17	100
SEP 14...	--	--	.46	2.0	.01	.03	.00	5.5	3	6.1	100

STREAMS TRIBUTARY TO LAKE HURON
04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 26...	1000	1	1	0	0	0	0	<10	0	1
JAN 16...	1400	2	1	0	0	--	2	10	0	--
APR 16...	1200	2	2	0	0	0	0	10	10	0
JUL 13...	1000	1	1	--	20	13	0	20	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 26...	1	6	5	40	10	9	5	--	20	<.5
JAN 16...	3	3	2	50	0	11	11	--	10	<.5
APR 16...	0	5	4	120	20	2	0	--	2	.5
JUL 13...	0	5	4	80	10	4	4	10	0	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 26...	<.5	0	0	0	0	0	0	5.8	.5
JAN 16...	<.5	0	0	0	0	20	0	5.6	.2
APR 16...	.5	0	0	0	0	--	20	8.6	.1
JUL 13...	<.5	0	0	1	0	20		20	13 .3

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	CHLOR- DANE, TOTAL (UG/L)	CHLOR- DANE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 20...	1330	ND	--	ND	--	ND	--	ND	--	ND	--
JUN 19...	1330	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- AZINON, TOTAL (UG/L)	DI- AZINON, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- ELDRIN TOTAL (UG/L)	DI- ELDRIN TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 20...	ND	--	ND	--	ND	--	ND	--	ND	--
JUN 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL (UG/L)	METH- OXY- CHLOR, TOT. IN BOTTOM MATL. (UG/KG)	HEPTA- CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	MALA- THION, TOTAL (UG/L)	MALA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 20...	ND	--	ND	ND	--	--	ND	--	ND	--
JUN 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL PARA- THION, TOT. IN BOTTOM MATL. (UG/KG)	METHYL TRI- THION, TOTAL (UG/L)	METHYL TRI- THION, TOT. IN BOTTOM MATL. (UG/KG)	PARA- THION, TOTAL (UG/L)	PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOX- APHENE, TOTAL (UG/L)	TOXA- PHENE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOTAL TRI- THION (UG/L)	TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 20...	ND	--	ND	--	ND	--	ND	--	ND	--
JUN 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND--NOT DETECTED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 20...	1330	24	--	.236	.315	.200	.000
MAR 12...	1200	28	--	1.65	2.13	1.82	.280
JUN 19...	1330	32	.00	.080	.080	.230	.000
AUG 10...	0930	28	288	.160	.310	.520	.420

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 10,77 0930	MAR 23,78 0930	MAY 18,78 1000	JUN 8,78 1000				
TOTAL CELLS/ML	4100	99	290	190				
DIVERSITY: DIVISION	0.9	0.0	1.2	0.8				
..CLASS	1.0	0.0	1.5	0.8				
..ORDER	1.1	0.7	2.1	0.8				
...FAMILY	1.2	0.7	2.1	1.1				
....GENUS	1.2	0.7	2.3	1.5				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....OOCYSTACEAE								
.....ANKISTRODESMUS	* 0	--	--	--	--	--	--	--
....OOCYSTIS	--	--	--	--	--	--	--	--
...SCENEDESMACEAE								
....CRUCIGENIA	--	--	--	--	--	--	--	--
....SCENEDESMUS	50 1	--	--	97# 33	--	--	--	--
..VOLVOCALES								
...CHLAMYDOMONADACEAE	--	--	--	--	--	--	--	--
....CARTERIA	* 0	--	--	65# 22	--	--	--	--
....CHLAMYDOMONAS	28 1	--	--	16 6	--	--	--	--
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	--	--	--	--	15 8	--	--
....SPONDYLIUM	* 0	--	--	--	--	--	--	--
....STAUSTRUM	--	--	--	--	--	--	--	--
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
....COSCINODISCACEAE								
....CYCLOTELLA	78 2	80# 80	--	--	--	--	--	--
....MELOSIRA	--	--	--	--	--	--	--	--
..PENNALES								
...FRAGILARIACEAE								
....ASTERIONELLA	57 1	--	--	--	--	--	--	--
....FRAGILARIA	--	--	--	--	130# 69	--	--	--
....SYNEDRA	36 1	20# 20	49# 17	15 8	--	--	--	--
...GOMPHONEMACEAE								
....GOMPHONEMA	36 1	--	--	15 8	--	--	--	--
...NAVICULACEAE								
....DIPLONEIS	--	--	--	--	--	--	--	--
....NAVICULA	21 1	--	--	--	--	--	--	--
...NITZSCHACEAE								
....NITZSCHIA	* 0	--	--	--	--	--	--	--
..CHRYSOPHYCEAE								
...CHRYSONOMADALES								
....MALLOMONADACEAE								
....MALLOMONAS	--	--	--	--	--	--	--	--
...OCHROMONADACEAE								
....DINOBYRON	150 4	--	--	--	--	--	--	--
....OCHROMONAS	--	--	49# 17	--	--	--	--	--
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
....CRYPTOCHRYSIDACEAE								
....CHROOMONAS	190 5	--	--	--	--	--	--	--
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
....CHROOCOCCACEAE								
.....ANACYSTIS	--	--	16 6	--	--	--	--	--
...HORMOGONALES								
...NOSTOCACEAE								
....APHANIZOMENON	3400# 83	--	--	--	--	--	--	--
...CHROOCOCCALES								
....CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	--	--	--	--	--	--	--
PYRRHOPHYTA (FIRE ALGAE)								
..DINOPHYCEAE								
...GYMNODINIALES								
....GYMNODINIACEAE								
.....GYMNODINIUM	--	--	--	--	--	--	--	--
...PERIDINIALES								
....PERIDINIACEAE								
.....PERIDINIUM	21 1	--	--	--	15 8	--	--	--

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
 * - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04132052 CHEROYGAN RIVER AT CHEROYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 19,78 1015	AUG 24,78 1030	SEP 21,78 0945			
TOTAL CELLS/ML	1000	1100	2300			
DIVERSITY: DIVISION	0.9	1.7	0.5			
..CLASS	1.6	1.7	0.5			
...ORDER	1.9	2.2	0.6			
...FAMILY	2.0	2.4	0.7			
....GENUS	2.0	0.0	1.1			
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-			22	1
....OOCYSTIS	--	-	89	8	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	230#	23	--	-	--	-
...SCENEDESMUS	--	-	89	8	89	4
..VOLVOCALES						
...CHLAMYDOMONADACEAE	--	-	130	12	--	-
....CARTERIA	--	-	--	-	22	1
...CHLAMYDOMONAS	--	-	--	-	45	2
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	--	-	--	-
...SPONDYLIUM	--	-	--	-	--	-
...STAUSTRUM	29	3	--	-	--	-
CHRYSTOPHYTA						
..RACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
...CYCLOTILLA	--	-	66	6	22	1
....MFLOSIRA	29	3	89	8	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
...FRAGILARIA	460#	45	--	-	--	-
...SYNEDRA	--	-	44	4	--	-
...GOMPHONEMACEAE						
....GOMPHONEMA	--	-	22	2	--	-
...NAVICULACEAE						
....DIPLOEIS	--	-	--	-	22	1
...NAVICULA	--	-	--	-	--	-
...NITZSCHACEAE						
....NITZSCHIA	--	-	--	-	--	-
..CHRYSTOPHYCEAE						
...CHRYSOMONADALES						
...MALLOMONADACEAE						
....MALLOMONAS	14	1	--	-	--	-
...OCHROMONADACEAE						
....DINOBRYON	240#	24	--	-	--	-
...OCHROMONAS	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	530#	48	220	10
...HORMOGONALES						
...NOSTOCACEAE						
....APHANIZOMENON	--	-	--	-	--	-
...CHROOCOCCALES						
...CHROOCOCCACEAE						
...GOMPHOSPHERIA	--	-	--	-	1800#	80
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	22	2	--	-
PYRRHOPHYTA (FIRE ALGAE)						
..DINOPHYCEAE						
...GYMNODINIALES						
...GYMNODINIACEAE						
....GYMNODINIUM	14	1	--	-	--	-
...PERIDINIALES						
...PERIDINIACEAE						
....PERIDINIUM	--	-	22	2	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	329	319	325	316	302	312	325	319	323
2	---	---	---	328	315	325	312	305	309	324	312	320
3	---	---	---	326	314	321	315	304	310	323	308	317
4	---	---	---	327	320	325	312	307	309	325	309	319
5	---	---	---	326	318	323	309	306	308	327	317	321
6	---	---	---	325	315	322	312	308	310	327	317	324
7	---	---	---	325	315	319	311	298	308	328	318	324
8	---	---	---	326	309	320	311	306	309	326	316	322
9	---	---	---	328	322	326	309	294	305	330	315	324
10	---	---	---	329	327	328	308	292	302	330	313	324
11	311	306	308	328	321	327	307	305	307	331	313	325
12	311	304	308	327	318	323	306	304	305	333	326	329
13	312	307	310	327	320	324	307	305	306	334	328	333
14	311	307	309	329	322	328	309	307	308	336	326	333
15	311	304	308	333	330	331	308	307	308	335	327	331
16	310	304	307	334	330	332	309	306	307	341	321	332
17	311	306	308	334	318	330	309	306	308	342	338	340
18	309	306	308	341	332	335	313	302	309	343	336	340
19	311	307	309	336	321	333	316	300	310	343	335	340
20	310	303	308	328	321	323	316	313	314	345	343	344
21	311	306	309	---	---	---	314	309	312	343	343	343
22	315	309	312	322	322	322	316	311	313	343	340	342
23	317	315	316	322	318	320	316	312	314	342	337	341
24	319	314	317	320	318	319	316	314	315	341	336	338
25	319	313	316	320	316	318	318	314	317	341	336	338
26	319	297	309	319	314	316	319	317	318	337	336	337
27	320	298	310	317	312	315	320	306	317	337	336	337
28	320	302	310	316	312	314	321	304	315	337	337	337
29	324	299	310	318	313	315	321	317	319	338	337	337
30	324	318	321	320	311	314	320	317	318	338	336	337
31	328	322	325	---	---	---	322	319	321	340	337	338
MONTH							322	292	311	345	308	332
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	340	337	338	341	340	340				---	---	---
2	342	337	339	342	337	341				---	---	---
3	342	337	340	341	352	341				---	---	---
4	342	337	340	342	336	340				---	---	---
5	3											

STREAMS TRIBUTARY TO LAKE HURON
04132052 CHEROYGAN RIVER AT CHEROYGAN, MI

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SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	330	302	318	---	---	---	291	282	287	302	291	297
2	327	314	322	---	---	---	289	281	285	304	295	300
3	---	---	---	---	---	---	289	281	286	307	296	303
4	---	---	---	---	---	---	289	281	285	308	295	303
5	---	---	---	---	---	---	297	279	285	307	295	303
6	---	---	---	---	---	---	289	281	285	309	297	304
7	---	---	---	---	---	---	287	280	284	310	306	309
8	---	---	---	---	---	---	293	278	285	311	300	307
9	---	---	---	---	---	---	288	280	286	310	302	308
10	---	---	---	---	---	---	287	281	285	311	301	307
11	---	---	---	---	---	---	289	280	285	313	306	311
12	---	---	---	---	---	---	289	280	285	313	301	309
13	---	---	---	307	298	303	291	285	288	312	300	307
14	---	---	---	308	301	304	294	291	292	313	303	309
15	---	---	---	308	301	305	292	283	288	309	296	304
16	---	---	---	308	300	305	293	282	288	308	298	304
17	---	---	---	306	298	302	294	285	290	312	301	307
18	---	---	---	309	296	302	292	280	287	311	303	308
19	---	---	---	304	298	302	294	282	289	313	303	309
20	---	---	---	305	296	300	296	285	291	313	303	309
21	---	---	---	305	294	298	296	285	291	310	301	307
22	---	---	---	300	291	296	295	285	291	312	300	308
23	---	---	---	298	291	295	296	284	291	312	299	306
24	---	---	---	297	288	293	296	286	292	312	301	307
25	---	---	---	293	277	287	298	290	294	312	298	308
26	---	---	---	286	278	282	300	286	295	313	302	309
27	---	---	---	289	281	284	299	288	295	314	302	309
28	---	---	---	293	283	288	300	286	294	313	302	309
29	---	---	---	293	286	290	298	284	292	314	309	312
30	---	---	---	292	285	289	302	290	295	314	301	308
31	---	---	---	292	285	289	303	291	298	---	---	---
MONTH							303	278	289	314	291	307

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	8.5	7.0	7.5	.5	.5	.5	.0	.0	.0
2	---	---	---	9.0	7.5	8.0	.5	.5	.5	.0	.0	.0
3	---	---	---	9.5	7.5	8.5	.5	.5	.5	.0	.0	.0
4	---	---	---	9.5	8.5	8.5	.5	.5	.5	.0	.0	.0
5	---	---	---	11.0	8.5	9.0	.5	.5	.5	.0	.0	.0
6	---	---	---	9.0	8.5	9.0	.5	.5	.5	.0	.0	.0
7	---	---	---	9.5	8.0	8.5	.5	.5	.5	.0	.0	.0
8	---	---	---	9.0	8.0	8.0	.5	.5	.5	.0	.0	.0
9	---	---	---	8.5	8.0	8.0	.5	.5	.5	.0	.0	.0
10	---	---	---	8.0	8.0	8.0	.5	.5	.5	.0	.0	.0
11	14.0	12.5	13.0	8.0	7.0	7.5	.5	.5	.5	.0	.0	.0
12	13.5	12.5	13.0	7.0	6.5	7.0	.5	.5	.5	.0	.0	.0
13	12.5	11.0	12.0	7.0	6.0	6.5	.5	.5	.5	.0	.0	.0
14	12.0	10.5	11.0	6.5	5.5	6.0	.5	.5	.5	.0	.0	.0
15	12.0	10.5	10.5	5.5	5.0	5.5	.5	.5	.5	.0	.0	.0
16	11.0	10.0	10.5	6.0	4.5	5.0	.5	.5	.5	.0	.0	.0
17	10.5	9.5	10.0	5.5	4.5	5.0	.5	.5	.5	.0	.0	.0
18	10.0	9.0	10.0	5.0	4.5	5.0	.5	.5	.5	.0	.0	.0
19	9.5	9.0	9.0	4.5	3.0	4.0	.5	.0	.0	.0	.0	.0
20	11.0	8.5	9.5	3.5	3.0	3.5	.0	.0	.0	.0	.0	.0
21	12.0	9.0	10.0	---	---	---	.0	.0	.0	.0	.0	.0
22	11.5	10.5	11.0	3.0	3.0	3.0	.0	.0	.0	.0	.0	.0
23	10.5	9.5	10.0	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
24	10.0	9.0	9.5	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
25	10.0	9.0	9.5	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
26	9.0	8.0	8.5	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
27	9.0	8.0	8.0	2.0	1.5	1.5	.0	.0	.0	.0	.0	.0
28	8.5	7.5	8.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
29	9.0	7.0	8.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
30	9.0	7.0	8.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
31	8.5	7.5	8.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH							.5	.0	.5	.0	.0	.0

STREAMS TRIBUTARY TO LAKE HURON
04132052 CHEROYGAN RIVER AT CHEROYGAN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MTN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	.0	.0	.5				---	---	---
2	.0	.0	.0	.5	.0	.0				---	---	---
3	.0	.0	.0	.5	.0	.0				---	---	---
4	.0	.0	.0	.5	.0	.5				---	---	---
5	.0	.0	.0	.5	.0	.5				---	---	---
6	.0	.0	.0	.5	.0	.0				---	---	---
7	.0	.0	.0	.5	.0	.0				---	---	---
8	.0	.0	.0	.5	.0	.5				---	---	---
9	.0	.0	.0	.5	.0	.5				---	---	---
10	.0	.0	.0	.5	.0	.0				---	---	---
11	.0	.0	.0	.5	.0	.0				---	---	---
12	.0	.0	.0	.5	.0	.0				---	---	---
13	.0	.0	.0	.5	.0	.5				---	---	---
14	.0	.0	.0	.5	.0	.0				---	---	---
15	.0	.0	.0	.5	.0	.0				---	---	---
16	.0	.0	.0	1.0	.0	.5				---	---	---
17	.0	.0	.0	1.0	.5	.5				---	---	---
18	.0	.0	.0	.5	.5	.5				14.5	13.5	14.0
19	.0	.0	.0	---	---	---				14.5	14.0	14.5
20	.0	.0	.0	---	---	---				14.5	14.0	14.0
21	.0	.0	.0	---	---	---				14.0	13.0	13.0
22	.0	.0	.0	---	---	---				13.0	12.0	12.5
23	.0	.0	.0	---	---	---				12.0	11.0	11.5
24	.0	.0	.0	---	---	---				13.0	10.5	12.0
25	.0	.0	.0	---	---	---				13.0	12.0	12.5
26	.0	.0	.0	---	---	---				12.0	11.5	12.0
27	.5	.0	.0	---	---	---				12.5	11.0	11.5
28	.5	.0	.0	---	---	---				13.0	11.5	12.0
29	---	---	---	---	---	---				14.5	12.0	13.0
30	---	---	---	---	---	---				15.0	13.5	14.0
31	---	---	---	---	---	---				16.0	14.0	15.0
MONTH	.5	.0	.0									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	15.5	11.0	13.5	---	---	---	25.5	23.5	24.0	23.0	21.0	22.0
2	15.0	12.5	14.0	---	---	---	25.5	23.5	24.5	24.0	21.5	22.5
3	---	---	---	---	---	---	25.5	23.0	24.0	23.0	21.0	21.5
4	---	---	---	---	---	---	24.5	23.5	24.0	23.5	21.0	22.0
5	---	---	---	---	---	---	25.0	23.0	24.0	24.0	21.0	22.0
6	---	---	---	---	---	---	24.5	22.5	23.5	24.0	21.0	22.5
7	---	---	---	---	---	---	25.0	22.5	23.5	21.0	20.0	20.5
8	---	---	---	---	---	---	24.5	22.5	23.5	21.5	19.0	20.0
9	---	---	---	---	---	---	24.0	22.0	22.5	20.0	18.5	19.0
10	---	---	---	---	---	---	23.0	21.5	22.5	20.0	18.0	19.0
11	---	---	---	---	---	---	23.0	21.0	21.5	19.0	17.5	18.0
12	---	---	---	---	---	---	23.0	20.0	21.5	19.5	17.5	18.0
13	---	---	---	26.0	25.0	25.5	21.5	20.5	21.0	18.5	17.5	18.0
14	---	---	---	26.5	25.5	26.0	20.5	18.0	19.0	18.5	17.0	17.5
15	---	---	---	27.5	25.5	26.0	20.0	17.5	18.5	19.0	17.5	18.0
16	---	---	---	26.5	24.5	25.5	19.5	16.5	18.0	20.0	17.5	18.5
17	---	---	---	26.0	24.0	25.0	18.5	18.0	18.0	19.5	17.5	18.5
18	---	---	---	25.5	23.5	24.5	20.0	18.0	18.5	19.0	16.5	18.0
19	---	---	---	25.0	23.0	24.0	20.5	17.5	19.0	19.0	16.0	17.0
20	---	---	---	25.0	23.0	24.0	21.5	18.5	19.5	18.0	16.0	17.0
21	---	---	---	26.0	23.5	24.5	21.5	19.0	20.5	18.0	16.0	17.0
22	---	---	---	25.5	23.5	24.5	22.5	20.0	21.0	18.0	15.0	16.5
23	---	---	---	26.5	24.5	25.5	23.0	21.0	21.5	18.5	15.5	16.5
24	---	---	---	27.5	25.0	26.0	23.5	21.0	22.0	18.0	16.0	17.0
25	---	---	---	26.0	25.0	25.5	21.5	20.5	21.0	18.0	16.5	17.0
26	---	---	---	26.0	24.5	25.0	22.5	20.0	21.0	18.5	16.0	17.0
27	---	---	---	26.0	24.5	25.0	21.5	20.5	21.0	19.5	16.0	17.5
28	---	---	---	26.0	23.5	24.5	21.5	20.0	21.0	19.5	17.5	18.0
29	---	---	---	26.0	23.5	24.5	22.5	20.0	21.0	18.0	17.5	17.5
30	---	---	---	25.5	24.0	24.5	22.5	20.0	21.0	19.5	17.5	18.0
31	---	---	---	25.0	23.5	24.5	22.5	20.0	21.0	---	---	---
MONTH							25.5	16.5	21.5	24.0	15.0	18.5

STREAMS TRIBUTARY TO LAKE HURON

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04133500 THUNDER BAY RIVER NEAR BOLTON, MI

LOCATION.--Lat 45°07'28", long 83°38'50", in NW¼ SE¼ sec.36, T.32 N., R.6 E., Alpena County, Hydrologic Unit 04070006, on left bank 0.7 mi (1.1 km) upstream from Orchard Hill Bridge, 3.8 mi (6.1 km) upstream from North Branch, 4.7 mi (7.6 km) southwest of Bolton, and 11.0 mi (17.7 km) northwest of Alpena.

DRAINAGE AREA.--588 mi² (1,520 km²).

PERIOD OF RECORD.--March 1945 to current year.

REVISED RECORDS.--WSP 1437: 1946. WSP 1727: 1947 (M).

GAGE.--Water-stage recorder. Datum of gage is 671.96 ft (204.813 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 12, 1945, nonrecording gage at site 500 ft (152 m) downstream at different datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 18 to Feb. 27, which are poor. Regulation by Fletcher Pond on the Upper South Branch Thunder Bay River (usable capacity, 40,170 acre-ft or 49.5 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 468 ft³/s (13.25 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,290 ft³/s (121 m³/s) Mar. 26, 1976, gage height, 10.29 ft (3.136 m); maximum gage height, 10.49 ft (3.197 m) Mar. 25, 1976, backwater from ice; minimum, 92 ft³/s (2.61 m³/s) Sept. 28, 29, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,020 ft³/s (57.2 m³/s) Mar. 20, gage height, 7.14 ft (2.176 m); minimum, 260 ft³/s (7.36 m³/s) Sept. 20-25, 29; minimum gage height, 3.43 ft (1.045 m) Sept. 20-22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	326	339	370	365	380	410	1840	816	486	429	361	343
2	369	341	370	370	380	430	1810	929	481	585	357	327
3	349	339	370	370	380	450	1530	1220	482	686	350	316
4	325	337	370	370	380	480	1340	1640	471	555	343	310
5	318	338	375	370	380	540	1180	1810	463	463	353	309
6	343	337	385	370	380	620	1040	1500	442	420	359	303
7	397	337	395	370	380	720	932	1300	443	362	328	298
8	381	338	410	370	380	840	876	1290	435	347	356	294
9	342	339	430	370	385	1110	840	1230	472	334	329	298
10	356	331	445	370	385	1250	775	1020	583	326	343	294
11	357	329	455	375	385	1300	719	826	615	316	403	291
12	343	330	460	375	385	1350	709	783	614	336	418	296
13	396	337	460	370	385	1350	695	768	572	352	383	295
14	389	352	450	370	385	1400	727	774	511	355	368	290
15	381	377	450	375	385	1450	743	759	452	336	374	288
16	370	370	440	380	390	1500	717	728	407	332	365	286
17	367	367	440	380	390	1580	680	710	373	366	358	281
18	367	382	430	380	390	1790	643	690	346	360	359	278
19	366	418	430	380	390	2000	596	673	337	351	363	265
20	340	413	420	380	390	2010	559	688	343	344	356	261
21	331	385	410	380	395	1880	531	670	465	320	347	262
22	339	374	400	380	400	1900	529	656	555	340	341	261
23	339	376	395	380	400	2000	513	641	631	339	335	261
24	338	401	390	380	400	1930	490	664	593	344	330	260
25	344	426	380	380	400	1760	486	688	484	393	328	262
26	359	420	380	380	400	1470	525	674	435	416	321	265
27	388	410	370	380	410	1190	727	650	365	422	323	266
28	381	400	370	380	410	999	918	643	358	426	326	264
29	369	390	370	380	---	898	923	622	336	418	343	261
30	355	380	370	380	---	1050	816	531	339	405	348	263
31	349	---	365	380	---	1480	---	496	---	379	353	---
TOTAL	11074	11013	12555	11640	10900	39137	25409	27089	13889	12157	10921	8548
MEAN	357	367	405	375	389	1262	847	874	463	392	352	285
MAX	397	426	460	380	410	2010	1840	1810	631	686	418	343
MIN	318	329	365	365	380	410	486	496	336	316	321	260

CAL YR 1978 TOTAL 148796 MEAN 408 MAX 2070 MIN 191
WTR YR 1979 TOTAL 194332 MEAN 532 MAX 2010 MIN 260

STREAMS TRIBUTARY TO LAKE HURON

04134000 NORTH BRANCH THUNDER BAY RIVER NEAR BOLTON, MI

LOCATION.--Lat 45°08'30", long 83°36'21", in SE¼ NW¼ sec.29, T.32 N., R.7 E., Alpena County, Hydrologic Unit 04070006, on left bank 1.5 mi (2.4 km) upstream from mouth, 2.5 mi (4.0 km) south of Bolton, and 10.3 mi (16.6 km) northwest of Alpena.

DRAINAGE AREA.--184 mi² (477 km²).

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 675.52 ft (205.898 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 16, 1945, nonrecording gage at site 0.5 mi (0.8 km) upstream at different datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Jan. 22 to Feb. 27, Apr. 2 to May 9, which are poor. Occasional regulation during low flows by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 119 ft³/s (3.370 m³/s), 8.78 in/yr (223 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,950 ft³/s (83.5 m³/s) Mar. 28, 1976, gage height, 7.46 ft (2.274 m); maximum gage height, 7.98 ft (2.432 m) Mar. 31, 1950, backwater from ice; minimum discharge, 0.40 ft³/s (0.011 m³/s) Oct. 14, 1955.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 13	--	802 22.7	ice jam	Apr. 1	1900	1330 37.7	5.84 1.780
Mar. 24	1300	*1400 39.6	*5.92 1.804	May 5	--	770 21.8	unknown

Minimum discharge, 3.2 ft³/s (0.091 m³/s) Sept. 25, gage height, 2.49 ft (0.759 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	47	64	32	31	67	1270	480	89	75	30	31
2	61	46	60	31	31	72	1220	520	83	101	27	28
3	65	45	56	31	31	78	1150	580	76	129	25	24
4	66	43	51	31	31	90	1100	650	69	157	23	21
5	66	41	48	31	31	105	1000	740	64	170	22	19
6	75	41	47	31	31	125	910	710	58	145	21	17
7	89	39	46	31	31	150	840	680	54	112	20	15
8	111	38	45	31	30	180	780	630	50	86	19	13
9	127	38	44	31	30	230	730	580	59	69	17	12
10	141	37	43	31	30	275	680	509	111	57	19	11
11	130	36	42	31	30	330	650	408	188	49	18	10
12	109	36	41	31	30	450	610	340	254	47	18	9.4
13	91	37	40	31	30	600	600	293	309	46	20	9.2
14	77	38	40	31	30	580	630	259	307	43	22	9.3
15	68	39	39	31	30	560	640	235	260	40	23	9.1
16	60	41	39	31	30	540	620	214	207	37	22	8.5
17	55	46	38	31	31	530	600	194	153	36	22	7.4
18	52	55	38	31	32	520	570	175	117	33	23	6.7
19	48	58	37	31	33	508	530	164	93	29	22	6.0
20	44	68	37	31	35	656	490	162	82	26	23	5.4
21	41	66	36	31	37	691	470	163	101	24	23	4.8
22	40	59	36	31	40	938	440	157	111	21	21	4.6
23	40	60	35	31	43	1180	420	146	131	20	20	4.2
24	39	65	35	31	46	1360	400	140	152	23	17	4.0
25	40	68	35	31	50	1030	370	136	155	30	16	3.8
26	43	73	34	31	55	934	400	136	134	41	15	4.1
27	45	72	34	31	60	770	460	133	109	50	15	4.0
28	50	70	34	31	64	652	510	124	89	53	17	4.3
29	52	68	33	31	---	566	530	114	74	44	28	4.1
30	51	67	32	31	---	595	490	106	67	40	34	5.0
31	49	---	32	31	---	858	---	98	---	34	33	---
TOTAL	2083	1537	1271	962	1013	16220	20110	9976	3806	1867	675	314.9
MEAN	67.2	51.2	41.0	31.0	36.2	523	670	322	127	60.2	21.8	10.5
MAX	141	73	64	32	64	1360	1270	740	309	170	34	31
MIN	39	36	32	31	30	67	370	98	50	20	15	3.8
CFSM	.37	.28	.22	.17	.20	2.84	3.64	1.75	.69	.33	.12	.06
IN.	.42	.31	.26	.19	.20	3.28	4.07	2.02	.77	.38	.14	.06
CAL YR 1978 TOTAL	42453.5			MEAN 116	MAX 1460	MIN 2.5	CFSM .63	IN 8.58				
WTR YR 1979 TOTAL	59834.9			MEAN 164	MAX 1360	MIN 3.8	CFSM .89	IN 12.10				

04135020 THUNDER BAY RIVER AT ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°04'15", long 83°26'16", in SW¼ NW¼ sec.22, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, 0.9 mi (1.4 km) upstream from mouth, on Ninth Ave. bridge in Alpena.

DRAINAGE AREA.--1,240 mi² (3,210 km²) approximately.

PERIOD OF RECORD.--February to September 1979.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February to September 1979.

WATER TEMPERATURES: February to September 1979.

REMARKS.--Daily record based on samples collected at mid-stream of Ninth Ave. bridge 0.9 mi (1.4 km) upstream from mouth. Daily samples collected between 0800 and 1200 hours. Monthly samples are collected as a cross-section sample at the upstream side of bridge. Water-discharge measurements are made at times of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 416 micromhos Mar. 4, 5; minimum, 270 micromhos, Apr. 2-4.

WATER TEMPERATURES: Maximum, 28.0°C July 21; minimum, 0.0°C on many days during winter period.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 440 micromhos was observed Feb. 13.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
FER 13...	1200	1060	440	7.6	.0	8.8	60	K15	K30	200	6
MAR 13...	1200	1940	400	7.4	.5	15.2	109	K13	210	200	25
APR 17...	1100	1780	320	7.9	6.0	12.6	101	K3	K13	150	14
MAY 17...	1045	1670	340	8.0	14.0	10.2	98	K4	K8	170	13
JUN 20...	1130	1600	310	7.9	20.5	8.0	88	K12	33	180	14
JUL 12...	1000	1340	345	8.2	23.5	8.4	102	40	68	180	14
AUG 09...	1045	1290	322	8.2	22.5	8.4	97	K9	K33	170	13
SEP 13...	1030	1580	323	7.9	19.0	8.4	91	K10	K5	170	8

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
FER 13...	55	16	6.9	.2	7	1.0	240	0	200	9.6	14
MAR 13...	56	14	5.3	.2	5	1.5	210	0	170	13	21
APR 17...	45	10	3.6	.1	5	.9	170	0	140	3.4	18
MAY 17...	48	12	4.3	.1	5	.9	190	0	160	3.0	11
JUN 20...	50	13	4.3	.1	5	.7	200	0	160	4.0	8.2
JUL 12...	50	13	4.3	.1	5	.5	200	0	160	2.0	8.0
AUG 09...	46	13	4.7	.2	6	.5	190	0	160	1.9	12
SEP 13...	46	14	5.3	.2	6	.5	200	0	160	4.0	7.1

STREAMS TRIBUTARY TO LAKE HURON
04135020 THUNDER BAY RIVER AT ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)
FEB 13...	7.3	.1	10	245	229	701	.08	.06	--	.56
MAR 13...	7.5	.1	9.3	239	218	1250	.49	.07	--	.51
APR 17...	5.0	.1	4.3	197	171	947	.04	.00	.00	.40
MAY 17...	4.9	.2	4.1	209	179	942	.01	.02	.02	.51
JUN 20...	4.7	.1	6.8	217	186	937	.03	.05	.06	.60
JUL 12...	4.8	.1	8.1	220	188	796	.04	.03	.04	.70
AUG 09...	4.9	.1	10	209	185	728	.01	.00	.00	.46
SEP 13...	4.7	.1	10	203	186	866	.01	.02	.02	.50

DATE	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON- ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
FEB 13...	.62	.70	3.1	.00	--	.00	9.3	--	--	--
MAR 13...	.58	1.1	4.7	.02	--	.02	4.7	2	10	100
APR 17...	.40	.44	1.9	.02	.06	.01	--	6	29	100
MAY 17...	.53	.54	2.4	.06	.18	.05	15	5	23	100
JUN 20...	.65	.68	3.0	.05	.15	.04	11	2	8.6	100
JUL 12...	.73	.77	3.4	.03	.09	.01	--	--	3.0	100
AUG 09...	.46	.47	2.1	.03	.09	.02	7.8	--	2.0	100
SEP 13...	.52	.53	2.3	.02	.06	.01	5.8	--	2.0	100

STREAMS TRIBUTARY TO LAKE HURON

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04135020 THUNDER RAY RIVER AT ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
APR 17...	1100	2	2	0	0	0	0	10	10	1
JUL 12...	1000	2	1	100	20	2	1	30	20	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
APR 17...	0	9	5	170	100	6	0	10	9	.5
JUL 12...	0	4	4	170	30	--	5	--	4	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
APR 17...	.5	0	0	0	0	10	0	11	.1
JUL 12...	<.5	0	0	1	1	10	10	8.1	.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)
AUG 09...	1045	28	179	2.21	3.39	6.60	2.45

STREAMS TRIBUTARY TO LAKE HURON

04135020 THUNDER BAY RIVER AT ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					---	408	281	314	335	338	317	323
2					---	408	270	322	338	328	317	323
3					---	392	270	312	343	333	316	327
4					---	416	270	312	342	334	332	333
5					---	416	272	300	343	329	334	321
6					---	413	272	281	342	326	316	333
7					---	400	280	302	345	336	326	325
8					---	399	282	286	343	328	332	327
9					---	370	282	302	348	334	326	333
10					---	365	289	291	343	336	321	339
11					---	373	293	302	343	336	321	333
12					---	370	306	310	343	336	323	332
13					---	373	310	312	333	337	313	340
14					---	375	303	323	329	336	313	336
15					408	380	311	318	324	352	---	322
16					414	380	311	331	342	338	312	336
17					404	374	303	320	343	345	313	336
18					407	380	310	334	342	337	322	336
19					407	374	302	334	333	337	321	337
20					412	361	307	336	341	331	321	336
21					408	335	312	340	336	338	322	337
22					409	313	312	335	334	338	321	345
23					402	300	314	328	335	329	323	337
24					407	282	314	323	337	324	328	---
25					385	276	311	336	328	317	328	337
26					407	281	313	341	332	315	302	338
27					407	282	334	344	332	314	323	336
28					415	282	324	340	337	313	316	338
29					---	291	322	338	331	314	324	342
30					---	302	322	341	336	315	322	346
31					---	289	---	344	---	315	322	---
MAX						416	334	344	348	352		
MIN						276	270	281	324	313		

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					---	1.0	3.0	8.5	18.0	15.0	22.5	21.5
2					---	2.0	3.5	8.0	17.5	16.0	23.0	22.0
3					---	2.0	4.0	8.5	19.0	17.5	23.0	21.0
4					---	2.0	4.0	7.0	20.0	18.0	23.5	20.0
5					---	.0	4.5	9.0	20.0	18.0	23.0	20.0
6					---	1.0	3.0	8.0	21.0	20.0	23.0	21.0
7					---	.0	2.0	8.5	21.0	22.0	22.0	20.0
8					---	.0	2.0	9.0	21.0	23.0	22.5	19.0
9					---	.0	2.5	13.5	20.0	23.0	22.0	18.0
10					---	.0	3.5	15.0	21.0	23.0	22.5	18.0
11					---	.0	4.5	17.5	19.0	25.0	20.5	18.5
12					---	.0	5.0	18.0	18.0	27.0	20.0	19.0
13					---	.0	7.0	16.0	18.5	27.0	20.0	19.0
14					---	.0	7.5	14.0	18.5	28.0	19.0	18.0
15					1.0	.0	4.5	14.0	19.0	28.0	18.5	17.0
16					.0	.0	---	13.5	21.0	27.0	17.0	16.5
17					.0	.0	5.5	14.0	21.0	26.0	19.5	16.0
18					.0	.0	7.0	16.0	19.0	27.0	19.5	16.0
19					.0	.0	8.5	17.0	20.0	26.0	18.5	15.5
20					.0	.0	10.0	18.0	19.0	27.5	19.0	15.0
21					1.0	.0	11.0	17.0	20.0	28.0	19.0	16.0
22					.0	.5	10.5	16.0	20.0	24.0	19.0	15.0
23					.0	.5	11.5	17.0	17.5	24.0	19.5	15.0
24					.0	.5	13.0	14.5	13.0	24.5	20.0	15.0
25					.0	.0	13.0	15.0	16.5	24.5	20.0	15.0
26					.0	.0	14.0	14.5	19.5	24.0	19.5	15.5
27					.0	.0	13.0	13.5	17.5	22.5	20.0	16.0
28					.0	.0	12.5	13.0	17.5	23.0	20.0	16.5
29					---	.5	11.5	14.5	18.0	23.0	20.0	16.0
30					---	2.0	10.0	15.0	16.0	23.5	20.0	17.0
31					---	3.0	---	16.0	---	23.5	21.0	---
MAX						3.0		18.0	21.0	28.0	23.5	22.0
MTN						.0		7.0	13.0	15.0	17.0	15.0

STREAMS TRIBUTARY TO LAKE HURON

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04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE¼ SE¼ sec.7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft (20 m) upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi (1.1 km) upstream from East Branch, and 114 mi (183 km) upstream from mouth.

DRAINAGE AREA.--110 mi² (285 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft (342.440 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi (4.0 km) above station.

AVERAGE DISCHARGE.--37 years, 74.8 ft³/s (2.118 m³/s), 9.23 in/yr (234 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft³/s (7.76 m³/s) June 2, 1943, gage height, 3.00 ft (0.914 m); minimum, 28 ft³/s (0.79 m³/s) Apr. 21, 1946, gage height, 0.80 ft (0.244 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 177 ft³/s (5.01 m³/s) Apr. 27, gage height, 2.32 ft (0.707 m); minimum daily, 45 ft³/s (1.27 m³/s) Feb. 17-19; minimum gage height, 1.11 ft (0.338 m) Feb. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	65	58	51	55	53	49	171	116	73	75	60	71
2	65	57	50	54	48	50	157	115	73	77	60	69
3	66	57	54	53	50	50	143	132	72	76	60	66
4	67	57	57	53	52	67	132	147	71	73	60	64
5	71	57	56	55	48	79	126	140	72	71	63	62
6	81	56	56	55	48	83	121	137	72	67	64	61
7	84	55	52	55	49	81	112	144	73	64	62	60
8	82	55	53	56	48	76	115	140	74	63	60	60
9	77	54	53	55	46	73	111	124	76	62	61	60
10	72	54	51	55	48	70	107	113	80	62	104	60
11	70	54	53	54	48	60	106	108	84	62	105	60
12	68	54	55	54	47	59	108	110	89	68	90	60
13	65	56	57	54	47	66	122	106	85	68	79	60
14	64	57	56	52	48	67	135	98	79	69	77	59
15	63	58	56	50	48	61	135	92	75	69	74	59
16	63	56	56	52	47	61	125	89	71	65	71	58
17	62	57	57	53	45	68	119	88	70	63	69	58
18	62	61	55	53	45	68	117	84	69	61	70	57
19	63	62	49	52	45	74	111	81	67	61	69	56
20	61	60	53	54	46	84	105	79	73	60	69	57
21	61	58	57	55	48	94	101	78	86	62	67	57
22	59	57	56	55	48	99	99	77	85	61	65	58
23	58	58	56	57	48	107	95	81	80	59	66	57
24	59	59	56	57	49	125	90	89	74	59	69	57
25	60	59	56	55	50	131	90	89	72	63	72	57
26	63	59	54	55	48	116	124	85	73	68	75	56
27	65	58	53	56	47	103	169	80	70	69	74	56
28	63	58	50	57	47	99	164	79	66	69	76	55
29	59	57	54	57	---	97	134	78	65	65	80	55
30	58	56	56	57	---	114	119	77	67	62	79	55
31	57	---	57	57	---	160	---	74	---	60	75	---
TOTAL	2033	1714	1685	1692	1341	2591	3663	3130	2236	2033	2225	1780
MEAN	65.6	57.1	54.4	54.6	47.9	83.6	122	101	74.5	65.6	71.8	59.3
MAX	84	62	57	57	53	160	171	147	89	77	105	71
MIN	57	54	49	50	45	49	90	74	65	59	60	55
CFSM	.60	.52	.50	.50	.44	.76	1.11	.92	.68	.60	.65	.54
IN.	.69	.58	.57	.57	.45	.88	1.24	1.06	.76	.69	.75	.60

CAL YR 1978 TOTAL 23533 MEAN 64.5 MAX 139 MIN 47 CFSM .59 IN 7.96
WTR YR 1979 TOTAL 26123 MEAN 71.6 MAX 171 MIN 45 CFSM .65 IN 8.83

STREAMS TRIBUTARY TO LAKE HURON

04135500 AU SABLE RIVER AT GRAYLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: March 1953 to current year.

INSTRUMENTATION.--Temperature recorder since March 1953.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 28.0°C July 1, 2, 1963; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum recorded, 20.0°C June 3; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	11.0	6.5	6.0			---	---	.0	.0		
2	11.5	10.0	6.5	6.0			---	---	.0	.0		
3	11.5	11.5	6.5	6.0			---	---	.0	.0		
4	11.5	11.0	8.5	7.5			---	---	.0	.0		
5	11.0	11.0	9.5	8.5			---	---	.0	.0		
6	11.0	9.5	10.0	9.0			---	---	.0	.0		
7	9.5	8.0	9.5	6.0			---	---	.0	.0		
8	8.0	8.0	---	---			---	---	.0	.0		
9	8.0	7.0	6.0	---			---	---	.0	.0		
10	10.0	8.0	---	---			---	---	.0	.0		
11	10.0	10.0	---	---			---	---	.0	.0		
12	10.0	10.0	---	---			---	---	.0	.0		
13	10.0	9.0	---	---			---	---	.0	.0		
14	9.0	7.5	---	---			---	---	.0	.0		
15	7.5	6.5	---	---			---	---	.0	.0		
16	6.5	6.5	---	---			---	---	.0	.0		
17	6.5	5.5	---	---			---	---	.0	.0		
18	6.0	6.0	---	---			---	---	.0	.0		
19	6.5	6.0	---	---			---	---	.0	.0		
20	8.0	6.5	---	---			---	---	.0	.0		
21	9.5	8.0	---	---			---	---	.0	.0		
22	10.0	9.5	---	---			---	---	.0	.0		
23	10.0	9.0	---	---			---	---	.0	.0		
24	9.0	7.0	---	---			.0	.0	.0	.0		
25	7.0	7.0	---	---			.0	.0	.0	.0		
26	7.0	7.0	---	---			.0	.0	.0	.0		
27	7.0	7.0	---	---			.0	.0	.0	.0		
28	7.5	7.0	---	---			.0	.0	.0	.0		
29	7.0	6.0	---	---			.0	.0	---	---		
30	6.0	5.0	---	---			.0	.0	---	---		
31	---	6.5	---	---			.0	.0	---	---		
MONTH	11.5	5.0							.0	.0		

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[illegible]

STREAMS TRIBUTARY TO LAKE HURON

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW¼ NW¼ sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank, at south boundary of Michigan Department of Natural Resources field office in Grayling (revised) and 0.4 mi (0.6 km) upstream from mouth.

DRAINAGE AREA.--76.0 mi² (196.8 km²).

PERIOD OF RECORD.--April 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft (338 m), from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft (3 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Michigan Department of Natural Resources ponds above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 44.7 ft³/s (1.266 m³/s), 7.99 in/yr (203 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft³/s (5.86 m³/s) Mar. 28, 1976, gage height, 5.24 ft (1.597 m); minimum, 7.0 ft³/s (0.20 m³/s) Mar. 27, 1965, result of freezeup; minimum daily, 16 ft³/s (0.45 m³/s) Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 130 ft³/s (3.68 m³/s) Apr. 1, gage height, 4.44 ft (1.353 m); minimum, 19 ft³/s (0.54 m³/s) Feb. 1, gage height, 2.80 ft (0.853 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	37	29	27	30	27	128	92	52	51	35	37
2	35	37	31	30	30	27	118	90	51	51	34	36
3	36	37	32	31	29	28	109	105	50	47	34	36
4	37	38	34	31	29	41	101	112	49	44	35	36
5	42	37	34	32	28	50	95	102	49	42	37	35
6	48	37	33	32	28	53	93	107	48	40	37	34
7	50	36	27	32	28	53	87	111	48	39	35	34
8	47	35	31	32	28	50	88	106	48	36	34	34
9	44	34	29	32	28	50	81	94	52	36	36	34
10	42	34	29	32	28	46	79	84	53	36	68	33
11	41	34	31	31	28	36	80	84	51	36	51	33
12	40	33	32	31	28	41	82	88	50	52	45	33
13	38	34	33	31	28	45	95	82	47	47	44	33
14	37	37	32	29	28	47	104	76	45	45	44	34
15	37	36	33	30	28	41	103	72	44	42	43	33
16	38	35	32	29	28	42	98	69	43	39	42	33
17	38	37	32	30	27	44	94	65	42	38	41	32
18	37	40	30	29	26	47	90	63	42	37	42	32
19	36	40	25	31	26	53	85	62	41	35	42	33
20	36	38	32	30	26	57	82	61	46	35	41	32
21	36	37	31	30	26	62	80	59	60	35	39	32
22	35	36	32	30	26	65	77	58	57	34	38	31
23	35	35	32	30	26	72	72	64	51	33	39	31
24	35	37	32	31	27	82	69	66	48	33	41	31
25	37	38	32	31	26	81	70	62	46	37	38	31
26	40	37	30	31	28	74	103	59	44	40	38	30
27	40	36	29	31	27	68	123	58	42	38	39	30
28	38	35	27	31	26	66	118	58	41	37	41	30
29	37	35	31	31	---	68	100	59	41	36	41	30
30	36	34	30	32	---	84	93	56	43	35	41	30
31	38	---	31	31	---	118	---	52	---	35	38	---
TOTAL	1203	1086	958	951	771	1718	2797	2376	1424	1221	1253	983
MEAN	38.8	36.2	30.9	30.7	27.5	55.4	93.2	76.6	47.5	39.4	40.4	32.8
MAX	50	40	34	32	30	118	128	112	60	52	68	37
MIN	35	33	25	27	26	27	69	52	41	33	34	30
CFSM	.51	.48	.41	.40	.36	.73	1.23	1.01	.63	.52	.53	.43
IN.	.59	.53	.47	.47	.38	.84	1.37	1.16	.70	.60	.61	.48

CAL YR 1978 TOTAL 13531 MEAN 37.1 MAX 86 MIN 20 CFSM .49 IN 6.62
WTR YR 1979 TOTAL 16741 MEAN 45.9 MAX 128 MIN 25 CFSM .60 IN 8.19

STREAMS TRIBUTARY TO LAKE HURON

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04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE¼ SE¼ sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft (3 m) upstream from Smith Bridge, 400 ft (122 m) downstream from bridge on State Highway 72, 4.6 mi (7.4 km) upstream from mouth, and 9.1 mi (14.6 km) west of Luzerne.

DRAINAGE AREA.--401 mi² (1,039 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft (326 m), from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--13 years, 225 ft³/s (6.372 m³/s), 7.62 in/yr (194 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Mar. 28, 1976, gage height, 7.30 ft (2.225 m); minimum, 99 ft³/s (2.80 m³/s) July 24, 27, 1977, gage height, 4.11 ft (1.253 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 632 ft³/s (17.9 m³/s) Apr. 1, gage height, 6.13 ft (1.868 m); maximum gage height, 7.15 ft (2.179 m) Feb. 10, backwater from ice; minimum discharge, 122 ft³/s (3.46 m³/s) Aug. 9, gage height, 4.26 ft (1.298 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	292	213	183	162	160	156	618	335	191	241	128	146
2	289	210	174	162	160	154	627	314	186	259	128	144
3	293	208	203	162	160	156	587	344	181	243	126	144
4	297	206	236	160	160	198	547	349	176	222	128	144
5	304	204	217	165	155	228	517	342	173	195	132	139
6	324	203	202	165	155	228	486	382	170	179	130	136
7	324	201	189	165	155	230	445	402	167	172	126	134
8	320	198	187	170	155	247	464	382	184	166	124	133
9	313	196	180	170	150	261	436	369	222	162	128	133
10	304	193	175	170	150	259	426	347	231	159	260	132
11	294	192	175	165	150	244	428	341	229	156	248	134
12	286	190	175	160	150	262	432	344	215	154	235	134
13	273	195	178	160	150	270	445	345	196	150	230	145
14	264	201	178	160	150	273	450	346	181	153	208	154
15	257	200	178	160	150	252	441	331	173	149	188	158
16	259	200	178	165	145	269	427	315	176	145	172	162
17	257	208	180	165	145	277	409	303	178	142	160	164
18	254	225	178	165	150	294	389	292	164	141	162	164
19	249	222	170	165	145	331	373	292	155	137	160	165
20	245	219	170	165	145	369	357	287	160	137	158	166
21	240	215	171	165	145	429	347	278	267	135	154	166
22	236	210	174	165	145	474	337	271	260	134	148	166
23	231	207	176	165	145	535	328	280	252	132	150	165
24	230	207	177	170	150	583	319	284	243	132	160	167
25	232	210	175	160	150	586	332	267	211	134	160	164
26	235	208	174	160	152	545	388	249	185	136	154	160
27	231	201	171	162	154	491	430	230	176	136	154	160
28	229	198	164	162	156	470	416	212	168	140	160	158
29	221	200	173	162	---	443	383	205	164	132	162	156
30	219	197	169	162	---	481	360	199	172	130	159	154
31	216	---	168	164	---	589	---	194	---	128	151	---
TOTAL	8218	6137	5598	5078	4237	10584	12944	9431	5806	4931	5043	4547
MEAN	265	205	181	164	151	341	431	304	194	159	163	152
MAX	324	225	236	170	160	589	627	402	267	259	260	167
MIN	216	190	164	160	145	154	319	194	155	128	124	132
CFSM	.66	.51	.45	.41	.38	.85	1.08	.76	.48	.40	.41	.38
IN.	.76	.57	.52	.47	.39	.98	1.20	.87	.54	.46	.47	.42
CAL YR 1978	TOTAL	72773	MEAN 199	MAX 541	MIN 102	CFSM .50	IN 6.75					
WTR YR 1979	TOTAL	82554	MEAN 226	MAX 627	MIN 124	CFSM .56	IN 7.66					

STREAMS TRIBUTARY TO LAKE HURON

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 24.0°C July 16, 1968, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum recorded, 18.5°C May 11; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.5	13.5	7.0	6.0	2.0	1.0	.0	.0	.5	.5	1.5	1.5
2	13.5	12.5	7.0	6.0	1.0	.5	.0	.0	.0	.0	1.5	.5
3	13.5	10.5	7.0	6.0	1.0	.5	.0	.0	.0	.0	2.0	1.0
4	11.0	10.0	8.5	7.0	1.0	1.0	.0	.0	.0	.0	1.0	2.0
5	11.0	10.5	9.0	7.5	1.0	1.0	.0	.0	.0	.0	1.0	1.0
6	10.5	10.0	9.0	8.5	1.0	1.0	.0	.0	.0	.0	1.0	.5
7	10.0	9.0	8.5	7.0	1.0	.5	.0	.0	.0	.0	2.0	.5
8	9.0	8.0	7.0	6.0	1.0	.5	.0	.0	.0	.0	2.0	1.0
9	8.5	7.0	7.0	6.0	.5	.0	.0	.0	.0	.0	2.0	1.0
10	9.5	8.0	7.5	7.0	.0	.0	.0	.0	.0	.0	1.0	.0
11	9.5	9.0	7.5	7.0	.0	.0	.5	.0	.0	.0	.0	.0
12	10.0	9.0	6.0	5.5	.5	.0	.5	.0	.0	.0	1.0	.0
13	10.0	8.5	5.5	5.5	1.0	.5	.5	.5	.0	.0	2.0	1.0
14	9.0	7.5	5.5	5.0	.5	.5	.5	.5	.0	.0	2.0	1.0
15	8.0	7.0	5.0	4.5	1.0	.5	.5	.5	.0	.0	1.0	.0
16	7.0	7.0	4.5	4.5	1.0	1.0	1.0	.5	.0	.0	1.5	.0
17	7.0	6.0	5.0	4.5	1.0	1.0	1.0	.5	.0	.0	2.0	1.0
18	7.0	6.5	5.0	5.0	1.0	.0	.5	.0	.0	.0	2.0	2.0
19	7.5	7.0	4.5	4.0	.0	.0	.0	.0	.0	.0	2.0	2.0
20	8.0	6.5	4.0	3.0	.0	.0	.0	.0	.0	.0	1.5	1.0
21	9.0	7.0	3.0	2.5	1.0	.0	.0	.0	.0	.0	1.5	1.0
22	10.0	9.0	3.0	2.5	1.0	1.0	.0	.0	.0	.0	1.5	.5
23	10.0	8.5	3.0	3.0	1.0	1.0	.0	.0	.0	.0	1.5	1.5
24	8.5	7.0	3.0	3.0	1.0	1.0	.0	.0	1.0	.0	2.0	1.5
25	8.0	7.5	3.0	3.0	1.0	.5	.0	.0	.0	.0	2.0	.0
26	7.5	7.5	2.5	1.5	.5	.5	1.0	1.0	.0	.0	.5	.0
27	8.0	7.0	1.5	1.5	.5	.0	1.0	1.0	1.0	.0	1.0	.0
28	8.0	7.0	2.0	1.5	.0	.0	1.0	1.0	1.5	.0	1.0	.0
29	7.0	6.5	2.0	1.5	.0	.0	1.0	1.0	---	---	2.0	1.0
30	6.5	6.0	2.0	1.5	1.0	.0	1.0	1.0	---	---	3.0	2.0
31	7.5	6.5	---	---	1.0	.0	1.0	1.0	---	---	3.0	2.5
MONTH	13.5	6.0	9.0	1.5	2.0	.0	1.0	.0	1.5	.0	3.0	.0

STREAMS TRIBUTARY TO LAKE HURON

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04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	2.0	8.5	5.5								
2	2.0	1.5	8.5	8.0								
3	2.5	1.0	8.0	8.0								
4	2.5	2.5	9.0	6.5								
5	2.5	1.5	8.5	7.5								
6	1.5	.0	7.0	6.0								
7	1.0	.0	11.0	7.0								
8	1.0	.0	14.5	11.0								
9	1.5	.0	17.0	14.5								
10	1.5	1.0	18.0	16.0								
11	3.0	2.5	18.5	17.5								
12	3.5	3.0	18.0	14.5								
13	5.5	3.5	14.5	12.0								
14	6.0	6.0	14.0	12.5								
15	6.0	5.0	14.0	10.0								
16	5.5	5.0	14.0	9.0								
17	7.5	5.0	13.0	10.0								
18	8.5	6.0	15.0	11.5								
19	9.5	7.0	14.5	13.0								
20	11.0	8.0	15.0	13.0								
21	10.5	10.0	14.0	12.5								
22	11.0	8.5	13.5	10.5								
23	12.0	9.5	13.5	11.0								
24	12.5	11.0	12.5	10.0								
25	12.5	12.0	13.0	10.5								
26	12.0	10.5	14.0	12.5								
27	10.0	9.0	12.5	11.5								
28	10.0	9.0	12.0	11.5								
29	9.5	7.0	15.0	12.5								
30	7.5	6.5	16.0	12.5								
31	---	---	16.0	14.5								
MONTH	12.5	.0	18.5	5.5								

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW¼ sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft (46 m) upstream from bridge on State Highway 33 in Mio, 500 ft (152 m) downstream from Mio hydroelectric plant, 9.5 mi (15.3 km) downstream from Big Creek, and 73.0 mi (117.5 km) upstream from mouth.

DRAINAGE AREA.--1,100 mi² (2,850 km²), approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft (283.342 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated at all stages by hydroelectric plant 500 ft (152 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 990 ft³/s (28.04 m³/s), 12.22 in/yr (310 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft³/s (118 m³/s) Mar. 28, 1976, gage height, 6.14 ft (1.871 m); minimum, 7.0 ft³/s (0.20 m³/s) Aug. 4, 1977, gage height, -0.09 ft (-0.027 m); minimum daily, 21 ft³/s (0.59 m³/s) Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,500 ft³/s (70.8 m³/s) Mar. 31, Apr. 1, gage height, 4.73 ft (1.442 m); minimum, 333 ft³/s (9.43 m³/s) Oct. 18, gage height, 1.72 ft (0.524 m); minimum daily, 624 ft³/s (17.7 m³/s) Jan. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1040	899	868	847	810	838	2490	1610	1060	1400	828	915
2	1020	893	817	692	694	878	2270	1610	1030	1470	819	867
3	1030	888	818	645	710	879	2090	1940	1020	1230	823	840
4	1050	888	884	624	871	1000	1890	2040	1010	1130	822	840
5	1050	890	923	706	801	1280	1790	1700	971	1010	880	846
6	1140	890	919	798	694	1280	1640	1540	962	972	861	823
7	1310	881	880	868	784	1170	1700	1850	974	957	838	803
8	1120	873	843	870	828	1140	1540	1900	991	928	827	804
9	1100	870	842	842	716	1140	1500	1700	1110	931	798	804
10	1070	859	774	842	743	1140	1500	1410	1260	932	1200	818
11	1050	849	681	785	761	1040	1500	1590	1200	912	1300	817
12	1040	838	793	759	760	1010	1520	1570	1190	954	1180	816
13	983	854	984	845	789	1070	1620	1520	1060	972	1110	804
14	948	911	959	849	775	1110	1740	1420	1030	934	1060	798
15	958	913	858	804	781	1140	1790	1340	1020	920	1030	814
16	989	869	826	795	791	1100	1690	1210	986	889	942	832
17	961	882	825	792	735	1090	1600	1190	981	852	915	830
18	956	969	833	807	693	1180	1500	1200	943	861	914	799
19	965	1000	756	794	766	1360	1420	1300	926	862	916	801
20	937	963	767	801	827	1430	1390	1230	975	882	898	824
21	926	930	883	836	842	1610	1390	1240	1380	876	889	820
22	926	911	912	842	817	1780	1350	1210	1630	887	867	816
23	926	907	866	842	828	1840	1330	1190	1240	847	855	817
24	922	926	853	874	846	2120	1270	1400	1150	818	942	810
25	921	936	836	865	846	2150	1270	1360	1100	820	934	813
26	973	932	842	812	784	1870	1480	1200	1010	868	913	793
27	988	913	833	831	797	1620	1900	1190	956	892	890	796
28	944	893	704	854	831	1530	2000	1160	932	905	924	804
29	929	884	687	822	---	1510	1890	1130	934	873	951	804
30	912	884	868	811	---	1670	1710	1110	963	852	935	844
31	908	---	998	843	---	2220	---	1070	---	850	926	---
TOTAL	30992	26995	26132	24997	21920	42195	49770	44130	31994	29486	28987	24612
MEAN	1000	900	843	806	783	1361	1659	1424	1066	951	935	820
MAX	1310	1000	998	874	871	2220	2490	2040	1630	1470	1300	915
MIN	908	838	681	624	693	838	1270	1070	926	818	798	793
CFSM	.91	.82	.77	.73	.71	1.24	1.51	1.30	.97	.87	.85	.75
IN.	1.05	.91	.88	.85	.74	1.43	1.68	1.49	1.08	1.00	.98	.83
CAL YR 1978	TOTAL	336519	MEAN	922	MAX	1990	MIN	653	CFSM	.84	IN	11.38
WTR YR 1979	TOTAL	382210	MEAN	1047	MAX	2490	MIN	624	CFSM	.95	IN	12.93

04137500 AU SABLE RIVER NEAR AU SABLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°26'09", long 83°26'28", in NE¼ NW¼ sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, 5.5 mi (8.8 km) northwest of Au Sable and 10.4 mi (16.7 km) upstream from mouth.

DRAINAGE AREA.--1,540 mi² (3,990 km²), approximately.

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1978 to current year.

WATER TEMPERATURES: April 1978 to current year.

REMARKS.--Daily record based on samples collected at mid-stream of bridge .6 mi (1.0 km) downstream from Foote Dam. Daily samples collected between 0600 and 1000 hours. Monthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of monthly sampling. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 346 micromhos Nov. 21, 1978; minimum, 229 micromhos April 19, 21, 1979.

WATER TEMPERATURES: Maximum, 24.0°C July 24, 26, 1978; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 346 micromhos Nov. 21; minimum, 229 micromhos April 19, 21.

WATER TEMPERATURES: Maximum, 23.0°C July 28-31, Aug. 2, 4, 8, Sept. 2; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
25...	1215	2510	302	7.8	10.0	10.6	96	<1	<2	150	19
NOV											
21...	1530	648	318	7.8	5.5	12.2	96	K1	<2	160	21
DEC											
12...	1330	1320	326	7.7	1.5	13.6	98	<1	K2	150	2
JAN											
17...	1445	1170	325	7.7	.0	13.9	97	K1	K4	160	16
FEB											
14...	1030	2190	330	7.7	.0	11.6	79	<1	<1	160	4
MAR											
14...	1345	2370	300	7.4	.0	13.5	94	<1	K1	170	20
APR											
18...	1030	3560	240	7.8	5.0	12.4	96	<1	<1	110	7
MAY											
16...	1100	1690	270	8.0	14.0	10.4	99	K1	K3	130	8
JUN											
21...	1500	3430	290	8.0	21.0	8.3	92	K2	K13	140	2
JUL											
11...	0730	497	300	8.2	19.5	8.7	100	K2	K20	150	1
AUG											
08...	0830	534	284	8.2	28.0	8.0	94	K3	K4	150	9
SEP											
12...	1200	2470	280	7.8	20.0	9.0	98	K3	K6	150	7

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
25...	42	11	3.6	.1	5	.9	160	0	130	4.1	15
NOV											
21...	47	11	4.5	.2	6	.9	170	0	140	4.3	11
DEC											
12...	43	11	4.5	.2	6	.8	180	0	150	5.7	10
JAN											
17...	44	13	4.2	.1	5	.6	180	0	150	5.7	11
FEB											
14...	46	11	4.4	.2	6	.7	190	0	160	6.1	10
MAR											
14...	49	11	4.5	.2	6	.4	180	0	150	11	12
APR											
18...	33	7.7	3.2	.1	6	.6	130	0	100	3.3	10
MAY											
16...	38	8.7	3.7	.1	6	.6	150	0	120	2.4	10
JUN											
21...	41	9.4	3.6	.1	5	.5	170	0	140	2.7	8.7
JUL											
11...	43	10	4.0	.1	6	.5	180	0	150	1.8	7.2
AUG											
08...	43	10	3.8	.1	5	.4	170	0	140	1.7	10
SEP											
12...	42	10	4.2	.2	6	.4	170	0	140	4.3	7.3

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SARLE RIVER NEAR AU SARLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 25...	5.0	.1	8.6	182	165	1230	.03	.06	--	.25	.31
NOV 21...	5.7	.1	8.4	175	172	306	.01	.01	--	.21	.22
DEC 12...	5.4	.1	7.6	180	171	642	.02	.01	--	.06	.07
JAN 17...	5.1	.1	9.3	180	176	569	.09	.01	--	.02	.03
FEB 14...	5.0	.1	9.4	184	180	1090	.13	.01	--	.29	.30
MAR 14...	5.2	.1	10	189	181	1210	.15	.02	--	.14	.16
APR 18...	3.9	.1	6.6	143	129	1380	.14	.00	.00	.21	.21
MAY 16...	4.4	.1	6.2	164	146	748	.02	.01	.01	.25	.26
JUN 21...	4.7	.1	7.2	171	159	1580	.04	.00	.00	.31	.31
JUL 11...	4.8	.1	7.8	172	166	231	.00	.01	.01	.59	.60
AUG 08...	4.7	.1	8.7	173	165	249	.01	.00	.00	.24	.24
SEP 12...	4.6	.1	9.0	169	161	1130	.00	.01	.01	.10	.11

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 25...	.07	.24	.34	1.5	.07	--	.06	--	6	41	100
NOV 21...	.03	.19	.23	1.0	.01	--	.00	7.5	1	1.7	100
DEC 12...	.04	.03	.09	.40	.00	--	.00	4.9	3	11	100
JAN 17...	--	--	.12	.53	.00	--	.00	--	2	6.3	100
FEB 14...	--	--	.43	1.9	.00	--	.00	2.6	8	47	100
MAR 14...	--	--	.31	1.4	.07	--	.06	3.2	1	6.4	100
APR 18...	--	--	.35	1.6	.03	.09	.02	--	8	77	100
MAY 16...	--	--	.28	1.2	.02	.06	.01	5.9	6	27	100
JUN 21...	--	--	.35	1.6	.02	.06	.02	5.3	3	28	100
JUL 11...	--	--	.60	2.7	.01	.03	.01	--	1	1.3	100
AUG 08...	--	--	.25	1.1	.01	.03	.00	6.3	2	2.9	100
SEP 12...	--	--	.11	.49	.01	.03	.01	4.5	3	20	100

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 25...	1215	1	1	0	0	2	2	<10	0	1
JAN 17...	1445	2	1	0	0	1	1	10	0	1
APR 18...	1030	3	2	0	0	0	0	10	10	0
JUL 11...	0730	2	1	--	20	--	1	20	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 25...	1	9	7	140	60	43	33	--	40	<.5
JAN 17...	0	7	2	110	0	6	5	10	10	<.5
APR 18...	0	7	5	240	50	2	0	30	10	.5
JUL 11...	0	2	1	80	0	2	2	10	1	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C)
OCT 25...	<.5	0	0	0	0	10	0	7.0	.3
JAN 17...	<.5	0	0	0	0	0	0	9.0	.2
APR 18...	.5	0	0	0	0	20	0	8.8	.1
JUL 11...	<.5	0	0	0	1	10	20	5.2	.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS WEIGHT G/SQ M	PERI- PHYTON BIOMASS WEIGHT G/SQ M	CHLOR-A PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 21...	1530	27	--	267	276	37.4	.000
FEB 14...	1030	28	--	--	--	--	--
MAY 16...	1100	28	370	3.46	4.17	1.92	.090
AUG 08...	0830	28	304	3.07	3.86	2.60	.500

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 22,78 1100	MAY 17,78 1130	JUN 7,78 0730	JUL 18,78 0945	AUG 23,78 1130	SEP 20,78 1030				
TOTAL CELLS/ML	20	590	380	560	300	1300				
DIVERSITY: DIVISION	0.0	0.9	0.6	1.3	1.1	1.5				
..CLASS	0.0	0.9	0.6	1.3	1.1	1.6				
...ORDER	0.0	1.2	1.4	1.5	1.3	1.6				
...FAMILY	0.0	1.9	1.4	2.5	2.0	1.6				
....GENUS	0.0	1.9	1.7	2.9	2.1	2.0				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	5	2	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	57	10	4	1	--	-
....DICTYOSPHAERIUM	--	-	300#	52	--	-	--	-	--	-
...OOCYSTIS	--	-	--	-	57	10	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	110#	21	4	1	89	7
...SCENEDESMUS	--	-	38	6	59#	15	5	2	--	-
..TFTRASPORALES										
...PALMELLACEAE										
...SPHAEROCYSTIS	--	-	--	-	--	-	8	3	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	38	6	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
...STAUSTRUM	--	-	--	-	29	5	--	-	--	-
CHRYSOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	20#100		--	-	--	-	--	-	22	2
...MFLOSIPIA	--	-	--	-	120#	31	--	-	11	4
...PENNALES										
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	14	3	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	76	13	180#	46	--	-	--	-
...FRAGILARIA	--	-	--	-	29	8	130#	23	28	10
...NITZSCHIA	--	-	--	-	--	-	57	10	--	-
...TABELLARIA	--	-	130#	23	--	-	--	-	--	-
..CHRYSTOPHYCEAE										
...CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	110	8
....OCHROMONAS	--	-	--	-	--	-	--	-	710#	54
CRYPTOPHYTA (CRYPTOMONADS)										
..CRYPTOPHYCEAE										
...CRYPTOMONADALES										
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	5	2	89	7
CYANOPHYTA (BLUE-GREEN ALGAE)										
..CYANOPHYCEAE										
...CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	--	-	270#	20
...HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	65#	22	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	160#	54	--	-
EUGLENOPHYTA (EUGLENOIDS)										
..EUGLENOPHYCEAE										
...EUGLENALES										
...EUGLENACEAE										
....TRACHELONAS	--	-	--	-	43	8	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
..DINOPHYCEAE										
...PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	22	2

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE HURON

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04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	295	289	308	308	313	311	279	248	260	287	290	308
2	295	293	314	314	317	311	279	254	262	286	290	332
3	290	295	322	316	313	310	268	249	260	291	292	296
4	292	294	318	314	311	323	262	254	262	289	---	296
5	298	293	306	316	314	314	260	250	263	317	290	297
6	295	293	306	314	317	323	260	268	262	287	283	293
7	293	294	314	314	314	324	252	259	263	292	292	284
8	297	293	311	311	313	311	250	257	263	291	288	295
9	300	294	314	310	322	314	245	268	263	300	295	297
10	294	296	305	309	315	309	248	270	266	---	286	298
11	297	294	308	314	323	318	245	266	275	294	302	297
12	297	296	308	309	314	321	250	265	269	292	310	286
13	300	295	306	315	315	318	241	260	270	301	319	286
14	297	300	305	---	324	315	239	261	267	292	287	282
15	297	298	306	314	318	324	241	268	273	293	295	291
16	301	337	309	314	314	293	241	270	269	293	295	283
17	297	297	307	316	325	314	238	256	271	293	293	289
18	297	340	304	313	319	300	237	260	275	293	287	288
19	301	340	306	317	322	316	229	260	272	289	287	292
20	297	342	306	320	321	272	235	266	273	292	287	290
21	294	346	307	312	323	283	229	258	275	292	297	291
22	293	344	314	321	315	300	236	260	270	327	292	291
23	292	316	306	323	328	279	234	260	289	294	292	291
24	292	323	309	323	322	315	235	260	290	290	288	292
25	294	314	306	328	311	281	232	272	281	293	287	294
26	284	316	308	323	332	332	238	260	282	290	288	291
27	293	317	311	311	317	260	243	260	290	293	285	291
28	294	316	311	317	313	283	249	260	282	292	286	---
29	293	306	314	320	---	290	249	269	287	294	290	291
30	289	311	314	318	---	286	240	---	---	294	292	293
31	289	---	309	314	---	276	---	---	---	294	297	---
MAX	301	346	322		332	332	279					
MIN	284	289	304		311	260	229					

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	9.0	3.0	.0	.0	.0	1.0	8.0	15.0	18.0	22.0	22.0
2	14.5	9.0	3.0	.0	.0	.0	1.0	9.0	16.0	18.0	23.0	23.0
3	14.0	9.0	2.5	.0	.0	.0	2.0	9.0	16.0	18.0	---	22.0
4	14.0	9.5	2.5	.0	.0	.0	2.0	9.0	15.0	19.0	23.0	22.0
5	14.0	8.0	2.0	.0	.0	.0	2.0	9.0	17.0	19.0	20.0	22.0
6	14.0	8.0	2.0	.0	.0	.0	2.0	9.0	16.0	19.0	22.0	22.0
7	13.5	7.5	2.0	.0	.0	.0	2.0	9.0	17.0	19.0	22.0	21.0
8	13.0	7.5	2.0	.0	.0	.0	2.0	10.0	17.0	19.0	23.0	21.0
9	12.0	7.0	1.5	.0	.0	.0	2.0	11.0	17.0	19.0	22.0	20.0
10	12.0	7.0	1.0	.0	.0	.0	2.0	12.0	17.0	20.0	22.0	20.0
11	12.0	7.0	.0	.0	.0	.0	2.0	12.0	17.0	21.0	---	20.0
12	12.0	6.5	.0	.0	.0	.0	2.0	13.0	17.0	21.0	---	19.0
13	11.5	6.5	.0	.0	.0	.0	2.0	13.0	17.0	21.0	---	19.0
14	11.0	6.5	.0	---	.0	.0	3.0	13.0	18.0	21.0	---	18.0
15	11.0	6.0	.0	.0	.0	.0	2.0	13.0	18.0	22.0	---	18.0
16	11.0	6.0	.0	.0	.0	.0	3.0	13.0	19.0	22.0	---	18.0
17	10.5	5.5	.0	.0	.0	.0	4.0	13.0	21.0	22.0	---	17.0
18	10.0	5.0	.0	.0	.0	.0	4.0	13.0	19.0	21.0	---	18.0
19	10.0	5.0	.0	.0	.0	.0	4.0	13.0	19.0	21.0	---	18.0
20	10.0	4.0	.0	.0	.0	.0	5.0	14.0	19.0	22.0	---	19.0
21	10.0	4.0	.0	.0	.0	.0	5.0	14.0	19.0	22.0	21.0	19.0
22	10.5	4.0	.0	.0	.0	.0	5.0	14.0	19.0	22.0	21.0	18.0
23	10.0	4.0	.0	.0	.0	.0	5.0	14.0	18.0	22.0	21.0	18.0
24	10.0	3.0	.0	.0	.0	.0	7.0	14.0	18.0	22.0	22.0	---
25	10.0	3.5	.0	.0	.0	.0	8.0	13.0	17.0	22.0	22.0	---
26	10.0	3.0	.0	.0	.0	.0	9.0	13.0	18.0	22.0	21.0	---
27	10.0	3.0	.0	.0	.0	.0	9.0	14.0	18.0	22.0	22.0	---
28	9.5	2.5	.0	.0	.0	1.0	9.0	14.0	19.0	23.0	22.0	---
29	9.5	2.5	.0	.0	---	1.0	9.0	14.0	19.0	23.0	21.0	---
30	9.5	3.0	.0	.0	---	1.0	8.0	14.0	---	23.0	21.0	---
31	9.0	---	.0	.0	---	.0	---	14.0	---	23.0	21.0	---
MAX	15.0	9.5	3.0		.0	1.0	9.0	14.0		23.0		
MIN	9.0	2.5	.0		.0	.0	1.0	8.0		18.0		

STREAMS TRIBUTARY TO LAKE HURON

04138500 AU GRES RIVER NEAR NATIONAL CITY, MI

LOCATION.--Lat 44°10'26", long 83°44'36", in NE¼ NE¼ sec.31, T.21 N., R.6 E., Iosco County, Hydrologic Unit 04080101, on left bank 15 ft (5 m) upstream from highway bridge on Allen Road, 1.7 mi (2.7 km) upstream from Elm Creek, 4.4 mi (7.1 km) southwest of National City, 12.8 mi (20.6 km) southwest of Tawas City, and 13 mi (21 km) upstream from mouth.

DRAINAGE AREA.--169 mi² (438 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only October, November, 1950, published in WSP 1727.

REVISED RECORDS.--WSP 1911: 1959-60.

GAGE.--Water-stage recorder. Datum of gage is 616.24 ft (187.830 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Department of Agriculture). Prior to Oct. 1, 1951, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum. Oct. 1, 1951 to July 24, 1969, water-stage recorder at site 50 ft (15 m) downstream at present datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Apr. 17 to May 14, which are poor. Some regulation at low flows. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 97.7 ft³/s (2.767 m³/s), 7.85 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft³/s (77.0 m³/s) Mar. 21, 1976; maximum gage height, 10.64 ft (3.243 m) Mar. 6, 1974, backwater from ice; minimum discharge, 5.9 ft³/s (0.17 m³/s) Nov. 3, 1966, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,140 ft³/s (32.3 m³/s) Mar. 19, gage height, 6.29 ft (1.917 m), backwater from ice; minimum, 17 ft³/s (0.48 m³/s) July 22, Sept. 21, 22, gage height, 0.80 ft (0.244 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	33	82	48	53	95	625	490	59	90	21	36
2	71	32	66	49	53	105	473	480	65	82	21	30
3	60	31	68	49	53	140	447	540	57	52	19	27
4	71	30	67	50	53	210	375	630	46	39	21	27
5	73	30	65	50	54	310	365	500	44	33	34	25
6	124	31	61	50	54	490	527	440	44	29	26	23
7	93	31	58	50	54	630	408	500	40	30	22	21
8	81	36	57	51	54	830	376	420	46	29	20	21
9	79	45	57	51	54	1000	338	320	69	28	22	21
10	72	47	57	51	54	840	359	280	131	26	171	21
11	65	39	57	51	54	700	391	255	202	25	71	21
12	59	38	57	52	55	640	368	225	132	25	42	21
13	53	41	57	52	55	620	345	200	93	23	32	20
14	47	64	56	52	56	760	332	185	84	23	32	20
15	41	66	55	52	56	690	303	170	65	23	29	19
16	49	56	53	52	56	640	277	166	61	21	26	20
17	47	85	51	52	56	620	260	140	50	21	25	19
18	41	187	50	52	56	800	235	117	38	20	27	25
19	38	113	47	52	57	980	215	116	34	20	26	19
20	35	91	48	52	58	650	200	107	34	20	24	18
21	36	85	53	52	59	575	190	84	73	19	28	18
22	34	83	53	53	63	539	180	67	53	18	30	18
23	36	97	52	53	66	495	170	67	42	20	33	19
24	37	138	51	53	71	520	165	80	37	19	186	21
25	35	119	50	53	74	642	170	67	33	27	64	20
26	45	106	49	53	79	454	280	62	30	45	44	20
27	44	95	48	53	84	381	480	65	29	29	50	19
28	40	90	47	53	91	369	370	62	44	24	52	18
29	37	86	48	53	---	438	320	77	36	22	43	18
30	36	76	48	53	---	605	380	68	48	20	36	19
31	34	---	48	53	---	911	---	54	---	20	31	---
TOTAL	1690	2101	1716	1600	1682	17679	9924	7034	1819	922	1308	644
MEAN	54.5	70.0	55.4	51.6	60.1	570	331	227	60.6	29.7	42.2	21.5
MAX	124	187	82	53	91	1000	625	630	202	90	186	36
MTN	34	30	47	48	53	95	165	54	29	18	19	18
CFSM	.32	.41	.33	.31	.36	3.37	1.96	1.34	.36	.18	.25	.13
IN.	.37	.46	.38	.35	.37	3.89	2.18	1.55	.40	.20	.29	.14
CAL YR 1978 TOTAL	31735			86.9	MAX 1050	MIN 15	CFSM .51	IN 6.99				
WTR YR 1979 TOTAL	48119			132	MAX 1000	MTN 18	CFSM .78	IN 10.59				

STREAMS TRIBUTARY TO LAKE HURON

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04140500 RIFLE RIVER AT SELKIRK, MI

LOCATION.--Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, on left bank at upstream side of bridge on State Road at Selkirk, 1.0 mi (1.6 km) downstream from Klacking Creek.

DRAINAGE AREA.--117 mi² (303 km²).

PERIOD OF RECORD.--September 1950 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 828.47 ft (252.518 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 144 ft³/s (4.078 m³/s), 16.71 in/yr (424 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,760 ft³/s (78.2 m³/s) May 20, 1959, gage height, 6.76 ft (2.060 m); minimum, 52 ft³/s (1.47 m³/s) July 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	1900	ice jam	*4.29 1.308	Mar. 31	1300	780 22.1	3.56 1.085
Mar. 24	2400	*825 23.4	3.65 1.113	May 4	0800	548 15.5	3.05 0.930

Minimum discharge, 62 ft³/s (1.76 m³/s) July 21, 22, gage height, 1.49 ft (0.454 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	171	102	123	115	105	185	633	371	113	142	83	92
2	146	101	120	115	100	190	438	348	112	135	81	91
3	135	101	120	110	100	200	402	388	107	112	77	91
4	140	106	118	110	100	220	335	518	105	108	89	90
5	160	104	119	110	100	450	307	361	105	96	112	89
6	207	104	118	110	100	400	338	335	101	91	105	86
7	177	101	115	110	100	350	297	369	100	85	90	78
8	149	100	115	110	100	290	292	299	119	81	86	77
9	131	101	120	110	100	275	260	240	168	80	98	76
10	121	102	125	110	105	250	261	212	165	79	378	78
11	115	102	135	110	105	230	260	197	180	78	426	79
12	115	113	140	110	105	220	250	211	166	92	197	78
13	110	108	140	110	105	210	263	192	138	87	141	78
14	106	141	130	110	105	225	259	175	121	86	139	77
15	108	126	120	110	105	240	241	161	115	80	123	77
16	120	118	115	110	105	240	224	155	104	76	107	78
17	119	138	115	110	110	242	213	147	98	76	101	79
18	114	258	115	110	110	335	196	140	95	73	103	78
19	110	227	115	110	110	429	172	137	91	70	100	76
20	108	168	115	105	110	436	168	138	103	65	96	77
21	106	145	110	105	115	493	165	130	196	62	93	79
22	105	137	112	105	120	528	171	124	152	64	90	78
23	104	138	110	105	130	529	160	130	119	65	95	81
24	102	161	110	105	140	624	151	147	111	71	114	79
25	104	181	112	110	160	664	180	134	101	116	102	79
26	117	154	110	110	170	440	283	125	95	167	100	79
27	116	139	110	110	175	298	388	131	93	120	97	79
28	111	133	110	105	180	259	281	124	89	109	116	76
29	112	130	115	105	---	279	237	120	92	87	115	78
30	111	127	115	105	---	430	254	117	104	82	105	96
31	105	---	115	105	---	751	---	114	---	83	95	---
TOTAL	3855	3966	3662	3375	3270	10912	8079	6490	3558	2818	3854	2429
MEAN	124	132	118	109	117	352	269	209	119	90.9	124	81.0
MAX	207	258	140	115	180	751	633	518	196	167	426	96
MIN	102	100	110	105	100	185	151	114	89	62	77	76
CFSM	1.06	1.13	1.01	.93	1.00	3.01	2.30	1.79	1.02	.78	1.06	.69
IN.	1.23	1.26	1.16	1.07	1.04	3.47	2.57	2.06	1.13	.90	1.23	.77

CAL YR 1978 TOTAL 50828 MEAN 139 MAX 856 MIN 65 CFSM 1.19 IN 16.16
WTR YR 1979 TOTAL 56268 MEAN 154 MAX 751 MIN 62 CFSM 1.32 IN 17.89

STREAMS TRIBUTARY TO LAKE HURON

04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE¼ SW¼ sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft (9 m) downstream from bridge on Old M-70, 2.8 mi (4.5 km) north of Sterling, and 20 mi (32 km) upstream from mouth.

DRAINAGE AREA.--320 mi² (830 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937 (M), 1939-40 (M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft (197.962 m) National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft (122 m) downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--43 years, 307 ft³/s (8.694 m³/s), 13.03 in/yr (331 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft³/s (151 m³/s) Mar. 28, 1950, gage height, 13.74 ft (4.188 m), from rating curve extended above 3,800 ft³/s (108 m³/s); minimum, 75 ft³/s (2.12 m³/s) Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,600 ft³/s (45.3 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 25	1000	2,030 57.5	7.32 2.231	Mar. 31	1800	*2,100 59.5	*7.50 2.286

Minimum discharge, 128 ft³/s (3.62 m³/s) July 22, 23, gage height, 1.33 ft (0.405 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	361	205	240	200	220	255	1710	1050	224	271	149	175
2	372	202	225	200	215	270	1180	932	219	299	147	181
3	309	198	240	190	210	290	1090	1100	219	242	143	171
4	307	196	245	190	205	430	919	1270	216	214	147	166
5	307	214	245	190	200	600	816	994	216	190	180	166
6	431	223	240	190	200	760	977	868	199	176	186	169
7	414	211	230	195	190	930	841	917	192	173	165	156
8	337	198	215	200	185	920	791	788	202	166	153	148
9	318	194	200	200	190	920	711	609	330	161	147	149
10	280	193	180	205	190	900	702	539	407	165	514	150
11	256	191	205	205	190	860	704	497	413	162	671	154
12	241	190	240	205	190	850	663	510	352	167	439	152
13	232	209	255	210	185	830	662	477	289	172	269	149
14	221	248	250	210	185	810	653	420	247	166	236	149
15	223	252	225	210	185	800	613	374	220	162	222	146
16	256	224	210	210	185	820	573	347	217	152	200	149
17	259	251	200	210	185	880	520	323	204	146	187	147
18	238	470	195	210	185	1000	483	304	192	147	185	144
19	225	480	200	210	185	1100	425	304	176	145	187	144
20	215	351	205	210	185	1300	388	295	186	138	181	142
21	213	296	210	210	190	1400	375	275	360	132	174	145
22	217	271	210	205	200	1400	351	261	375	131	170	144
23	237	276	210	205	210	1450	349	268	254	131	196	145
24	220	316	205	210	215	1590	324	298	228	136	238	152
25	214	361	200	210	220	1910	405	283	213	178	211	149
26	225	335	200	220	225	1360	681	264	190	260	190	150
27	229	296	200	220	235	991	870	264	181	224	186	148
28	222	277	205	220	245	839	721	272	173	189	215	148
29	224	270	205	220	---	860	627	251	173	167	226	146
30	256	260	210	220	---	1150	798	240	197	154	210	160
31	217	---	210	220	---	1940	---	232	---	150	188	---
TOTAL	8276	7858	6710	6410	5605	30415	20922	15826	7264	5466	6912	4594
MEAN	267	262	216	207	200	981	697	511	242	176	223	153
MAX	431	480	255	220	245	1940	1710	1270	413	299	671	181
MIN	213	190	180	190	185	255	324	232	173	131	143	142
CFSM	.83	.82	.68	.65	.63	3.07	2.18	1.60	.76	.55	.70	.48
IN.	.96	.91	.78	.75	.65	3.54	2.43	1.84	.84	.64	.80	.53
CAL YR 1978	TOTAL	106523	MEAN 292	MAX 2080	MIN 130	CFSM .91	IN 12.38					
WTR YR 1979	TOTAL	126258	MEAN 346	MAX 1940	MIN 131	CFSM 1.08	IN 14.68					

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to current year.

WATER TEMPERATURES: November 1974 to current year.

SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water-quality monitor since August 1975.

REMARKS.--Monthly samples were collected as a cross-section sample at or near vicinity of bridge. Interruptions in the daily record were due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum recorded, 567 micromhos Sept. 6, 1978; minimum, 157 micromhos Aug. 31, 1975.

WATER TEMPERATURES: Maximum, 30.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 567 micromhos Sept. 6, minimum, 273 micromhos Mar. 25, Apr. 1.

WATER TEMPERATURES: Maximum, 23.5°C Aug. 7, minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)
OCT											
24...	1100	217	476	7.9	8.0	12.2	104	<2	K8	220	40
NOV											
22...	1115	272	479	8.0	1.5	14.2	101	55	134	230	50
DEC											
13...	1100	258	486	7.9	.0	13.9	96	K18	K15	220	23
JAN											
18...	1300	210	510	7.7	.0	11.8	80	K18	K8	230	38
FEB											
15...	1145	184	490	7.5	.0	--	--	--	120	210	30
MAR											
15...	1200	809	375	7.7	.0	14.9	102	K17	200	170	43
APR											
19...	1100	400	385	8.1	9.0	11.4	103	K13	K7	180	23
MAY											
15...	1330	376	410	8.1	14.0	10.8	104	K37	K14	190	35
JUN											
22...	1100	379	405	7.9	18.5	8.8	94	K1100	400	190	22
JUL											
10...	1130	167	440	8.4	19.0	9.5	110	K49	K31	200	25
AUG											
07...	1100	168	422	8.3	19.5	9.9	112	K42	K28	210	29
SEP											
11...	1100	163	436	8.1	13.0	11.8	118	43	37	220	40

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
24...	62	17	11	.3	10	1.4	220	0	180	4.4	39
NOV											
22...	66	16	11	.3	9	1.4	220	0	180	3.5	40
DEC											
13...	61	16	11	.3	10	1.2	240	0	200	4.8	36
JAN											
18...	61	18	11	.3	10	1.0	230	0	190	7.3	35
FEB											
15...	59	15	11	.3	10	1.3	220	0	180	11	35
MAR											
15...	50	12	8.2	.3	9	2.2	160	0	130	5.1	30
APR											
19...	50	13	9.8	.3	11	1.4	190	0	160	2.4	30
MAY											
15...	55	13	10	.3	10	1.3	190	0	160	2.4	27
JUN											
22...	53	13	9.3	.3	10	1.2	200	0	160	4.0	22
JUL											
10...	57	15	11	.3	10	.9	210	4	180	1.4	26
AUG											
07...	59	15	9.9	.3	9	.9	220	0	180	1.8	26
SEP											
11...	62	16	12	.4	11	1.0	220	0	180	2.8	27

STREAMS TRIBUTARY TO LAKE HURON

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 24...	20	.1	5.8	277	265	162	.00	.01	--	--	--
NOV 22...	19	.1	8.7	285	271	209	.16	.01	--	.35	.36
DEC 13...	17	.1	9.0	281	270	196	.27	.06	--	.15	.21
JAN 18...	16	.1	11	266	267	151	.23	.09	--	.04	.13
FEB 15...	18	.1	10	274	258	136	.26	.21	--	.41	.62
MAR 15...	15	.1	7.7	228	204	498	.92	.07	--	.72	.79
APR 19...	14	.1	4.8	247	217	267	.13	.02	.02	.45	.47
MAY 15...	16	.1	4.7	239	221	243	.07	.02	.02	.48	.50
JUN 22...	15	.1	7.4	246	220	252	.30	.07	.08	.92	.99
JUL 10...	18	.1	4.6	253	240	114	.02	.02	.02	.31	.33
AUG 07...	16	.1	7.2	257	243	117	.01	.00	.00	.22	.22
SEP 11...	17	.1	6.9	262	250	115	.00	.03	.04	.18	.21

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 24...	.00	--	--	--	.05	--	.00	--	4	2.3	100
NOV 22...	.09	.27	.52	2.3	.01	--	.00	7.9	9	6.6	100
DEC 13...	.00	--	.48	2.1	.01	--	.00	8.4	10	7.0	100
JAN 18...	--	--	.36	1.6	.01	--	.00	--	7	4.0	100
FEB 15...	--	--	.88	3.9	.02	--	.01	4.2	36	18	100
MAR 15...	--	--	1.7	7.6	.05	--	.02	15	44	96	100
APR 19...	--	--	.60	2.7	.03	.09	.01	--	28	30	100
MAY 15...	--	--	.57	2.5	.02	.06	.01	12	29	29	100
JUN 22...	--	--	1.3	5.7	.07	.21	.01	13	68	70	100
JUL 10...	--	--	.35	1.6	.03	.09	.01	--	22	9.9	100
AUG 07...	--	--	.23	1.0	.02	.06	.00	5.5	14	6.4	100
SEP 11...	--	--	.21	.93	.01	.03	.00	5.7	15	6.6	100

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 10.77 1350	MAR 21.78 1330	MAY 16.78 1130	JUN 6.78 1130
TOTAL CELLS/ML	1200	480	930	2500
DIVERSITY: DIVISION	0.6	0.0	0.1	0.9
..CLASS	1.1	0.0	0.1	0.9
...ORDER	1.2	0.2	0.1	1.0
...FAMILY	2.9	2.3	2.0	2.2
....GENUS	3.0	2.4	2.0	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
....OOCYSTACEAE								
....CHODATELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-
...TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	660#	27
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
...VOLVOCAEAE								
....PANDORINA	--	-	--	-	--	-	--	-
...ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	55	2
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	10	1	14	3	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-
...PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	31	2	41	9	19	2	--	-
....RHOICOSPHEA	31	2	27	6	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	51	4	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	320#	26	41	9	38	4	--	-
....EUNOTIACEAE								
....EUNOTIA	--	-	--	-	--	-	820#	34
...FRAGILARIACEAE								
....SYNEDRA	21	2	41	9	190#	20	55	2
...GOMPHONEMACEAE								
....GOMPHONEMA	110	9	81#	17	76	8	--	-
...NAVICULACEAE								
....AMPHIPLEURA	--	-	--	-	--	-	--	-
....CALONEIS	10	1	--	-	--	-	--	-
...NAVICULA	290#	23	220#	46	510#	55	570#	23
....STAURONEMIS	--	-	--	-	--	-	55	2
...NITZSCHACEAE								
....NITZSCHIA	72	6	14	3	57	6	55	2
...SURIPELLACEAE								
....CYMATOPLEURA	--	-	--	-	--	-	--	-
....SURIPELLA	--	-	--	-	19	2	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	180	7
..CHRYSTOPHYCEAE								
...CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	150	12	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	19	2	--	-

STREAMS TRIBUTARY TO LAKE HURON
04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 10.77 1350		MAR 21.78 1330		MAY 16.78 1130		JUN 6.78 1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....COCCOCHLORIS	--	-	--	-	--	-	--	-
...HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
...OSCILLATORIA	120	10	--	-	--	-	--	-
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....EUGLENA	10	1	--	-	--	-	--	-
....TRACHELOMONAS	10	1	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 17,78 1045	AUG 22,78 1030	SEP 19,78 1130
TOTAL CELLS/ML	470	190	4400
DIVERSITY: DIVISION	0.9	1.3	1.2
..CLASS	0.9	1.3	1.2
..ORDER	1.5	2.1	1.8
...FAMILY	2.7	2.8	2.8
....GENUS	3.1	3.0	3.2

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
...HYDRODICTYACEAE						
....PFDIASTRUM	57	12	--	--	--	--
...OOCYSTACEAE						
....CHODATELLA	--	--	--	--	23	1
...OOCYSTIS	14	3	--	--	--	--
...SELENASTRUM	--	--	--	--	45	1
...SCENEDESMACEAE						
....ACTINASTRUM	--	--	--	--	91	2
...SCENEDESMUS	86#	18	49#	26	--	--
..TETRASPORALES						
...PALMELLACEAE						
...SPHAEROCYSTIS	--	--	--	--	--	--
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	14	3	--	--	23	1
...VOLVOCAEAE						
....PANDORINA	--	--	43#	23	--	--
..ZYGNEMATALES						
...DESMIDIACEAE						
...CLOSTERIUM	--	--	--	--	23	1
...COSMARIUM	--	--	--	--	--	--
CHRYSTOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	57	12	5	3	--	--
....MELOSIRA	--	--	11	6	91	2
...STEPHANODISCUS	--	--	3	1	--	--
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	14	3	3	1	91	2
...COCONEIS	86#	18	--	--	320	7
...RHOICOSPHENIA	43	9	--	--	68	2
...CYMBELLACEAE						
....CYMBELLA	14	3	14	7	140	3
...DIATOMACEAE						
....DIATOMA	--	--	27	14	380	9
...EUNOTIACEAE						
....EUNOTIA	--	--	--	--	--	--
...FRAGILARIACEAE						
....SYNEDRA	--	--	--	--	--	--
...GOMPHONEMACEAE						
....GOMPHONEMA	14	3	--	--	45	1
...NAVICULACEAE						
....AMPHIPLEURA	--	--	--	--	23	1
...CALONEIS	--	--	--	--	--	--
...NAVICULA	72#	15	14	7	790#	18
...STAURONEIS	--	--	--	--	--	--
...NITZSCHIACEAE						
....NITZSCHIA	--	--	11	6	110	3
...SURIPELLACEAE						
....CYMATOPLEURA	--	--	--	--	23	1
...SURIPELLA	--	--	--	--	--	--
...TABELLARIACEAE						
....TABELLARIA	--	--	--	--	--	--
..CHRYSTOPHYCEAE						
...CHRYSOMONADALES						
...OCHROMONADACEAE						
....DINOBRION	--	--	--	--	--	--
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	--	5	3	--	--

STREAMS TRIBUTARY TO LAKE HURON
04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 17,78 1045		AUG 22,78 1030		SEP 19,78 1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....COCCOCHLORIS	--	-	--	-	140	3
..HORMOGONALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	110	3
...OSCILLATORIA	--	-	--	-	1500#	34
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	410	9
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	--	-	--	-
....TRACHELOMONAS	--	-	3	1	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	468	469	466	462	440	452	495	485	490	469	467	468
2	460	448	452	460	450	454	511	494	504	472	468	469
3	452	447	449	459	454	456	516	488	504	490	472	482
4	449	444	447	460	455	459	489	481	486	507	490	498
5	450	444	448	466	448	460	488	467	476	509	495	505
6	449	443	446	453	447	450	484	468	472	508	499	505
7	447	443	445	453	448	451	498	485	491	509	503	506
8	447	442	445	460	455	457	493	475	484	503	491	497
9	444	440	443	462	458	460	493	486	490	496	488	491
10	448	442	445	463	458	460	512	496	501	517	490	495
11	449	445	446	468	462	463	537	514	528	497	472	487
12	451	447	449	468	462	465	538	488	517	499	483	492
13	447	446	447	464	445	456	478	465	469	502	492	497
14	446	444	445	472	451	459	473	466	470	497	479	490
15	444	436	440	473	464	468	484	466	472	483	474	480
16	436	433	435	476	472	474	482	470	476	486	474	479
17	435	432	438	477	447	464	475	465	470	485	475	480
18	439	436	437	482	446	459	481	473	477	495	471	477
19	439	436	437	451	446	448	499	478	489	471	468	469
20	443	438	440	464	455	460	503	485	494	481	477	478
21	446	438	442	472	465	468	484	467	475	491	485	488
22	438	432	436	485	475	480	471	465	468	492	491	492
23	---	---	---	487	476	482	479	467	473	500	498	499
24	439	434	436	483	476	478	479	470	475	497	495	496
25	445	437	442	491	484	488	475	472	473	496	494	495
26	448	437	444	487	484	485	486	478	482	493	489	491
27	453	442	449	485	479	483	497	481	490	490	487	489
28	456	452	454	484	479	482	507	491	497	489	488	489
29	457	426	449	484	480	482	526	501	510	487	485	487
30	443	432	438	488	483	484	525	480	500	487	485	486
31	447	434	440	---	---	---	480	466	474	487	484	485
MONTH				491	440	466	538	465	486	517	467	488
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	490	484	486	443	438	440	287	273	278	354	347	351
2	503	487	492	439	436	437	325	289	300	365	353	359
3	503	491	498	439	432	437	315	309	312	364	332	345
4	493	490	492	430	388	409	324	313	320	344	334	338
5	---	---	---	389	353	375	328	319	326	353	338	345
6	---	---	---	352	342	345	328	313	323	---	---	---
7	---	---	---	357	348	353	338	326	331	---	---	---
8	---	---	---	359	355	357	346	339	343	---	---	---
9	---	---	---	360	356	357	351	344	347	---	---	---
10	---	---	---	362	358	359	356	350	354	---	---	---
11	---	---	---	372	363	368	360	355	358	---	---	---
12	---	---	---	382	374	378	360	358	359	---	---	---
13	---	---	---	383	361	373	362	360	361	---	---	---
14	---	---	---	361	347	350	363	360	361	---	---	---
15	451	449	450	352	341	347	363	359	361	---	---	---
16	449	443	446	360	346	352	368	360	364	---	---	---
17	443	437	441	358	342	353	379	370	374	---	---	---
18	448	440	443	339	322	333	384	375	380	---	---	---
19	451	449	450	321	313	316	389	383	385	---	---	---
20	452	448	450	318	313	316	406	364	383	---	---	---
21	450	440	445	317	298	310	418	402	407	---	---	---
22	441	432	437	306	297	300	422	417	419	---	---	---
23	438	429	433	303	296	298	426	406	416	---	---	---
24	432	427	429	298	280	293	425	415	420	---	---	---
25	440	426	433	279	273	275	426	385	405	---	---	---
26	453	436	444	297	277	289	402	367	386	---	---	---
27	455	434	447	320	297	310	387	376	383	---	---	---
28	452	429	441	328	317	324	385	380	383	---	---	---
29	---	---	---	331	327	329	387	362	378	---	---	---
30	---	---	---	328	297	315	387	341	358	---	---	---
31	---	---	---	295	274	282	---	---	---	---	---	---
MONTH				443	273	345	426	273	363			

STREAMS TRIBUTARY TO LAKE HURON
04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1							---	---	---	544	419	538
2							---	---	---	559	515	550
3							---	---	---	561	547	553
4							---	---	---	555	545	553
5							---	---	---	559	544	550
6							---	---	---	567	552	559
7							415	408	410	566	552	560
8							429	414	422	558	547	553
9							434	400	422	554	546	549
10							391	347	359	551	543	547
11							350	333	342	550	421	497
12							390	351	369	438	425	432
13							408	393	401	461	420	433
14							414	406	411	458	422	434
15							425	415	419	436	420	427
16							428	422	424	511	428	444
17							432	422	426	456	425	434
18							441	427	432	453	425	435
19							462	441	452	437	425	431
20							474	457	464	443	426	432
21							484	469	475	441	421	432
22							488	479	483	434	422	427
23							481	418	463	437	425	430
24							476	420	443	440	424	431
25							489	475	481	440	421	431
26							494	481	488	488	423	430
27							489	450	480	528	428	443
28							460	442	452	450	430	440
29							494	462	475	442	429	434
30							531	496	516	441	413	433
31							537	527	532	---	---	---
MONTH										567	413	475

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	13.0	11.5	12.5	7.0	5.0	6.0	.0	.0	.0	.0	.0	.0
2	14.0	11.0	12.5	7.5	5.0	6.5	.0	.0	.0	.0	.0	.0
3	13.0	12.0	12.5	8.5	5.5	7.0	.0	.0	.0	.0	.0	.0
4	13.5	11.5	12.0	10.0	7.0	8.5	.0	.0	.0	.5	.0	.0
5	13.0	11.5	12.0	11.5	7.5	9.5	.0	.0	.0	.0	.0	.0
6	11.5	10.0	11.0	11.0	9.5	10.0	.0	.0	.0	.0	.0	.0
7	11.0	9.0	9.5	9.0	6.5	7.5	.0	.0	.0	.0	.0	.0
8	10.0	8.5	9.0	6.5	4.5	6.0	.0	.0	.0	.0	.0	.0
9	10.5	7.5	9.0	7.0	5.5	6.5	.0	.0	.0	.0	.0	.0
10	12.0	9.0	10.0	8.5	6.0	7.0	.0	.0	.0	.0	.0	.0
11	12.0	9.5	11.0	7.0	6.0	6.5	.0	.0	.0	.5	.0	.0
12	12.5	9.5	11.5	6.0	5.5	5.5	.0	.0	.0	.0	.0	.0
13	11.0	8.5	10.0	6.5	4.5	5.5	.0	.0	.0	.0	.0	.0
14	10.0	6.5	9.0	6.5	5.0	5.5	.0	.0	.0	.0	.0	.0
15	9.0	7.0	8.0	5.5	3.5	4.5	.0	.0	.0	.5	.0	.0
16	9.0	6.0	7.5	4.5	1.5	3.0	.0	.0	.0	.5	.0	.0
17	8.5	6.0	7.0	5.5	2.0	4.0	.0	.0	.0	.5	.0	.0
18	9.0	7.0	7.5	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0
19	9.0	6.5	8.0	5.5	4.0	4.5	.0	.0	.0	.0	.0	.0
20	11.0	7.0	8.5	4.0	1.5	2.5	.0	.0	.0	.0	.0	.0
21	12.5	10.0	11.5	2.0	.5	1.5	.0	.0	.0	.0	.0	.0
22	11.0	7.0	9.5	2.0	1.5	1.5	.0	.0	.0	.0	.0	.0
23	---	---	---	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
24	9.0	7.5	8.5	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
25	8.5	6.5	7.5	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
26	9.0	8.0	8.5	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
27	9.5	7.0	8.0	.5	.5	.5	.0	.0	.0	.0	.0	.0
28	8.0	6.0	7.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
29	7.0	4.5	6.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
30	7.5	5.0	6.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
31	8.5	6.0	7.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH				11.5	.0	4.5	.0	.0	.0	.5	.0	.0

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.0	.0	.0	.0	.0	.0	4.0	2.0	3.0	9.5	5.5	7.5
2	.0	.0	.0	.0	.0	.0	3.0	2.0	2.5	9.5	9.0	9.0
3	.0	.0	.0	.0	.0	.0	4.5	2.0	3.0	9.5	8.5	9.0
4	.0	.0	.0	.0	.0	.0	4.0	3.0	4.0	9.5	8.0	8.5
5	---	---	---	.0	.0	.0	3.5	2.5	3.0	9.0	7.0	8.0
6	---	---	---	.0	.0	.0	2.5	1.0	2.0	8.5	6.5	7.5
7	---	---	---	.0	.0	.0	3.5	.5	1.5	---	---	---
8	---	---	---	.0	.0	.0	2.0	.5	1.5	---	---	---
9	---	---	---	.0	.0	.0	3.5	.5	1.5	---	---	---
10	---	---	---	.0	.0	.0	5.0	1.5	3.0	---	---	---
11	---	---	---	.0	.0	.0	4.5	3.5	4.0	---	---	---
12	---	---	---	.0	.0	.0	5.5	4.0	4.5	---	---	---
13	---	---	---	.0	.0	.0	7.0	5.0	6.0	---	---	---
14	---	---	---	.0	.0	.0	7.5	6.0	6.5	---	---	---
15	.0	.0	.0	.0	.0	.0	6.5	5.5	6.0	---	---	---
16	.0	.0	.0	.0	.0	.0	7.5	5.0	6.0	---	---	---
17	.0	.0	.0	.0	.0	.0	9.5	6.0	7.5	---	---	---
18	.0	.0	.0	1.0	.0	.0	11.0	6.5	8.5	---	---	---
19	.0	.0	.0	1.5	1.0	1.0	10.5	7.0	8.0	---	---	---
20	.0	.0	.0	2.0	1.0	1.5	13.0	8.5	10.5	---	---	---
21	.0	.0	.0	2.5	1.5	2.0	11.5	10.5	11.0	---	---	---
22	.0	.0	.0	3.5	1.5	2.5	14.0	9.0	11.5	---	---	---
23	.0	.0	.0	4.0	3.0	3.5	15.5	10.5	13.0	---	---	---
24	.0	.0	.0	4.5	4.0	4.0	15.5	11.5	13.5	---	---	---
25	.0	.0	.0	4.0	.5	1.5	15.0	13.5	14.0	---	---	---
26	.0	.0	.0	1.5	.0	.5	14.0	11.5	13.0	---	---	---
27	.0	.0	.0	2.5	.0	1.0	12.5	10.5	11.5	---	---	---
28	.0	.0	.0	2.5	1.0	1.5	11.0	9.0	10.5	---	---	---
29	---	---	---	3.5	2.5	3.0	10.5	7.5	9.0	---	---	---
30	---	---	---	5.0	3.5	4.0	9.0	6.5	7.5	---	---	---
31	---	---	---	5.0	4.0	5.0	---	---	---	---	---	---
MONTH				5.0	.0	1.0	15.5	.5	7.0			
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1							---	---	---	23.5	19.0	21.5
2							---	---	---	23.5	20.5	22.5
3							---	---	---	22.5	20.0	21.0
4							---	---	---	21.5	18.5	20.0
5							---	---	---	23.0	18.0	20.5
6							---	---	---	22.5	19.0	21.0
7							23.5	22.0	23.0	20.5	16.5	18.0
8							22.5	19.0	21.0	17.0	13.5	15.5
9							21.0	18.0	19.5	16.0	12.5	14.5
10							19.0	17.5	18.5	15.5	14.0	15.0
11							19.5	17.0	18.0	16.5	13.5	15.0
12							20.0	16.0	18.0	19.5	14.5	17.0
13							18.5	16.5	17.5	19.0	17.0	18.0
14							17.5	15.5	16.5	18.0	15.5	17.0
15							19.0	14.0	16.0	17.0	14.0	15.5
16							18.5	14.0	16.5	17.5	13.5	15.5
17							17.0	15.5	16.0	18.0	14.5	16.0
18							19.0	15.5	17.0	18.0	14.5	16.5
19							20.0	15.5	17.5	16.5	12.5	14.5
20							21.0	16.5	18.5	15.5	11.5	13.5
21							22.0	17.0	19.5	16.0	14.0	15.0
22							22.0	18.5	20.0	15.0	12.0	14.0
23							21.5	19.0	20.0	14.5	11.0	13.0
24							22.5	18.5	20.0	15.0	11.0	13.0
25							20.0	18.0	19.0	16.0	12.5	14.5
26							20.5	16.5	18.5	16.5	12.5	14.5
27							19.0	17.0	18.0	17.0	13.0	15.0
28							18.5	17.0	17.5	17.5	14.0	16.0
29							20.0	17.0	18.5	18.5	15.0	17.0
30							23.0	17.0	20.0	18.5	16.5	17.5
31							22.5	18.0	20.5	---	---	---
MONTH										23.5	11.0	16.5

STREAMS TRIBUTARY TO LAKE HURON

04143500 NORTH BRANCH KAWKAWLIN RIVER NEAR KAWKAWLIN, MI

LOCATION.--Lat 43°40'05", long 83°58'13", in SE¼ SE¼ sec.27, T.15 N., R.4 E., Bay County, Hydrologic Unit 04080102, on left bank 50 ft (15 m) upstream from bridge on Beaver Road, 1.7 mi (2.7 km) northwest of Kawkawlin, and 2.4 mi (3.9 km) upstream from mouth.

DRAINAGE AREA.--101 mi² (262 km²).

PERIOD OF RECORD.--March 1951 to current year.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 26, 1951, nonrecording gage at site 70 ft (21 m) downstream, and Sept. 27, 1951, to Sept. 30, 1960, water-stage recorder at present site, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records fair except those for the winter period, which are poor. Some diversion above station for irrigation. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--28 years, 58.7 ft³/s (1.662 m³/s), 7.89 in/yr (200 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,610 ft³/s (45.6 m³/s) May 18, 1974, gage height, 10.92 ft (3.328 m); no flow at times in each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 548 ft³/s (15.5 m³/s) Apr. 2, gage height, 8.19 ft (2.496 m); maximum gage height, 8.54 ft (2.603 m) Mar. 11, backwater from ice; no flow June 26, 27, Aug. 11-22, Aug. 28 to Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	.56	3.6	2.5	1.0	5.2	379	123	14	5.1	.11	.00
2	2.2	.45	2.9	2.5	1.0	5.2	535	124	16	10	.02	.00
3	2.0	.39	2.7	2.7	1.0	5.4	466	244	16	10	.02	.00
4	3.3	.34	3.3	2.8	1.1	66	358	383	14	6.9	.02	.00
5	2.9	.28	4.2	2.9	1.1	130	281	448	12	4.5	.02	.00
6	1.7	.24	6.0	3.0	1.2	132	230	475	10	3.0	.02	.00
7	1.1	.16	7.7	3.0	1.2	135	184	379	8.5	1.6	.02	.00
8	.49	.11	8.1	2.2	1.2	190	159	272	6.8	.74	.02	.00
9	.34	.07	7.5	2.0	1.3	300	149	196	5.7	.68	.02	.00
10	.14	.05	6.4	1.7	1.4	430	140	157	5.8	1.6	.01	.00
11	.09	.05	5.3	1.5	1.4	460	126	133	6.3	2.4	.00	.00
12	.30	.10	4.3	1.3	1.5	430	121	116	6.1	88	.00	.00
13	1.2	.18	3.9	1.1	1.6	360	120	101	5.2	34	.00	.00
14	.78	.57	3.8	1.0	1.7	350	116	88	4.4	14	.00	.00
15	.38	.63	3.6	.90	1.9	350	111	81	3.5	8.3	.00	.00
16	.32	.57	3.4	.84	2.0	360	110	80	2.6	4.3	.00	.00
17	.19	.78	3.3	.83	2.2	367	106	77	1.5	2.7	.00	.00
18	.07	2.4	3.2	.83	2.3	394	96	70	.77	1.3	.00	.00
19	.06	2.0	3.2	.82	2.6	400	83	62	.48	.51	.00	.00
20	.06	1.8	3.2	.82	3.0	439	69	53	.28	.18	.00	.00
21	.05	1.4	3.1	.83	3.3	488	57	43	.35	.05	.00	.00
22	.05	1.2	3.1	.84	3.7	461	47	35	.39	.03	.00	.00
23	.05	2.3	3.1	.84	4.0	413	36	29	.26	.03	.02	.00
24	.05	4.8	3.1	.84	4.5	362	28	27	.12	.03	8.8	.00
25	.14	5.2	3.1	.85	4.8	307	26	34	.03	.03	4.9	.00
26	.47	5.1	3.1	.86	5.0	258	36	35	.00	.03	.92	.00
27	.58	4.7	3.1	.88	5.2	222	45	30	.00	.03	.05	.00
28	.52	4.4	3.2	.91	5.2	197	50	23	.02	.03	.00	.00
29	.53	4.1	3.1	.94	---	180	100	19	.14	.03	.00	.00
30	1.5	3.9	2.8	.96	---	199	123	16	.98	.03	.00	.00
31	.77	---	2.6	.98	---	284	---	14	---	.03	.00	---
TOTAL	24.83	48.83	123.0	44.97	67.4	8679.8	4487	3967	142.22	200.16	14.97	.00
MEAN	.80	1.63	3.97	1.45	2.41	280	150	128	4.74	6.46	.48	.000
MAX	3.3	5.2	8.1	3.0	5.2	488	535	475	16	88	8.8	.00
MIN	.05	.05	2.6	.82	1.0	5.2	26	14	.00	.03	.00	.00
CFSM	.008	.02	.04	.01	.02	2.77	1.49	1.27	.05	.06	.005	.000
IN.	.01	.02	.05	.02	.02	3.20	1.65	1.46	.05	.07	.01	.00
CAL YR 1978	TOTAL	16254.93	MEAN	44.5	MAX	790	MIN	.00	CFSM	.44	IN	5.99
WTR YR 1979	TOTAL	17800.18	MEAN	48.8	MAX	535	MIN	.00	CFSM	.48	IN	6.56

STREAMS TRIBUTARY TO LAKE HURON

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04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW¼ sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi (1.6 km) west of Linden.

DRAINAGE AREA.--81.2 mi² (210.3 km²).

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 844.96 ft (257.544 m) National Geodetic Vertical Datum of 1929.

RIMARKS.--Records good except those for the winter period, which are fair. Flow regulated by dam at Linden since 1967. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 60.6 ft³/s (1.716 m³/s), 10.13 in/yr (257 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft³/s (13.5 m³/s) Apr. 22, 1975, gage height, 7.43 ft (2.265 m); minimum, 0.74 ft³/s (0.021 m³/s) May 22, 23, 1971; minimum gage height, 2.82 ft (0.860 m) Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 170 ft³/s (4.81 m³/s) Mar. 11, gage height, 5.72 ft (1.743 m); minimum, 7.0 ft³/s (0.20 m³/s) Oct. 4; minimum gage height, 3.26 ft (0.994 m) July 28, Sept. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	24	33	35	32	16	88	65	13	58	17	20
2	14	24	34	40	32	16	89	27	14	74	36	20
3	8.0	24	35	43	32	16	88	34	14	81	42	20
4	7.3	24	37	42	32	29	88	45	15	83	42	20
5	8.1	24	39	42	32	47	94	67	15	83	43	20
6	11	24	41	41	32	70	101	70	16	83	42	20
7	13	24	48	41	32	85	105	70	16	84	40	20
8	13	23	50	41	32	90	110	70	16	84	39	19
9	13	23	47	41	32	108	112	72	17	84	39	17
10	13	20	50	41	32	149	112	75	17	81	39	9.6
11	13	20	53	41	32	166	116	69	18	74	37	10
12	14	19	49	42	32	163	120	36	19	63	30	10
13	14	18	47	42	32	160	119	44	19	68	29	10
14	13	16	47	42	31	141	118	45	19	66	28	12
15	12	16	45	43	31	130	117	54	18	64	28	11
16	9.6	18	39	44	30	121	114	58	18	37	26	11
17	11	20	39	44	29	116	111	52	18	25	20	11
18	17	23	39	44	28	111	111	45	17	24	23	12
19	18	23	38	45	28	106	111	33	16	23	27	16
20	21	23	35	44	27	107	112	31	17	22	26	15
21	20	23	35	43	27	104	111	29	17	22	25	15
22	20	25	35	42	26	87	111	25	17	22	23	14
23	21	26	35	40	26	95	109	24	16	21	23	14
24	18	25	35	40	22	102	102	25	16	21	23	14
25	19	24	34	40	14	95	88	25	16	21	22	14
26	22	24	36	40	17	92	75	25	15	21	22	13
27	24	25	34	38	17	98	78	25	15	18	22	13
28	24	30	37	36	16	99	82	24	15	10	20	7.7
29	24	28	35	34	---	99	81	24	17	11	17	7.9
30	24	33	36	33	---	98	79	16	27	11	17	8.2
31	24	---	37	32	---	90	---	12	---	13	18	---
TOTAL	499.0	693	1234	1256	785	3006	3052	1316	503	1452	885	424.4
MEAN	16.1	23.1	39.8	40.5	28.0	97.0	102	42.5	16.8	46.8	28.5	14.1
MAX	24	33	53	45	32	166	120	75	27	84	43	20
MIN	7.3	16	33	32	14	16	75	12	13	10	17	7.7
CFSM	.20	.28	.49	.50	.35	1.20	1.26	.52	.21	.58	.35	.17
IN.	.23	.32	.57	.58	.36	1.38	1.40	.60	.23	.67	.41	.19
CAL YR 1978 TOTAL	13293.5			MEAN 36.4	MAX 188	MIN 1.6	CFSM .45	IN 6.09				
WTR YR 1979 TOTAL	15105.4			MEAN 41.4	MAX 166	MIN 7.3	CFSM .51	IN 6.92				

STREAMS TRIBUTARY TO LAKE HURON

04144000 SHIAWASSEE RIVER AT BYRON, MI

LOCATION.--Lat 42°49'25", long 83°56'45", in NE¼ NE¼ sec.23, T.5 N., R.4 E., Shiawassee County, Hydrologic Unit 04080203, on left bank at upstream side of highway bridge at Byron, 0.3 mi (0.5 km) downstream from milldams which are just upstream from South Branch Shiawassee River.

DRAINAGE AREA.--368 mi² (953 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1144: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 812.00 ft (247.498 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 17, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Low flow slightly regulated at times by mills above station.

AVERAGE DISCHARGE.--32 years, 249 ft³/s (7.052 m³/s), 9.19 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,880 ft³/s (110 m³/s) Apr. 22, 1975, gage height, 15.25 ft (4.648 m); minimum, 19 ft³/s (0.54 m³/s), Aug. 16, 1965; minimum gage height, 3.55 ft (1.082 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Mar. 8, gage height, 9.25 ft (2.819 m); minimum, 38 ft³/s (1.08 m³/s) June 25, gage height, 4.11 ft (1.253 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	89	127	125	94	100	456	240	121	224	65	79
2	61	91	126	140	94	97	504	240	113	300	96	76
3	64	89	123	170	93	115	500	243	100	439	163	70
4	60	91	116	185	92	240	472	249	92	556	238	66
5	58	90	133	190	91	500	446	265	96	573	269	69
6	53	87	136	185	90	779	420	273	89	505	272	67
7	54	90	135	165	90	1090	410	254	90	421	258	68
8	56	93	132	145	90	1200	417	237	91	350	204	67
9	52	98	127	130	105	1160	432	218	95	273	147	63
10	55	99	95	120	120	1030	485	213	110	228	131	59
11	52	96	115	110	120	886	546	209	111	187	127	73
12	55	90	115	105	120	802	602	227	104	177	118	78
13	52	87	110	110	125	660	642	252	99	165	106	84
14	51	100	105	115	125	536	702	235	92	153	99	89
15	48	120	110	120	130	480	684	223	87	146	93	101
16	54	125	110	125	125	460	686	216	86	137	89	100
17	63	132	115	130	120	432	645	194	81	130	97	93
18	96	146	115	130	110	408	551	164	76	120	112	92
19	124	175	110	130	110	404	482	151	77	107	143	72
20	133	187	110	135	115	416	429	141	78	89	158	62
21	138	192	105	135	125	410	402	132	71	80	143	55
22	112	170	100	135	135	394	374	127	82	70	112	47
23	87	139	98	140	140	370	321	103	80	65	102	49
24	89	138	97	140	155	352	279	110	72	67	96	49
25	89	140	95	140	155	344	289	129	52	66	93	57
26	92	130	92	135	150	336	297	142	48	70	85	62
27	94	125	90	125	115	326	274	149	53	69	79	55
28	94	125	86	115	105	314	256	151	56	66	79	55
29	91	121	94	105	---	320	243	141	62	62	80	52
30	87	126	100	98	---	336	237	138	146	53	79	49
31	90	---	105	94	---	380	---	128	---	57	82	---
TOTAL	2368	3581	3427	4127	3239	15677	13483	5894	2610	6005	4015	2058
MEAN	76.4	119	111	133	116	506	449	190	87.0	194	130	68.6
MAX	138	192	136	190	155	1200	702	273	146	573	272	101
MIN	48	87	86	94	90	97	237	103	48	53	65	47
CFSM	.21	.32	.30	.36	.32	1.38	1.22	.52	.24	.53	.35	.19
IN.	.24	.36	.35	.42	.33	1.58	1.36	.60	.26	.61	.41	.21

CAL YR 1978 TOTAL 61249 MEAN 168 MAX 1250 MIN 30 CFSM .46 IN 6.19
WTR YR 1979 TOTAL 66484 MEAN 182 MAX 1200 MIN 47 CFSM .50 IN 6.72

STREAMS TRIBUTARY TO LAKE HURON

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04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Water years 1962 to current year.

INSTRUMENTATION.--Temperature recorder since March 1962.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 29.0°C on several days in 1971, 1974 and 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 25.5°C June 8, 9, 10, 16; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.5	8.0	7.0	1.0	.5	.0	.0	.0	.0	.0	.0
2	13.0	12.0	7.5	6.5	.5	.5	.0	.0	.0	.0	.0	.0
3	12.5	12.5	8.0	7.0	.5	.5	.0	.0	.0	.0	.0	.0
4	12.5	11.5	9.0	8.0	.5	.5	.0	.0	.0	.0	.0	.0
5	11.5	11.0	10.5	9.0	.5	.5	.0	.0	.0	.0	.0	.0
6	11.0	10.0	10.5	9.5	1.0	.5	.0	.0	.0	.0	.0	.0
7	10.0	9.0	9.5	8.0	1.0	.5	.0	.0	.0	.0	.0	.0
8	8.5	7.0	8.0	6.5	1.0	1.0	.0	.0	.0	.0	.0	.0
9	7.0	6.0	7.0	6.5	.5	.5	.0	.0	.0	.0	.0	.0
10	9.0	7.0	7.5	6.5	---	---	.0	.0	.0	.0	.0	.0
11	9.5	8.5	7.5	7.5	---	---	.0	.0	.0	.0	.0	.0
12	10.5	9.5	7.5	6.5	---	---	.0	.0	.0	.0	.0	.0
13	10.5	10.0	6.5	6.0	.0	.0	.0	.0	.0	.0	.5	.0
14	10.0	7.5	6.5	6.5	.0	.0	.0	.0	.0	.0	1.0	.5
15	---	---	6.5	6.0	.0	.0	.0	.0	.0	.0	.5	.0
16	---	---	5.5	4.5	.0	.0	.0	.0	.0	.0	1.0	.0
17	---	---	6.0	5.0	.0	.0	.0	.0	.0	.0	2.0	1.0
18	9.0	8.5	6.0	5.0	.0	.0	.0	.0	.0	.0	5.0	2.5
19	9.5	9.0	5.0	4.5	.0	.0	.0	.0	.0	.0	5.0	5.0
20	10.0	9.0	4.5	3.0	.0	.0	.0	.0	.0	.0	5.0	4.5
21	11.5	10.0	3.0	3.0	.0	.0	.0	.0	.0	.0	6.0	5.0
22	12.5	11.5	3.0	3.0	.0	.0	.0	.0	.0	.0	7.0	5.5
23	12.5	10.5	3.0	3.0	.0	.0	.0	.0	.0	.0	8.0	7.0
24	10.5	9.0	3.0	3.0	.0	.0	.0	.0	.0	.0	8.0	8.0
25	9.5	8.5	3.0	2.5	.0	.0	.0	.0	.0	.0	8.0	4.0
26	9.0	9.0	2.5	2.0	.0	.0	.0	.0	.0	.0	4.0	2.5
27	9.0	8.5	2.0	1.0	.0	.0	.0	.0	.0	.0	3.5	2.0
28	9.0	8.5	1.0	1.0	.0	.0	.0	.0	.0	.0	4.0	2.5
29	9.0	7.5	1.0	.5	.0	.0	.0	.0	---	---	5.5	4.0
30	9.0	7.0	1.0	1.0	.0	.0	.0	.0	---	---	8.0	5.5
31	9.0	8.0	---	---	.0	.0	.0	.0	---	---	8.0	7.5
MONTH			10.5	.5			.0	.0	.0	.0	8.0	.0

STREAMS TRIBUTARY TO LAKE HURON
04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.5	6.0	9.5	7.5	19.5	17.0	18.5	17.5	24.0	23.0	23.0	22.0
2	6.0	5.5	11.5	8.5	21.0	18.0	17.5	17.0	23.0	21.5	23.0	22.0
3	6.0	4.5	12.0	11.5	22.5	19.0	17.0	17.0	23.0	21.5	23.5	22.0
4	6.0	5.0	12.0	10.5	22.5	19.0	18.0	17.0	22.5	21.5	23.0	21.5
5	4.5	4.5	10.5	9.0	22.5	21.0	18.5	17.5	22.5	22.0	23.0	21.0
6	4.5	3.5	12.5	10.0	23.0	20.5	19.5	18.0	23.0	21.5	23.0	22.0
7	4.0	2.5	17.0	12.5	23.5	22.5	21.0	18.5	23.5	21.5	22.0	19.5
8	4.0	3.0	21.0	16.5	25.5	23.0	22.0	20.0	23.5	23.0	19.5	17.0
9	3.5	2.5	23.0	19.0	25.5	24.5	22.0	21.0	23.0	21.5	17.0	15.5
10	5.0	3.0	23.0	21.0	25.5	23.5	22.5	20.5	23.0	22.0	17.5	16.5
11	5.0	5.0	23.0	21.0	23.5	21.5	23.0	22.0	23.0	21.0	18.5	17.0
12	7.0	5.0	22.5	17.5	22.5	20.5	24.0	22.0	22.0	19.5	20.0	18.0
13	8.0	7.0	18.0	15.5	22.0	19.5	24.0	23.0	21.0	19.5	20.0	20.0
14	10.0	8.0	17.5	15.5	22.5	19.0	24.5	24.0	19.5	19.0	20.0	18.5
15	10.0	8.5	17.5	16.5	24.0	21.0	25.0	23.5	19.0	17.5	19.0	17.0
16	8.5	8.0	18.5	15.0	25.5	22.0	24.5	23.5	19.0	17.0	18.0	16.0
17	9.0	7.5	18.5	15.5	24.0	23.0	24.0	22.0	19.0	18.0	18.0	17.0
18	11.0	8.5	20.0	17.0	23.5	20.5	23.0	21.0	18.0	17.5	18.5	17.0
19	11.5	9.5	20.0	18.5	23.0	20.0	23.5	21.0	19.0	18.0	18.5	16.0
20	13.0	10.5	20.5	19.0	22.5	20.5	24.0	21.0	19.0	19.0	16.5	14.5
21	13.0	12.0	20.5	18.0	24.0	21.0	24.0	21.0	20.0	19.0	16.5	16.0
22	14.0	12.0	19.5	16.5	24.0	22.0	25.0	21.5	20.0	19.0	16.0	15.0
23	15.5	13.0	19.0	16.5	22.5	18.5	25.0	23.0	21.0	20.0	15.0	13.0
24	15.5	14.0	16.5	14.5	19.5	17.0	25.0	24.0	21.5	21.0	15.5	13.5
25	15.0	15.0	14.5	12.5	20.5	16.5	25.0	24.0	21.5	20.0	16.5	15.0
26	15.0	14.5	12.5	12.0	21.5	18.0	23.0	22.5	21.0	19.5	16.5	14.5
27	14.0	12.0	13.0	12.0	22.0	19.5	24.0	21.5	20.0	19.5	17.0	15.0
28	13.0	10.5	13.5	13.0	23.5	20.0	24.0	23.0	20.0	20.0	17.5	16.0
29	10.5	9.0	16.0	13.0	23.5	21.0	24.5	22.0	20.0	20.0	18.5	17.0
30	10.5	9.0	16.0	14.5	21.5	18.5	24.5	22.5	22.0	20.0	18.5	17.5
31	---	---	18.0	14.5	---	---	24.0	23.0	23.0	21.0	---	---
MONTH	15.5	2.5	23.0	7.5	25.5	16.5	25.0	17.0	24.0	17.0	23.5	13.0

STREAMS TRIBUTARY TO LAKE HURON

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04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW¼ sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi (2.4 km) north of Owosso.

DRAINAGE AREA.--538 mi² (1,393 km²).

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft (215.570 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 15, 1933, at site 1.5 mi (2.4 km) upstream at datum 5.46 ft (1.664 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated below about 800 ft³/s (22.7 m³/s) by power-plant at Shiawassee town prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--48 years, 327 ft³/s (9.261 m³/s), 8.25 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,240 ft³/s (177 m³/s) Apr. 6, 1947, gage height, 10.35 ft (3.155 m); minimum, 0.2 ft³/s (0.006 m³/s) July 27, 1934, gage height, 1.12 ft (0.341 m); minimum daily, 2.0 ft³/s (0.057 m³/s) July 28, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,710 ft³/s (48.4 m³/s) Mar. 9, gage height, 5.70 ft (1.737 m); maximum gage height, 6.67 ft (2.033 m) Mar. 4, backwater from ice; only peak discharge above base of 1,500 ft³/s (42.5 m³/s); minimum discharge, 48 ft³/s (1.36 m³/s) Sept. 25; minimum gage height, 2.00 ft (0.610 m) Oct. 10, 11, 12, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	88	149	150	150	160	607	323	151	607	89	89
2	72	89	146	160	150	155	611	316	143	663	123	89
3	78	89	155	155	150	150	652	364	136	593	123	89
4	74	88	160	160	145	800	662	376	129	644	197	87
5	74	87	150	165	140	1300	647	362	111	695	310	83
6	71	95	160	190	140	1460	633	360	124	656	334	79
7	67	100	150	210	140	1390	618	354	121	572	331	77
8	63	105	160	220	140	1470	589	330	124	475	317	77
9	62	110	130	230	140	1670	680	306	124	408	272	75
10	62	112	140	220	150	1680	780	290	129	338	222	74
11	60	116	160	210	180	1340	820	320	137	294	176	71
12	62	113	160	200	185	1100	867	298	139	447	159	67
13	71	116	160	195	185	1080	923	303	128	325	149	71
14	66	118	160	190	190	973	959	316	117	251	137	77
15	65	108	150	190	190	721	979	292	108	215	121	82
16	78	126	140	190	195	651	891	273	99	194	111	89
17	67	156	130	190	200	641	842	257	97	177	130	103
18	70	158	125	190	195	616	754	233	95	166	125	98
19	80	162	120	190	170	603	648	198	93	152	131	93
20	130	200	115	185	170	599	568	176	105	138	157	86
21	150	223	110	185	180	590	509	168	99	129	193	75
22	156	229	105	185	200	570	476	153	98	100	184	69
23	142	233	100	190	210	546	433	145	93	104	152	61
24	108	180	100	190	215	516	383	132	100	138	130	55
25	100	164	100	185	220	488	355	117	98	64	115	51
26	109	166	105	180	215	467	389	142	87	66	108	51
27	101	160	105	180	215	451	388	162	68	70	104	51
28	97	153	110	170	180	438	352	171	67	103	99	52
29	96	142	110	160	---	424	334	177	101	85	113	51
30	94	151	120	155	---	482	334	168	286	86	95	53
31	88	---	130	150	---	588	---	159	---	88	90	---
TOTAL	2688	4137	4115	5720	4940	24119	18683	7741	3507	9043	5097	2225
MEAN	86.7	138	133	185	176	778	623	250	117	292	164	74.2
MAX	156	233	160	230	220	1680	979	376	286	695	334	103
MIN	60	87	100	150	140	150	334	117	67	64	89	51
CFSM	.16	.26	.25	.34	.33	1.45	1.16	.47	.22	.54	.31	.14
IN.	.19	.29	.28	.40	.34	1.67	1.29	.54	.24	.63	.35	.15

CAL YR 1978 TOTAL 78975 MEAN 216 MAX 2030 MIN 27 CFSM .40 IN 5.46
WTR YR 1979 TOTAL 92015 MEAN 252 MAX 1680 MIN 51 CFSM .47 IN 6.36

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi (1.9 km) east of Fergus, 1.8 mi (2.9 km) upstream from Bear Creek, and 14 mi (22 km) above mouth.

DRAINAGE AREA.--637 mi² (1,650 km²).

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft (178.552 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Aug. 4 to Sept. 19, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 415 ft³/s (11.75 m³/s), 8.85 in/yr (225 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft³/s (212 m³/s) Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.44 ft (4.706 m), present datum, Mar. 29, 1960; minimum discharge, 27 ft³/s (0.76 m³/s) Aug. 8, 1966; minimum gage height, 1.60 ft (0.488 m) July 25, 26, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,000 ft³/s (56.6 m³/s) Mar. 10, based on correlation with nearby stations; maximum gage height, 11.49 ft (3.502 m), Mar. 6, backwater from ice; minimum discharge, 67 ft³/s (1.90 m³/s) Sept. 25-30; minimum gage height recorded, 1.83 ft (0.558 m) Sept. 28-30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	114	115	150	180	155	180	930	437	186	386	93	100
2	100	118	180	190	160	170	864	419	184	701	110	100
3	100	122	180	180	160	180	923	434	168	613	135	100
4	103	121	206	175	160	450	923	498	153	610	200	100
5	98	119	174	170	155	1000	854	463	146	657	320	95
6	98	115	171	190	155	1500	833	447	125	704	380	93
7	99	121	182	240	155	1700	813	429	128	636	380	90
8	93	117	184	250	150	1600	746	404	129	537	370	88
9	85	113	156	240	150	1700	756	369	125	463	330	86
10	81	114	106	230	170	1900	958	346	136	411	270	84
11	79	115	110	220	200	1800	990	335	161	332	220	82
12	76	118	171	220	210	1600	1040	351	161	364	190	79
13	78	117	206	220	210	1300	1170	337	147	424	180	79
14	84	125	211	215	210	1250	1130	332	147	319	160	85
15	89	129	188	215	210	1150	1160	341	139	248	140	94
16	88	118	173	215	210	900	1100	330	124	216	130	100
17	92	125	160	210	210	840	1010	309	118	195	140	115
18	84	153	150	210	210	820	950	284	117	180	150	110
19	82	156	140	215	210	803	837	263	110	168	145	98
20	90	156	135	220	210	796	736	231	110	156	175	92
21	128	179	130	220	210	776	657	216	110	145	200	91
22	153	197	125	220	215	749	613	200	117	133	220	85
23	177	206	125	220	220	717	570	198	114	113	190	77
24	162	208	120	225	240	685	520	191	106	119	160	70
25	133	173	120	230	260	654	485	174	100	143	140	67
26	132	162	115	225	255	621	482	153	101	97	130	67
27	133	159	115	220	250	595	593	184	97	80	120	67
28	128	158	110	200	220	579	520	203	91	84	115	67
29	122	170	120	190	---	573	460	211	84	113	130	67
30	117	147	140	175	---	675	445	214	117	92	115	67
31	115	---	160	165	---	1060	---	191	---	92	105	---
TOTAL	3313	4246	4713	6495	5530	29323	24068	9494	3851	9531	5843	2595
MEAN	107	142	152	210	198	946	802	306	128	307	188	86.5
MAX	177	208	211	250	260	1900	1170	498	186	704	380	115
MIN	76	113	106	165	150	170	445	153	84	80	93	67
CFSM	.17	.22	.24	.33	.31	1.49	1.26	.48	.20	.48	.30	.14
IN.	.19	.25	.28	.38	.32	1.71	1.41	.55	.22	.56	.34	.15

CAL YR 1978 TOTAL 91697 MEAN 251 MAX 2670 MIN 49 CFSM .39 IN 5.35
WTR YR 1979 TOTAL 109002 MEAN 299 MAX 1900 MIN 67 CFSM .47 IN 6.37

STREAMS TRIBUTARY TO LAKE HURON

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi (3.2 km) west of Lapeer.

DRAINAGE AREA.--55.3 mi² (143.2 km²).

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952(M). WRD MI-78: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft (245.605 m) National Geodetic Vertical Datum of 1929. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for January and February, which are fair. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, 29.8 ft³/s (0.844 m³/s), 7.32 in/yr (186 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) Apr. 6, 1947, gage height, 19.87 ft (6.056 m), from flood-mark, from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 196 ft³/s (5.55 m³/s) Mar. 7, gage height, 16.86 ft (5.139 m), only peak above base of 160 ft³/s (4.53 m³/s); minimum, 2.3 ft³/s (0.065 m³/s) Sept. 23, 24-26, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	7.2	15	24	13	13	49	57	15	24	5.6	4.1
2	12	7.2	14	21	13	14	57	60	14	31	13	4.1
3	11	9.0	16	19	13	22	57	64	13	42	16	3.8
4	9.6	14	18	17	13	74	56	60	12	51	18	3.5
5	8.6	18	17	16	12	110	57	59	11	49	18	3.5
6	8.2	18	16	15	12	155	59	59	9.7	41	18	3.3
7	8.2	17	16	14	12	174	56	54	9.3	32	15	3.3
8	7.9	15	16	14	12	156	55	39	8.6	24	12	3.3
9	7.6	14	13	13	12	109	59	33	8.6	18	10	3.1
10	7.6	12	13	13	11	95	59	32	9.7	16	10	3.1
11	6.8	12	14	13	11	78	56	31	12	14	9.7	2.9
12	6.5	13	13	13	11	74	61	29	13	13	8.6	2.7
13	6.2	19	13	13	11	66	66	23	14	13	7.9	2.9
14	5.9	24	11	12	10	60	97	18	13	13	6.9	3.5
15	5.6	23	12	12	10	46	95	16	11	12	5.9	3.5
16	5.9	20	12	12	10	49	127	15	9.7	10	5.3	3.5
17	6.2	19	12	12	9.8	42	137	15	8.6	9.3	5.0	3.5
18	6.2	17	11	12	9.6	44	122	14	6.9	9.3	5.9	3.3
19	6.5	17	10	12	9.4	44	105	14	5.9	8.6	6.5	2.9
20	6.9	17	11	12	9.4	44	90	13	5.6	7.9	6.5	2.9
21	6.9	25	13	12	9.1	46	77	13	5.0	7.2	6.2	2.7
22	6.5	29	13	12	9.0	46	65	12	4.4	6.5	5.9	2.5
23	6.5	31	13	13	9.0	45	39	12	4.1	5.9	5.6	2.5
24	6.9	27	12	15	9.3	44	25	12	3.5	5.6	5.6	2.3
25	7.2	24	11	14	10	42	24	12	3.3	5.3	5.3	2.3
26	7.2	22	10	14	10	41	28	13	2.9	5.0	5.0	2.3
27	7.6	20	9.6	14	11	39	38	14	2.7	5.0	4.7	2.5
28	7.6	19	9.3	14	12	38	42	16	2.7	5.3	4.7	2.5
29	7.2	18	11	13	---	40	50	17	4.1	5.6	4.7	2.7
30	7.2	17	13	13	---	45	57	17	11	5.3	5.0	2.7
31	7.2	---	18	13	---	45	---	16	---	5.3	4.4	---
TOTAL	232.4	544.4	405.9	436	303.5	1940	1965	859	254.3	500.1	260.9	91.7
MEAN	7.50	18.1	13.1	14.1	10.8	62.6	65.5	27.7	8.48	16.1	8.42	3.06
MAX	12	31	18	24	13	174	137	64	15	51	18	4.1
MIN	5.6	7.2	9.3	12	9.0	13	24	12	2.7	5.0	4.4	2.3
CFSM	.14	.33	.24	.26	.20	1.13	1.18	.50	.15	.29	.15	.06
IN.	.16	.37	.27	.29	.20	1.31	1.32	.58	.17	.34	.18	.06

CAL YR 1978 TOTAL 8577.8 MEAN 23.5 MAX 260 MIN 1.1 CFSM .43 IN 5.77
WTR YR 1979 TOTAL 7793.2 MEAN 21.4 MAX 174 MIN 2.3 CFSM .39 IN 5.24

STREAMS TRIBUTARY TO LAKE HURON

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW₄ sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi (5.6 km) southeast of Otisville.

DRAINAGE AREA.--526 mi² (1,362 km²).

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft (35.6 hm³) at elevation 760.00 ft (231.65 m). The spillway section includes two 90 foot (27.4 m) drum gates with minimum crest elevation of 751 ft (228.9 m), maximum at 755 ft (230.1 m), three 20-foot (6.1 m) radial gates with sill elevation of 745 ft (227.1 m), and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft (220.7 m). Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft (28.2 hm³) Mar. 8, 1956, elevation, 757.4 ft (230.86 m); minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 820,000,000 cu ft (23.2 hm³) Mar. 16, elevation, 755.55 ft (230.29 m); minimum, 252,000,000 cu ft (7.14 hm³) Oct. 17, elevation, 746.75 ft (227.61 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month	
			Millions of cubic feet	Equivalent in ft ³ /s
Sept. 30	748.42	326	--	--
Oct. 31	747.91	300	-26	-9.7
Nov. 30	751.23	487	+187	+72.1
Dec. 31	751.30	491	+4	+1.5
CAL YR 1978	--	--	-6	-0.2
Jan. 31	751.11	480	-11	-4.1
Feb. 28	751.14	481	+1	+0.4
Mar. 31	752.64	582	+101	+37.7
Apr. 30	754.61	736	+154	+59.4
May 31	755.17	785	+49	18.3
June 30	755.07	776	-9	-3.5
July 31	754.23	705	-71	-26.5
Aug. 31	754.91	762	+57	+21.3
Sept. 30	753.42	641	-121	-46.7
WTR YR 1979	--	--	+315	+10.0

STREAMS TRIBUTARY TO LAKE HURON

325

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE¼ sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 15, 1.5 mi (2.4 km) downstream from Holloway Reservoir, 3.5 mi (5.6 km) upstream from Powers-Cullen drain, and 3.8 mi (6.1 km) south of Otisville.

DRAINAGE AREA.--530 mi² (1,373 km²).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft (219.880 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi (2.4 km) above station (see preceding page). Several observations of water temperature were made during the year. City of Flint gage-height telemark at station.

AVERAGE DISCHARGE.--27 years, 291 ft³/s (8.241 m³/s), 7.46 in/yr (189 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft³/s (174 m³/s) Apr. 1, 1960, gage height, 14.97 ft (4.563 m); minimum, 2.1 ft³/s (0.059 m³/s) Oct. 11, 12, 1971, gage height, 1.57 ft (0.479 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Apr. 16, gage height, 10.40 ft (3.170 m); minimum, 12 ft³/s (0.34 m³/s) several days in Nov. and Sept.; minimum gage height, 1.94 ft (0.591 m) Nov. 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	159	15	114	194	121	121	382	353	149	240	104	14
2	158	15	116	237	120	125	412	311	142	372	83	50
3	157	15	122	250	117	132	443	299	133	443	74	101
4	155	14	126	247	119	242	466	380	127	450	13	99
5	150	14	128	243	116	570	478	423	127	395	17	98
6	151	14	132	233	117	861	489	434	115	336	60	98
7	151	14	139	211	116	1290	509	435	105	280	89	98
8	150	14	140	185	115	1510	523	410	110	231	109	98
9	150	14	134	161	112	1510	526	384	120	194	109	98
10	149	14	116	141	109	1420	532	347	106	163	109	98
11	147	14	112	127	108	1200	545	307	132	165	104	99
12	148	13	115	116	105	974	557	291	134	182	89	98
13	148	13	114	121	103	856	551	271	127	188	74	99
14	148	12	109	130	103	808	604	247	117	181	70	100
15	147	12	106	114	101	711	823	239	107	182	68	100
16	124	12	104	111	96	629	1440	220	108	166	63	99
17	46	13	105	110	97	620	1690	201	97	135	61	99
18	31	13	104	106	95	624	1390	188	96	111	66	99
19	30	12	101	105	92	625	1080	179	79	98	68	100
20	30	12	104	105	91	631	971	172	88	165	69	100
21	30	12	113	105	93	633	848	168	91	170	68	100
22	30	12	113	107	91	639	826	161	85	106	64	100
23	32	13	113	107	94	628	694	156	71	128	60	100
24	32	12	115	111	99	611	427	148	69	148	55	102
25	26	12	116	115	104	593	259	144	59	146	54	107
26	15	30	108	114	110	560	173	133	53	140	56	107
27	15	56	104	114	113	516	180	143	51	140	81	107
28	15	67	102	117	117	320	192	155	60	139	115	100
29	15	90	103	118	---	241	241	163	74	139	104	13
30	15	97	110	118	---	295	305	166	127	139	102	12
31	15	---	133	120	---	346	---	164	---	139	85	---
TOTAL	2769	670	3571	4493	2974	20841	18556	7792	3059	6211	2343	2693
MEAN	89.3	22.3	115	145	106	672	619	251	102	200	75.6	89.8
MAX	159	97	140	250	121	1510	1690	435	149	450	115	107
MIN	15	12	101	105	91	121	173	133	51	98	13	12
MEAN+	79.6	94.5	117	141	107	710	678	270	98.5	174	96.9	43.1
CFSM+	.15	.18	.22	.27	.20	1.34	1.28	.51	.19	.33	.18	.08
IN+	.17	.20	.25	.31	.21	1.54	1.43	.59	.21	.38	.21	.09

CAL YR 1978 TOTAL 95168 MEAN 261 MAX 2680 MIN 12 MEAN+ 261 CFSM+ .49 IN+ 6.67
WTR YR 1979 TOTAL 75972 MEAN 208 MAX 1690 MIN 12 MEAN+ 218 CFSM+ .41 IN+ 5.59

+ Adjusted for change in contents in Holloway Reservoir.

STREAMS TRIBUTARY TO LAKE HURON

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE¼ NE¼ sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Frances Road, 2.3 mi (3.7 km) upstream from mouth, and 2.0 mi (3.2 km) northeast of Genesee.

DRAINAGE AREA.--34.7 mi² (89.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 730 ft (223 m) from topographic map (nearest 10 ft). Prior to June 11, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 21.0 ft³/s (0.595 m³/s), 8.22 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 533 ft³/s (15.1 m³/s) May 17, 1974, gage height, 8.21 ft (2.502 m); maximum gage height, 8.68 ft (2.646 m) Dec. 31, 1972; minimum discharge, 1.2 ft³/s (0.034 m³/s) Dec. 1, 1971, result of freezeup, Oct. 3, 1978; minimum gage height, 1.48 ft (0.451 m) July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 392 ft³/s (11.1 m³/s) Mar. 4, gage height, 8.64 ft (2.633 m), only peak above base of 200 ft³/s (5.66 m³/s); minimum, 1.2 ft³/s (0.034 m³/s) Oct. 3; minimum gage height, 1.49 ft (0.454 m) July 15, 20, 21, 22, 23, 24, 25, Sept. 11, 12, 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	4.4	4.2	36	4.7	7.4	38	17	4.5	9.6	2.3	2.2
2	1.4	4.4	5.2	18	4.6	7.8	40	15	4.2	8.8	3.5	2.2
3	1.4	4.3	4.4	14	4.5	8.3	37	45	3.9	5.8	3.1	2.1
4	1.5	4.2	5.3	10	4.5	220	30	38	3.7	4.9	2.7	2.1
5	1.6	4.1	6.4	8.7	4.5	160	28	29	3.5	4.1	2.6	2.0
6	1.9	4.2	4.7	8.0	4.5	66	31	25	3.2	3.5	2.4	2.0
7	2.0	4.1	4.6	7.4	4.5	65	25	21	3.1	3.0	2.2	2.0
8	1.8	3.8	4.3	6.8	4.5	64	23	18	3.3	2.7	2.2	2.1
9	1.6	3.9	4.2	6.4	4.4	56	30	15	4.0	2.7	2.1	2.1
10	1.6	3.9	4.1	6.1	4.4	50	34	13	3.4	2.7	2.5	2.0
11	1.7	3.8	4.0	5.9	4.4	40	28	12	3.6	2.6	2.4	2.0
12	2.0	3.7	4.2	5.8	4.4	35	35	11	3.4	2.6	2.2	1.9
13	2.8	3.5	4.1	5.8	4.4	31	33	11	3.1	2.4	2.2	3.5
14	2.4	4.0	3.9	5.7	4.4	32	75	10	2.9	2.3	2.2	6.0
15	2.6	3.9	3.8	5.7	4.4	35	47	9.2	2.7	2.2	2.1	4.4
16	2.9	3.6	3.6	5.6	4.3	29	39	8.3	2.6	2.1	2.0	3.5
17	3.2	4.0	3.4	5.6	4.3	24	34	7.5	2.5	2.1	2.1	3.0
18	3.9	5.0	3.5	5.6	4.3	37	28	6.9	2.5	2.0	2.2	2.7
19	5.2	4.8	3.5	5.6	4.3	41	23	6.2	2.4	2.0	2.3	2.6
20	5.2	4.6	3.8	5.5	4.5	36	20	5.8	2.5	1.9	2.2	2.4
21	5.1	4.5	3.9	5.5	4.6	34	18	5.6	2.8	1.9	2.2	2.4
22	5.0	4.4	3.6	5.4	4.7	30	17	5.3	2.6	1.9	2.1	2.3
23	6.8	5.4	3.5	5.3	4.9	26	16	5.1	2.5	1.9	2.1	2.3
24	7.6	6.3	3.5	5.2	5.3	24	14	4.9	2.5	1.9	2.1	2.2
25	7.0	5.6	3.6	5.1	5.7	24	14	4.9	2.4	2.0	2.2	2.0
26	6.6	4.7	3.7	5.0	6.3	21	18	5.3	2.3	2.1	2.7	2.0
27	6.2	4.3	3.9	5.0	7.0	20	24	5.5	2.3	2.1	2.9	2.0
28	5.5	4.2	4.1	5.0	7.2	22	19	5.3	2.4	2.4	2.9	2.0
29	4.9	4.7	4.6	4.9	---	31	17	5.2	2.6	2.2	2.9	2.0
30	4.8	4.1	5.6	4.9	---	55	18	5.0	4.7	2.1	2.7	2.0
31	4.7	---	15	4.7	---	52	---	4.8	---	2.4	2.4	---
TOTAL	112.4	130.4	140.2	234.2	134.5	1383.5	853	380.8	92.1	92.9	74.7	74.0
MEAN	3.63	4.35	4.52	7.55	4.80	44.6	28.4	12.3	3.07	3.00	2.41	2.47
MAX	7.6	6.3	15	36	7.2	220	75	45	4.7	9.6	3.5	6.0
MIN	1.4	3.5	3.4	4.7	4.3	7.4	14	4.8	2.3	1.9	2.0	1.9
CFSM	.11	.13	.13	.22	.14	1.29	.82	.35	.09	.09	.07	.07
IN.	.12	.14	.15	.25	.14	1.48	.91	.41	.10	.10	.08	.08
CAL YR 1978 TOTAL	6299.5			MEAN 17.3	MAX 304	MIN 1.4	CFSM .50	IN 6.75				
WTR YR 1979 TOTAL	3702.7			MEAN 10.1	MAX 220	MIN 1.4	CFSM .29	IN 3.97				

STREAMS TRIBUTARY TO LAKE HURON

327

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE¼ sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) upstream from bridge on State Highway 21, 1.4 mi (2.3 km) downstream from Black Creek, and 3.3 mi (5.3 km) west of Davison.

DRAINAGE AREA.--99.4 mi² (257.4 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft (227.804 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--14 years, 68.6 ft³/s (1.943 m³/s), 9.37 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Apr. 21, 1975, gage height, 11.32 ft (3.450 m); minimum, 2.5 ft³/s (0.071 m³/s) Sept. 10, 1978; minimum gage height, 2.69 ft (0.820 m) Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 470 ft³/s (13.3 m³/s) Mar. 5, based on correlation with nearby stations, gage height, 9.59 ft (2.923 m), backwater from ice, only peak above base of 350 ft³/s (9.91 m³/s); minimum, 4.4 ft³/s (0.12 m³/s) Sept. 28, gage height, 2.90 ft (0.884 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.0	16	23	77	24	35	126	88	32	124	12	8.5
2	5.9	15	22	60	24	36	146	81	29	146	48	8.4
3	6.5	14	30	52	24	75	144	95	27	151	43	8.1
4	6.7	14	38	48	24	360	119	92	24	151	48	7.6
5	7.3	19	29	44	24	400	122	96	22	130	46	6.9
6	9.1	16	39	40	23	280	142	100	15	93	38	6.4
7	9.5	18	35	35	23	300	122	80	13	52	31	6.4
8	9.0	16	36	30	23	290	119	64	20	42	25	6.8
9	8.8	15	26	27	23	280	138	60	25	40	21	6.5
10	8.6	21	29	25	22	208	149	58	25	38	22	7.1
11	8.2	18	34	24	22	158	120	61	28	40	19	6.4
12	8.6	16	31	24	22	147	138	65	27	38	17	6.3
13	8.8	20	31	23	22	132	139	62	29	37	16	6.2
14	8.7	26	28	23	22	120	246	53	40	33	14	11
15	8.2	21	26	23	22	94	205	46	22	31	12	9.0
16	10	17	20	23	22	108	270	42	11	26	10	9.8
17	10	25	19	23	22	94	259	39	7.4	22	10	10
18	12	19	18	24	22	96	188	35	7.4	20	14	9.0
19	15	19	17	24	22	88	152	34	8.1	16	13	8.2
20	17	23	17	24	23	85	123	32	11	15	14	7.1
21	18	23	25	24	23	96	104	31	9.8	13	14	6.6
22	18	22	27	25	25	89	86	28	8.6	13	12	6.1
23	18	27	25	25	28	84	74	26	7.8	12	11	6.2
24	15	24	23	26	32	79	70	26	7.4	11	11	6.0
25	16	24	22	26	33	71	70	25	7.2	10	9.7	5.8
26	26	27	22	26	33	71	69	28	6.8	9.7	9.0	5.6
27	23	27	22	26	34	69	67	30	6.2	9.2	8.6	5.4
28	21	26	21	25	34	68	90	34	6.6	17	8.5	5.4
29	19	28	21	25	---	73	101	35	13	12	9.4	5.3
30	18	27	30	25	---	105	95	36	46	13	9.2	6.4
31	17	---	47	25	---	124	---	34	---	15	8.8	---
TOTAL	392.9	623	833	951	697	4315	3993	1616	542.3	1379.9	584.2	214.5
MEAN	12.7	20.8	26.9	30.7	24.9	139	133	52.1	18.1	44.5	18.8	7.15
MAX	26	28	47	77	34	400	270	100	46	151	48	11
MIN	5.9	14	17	23	22	35	67	25	6.2	9.2	8.5	5.3
CFSM	.13	.21	.27	.31	.25	1.40	1.34	.52	.18	.45	.19	.07
IN.	.15	.23	.31	.36	.26	1.61	1.49	.60	.20	.52	.22	.08

CAL YR 1978 TOTAL 17525.8 MEAN 48.0 MAX 644 MIN 3.1 CFSM .48 IN 6.56
WTR YR 1979 TOTAL 16141.8 MEAN 44.2 MAX 400 MIN 5.3 CFSM .45 IN 6.04

STREAMS TRIBUTARY TO LAKE HURON

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NE¼ SW¼ sec.10, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft (8 m) downstream from culvert on extension of Arapaho Street, 5.1 mi (8.2 km) upstream from mouth, and 3.5 mi (5.6 km) east of Flint.

DRAINAGE AREA.--6.43 mi² (16.65 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.56 ft (227.856 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair except those for the winter period and those below 1.0 ft³/s (0.028 m³/s), which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 4.58 ft³/s (0.130 m³/s), 9.67 in/yr (246 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 285 ft³/s (8.07 m³/s) Apr. 19, 1975, gage height, 7.66 ft (2.335 m); no flow on many days during 1970, 1973-79.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 130 ft³/s (3.68 m³/s) Mar. 4, based on correlation with nearby stations, gage height, 5.15 ft (1.570 m), backwater from ice, only peak above base of 80 ft³/s (2.27 m³/s); no flow on many days during year.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.03	.00	.17	6.8	.00	.60	6.1	2.7	.26	25	.21	.01
2	.04	.00	.07	1.2	.00	.50	16	2.3	.16	5.2	12	.00
3	.06	.00	.37	.20	.00	10	10	8.7	.15	1.0	1.5	.00
4	.20	.00	3.9	.14	.00	90	6.1	4.4	.10	1.1	.86	.00
5	.18	.00	1.1	.10	.00	34	7.3	3.1	.10	.77	.58	.00
6	1.5	.00	.51	.08	.00	15	14	2.7	.09	.55	.22	.00
7	1.0	.02	.21	.07	.00	8.0	6.4	2.3	.08	.36	.08	.00
8	.11	.00	.57	.05	.00	5.6	6.1	1.8	4.6	.17	.06	.00
9	.02	.00	.41	.04	.00	4.3	15	1.4	3.1	.11	.05	.00
10	.00	.00	.08	.03	.00	3.6	18	2.2	.51	.13	.53	.00
11	.00	.00	.03	.03	.00	3.1	8.7	1.8	.55	.68	.25	.00
12	.00	.00	.03	.02	.00	3.3	12	1.3	.29	.81	.06	.00
13	.00	.03	.02	.02	.00	3.5	11	1.6	.07	.42	.03	.02
14	.00	.50	.02	.01	.00	3.0	38	1.2	.03	.13	.02	.17
15	.00	.32	.02	.01	.00	2.7	14	1.0	.03	.10	.01	.11
16	.09	.05	.02	.00	.00	3.0	6.8	.94	.02	.07	.00	.02
17	.19	.52	.02	.00	.00	2.8	5.1	.86	.00	.04	.08	.00
18	.05	1.2	.02	.00	.00	2.6	4.2	.86	.00	.03	.57	.00
19	.00	.21	.02	.00	.00	2.4	3.6	.89	.00	.03	.22	.00
20	.00	.05	.02	.00	.01	2.3	3.1	.86	.38	.02	.04	.00
21	.00	.03	.02	.00	.02	2.2	2.7	.90	.67	.01	.02	.00
22	.00	.03	.02	.00	.03	2.1	2.5	.74	.08	.02	.01	.00
23	.06	1.5	.02	.01	.10	2.4	2.2	.61	.01	.02	.00	.00
24	.27	.97	.02	.02	.50	2.5	2.1	.63	.00	.02	.00	.00
25	.12	.17	.04	.03	.50	2.7	2.2	.70	.00	.01	.00	.00
26	1.5	.06	.06	.02	.38	2.8	2.9	.80	.00	.01	.00	.00
27	.61	.04	.06	.02	.28	2.7	3.7	.88	.00	.01	.00	.00
28	.08	.06	.05	.01	.45	3.3	2.6	.97	.00	1.6	.00	.00
29	.02	.11	.05	.00	---	6.0	2.5	.82	1.9	.35	.04	.00
30	.00	.51	2.6	.00	---	15	3.0	.59	18	.36	.13	.00
31	.00	---	6.5	.00	---	13	---	.44	---	.74	.04	---
TOTAL	6.13	6.38	17.05	8.91	2.27	255.00	237.9	50.99	31.18	39.87	17.61	.33
MEAN	.20	.21	.55	.29	.081	8.23	7.93	1.64	1.04	1.29	.57	.011
MAX	1.5	1.5	6.5	6.8	.50	90	38	8.7	18	25	12	.17
MIN	.00	.00	.02	.00	.00	.50	2.1	.44	.00	.01	.00	.00
CFSM	.03	.03	.09	.05	.01	1.28	1.23	.26	.16	.20	.09	.002
IN.	.04	.04	.10	.05	.01	1.48	1.38	.29	.18	.23	.10	.00

CAL YR 1978 TOTAL 795.92 MEAN 2.18 MAX 110 MIN .00 CFSM .34 IN 4.60
WTR YR 1979 TOTAL 673.62 MEAN 1.85 MAX 90 MIN .00 CFSM .29 IN 3.90

STREAMS TRIBUTARY TO LAKE HURON

329

04148300 SWARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW¼ sec.26, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft (2 m) downstream from bridge on South Ballenger Highway, in Flint, 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--115 mi² (298 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft (221.605 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 4, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--9 years, 79.9 ft³/s (2.263 m³/s), 9.44 in/yr (240 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft³/s (89.5 m³/s) Apr. 19, 1975, gage height, 9.02 ft (2.749 m); minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 9, 1978; minimum gage height, 1.16 ft (0.354 m) Aug. 19, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,400 ft³/s (39.6 m³/s) Mar. 4, based on correlation with nearby stations, gage height, 8.18 ft (2.493 m), backwater from ice, only peak above base of 800 ft³/s (22.7 m³/s); minimum, 0.37 ft³/s (0.010 m³/s) Sept. 27, 28, gage height, 1.34 ft (0.408 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.4	3.9	8.5	110	13	20	138	70	21	242	18	4.1
2	2.4	4.2	9.2	80	12	21	160	67	20	151	84	3.8
3	5.1	4.5	18	60	12	60	161	98	18	85	43	3.0
4	3.4	5.3	30	40	12	950	130	92	18	75	28	2.9
5	4.2	4.3	19	26	12	758	130	81	16	55	22	3.3
6	6.5	6.0	15	22	12	379	171	76	16	42	17	2.7
7	3.4	5.4	13	20	12	273	135	71	15	35	14	2.3
8	3.1	4.4	15	18	11	253	125	67	24	31	13	2.7
9	2.8	4.6	12	17	11	230	182	63	25	31	12	2.5
10	2.8	4.3	11	16	11	209	259	73	20	28	17	1.9
11	2.8	4.3	11	16	11	155	191	64	17	104	11	1.7
12	3.1	4.3	12	15	12	150	215	64	14	209	9.7	1.5
13	2.8	6.4	12	16	12	149	193	59	12	84	8.9	27
14	2.9	7.4	11	16	12	144	285	55	10	53	8.1	16
15	3.5	4.3	11	16	12	114	215	51	9.7	40	7.3	3.5
16	9.2	4.2	10	16	12	117	165	48	9.7	32	6.5	2.5
17	4.0	13	9.5	16	12	104	142	45	8.9	27	15	1.7
18	3.6	7.8	8.8	16	12	121	127	41	8.1	24	16	1.3
19	3.8	6.2	8.8	16	12	127	117	40	8.1	21	12	.95
20	3.8	5.5	10	16	12	114	108	37	20	19	9.1	.94
21	4.3	5.3	11	16	12	107	101	36	13	17	7.9	1.0
22	4.4	5.1	10	15	13	100	94	32	9.7	15	7.6	.97
23	7.5	16	9.6	15	15	94	88	31	7.7	14	7.2	.83
24	3.6	9.9	9.2	15	18	92	82	29	6.9	12	6.7	.70
25	7.2	8.1	9.3	14	19	91	80	27	6.1	12	5.7	1.1
26	12	7.1	9.2	13	19	88	86	28	5.1	11	5.2	1.0
27	5.6	11	8.8	14	19	82	81	25	4.8	9.3	5.2	.44
28	4.8	9.1	8.4	14	20	85	76	26	4.5	23	4.8	.49
29	4.0	8.2	8.6	13	---	99	73	24	15	11	8.1	1.2
30	3.8	9.1	20	13	---	180	76	23	126	13	7.1	1.3
31	3.9	---	50	13	---	183	---	22	---	13	5.4	---
TOTAL	137.7	199.2	408.9	723	372	5649	4186	1565	509.3	1538.3	442.5	95.32
MEAN	4.44	6.44	13.2	23.3	13.3	182	140	50.5	17.0	49.6	14.3	3.18
MAX	12	16	50	110	20	950	285	98	126	242	84	27
MIN	2.4	3.9	8.4	13	11	20	73	22	4.5	9.3	4.8	.44
CFSM	.04	.06	.12	.20	.12	1.58	1.22	.44	.15	.43	.12	.03
IN.	.04	.06	.13	.23	.12	1.83	1.35	.51	.16	.50	.14	.03

CAL YR 1978 TOTAL 14041.53 MEAN 38.5 MAX 949 MIN .02 CFSM .34 IN 4.54
WTR YR 1979 TOTAL 15826.22 MEAN 43.4 MAX 950 MIN .44 CFSM .38 IN 5.12

STREAMS TRIBUTARY TO LAKE HURON

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on Bristol Road, 6.0 mi (9.7 km) upstream from mouth, and 4.0 mi (6.4 km) southeast of Flint.

DRAINAGE AREA.--54.4 mi² (140.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft (232.977 m) National Geodetic Vertical Datum of 1929. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--9 years, 37.3 ft³/s (1.056 m³/s), 9.31 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft³/s (35.7 m³/s) Apr. 19, 1975, gage height, 7.65 ft (2.332 m) from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 400 ft³/s (11.3 m³/s) Mar. 4, based on correlation with nearby stations, gage height, 5.87 ft (1.789 m), backwater from ice, only peak above base of 300 ft³/s (8.50 m³/s); minimum, 0.05 ft³/s (0.001 m³/s) Sept. 27, gage height, 0.61 ft (0.186 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	4.4	6.9	50	9.4	15	65	41	10	81	6.4	5.5
2	2.2	4.0	11	35	9.2	16	79	37	9.5	62	43	4.1
3	2.4	3.6	27	29	9.1	25	69	50	8.7	56	21	2.6
4	2.9	3.3	16	25	9.0	230	64	42	7.5	68	22	1.8
5	3.1	3.1	14	20	8.9	235	65	44	6.5	48	20	1.7
6	7.0	3.4	12	18	8.9	155	91	42	5.6	40	14	1.2
7	4.4	4.2	11	16	8.8	140	82	37	5.0	31	11	1.1
8	3.0	3.8	12	15	8.8	125	74	32	6.4	19	8.7	1.6
9	3.1	3.6	10	14	8.8	104	91	28	11	13	7.0	3.7
10	3.1	3.6	9.3	13	8.8	101	97	25	9.8	12	9.0	4.5
11	2.9	3.6	9.0	13	8.8	84	83	30	13	16	7.2	2.4
12	2.9	3.6	9.4	12	8.8	83	95	38	13	32	6.1	1.5
13	2.5	4.2	9.3	12	8.7	72	83	37	12	15	5.2	1.1
14	2.4	6.4	9.0	11	8.7	58	144	30	9.4	11	4.5	3.2
15	2.5	4.8	8.5	11	8.7	44	133	26	9.0	9.0	4.0	3.5
16	6.0	4.1	8.1	11	8.7	49	123	22	7.5	7.8	3.6	4.7
17	4.5	6.3	7.7	11	8.7	40	96	19	5.1	6.6	4.9	3.3
18	3.0	8.9	7.1	11	8.8	46	75	17	4.1	5.8	9.8	2.2
19	2.8	5.7	7.2	11	8.8	43	61	14	3.2	5.2	6.5	1.7
20	3.2	5.7	8.5	11	8.9	44	51	13	3.9	6.8	5.8	1.6
21	3.2	6.3	8.6	11	9.1	42	43	13	6.1	6.0	5.4	1.6
22	3.1	6.2	8.1	10	9.5	38	38	13	3.1	4.3	4.9	1.7
23	5.0	11	7.7	10	10	36	33	10	2.9	3.2	4.7	2.3
24	4.8	9.3	7.6	10	11	34	31	10	3.1	2.5	4.2	2.9
25	4.4	7.3	7.6	10	12	35	29	11	2.6	5.2	4.2	1.8
26	10	6.5	7.4	10	13	34	31	12	1.8	6.3	3.8	1.1
27	6.2	7.1	7.0	10	14	31	36	13	1.4	5.3	3.7	.71
28	5.3	8.4	6.8	10	15	30	35	15	1.5	8.2	3.1	1.4
29	5.1	7.5	7.2	9.9	---	34	38	14	11	4.7	7.6	2.1
30	4.5	6.8	10	9.7	---	60	42	12	56	2.9	9.5	3.0
31	4.4	---	23	9.6	---	65	---	11	---	3.4	7.8	---
TOTAL	122.2	166.7	314.0	459.2	270.9	2148	2077	758	249.7	597.2	278.6	71.61
MEAN	3.94	5.56	10.1	14.8	9.68	69.3	69.2	24.5	8.32	19.3	8.99	2.39
MAX	10	11	27	50	15	235	144	50	56	81	43	5.5
MIN	2.2	3.1	6.8	9.6	8.7	15	29	10	1.4	2.5	3.1	.71
CFSM	.07	.10	.19	.27	.18	1.27	1.27	.45	.15	.36	.17	.04
IN.	.08	.11	.21	.31	.19	1.47	1.42	.52	.17	.41	.19	.05

CAL YP 1978 TOTAL 7196.06 MEAN 19.7 MAX 333 MIN .01 CFSM .36 IN 4.92
WTR YR 1979 TOTAL 7513.11 MEAN 20.6 MAX 235 MIN .71 CFSM .38 IN 5.14

STREAMS TRIBUTARY TO LAKE HURON

331

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW¼ sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi (1.9 km) upstream from Pirnie Creek, 1.8 mi (2.9 km) downstream from Flint, and 5.0 mi (8.0 km) downstream from Swartz Creek.

DRAINAGE AREA.--956 mi² (2,476 km²).

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft (206.898 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good. Some regulation by reservoirs above station (station 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft³/s (1.42 m³/s) as sewage effluent which originates outside the basin. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--47 years, 572 ft³/s (16.20 m³/s), 8.13 in/yr (207 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft³/s (422 m³/s) Apr. 6, 1947, gage height, 16.35 ft (4.983 m); minimum, 9.0 ft³/s (0.25 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,330 ft³/s (123 m³/s) Mar. 4, gage height, 9.82 ft (2.993 m); minimum, 67 ft³/s (1.90 m³/s) Oct. 9, gage height, 2.66 ft (0.811 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	232	108	185	885	243	307	1050	775	281	1120	263	165
2	220	106	218	520	326	316	1200	780	263	1030	705	118
3	254	106	300	475	240	550	1280	910	246	965	383	112
4	237	103	433	485	226	2500	1120	890	243	1020	294	148
5	257	95	320	475	223	3540	1130	890	237	880	240	165
6	303	110	303	433	232	2300	1190	885	229	775	196	167
7	266	112	313	392	232	2150	1160	885	223	630	177	167
8	226	108	424	352	167	2550	1120	830	351	505	196	160
9	127	103	359	281	177	2670	1320	760	520	451	209	153
10	204	101	344	254	215	2520	1550	745	300	351	278	160
11	209	97	272	281	300	2120	1420	680	269	406	229	170
12	204	85	294	240	215	1610	1300	675	266	670	193	165
13	234	101	249	229	212	1480	1330	620	252	455	180	392
14	249	127	249	266	209	1460	1780	555	237	392	172	323
15	226	99	232	252	177	1310	1840	520	229	397	158	182
16	249	97	226	240	153	1150	1960	455	215	359	148	165
17	263	160	207	237	196	1040	2630	406	180	278	182	167
18	180	127	196	226	188	1090	2450	340	138	240	212	167
19	125	110	193	209	196	1130	1920	505	155	212	170	167
20	110	116	229	209	196	1150	1680	307	243	198	165	160
21	103	148	252	218	207	1110	1520	320	193	269	165	162
22	97	141	223	223	212	1110	1340	284	170	226	160	160
23	123	209	212	223	288	1090	1060	272	150	193	153	146
24	112	155	204	226	307	1070	925	275	132	207	148	150
25	125	143	207	226	249	1050	695	266	129	232	132	160
26	170	132	204	234	254	1030	650	234	127	243	123	165
27	125	143	193	232	275	965	625	220	129	226	129	167
28	116	153	182	232	294	830	595	229	114	428	158	148
29	108	185	190	212	---	725	595	263	252	249	207	148
30	112	207	310	170	---	1010	730	281	705	249	207	103
31	110	---	685	185	---	1160	---	284	---	260	193	---
TOTAL	5676	3787	8408	9322	6409	44093	39165	16341	7178	14116	6525	5082
MEAN	183	126	271	301	229	1422	1306	527	239	455	210	169
MAX	303	209	685	885	326	3540	2630	910	705	1120	705	392
MIN	97	85	182	170	153	307	595	220	114	193	123	103
MEAN+	173	198	273	297	229	1460	1365	545	236	429	232	123
CFSM+	.18	.21	.29	.31	.24	1.53	1.43	.57	.25	.45	.24	.13
IN+	.21	.23	.33	.36	.25	1.76	1.59	.66	.28	.52	.28	.14

CAL YR 1978 TOTAL 185494 MEAN 508 MAX 4280 MIN 85 MEAN+ 508 CFSM+ .53 IN+ 7.21
 WTP YR 1979 TOTAL 166102 MEAN 455 MAX 3540 MIN 85 MEAN+ 465 CFSM+ .49 IN+ 6.60
 + Adjusted for change in contents in Holloway Reservoir.

LOCATION.--Lat 43°10'12", long 83°50'03", in SE₄ NE₄ sec.23, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Morrish Road, 0.8 mi (1.3 km) upstream from Central-Stadler Drain, 3.0 mi (4.8 km) upstream from mouth, and 3.1 mi (5.0 km) east of Montrose.

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 655 ft (200 m) from topographic map (nearest 5 ft). Prior to Aug. 26, 1970, non-recording gage at same site and datum.

AVERAGE DISCHARGE.--9 years, 14.9 ft³/s (0.422 m³/s), 9.73 in/yr (247 mm/yr).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 450 ft³/s (12.7 m³/s) Mar. 4, based on correlations with nearby stations, gage height, 6.63 ft (2.021 m), backwater from ice, only peak above base of 250 ft³/s (7.08 m³/s); minimum, 1.9 ft³/s (0.054 m³/s) Oct. 13; minimum gage height recorded, 1.08 ft (0.329 m) July 24, 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	4.8	6.4	32	6.7	12	20	12	4.8	57	4.1	3.6
2	3.9	5.2	6.3	24	5.1	14	14	8.5	4.7	34	13	3.5
3	2.9	5.0	5.6	16	4.8	13	20	15	4.6	12	28	3.4
4	5.9	4.7	20	11	4.6	200	12	29	4.2	7.3	8.6	3.4
5	3.8	5.0	21	8.6	4.4	330	11	12	3.9	8.2	7.5	3.2
6	4.5	5.8	7.0	7.6	4.4	60	19	10	4.1	5.0	5.6	3.2
7	5.8	6.1	6.7	6.8	4.3	23	15	8.9	4.1	4.5	4.2	3.3
8	4.7	8.3	5.8	6.5	4.2	20	11	7.7	4.5	4.3	3.9	3.3
9	2.8	7.1	9.8	6.2	4.2	17	11	7.4	35	3.8	3.6	3.4
10	2.6	6.6	6.8	6.0	4.1	15	33	7.0	19	3.9	4.3	3.3
11	2.4	7.2	6.2	5.8	4.1	16	16	6.8	13	4.1	7.2	3.2
12	2.7	7.4	5.6	5.7	4.0	12	16	9.2	7.8	8.7	4.1	3.2
13	2.3	6.1	5.2	5.6	4.0	10	20	11	6.1	5.6	3.3	7.0
14	2.6	9.9	4.8	5.5	4.0	13	26	8.0	5.2	4.3	3.2	8.8
15	2.7	13	4.5	5.4	4.0	11	22	6.6	4.9	9.5	3.5	6.3
16	2.9	5.9	4.2	5.4	4.0	10	12	7.0	4.5	6.3	3.3	5.0
17	3.7	5.3	4.0	5.3	4.1	9.4	10	5.9	4.1	3.9	3.4	4.5
18	3.9	15	3.7	5.2	4.1	9.8	9.6	5.5	3.9	3.7	3.5	4.1
19	3.4	8.6	3.6	5.2	4.2	13	9.0	5.3	3.5	3.5	3.7	3.9
20	3.6	5.3	3.9	5.1	4.3	11	8.0	5.2	3.8	3.4	3.6	3.7
21	4.2	4.5	14	5.1	4.5	10	7.6	5.2	10	3.3	3.5	3.6
22	6.7	4.3	13	5.0	4.8	9.3	8.6	6.8	5.9	3.4	3.4	3.5
23	7.8	5.6	5.4	5.0	6.0	9.2	7.8	5.1	4.3	3.0	3.4	3.3
24	9.0	19	4.4	5.0	7.5	9.5	6.7	5.0	3.9	2.8	3.4	3.2
25	15	7.2	4.2	5.5	9.6	10	7.2	5.1	3.5	3.0	3.5	3.0
26	18	5.1	4.1	6.0	15	11	9.0	5.2	3.2	3.9	4.2	2.9
27	20	4.6	4.0	5.5	14	12	17	5.6	3.2	4.4	4.7	3.0
28	8.3	4.6	4.0	5.2	13	11	11	5.7	3.2	6.9	4.8	3.2
29	6.2	7.6	4.2	6.0	---	12	9.8	6.0	4.3	16	4.7	3.2
30	4.7	6.1	4.5	5.6	---	31	9.2	5.1	13	4.7	4.4	3.0
31	4.9	---	11	6.6	---	34	---	5.1	---	4.0	3.9	---
TOTAL	176.7	210.9	213.9	239.4	162.0	978.2	408.5	247.9	200.2	248.4	165.5	115.2
MEAN	5.70	7.03	6.90	7.72	5.79	31.6	13.6	8.00	6.67	8.01	5.34	3.84
MAX	20	19	21	32	15	330	33	29	35	57	28	8.8
MIN	2.3	4.3	3.6	5.0	4.0	9.2	6.7	5.0	3.2	2.8	3.2	2.9
CFSM	.27	.34	.33	.37	.28	1.52	.65	.39	.32	.39	.26	.19
IN.	.32	.38	.38	.43	.29	1.75	.73	.44	.36	.44	.30	.21
CAL YP 1978	TOTAL	3717.9	MEAN	10.2	MAX 237	MIN 2.3	CFSM .49	IN 6.65				

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE¼ SE¼ sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 13, 2 mi (3 km) west of Fosters and 6.5 mi (10.5 km) downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,188 mi² (3,077 km²), includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi (3.5 km) upstream at datum 582.22 ft (177.461 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 724 ft³/s (20.50 m³/s), 8.28 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft³/s (538 m³/s) Apr. 7, 1947 (including flow bypassing gage); maximum gage height, 18.6 ft (5.67 m) Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft³/s (0.76 m³/s) Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft (5.61 m) from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,540 ft³/s (185 m³/s) Mar. 5, gage height, 16.42 ft (5.005 m); minimum, 126 ft³/s (3.568 m³/s) Oct. 22, gage height, 1.91 ft (0.582 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	280	144	248	1180	280	370	1430	826	325	1050	287	260
2	267	148	232	814	390	390	1310	839	322	1290	406	220
3	255	144	246	600	320	560	1500	910	300	1100	637	180
4	290	148	357	590	290	2600	1350	1160	280	1020	436	150
5	275	148	460	600	280	6150	1280	1050	282	1020	350	180
6	292	148	365	560	290	4190	1330	999	275	868	302	210
7	335	146	337	500	290	2630	1340	961	267	745	241	220
8	302	132	357	450	210	2580	1270	935	265	625	217	220
9	265	136	406	370	220	2890	1290	862	499	517	228	210
10	172	140	410	330	250	2850	1650	790	532	475	262	200
11	230	142	350	350	350	2480	1700	778	409	395	330	210
12	232	144	330	300	270	2220	1510	724	357	616	277	220
13	232	142	320	290	270	1690	1530	730	325	661	235	220
14	252	148	310	330	260	1670	1740	652	302	490	226	500
15	275	188	290	320	240	1540	2020	607	287	439	219	460
16	267	162	280	300	200	1390	1910	559	277	421	202	290
17	270	152	257	290	240	1250	2210	496	262	390	195	250
18	295	191	235	290	240	1120	2510	454	260	313	217	240
19	226	208	224	270	240	1240	2200	466	197	270	275	230
20	172	172	219	260	250	1260	1820	463	221	241	230	219
21	154	166	265	270	260	1250	1650	357	305	221	217	213
22	142	188	290	280	270	1230	1500	367	290	277	215	215
23	140	197	252	280	330	1210	1290	337	239	246	210	210
24	154	260	239	280	370	1180	1080	345	232	210	200	197
25	156	228	235	280	320	1150	948	370	199	219	200	199
26	170	197	224	290	320	1140	718	322	180	248	180	204
27	221	184	250	290	340	1090	796	292	182	260	170	208
28	182	186	514	280	350	1040	730	272	186	275	170	210
29	164	197	598	270	---	836	694	277	191	433	200	202
30	156	215	589	220	---	1070	721	307	335	275	250	186
31	144	---	706	230	---	1500	---	322	---	270	270	---
TOTAL	6967	5101	10395	11964	7940	53766	43027	18829	8583	15880	8054	6933
MEAN	225	170	335	386	284	1734	1434	607	286	512	260	231
MAX	335	260	706	1180	390	6150	2510	1160	532	1290	637	500
MIN	140	132	219	220	200	370	694	272	180	210	170	150
CAL YR 1978 TOTAL	239099			MEAN 655	MAX 6520	MIN 132						
WTR YR 1979 TOTAL	197439			MEAN 541	MAX 6150	MIN 132						

STREAMS TRIBUTARY TO LAKE HURON

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE¼ sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft (30 m) downstream from the Prairie Farms Association flood-pumping station, 2.8 mi (4.5 km) north of Alicia, and 4 mi (6 km) upstream from mouth.

PERIOD OF RECORD.--November 1948 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft (175.870 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft (4.176 m) Apr. 3, 1960; minimum, less than 1.5 ft (0.46 m) during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 10.75 ft (3.277 m) Mar. 6; minimum, 1.54 ft (0.469 m) Nov. 18, Dec. 4.

GAGE HEIGHT, IN FEET, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.76	3.41	3.41	3.64	3.19	---	6.37	4.81	4.31	5.06	4.99	4.40
2	3.75	3.26	3.48	3.55	3.16	3.23	6.53	4.91	4.40	5.18	4.69	4.27
3	3.31	3.42	3.53	2.99	3.06	3.26	6.21	4.95	4.26	5.16	4.53	4.92
4	3.28	3.41	2.06	3.12	2.89	5.07	5.94	5.39	4.08	5.20	4.58	4.78
5	3.52	3.23	2.62	---	---	9.51	5.59	5.62	4.67	5.28	4.56	4.58
6	3.24	3.44	3.32	---	---	10.51	4.86	5.36	4.55	4.97	5.02	4.60
7	3.98	3.82	3.54	---	---	9.43	5.33	5.03	4.10	4.82	4.33	5.01
8	3.83	2.81	3.34	---	---	8.82	5.25	4.71	4.37	4.75	4.73	4.92
9	3.45	2.97	3.28	---	---	8.91	5.48	4.62	4.55	4.72	4.74	4.26
10	3.48	3.50	3.15	---	---	---	5.35	4.80	4.01	4.81	4.75	4.14
11	3.46	3.30	3.11	---	---	---	5.43	4.51	4.58	4.66	5.18	4.68
12	3.21	4.04	2.89	---	---	---	5.40	4.59	4.67	4.80	4.82	4.25
13	4.06	3.04	2.91	---	---	---	5.24	4.47	4.60	5.02	4.15	4.42
14	4.06	2.70	3.08	---	---	6.65	5.32	4.23	4.27	4.77	4.61	5.09
15	3.75	3.46	2.69	---	---	6.26	5.59	4.83	3.95	4.67	5.21	4.55
16	4.19	3.51	3.11	---	---	---	5.78	4.63	4.36	5.01	4.79	4.41
17	3.48	3.20	3.17	---	---	---	5.81	4.18	4.22	5.05	4.31	4.09
18	3.33	2.38	3.46	---	---	5.25	5.82	4.08	5.38	4.64	4.52	4.33
19	3.45	3.29	3.35	---	---	5.45	5.61	4.23	4.65	4.46	4.68	4.81
20	3.63	4.06	3.17	---	---	5.79	5.19	4.37	4.13	4.55	4.69	3.78
21	3.17	3.41	2.88	2.76	---	6.13	4.84	4.60	3.94	4.47	4.89	4.52
22	3.36	3.39	2.65	2.68	---	6.16	4.72	4.60	4.62	4.50	4.68	4.88
23	4.06	3.28	3.15	2.65	---	5.92	4.52	4.73	4.83	4.44	4.48	4.47
24	3.20	3.06	3.05	2.53	---	5.58	4.34	5.55	4.83	4.25	4.32	4.24
25	2.76	3.56	2.92	3.11	---	5.52	4.15	5.95	4.64	4.15	4.51	4.19
26	3.69	3.80	3.08	3.34	---	5.34	4.18	5.05	4.31	4.64	4.73	4.35
27	3.18	3.66	2.95	3.25	---	5.09	4.91	4.40	4.39	4.52	4.52	4.16
28	3.75	2.79	3.17	3.21	---	4.65	5.03	4.38	4.70	4.53	4.81	4.21
29	3.75	2.32	2.99	3.23	---	4.48	4.76	4.42	4.59	4.68	4.32	4.23
30	2.98	3.08	2.78	3.27	---	4.73	4.64	4.49	5.15	4.31	4.72	4.23
31	3.60	---	3.34	3.19	---	5.56	---	4.39	---	4.50	4.73	---
MEAN	3.54	3.29	3.08	---	---	---	5.27	4.74	4.47	4.73	4.66	4.46
MAX	4.19	4.06	3.54	---	---	---	6.53	5.95	5.38	5.28	5.21	5.09
MIN	2.76	2.32	2.06	---	---	---	4.15	4.08	3.94	4.15	4.15	3.78

04150000 SOUTH BRANCH CASS RIVER NEAR CASS CITY, MI

LOCATION.--Lat 43°34'01", long 83°06'43", in SW¼ NW¼ sec.7, T.13 N., R.12 E., Sanilac County, Hydrologic Unit 04080205, on left bank 1.5 mi (2.4 km) downstream from bridge on State Highway 53, 3.9 mi (6.3 km) southeast of Cass City, 4.2 mi (6.8 km) upstream from confluence with North Branch.

DRAINAGE AREA.--238 mi² (616 km²).

PERIOD OF RECORD.--October 1948 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1963, published as East Branch Cass River near Cass City.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1707: 1951-53, 1959. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 719.5 ft (219.3 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 8, 1952, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 123 ft³/s (3.483 m³/s), 7.02 in/yr (178 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,400 ft³/s (181 m³/s) Mar. 28, 1967, gage height, 14.86 ft (4.529 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 20-23, 1955, Aug. 19, 20, 1958.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,100 ft³/s (31.2 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0900	ice jam	*14.36 4.377	Apr. 14	1800	*3460 98.0	11.07 3.374

Minimum discharge 3.3 ft³/s (0.093 m³/s) Sept. 29, gage height, 1.74 ft (0.530 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	6.6	14	80	10	10	540	137	26	104	8.7	6.3
2	9.4	6.6	13	200	10	10	354	119	29	586	18	5.7
3	8.8	6.8	13	140	10	11	659	164	24	423	34	5.3
4	8.4	6.7	15	90	10	780	370	400	21	241	97	4.9
5	8.2	6.7	17	64	10	1000	246	273	20	142	60	4.7
6	9.4	6.9	17	48	10	800	317	195	18	91	31	4.6
7	11	7.2	18	36	10	600	330	191	17	61	21	4.6
8	11	7.0	19	25	10	500	211	156	19	43	17	4.5
9	11	7.0	19	20	10	450	160	120	18	33	14	4.3
10	9.9	6.9	11	17	10	420	219	95	23	42	14	4.3
11	8.8	6.5	11	15	10	370	382	85	28	414	12	4.7
12	8.4	7.0	11	14	10	300	350	95	24	281	12	4.5
13	8.0	7.5	11	13	10	270	338	74	20	155	11	4.6
14	7.5	8.4	11	12	10	260	2440	63	17	97	9.5	5.8
15	6.6	8.9	11	11	10	260	1710	55	17	66	8.3	6.0
16	6.0	10	11	11	10	250	539	51	14	45	8.1	6.8
17	6.1	11	11	11	10	242	334	48	11	32	7.5	6.1
18	5.9	13	11	10	10	318	243	40	9.9	24	7.4	5.1
19	6.3	14	11	10	10	518	178	35	9.7	19	7.4	4.6
20	6.6	14	11	10	10	415	141	33	9.0	17	7.2	4.2
21	6.6	12	11	10	10	316	116	31	9.3	15	7.0	4.1
22	6.7	12	11	10	10	286	106	29	7.9	13	6.3	3.9
23	6.6	14	11	10	10	260	95	28	7.2	12	5.6	3.8
24	6.3	18	11	10	10	240	83	27	9.1	12	5.5	3.6
25	6.5	22	11	10	10	230	82	26	8.4	11	5.4	3.6
26	7.3	20	11	10	10	208	87	27	7.3	13	5.2	3.8
27	7.4	17	11	10	10	160	186	28	8.0	12	4.8	3.9
28	7.8	15	11	10	10	150	218	34	7.9	12	5.5	3.6
29	7.6	14	11	10	---	272	158	35	9.8	11	6.3	3.4
30	6.9	14	11	10	---	565	132	30	23	11	6.3	3.6
31	6.8	---	12	10	---	764	---	27	---	9.8	6.3	---
TOTAL	243.8	326.7	388	947	280	11235	11324	2751	472.5	3047.8	469.3	138.9
MEAN	7.86	10.9	12.5	30.5	10.0	362	377	88.7	15.8	98.3	15.1	4.63
MAX	11	22	19	200	10	1000	2440	400	29	586	97	6.8
MIN	5.9	6.5	11	10	10	10	82	26	7.2	9.8	4.8	3.4
CFSM	.03	.05	.05	.13	.04	1.52	1.58	.37	.07	.41	.06	.02
IN.	.04	.05	.06	.15	.04	1.76	1.77	.43	.07	.48	.07	.02

CAL YR 1978	TOTAL	41519.5	MEAN	114	MAX	3650	MIN	2.9	CFSM	.48	IN	6.49
WTR YR 1979	TOTAL	31624.0	MEAN	86.6	MAX	2440	MIN	3.4	CFSM	.36	IN	4.94

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE¼ NE¼ sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft (183 m) downstream from bridge on Cemetery Road, 0.3 mi (0.5 km) downstream from confluence of North and South Branches, and 1.1 mi (1.8 km) south of Cass City.

DRAINAGE AREA.--359 mi² (930 km²).

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft (212.726 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft (183 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 199 ft³/s (5.636 m³/s), 7.53 in/yr (191 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft³/s (240 m³/s) Mar. 20, 1948, gage height, 15.80 ft (4.816 m), from graph based on gage readings; minimum, 0.50 ft³/s (0.014 m³/s) Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (39.6 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	--	1970 55.8	*a12.11 3.691	Apr. 14	2000	*3640 103	11.27 3.435

a Ice jam.

Minimum discharge, 3.6 ft³/s (0.10 m³/s) Sept. 30, gage height, 4.48 ft (1.366 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	16	40	150	20	19	932	318	59	65	12	10
2	22	16	40	330	20	20	740	277	59	552	20	10
3	21	16	34	230	20	21	1010	369	54	489	25	10
4	20	17	35	170	20	310	673	644	46	316	71	9.0
5	20	17	39	130	19	1700	508	502	41	210	59	8.9
6	22	17	38	98	19	1500	558	430	39	142	42	8.7
7	23	18	43	70	19	1300	557	403	36	96	34	8.5
8	25	18	44	52	19	1050	421	337	36	67	27	8.4
9	25	18	44	40	19	920	340	283	39	51	23	8.5
10	23	18	44	34	19	800	399	245	49	46	22	8.0
11	22	17	40	31	19	680	545	236	61	340	19	8.5
12	21	17	35	26	19	500	538	258	88	289	19	9.5
13	20	18	32	24	19	450	529	224	126	151	18	9.5
14	19	19	34	23	19	480	2480	204	125	93	16	11
15	18	20	32	22	19	460	2330	185	98	67	14	11
16	16	21	32	21	19	450	1110	168	70	52	13	11
17	15	24	34	21	19	396	758	152	49	39	12	12
18	14	27	35	20	19	506	541	134	37	30	12	10
19	15	29	34	20	19	762	403	119	29	24	12	7.6
20	15	29	35	20	19	693	314	107	25	21	11	6.8
21	15	27	38	20	19	580	262	102	25	19	11	7.0
22	15	25	39	20	19	536	235	94	21	17	10	6.2
23	15	29	40	20	19	489	213	85	18	16	9.0	5.3
24	14	37	40	20	19	453	197	81	18	15	8.5	5.2
25	15	44	40	20	19	458	196	73	19	14	8.5	5.0
26	16	45	40	20	19	376	215	74	17	15	8.0	5.2
27	18	43	40	20	19	321	350	73	18	15	7.2	4.4
28	18	37	40	20	19	308	392	74	18	14	6.8	4.8
29	19	40	41	20	---	438	345	76	19	14	9.5	4.4
30	17	40	42	20	---	784	327	70	33	13	9.5	4.0
31	17	---	58	20	---	1100	---	64	---	12	10	---
TOTAL	579	759	1202	1752	536	18860	18418	6461	1372	3304	579.0	238.4
MEAN	18.7	25.3	38.8	56.5	19.1	608	614	208	45.7	107	18.7	7.95
MAX	25	45	58	330	20	1700	2480	644	126	552	71	12
MIN	14	16	32	20	19	19	196	64	17	12	6.8	4.0
CFSM	.05	.07	.11	.16	.05	1.69	1.71	.58	.13	.30	.05	.02
IN.	.06	.08	.12	.18	.06	1.95	1.91	.67	.14	.34	.06	.02

CAL YR 1978	TOTAL	60035.9	MEAN 164	MAX 4000	MIN 2.8	CFSM .46	IN 6.22
WTR YR 1979	TOTAL	54060.4	MEAN 148	MAX 2480	MIN 4.0	CFSM .41	IN 5.60

STREAMS TRIBUTARY TO LAKE HURON

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04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW¼ NW¼ sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft (27 m) upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi (3.1 km) downstream from Michigan Sugar Co. dam, and 40 mi (64 km) upstream from mouth.

DRAINAGE AREA.--645 mi² (1,671 km²).

PERIOD OF RECORD.--October 1968 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft (198 m) from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft (27 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dam at Michigan Sugar Co., 1.9 mi (3.1 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--11 years, 394 ft³/s (11.16 m³/s), 8.30 in/yr (211 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft³/s (331 m³/s) Mar. 6, 1976, gage height, 19.92 ft (6.072 m); minimum, 21 ft³/s (0.59 m³/s) Sept. 26-30, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,400 ft³/s (68.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 6	--	3490 98.8	*a15.81 4.819	Apr. 15	0800	*4910 139	14.02 4.273

a Ice jam.

Minimum discharge, 21 ft³/s (0.59 m³/s) Sept. 26-30; gage height, 2.87 ft (0.875 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	55	78	152	58	76	1810	582	130	158	42	28
2	66	49	82	350	58	77	1320	515	129	315	45	28
3	62	47	82	480	59	79	1510	590	125	648	50	28
4	61	45	89	400	59	450	1310	1120	112	449	58	27
5	61	44	89	330	61	2450	951	987	103	302	96	25
6	67	45	96	230	62	3200	947	778	91	227	97	25
7	71	48	94	160	63	2150	975	713	84	179	72	25
8	71	50	99	115	65	1950	788	615	84	142	64	25
9	70	48	88	84	67	1650	659	507	107	123	58	24
10	67	47	92	66	68	1400	702	425	103	117	59	24
11	64	47	73	64	68	1100	789	379	128	119	56	24
12	60	45	70	64	69	920	913	384	128	324	52	24
13	57	44	65	64	69	880	836	380	144	238	48	23
14	53	51	64	64	70	900	2340	338	164	173	46	23
15	50	51	63	65	70	900	4380	300	156	135	44	24
16	49	52	63	66	70	840	2200	268	133	112	40	24
17	45	60	64	66	71	776	1350	243	108	87	38	24
18	45	78	62	66	73	970	982	226	86	72	36	24
19	44	79	59	66	76	1460	740	202	66	64	36	24
20	44	76	64	66	76	1400	588	185	60	59	34	24
21	44	70	72	66	76	1150	493	184	64	55	33	24
22	44	68	73	66	78	1030	437	172	60	54	31	23
23	42	80	72	66	78	946	398	162	54	52	30	23
24	40	102	72	66	78	877	362	151	52	51	30	22
25	40	115	75	66	78	850	361	143	49	49	30	22
26	50	113	68	64	78	761	418	140	45	50	30	22
27	57	109	70	63	78	644	678	148	44	50	29	21
28	57	100	70	59	76	629	753	150	47	48	28	21
29	54	87	54	58	---	792	640	153	50	46	28	21
30	66	92	56	58	---	1310	596	148	107	46	29	21
31	66	---	81	58	---	1990	---	140	---	43	29	---
TOTAL	1742	1997	2299	3708	1952	34607	31226	11428	2813	4587	1398	717
MEAN	56.2	66.6	74.2	120	69.7	1116	1041	369	93.8	148	45.1	23.9
MAX	75	115	99	480	78	3200	4380	1120	164	648	97	28
MIN	40	44	54	58	58	76	361	140	44	43	28	21
CFSM	.09	.10	.12	.19	.11	1.73	1.61	.57	.15	.23	.07	.04
IN.	.10	.12	.13	.21	.11	2.00	1.80	.66	.16	.26	.08	.04
CAL YR 1978	TOTAL	113097	MEAN 310	MAX 6450	MIN 22	CFSM .48	IN 6.52					
WTR YR 1979	TOTAL	98474	MEAN 270	MAX 4380	MIN 21	CFSM .42	IN 5.68					

STREAMS TRIBUTARY TO LAKE HURON

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW¼ SE¼ sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft (610 m) below dam in Frankenmuth, 3,600 ft (1,097 m) above highway bridge on Dehmel Road, 3.4 mi (5.5 km) upstream from Dead Creek, and 17 mi (27 km) upstream from mouth.

DRAINAGE AREA.--841 mi² (2,178 km²).

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft (177.991 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft (610 m) upstream at datum 1.81 ft (0.552 m) lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, and June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft (1,097 m) downstream at datum 0.04 ft (0.012 m) higher.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 476 ft³/s (13.48 m³/s), 7.69 in/yr (195 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft³/s (501 m³/s) Mar. 18, 1942, gage height, 20.88 ft (6.364 m), site and datum then in use; maximum gage height, 23.37 ft (7.123 m) Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft³/s (0.042 m³/s) Aug. 6, 1944.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 6	--	*5930 168	*a18.43 5.617	Apr. 15	1700	4980 141	15.97 4.868

a Ice jam.

Minimum discharge, 31 ft³/s (0.88 m³/s) Sept. 30; minimum gage height, 3.16 ft (0.963 m) Sept. 29, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	88	133	261	100	125	2270	735	170	222	60	42
2	96	81	102	300	100	130	1740	666	163	285	72	40
3	93	75	125	450	100	150	1600	697	159	543	76	39
4	94	71	135	500	100	600	1650	1200	151	586	73	38
5	94	68	135	400	100	3000	1250	1340	140	404	77	40
6	95	71	143	300	100	5100	1150	1060	133	296	102	41
7	100	73	141	210	100	5000	1130	906	127	232	100	38
8	98	78	139	150	100	3900	1000	796	121	185	87	40
9	95	81	129	120	99	3000	884	656	125	161	80	38
10	93	80	92	100	99	2500	915	551	152	151	89	37
11	91	78	123	100	98	1900	939	471	165	139	84	39
12	90	73	125	100	98	1450	1060	441	169	195	75	37
13	86	76	118	100	98	1300	1030	475	159	307	69	42
14	83	84	105	102	97	1200	1650	438	173	221	68	56
15	76	91	108	103	97	1150	4490	388	183	168	66	57
16	72	88	101	104	97	1080	3060	342	168	139	59	49
17	71	88	104	104	97	1040	1720	310	143	118	57	46
18	64	104	100	104	96	1050	1240	282	123	97	59	42
19	64	114	95	104	96	1480	934	258	110	84	57	42
20	68	113	103	104	95	1700	734	231	99	80	54	40
21	65	112	114	104	96	1450	610	222	103	76	53	46
22	66	105	115	103	97	1260	546	218	100	70	49	41
23	66	111	113	102	98	1160	495	208	93	69	49	37
24	61	137	112	100	102	1070	457	196	85	67	49	36
25	61	148	113	100	108	1010	461	188	80	65	45	37
26	72	151	97	100	110	956	501	180	74	66	43	38
27	80	146	100	100	115	825	835	181	74	68	43	35
28	86	142	100	100	120	771	920	188	76	72	45	33
29	82	133	100	100	---	868	814	188	79	65	49	32
30	77	134	101	100	---	1300	742	190	117	60	49	31
31	85	---	126	100	---	2150	---	180	---	61	50	---
TOTAL	2522	2994	3547	4925	2813	49675	36827	14382	3814	5352	1988	1209
MEAN	81.4	99.8	114	159	100	1602	1228	464	127	173	64.1	40.3
MAX	100	151	143	500	120	5100	4490	1340	183	586	102	57
MIN	61	68	92	100	95	125	457	180	74	60	43	31
CFSM	.10	.12	.14	.19	.12	1.91	1.46	.55	.15	.21	.08	.05
IN.	.11	.13	.16	.22	.12	2.20	1.63	.64	.17	.24	.09	.05

CAL YR 1978	TOTAL	148934	MEAN 408	MAX 7880	MIN 23	CFSM .49	IN 6.59
WTR YR 1979	TOTAL	130048	MEAN 356	MAX 5100	MIN 31	CFSM .42	IN 5.75

STREAMS TRIBUTARY TO LAKE HURON

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04152500 TOBACCO RIVER AT BEAVERTON, MI

LOCATION.--Lat 43°52'43", long 84°28'18", in NW¼ SE¼ sec.7, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, on left bank 15 ft (5 m) downstream from bridge on Glidden Road, 1.0 mi (1.6 km) downstream from dam in Beaverton, and 2.0 mi (3.2 km) upstream from Venison Creek.

DRAINAGE AREA.--487 mi² (1,261 km²).

PERIOD OF RECORD.--July 1948 to current year.

REVISED RECORDS.--WSP 1307: 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 683.27 ft (208.261 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are poor. Prior to Feb. 21, 1961, regulation at all stages by hydro-electric powerplant 1.0 mi (1.6 km) above station; occasional regulation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 379 ft³/s (10.73 m³/s), 10.57 in/yr (268 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,680 ft³/s (217 m³/s) July 9, 1957, gage height, 12.95 ft (3.947 m); minimum, 5.6 ft³/s (0.16 m³/s) July 12, 13, 14, 1959, Aug. 21, 1961; minimum daily, 5.9 ft³/s (0.17 m³/s) July 12, 13, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,110 ft³/s (59.8 m³/s) Mar. 31, gage height, 6.85 ft (2.088 m); minimum, 104 ft³/s (2.95 m³/s) Oct. 19, 20, gage height, 1.72 ft (0.524 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	244	214	230	215	195	255	1900	953	250	407	164	201
2	263	214	209	220	195	270	1310	882	250	499	143	193
3	334	214	210	230	190	300	993	995	245	299	142	193
4	265	213	250	230	195	450	945	1150	235	292	153	170
5	367	211	260	240	205	1060	813	861	230	361	162	171
6	372	212	250	235	200	1290	846	653	230	296	168	177
7	416	205	215	225	200	1170	822	553	225	285	178	172
8	399	205	220	210	200	1110	703	538	222	277	167	167
9	298	210	230	205	200	1250	627	492	233	376	158	165
10	236	205	230	200	210	1170	556	428	257	276	189	165
11	257	195	223	205	215	1060	535	406	256	211	253	167
12	287	200	230	210	220	858	530	450	249	211	236	168
13	344	210	235	210	220	769	623	469	223	210	201	172
14	362	235	235	240	225	945	679	431	214	204	184	173
15	360	245	230	250	230	989	635	400	213	199	174	168
16	358	230	230	260	230	914	535	370	209	192	160	151
17	361	250	225	260	230	800	487	345	205	173	157	157
18	355	280	220	260	230	1010	455	320	198	171	162	171
19	219	295	220	260	235	1660	426	310	194	173	170	184
20	114	290	212	265	235	1750	405	305	278	173	176	490
21	219	290	210	265	240	1640	388	300	761	168	174	229
22	261	290	215	270	250	1520	369	285	517	166	169	166
23	249	295	215	275	260	1440	360	270	408	169	169	162
24	228	295	215	280	270	1400	350	270	288	173	225	162
25	183	295	215	290	270	1530	370	265	243	171	282	165
26	170	295	215	275	270	1370	668	255	196	187	235	162
27	181	290	215	240	270	821	840	250	192	192	208	159
28	192	285	210	225	265	704	750	255	207	184	221	164
29	206	271	193	205	---	683	642	260	293	177	232	161
30	215	265	200	195	---	940	569	255	270	168	242	184
31	214	---	205	190	---	1860	---	250	---	164	223	---
TOTAL	8529	7404	6872	7340	6355	32988	20131	14226	7991	7204	5877	5489
MEAN	275	247	222	237	227	1064	671	459	266	232	190	183
MAX	416	295	260	290	270	1860	1900	1150	761	499	282	490
MIN	114	195	193	190	190	255	350	250	192	164	142	151
CFSM	.57	.51	.46	.49	.47	2.19	1.38	.94	.55	.48	.39	.38
IN.	.65	.57	.52	.56	.49	2.52	1.54	1.09	.61	.55	.45	.42
CAL YR 1978 TOTAL	115158		MEAN 316	MAX 1930	MIN 114	CFSM .65	IN 8.80					
WTR YR 1979 TOTAL	130406		MEAN 357	MAX 1900	MIN 114	CFSM .73	IN 9.96					

LOCATION.--Lat 43°37'32", long 84°42'28", in NW¼ NW¼ sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft (4 m) downstream from bridge on South Leaton Road, 3.8 mi (6.1 km) northeast of Mount Pleasant, and 36 mi (58 km) upstream from mouth.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft (216.524 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft (9 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below 750 ft³/s (21.2 m³/s) caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft³/s (140 m³/s) Mar. 8, 1946; gage height, 12.78 ft (3.895 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 18, 1945; minimum daily, 19 ft³/s (0.54 m³/s) Aug. 16, 1936; minimum gage height, 2.70 ft (0.823 m) Oct. 8, 1966.

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Mar. 24	1500	1400	39.6	6.52	1.987	May 4	0800	1200	34.0	6.37	1.942
Mar. 31	2000	*1460	41.3	*6.70	2.042						

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	215	292	210	260	225	200	1310	735	205	186	132	140
2	215	288	210	255	225	200	1200	662	207	177	128	138
3	218	284	210	250	220	210	1180	772	201	172	126	131
4	226	281	210	250	220	230	1050	1100	197	176	125	127
5	240	278	206	250	220	250	948	902	195	173	129	124
6	254	277	206	250	215	295	914	764	187	166	132	122
7	258	268	201	245	210	350	826	646	185	162	130	120
8	251	265	205	245	210	430	784	573	193	158	132	117
9	243	259	205	240	210	500	735	521	193	156	129	115
10	236	255	210	240	210	490	686	468	213	157	153	115
11	230	250	205	240	205	470	637	417	222	168	150	114
12	252	246	205	235	205	460	620	381	200	153	145	113
13	248	253	200	235	200	451	665	346	192	152	141	113
14	234	263	200	235	200	637	679	322	183	151	138	114
15	239	253	195	230	200	648	609	300	180	148	130	113
16	249	250	197	230	200	550	564	279	176	146	125	112
17	251	258	197	230	200	528	522	268	168	143	132	111
18	272	266	195	230	200	752	486	251	165	141	137	112
19	291	258	195	230	200	1160	456	241	159	140	136	112
20	288	253	190	230	195	1190	414	244	180	139	136	112
21	284	245	190	230	195	1140	393	252	180	136	135	114
22	281	235	190	230	195	1270	384	230	184	134	133	113
23	281	232	190	230	195	1350	366	221	179	136	144	113
24	295	232	190	230	195	1390	354	222	181	137	150	114
25	307	230	195	230	195	1340	369	216	172	141	149	117
26	320	225	200	230	195	1220	429	205	166	140	151	116
27	316	222	210	230	195	1100	483	205	162	137	149	116
28	311	220	235	230	195	959	519	207	161	135	150	117
29	305	215	250	230	---	878	592	210	174	131	153	117
30	303	213	260	230	---	959	630	210	184	131	152	118
31	297	---	260	230	---	1340	---	206	---	132	146	---
TOTAL	8210	7566	6422	7340	5730	22947	19804	12576	5544	4654	4298	3530
MEAN	265	252	207	237	205	740	660	406	185	150	139	118
MAX	320	292	260	260	225	1390	1310	1100	222	186	153	140
MIN	215	213	190	230	195	200	354	205	159	131	125	111
CFSM	.64	.61	.50	.57	.49	1.78	1.59	.98	.45	.36	.33	.28
IN.	.73	.68	.57	.66	.51	2.05	1.77	1.12	.50	.42	.38	.32
CAL YR 1978	TOTAL	97419	MEAN 267	MAX 1360	MIN 128	CFSM .64	IN 8.71					
WTR YR 1979	TOTAL	108621	MEAN 298	MAX 1390	MIN 111	CFSM .72	IN 9.71					

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW¼ SE¼ sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft (32 m) downstream from Superior Street Bridge in Alma, 0.6 mi (1.0 km) downstream from municipal reservoir, and 38 mi (61 km) upstream from mouth.

DRAINAGE AREA.--288 mi² (746 km²).

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft (218.959 m) National Geodetic Vertical Datum of 1929. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft (21 m) downstream from bridge and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation caused by dam 0.6 mi (1.0 km) above station and by variable backwater from powerplant at St. Louis, 5.2 mi (8.4 km) below station. About 4.8 ft³/s (0.14 m³/s) diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--49 years, 213 ft³/s (6.032 m³/s), 10.04 in/yr (255 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft³/s (125 m³/s) Mar. 19, 1948, gage height, 10.81 ft (3.295 m); minimum daily, 0.40 ft³/s (0.011 m³/s) Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 808 ft³/s (22.9 m³/s) Mar. 19, gage height, 5.11 ft (1.558 m); maximum gage height, 5.16 ft (1.573 m) Mar. 11; minimum, 4.0 ft³/s (0.11 m³/s) June 15, gage height, 0.01 ft (0.003 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	135	138	155	115	130	657	503	144	168	43	63
2	93	148	116	145	115	145	696	447	145	192	44	63
3	100	139	148	135	115	155	686	525	152	171	42	62
4	109	158	151	130	115	235	612	563	135	165	47	68
5	122	135	129	125	115	339	564	529	123	147	60	58
6	138	111	137	120	115	381	502	593	123	136	57	47
7	118	92	129	120	115	421	455	554	107	126	59	38
8	123	93	125	115	115	563	430	475	116	116	51	39
9	125	90	116	115	115	768	420	409	161	103	45	50
10	128	92	124	115	115	724	400	371	182	95	62	56
11	136	98	139	115	115	692	370	346	211	90	66	56
12	139	104	134	115	115	571	360	312	269	88	95	67
13	111	123	134	115	115	513	425	303	206	86	100	70
14	113	129	139	115	115	620	430	282	197	80	96	66
15	120	138	138	115	115	606	425	284	54	78	71	65
16	138	161	146	115	115	507	415	265	45	71	60	68
17	133	162	184	115	115	504	400	240	107	64	69	59
18	142	128	152	115	115	679	388	226	161	63	71	52
19	145	129	129	115	115	767	367	224	174	61	90	49
20	142	145	121	115	115	697	332	213	127	54	93	40
21	136	155	122	115	115	747	251	199	161	51	81	41
22	126	154	124	115	115	763	304	188	156	54	72	43
23	116	152	133	115	115	732	176	178	113	76	103	38
24	107	150	160	115	115	710	241	176	133	50	114	35
25	104	143	188	115	115	670	271	169	104	37	136	35
26	130	162	157	115	115	627	322	171	79	49	171	45
27	139	172	124	115	115	580	403	168	43	54	163	31
28	127	160	120	115	120	541	406	164	51	58	109	31
29	120	140	110	115	---	507	445	171	92	65	86	34
30	116	140	110	115	---	570	501	172	120	61	92	35
31	113	---	174	115	---	688	---	165	---	49	74	---
TOTAL	3803	4038	4251	3690	3225	17152	12654	9585	3991	2758	2522	1504
MEAN	123	135	137	119	115	553	422	309	133	89.0	81.4	50.1
MAX	145	172	188	155	120	768	696	593	269	192	171	70
MIN	93	90	110	115	115	130	176	164	43	37	42	31
CFSM	.43	.47	.48	.41	.40	1.92	1.47	1.07	.46	.31	.28	.17
TH.	.49	.52	.55	.48	.42	2.22	1.63	1.24	.52	.36	.33	.19

CAL YR 1978 TOTAL 71484 MEAN 196 MAX 2180 MIN 62 CFSM .68 IN 9.23
WTR YR 1979 TOTAL 69173 MEAN 190 MAX 768 MIN 31 CFSM .66 IN 8.93

STREAMS TRIBUTARY TO LAKE HURON

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW¼ NW¼ sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi (11.6 km) southwest of Midland, and 7.8 mi (12.6 km) upstream from Chippewa River.

DRAINAGE AREA.--390 mi² (1,010 km²), approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft (190.177 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft (1.692 m) lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records fair except those for the winter period, which are poor. Regulation at low and medium flows by hydroelectric power-plant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 294 ft³/s (8.326 m³/s), 10.24 in/yr (260 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft³/s (180 m³/s) Mar. 20, 1948, gage height, 10.00 ft (3.048 m), from graph based on gage readings; maximum gage height, 12.08 ft (3.682 m) Feb. 2, 1968, backwater from ice; minimum discharge, not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,370 ft³/s (95.4 m³/s) Mar. 19, gage height, 7.27 ft (2.216 m), only peak above base of 1,200 ft³/s (34.0 m³/s); minimum, 20 ft³/s (0.57 m³/s) June 19, gage height, 2.25 ft (0.686 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	171	77	210	120	120	125	941	776	206	137	105	147
2	146	73	170	120	120	140	872	687	158	152	34	97
3	62	120	152	120	120	165	863	708	123	269	59	99
4	52	78	160	120	120	190	840	858	163	155	97	95
5	76	130	170	120	120	220	724	769	162	164	47	92
6	92	144	165	120	120	255	720	649	123	137	99	100
7	197	152	170	120	120	300	615	739	155	130	134	82
8	190	112	175	120	120	350	515	646	179	90	125	74
9	165	110	170	120	120	390	533	547	69	103	120	64
10	66	107	169	120	120	450	542	430	142	122	58	60
11	73	92	175	120	120	540	502	420	261	93	72	84
12	92	93	185	120	120	660	527	476	250	54	90	84
13	160	99	180	120	120	800	552	323	316	75	110	84
14	94	142	175	120	120	940	548	373	272	97	145	100
15	89	122	170	120	120	1150	518	274	261	88	150	105
16	94	110	170	120	120	1400	492	335	228	103	120	100
17	118	182	170	120	120	1600	427	317	93	118	100	100
18	98	242	170	120	120	1980	396	249	36	48	90	100
19	125	179	165	120	120	2890	501	228	38	53	100	90
20	124	147	160	120	120	2050	357	233	231	84	115	80
21	123	192	160	120	120	1140	478	223	169	105	130	74
22	122	182	155	120	120	994	247	217	250	42	140	62
23	120	189	155	120	120	1010	323	213	172	39	115	62
24	118	166	150	120	120	942	163	197	114	88	110	62
25	118	206	150	120	120	883	331	198	150	130	155	58
26	76	144	145	120	120	778	440	171	169	78	180	54
27	77	182	140	120	120	752	581	185	62	39	210	54
28	127	210	135	120	120	669	640	182	77	62	250	64
29	137	210	130	120	---	650	570	163	51	36	220	50
30	132	210	125	120	---	731	730	157	77	36	175	43
31	96	---	120	120	---	1090	---	164	---	161	160	---
TOTAL	3530	4402	4996	3720	3360	26234	16488	12107	4757	3088	3815	2420
MEAN	114	147	161	120	120	846	550	391	159	99.6	123	80.7
MAX	197	242	210	120	120	2890	941	858	316	269	250	147
MIN	52	73	120	120	120	125	163	157	36	36	34	43
CFSM	.29	.38	.41	.31	.31	2.17	1.41	1.00	.41	.26	.32	.21
IN.	.34	.42	.48	.35	.32	2.50	1.57	1.15	.45	.29	.36	.23
CAL YR 1978	TOTAL	86550	MEAN 237	MAX 2980	MIN 13	CFSM .61	IN 8.26					
WTR YR 1979	TOTAL	88917	MEAN 244	MAX 2890	MIN 34	CFSM .63	IN 8.48					

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW¼ NE¼ sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft (610 m) downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi (1.1 km) upstream from Bullock Creek, 1.4 mi (2.3 km) downstream from Chippewa River and 23 mi (37 km) upstream from mouth.

DRAINAGE AREA.--2,400 mi² (6,200 km²), approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft (176.869 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1955, at datum 10.00 ft (3.048 m) higher.

REMARKS.--Records fair except those for the winter period or doubtful gage height record, Mar. 13 to Apr. 2, Apr. 17 to May 11, which are poor. Water is diverted from river a short distance above station for industrial use. Small part returned to river at gage, small part returned to river 0.25 mi (0.4 km) below station, remainder returned 1 mi (1.6 km) below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft³/s (113 m³/s) regulated by dam 2,000 ft (610 m) above station; fixed crest dam since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--43 years, 1,655 ft³/s (46.87 m³/s), 9.36 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft³/s (963 m³/s) Mar. 21, 1948, gage height, 29.50 ft (8.992 m); minimum, 39 ft³/s (1.10 m³/s) Oct. 12, 1942; minimum daily, 111 ft³/s (3.14 m³/s) Aug. 21, 1949; minimum gage height, 9.04 ft (2.755 m) Aug. 19, 1954, caused by bridge construction above station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft (9.05 m) Mar. 28, 1916, discharge, 34,800 ft³/s (986 m³/s), from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 7,000 ft³/s (198 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 21	--	a9650 273	unknown	Apr. 1	--	*9730 276	*b20.30 6.187

a Discharge measurement.

b Observed.

Minimum discharge, 192 ft³/s (5.44 m³/s) Aug. 3, gage height 9.32 ft (2.841 m); minimum daily, 253 ft³/s (7.16 m³/s) July 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	474	785	1180	366	580	1100	9390	5210	744	522	430	526
2	772	755	614	595	700	1400	7160	4860	571	1280	404	408
3	960	605	471	1200	500	920	5830	5030	466	1780	391	380
4	911	467	842	1600	430	800	5350	6590	768	1010	310	657
5	945	407	994	1800	700	1500	4940	5650	867	1240	285	520
6	1260	740	968	1000	800	2000	4360	4890	821	1530	388	510
7	751	807	763	500	900	2500	4480	4470	826	808	473	674
8	562	614	892	730	1100	2900	4260	4260	954	451	449	401
9	1290	865	496	1000	1250	3300	4120	3940	449	767	447	323
10	1200	963	386	800	1350	3600	3960	2860	400	843	564	435
11	1040	481	423	640	1400	4000	3810	2500	1120	588	365	454
12	1040	376	879	800	1200	4500	3800	1780	1210	723	334	466
13	735	1020	1240	560	920	4880	3870	1220	1200	529	580	431
14	444	1510	1220	430	840	5020	3590	1410	978	403	658	449
15	377	1370	1120	640	760	5660	2690	1700	861	361	632	337
16	480	1120	609	820	600	5190	2440	1480	595	465	678	304
17	502	1490	516	880	480	4840	2740	1330	411	484	647	431
18	608	998	677	940	420	5590	3390	1800	635	384	380	448
19	1020	657	1130	960	400	7210	3400	1060	479	390	324	441
20	1050	1290	1060	600	660	8270	2720	690	578	337	587	414
21	537	1740	1040	400	1000	9170	1640	1230	1330	321	530	494
22	467	1700	1060	700	1300	8010	1020	878	1820	291	511	319
23	865	1060	564	800	1100	7160	1560	1010	936	307	560	258
24	983	1160	495	840	600	6860	1860	1430	512	304	1140	436
25	1320	1100	442	1000	380	7200	2040	1080	967	415	763	518
26	1290	629	644	1300	600	6520	2860	627	1090	434	631	555
27	987	1230	645	760	700	5150	4400	569	744	588	904	525
28	538	1700	671	420	800	4670	4490	562	702	315	931	380
29	513	1490	975	620	---	4500	4130	856	560	253	831	276
30	1230	1370	708	660	---	5230	3790	891	472	379	1000	264
31	1190	---	469	500	---	8300	---	892	---	432	772	---
TOTAL	26341	30499	24193	24861	22470	147950	114090	72755	24066	18934	17899	13034
MEAN	850	1017	780	802	803	4773	3803	2347	802	611	577	434
MAX	1320	1740	1240	1800	1400	9170	9390	6590	1820	1780	1140	674
MIN	377	376	386	366	380	800	1020	562	400	253	285	258
+	22.9	15.3	19.0	23.7	22.6	29.8	30.0	28.1	23.1	26.8	26.4	30.6
MEAN†	873	1032	799	826	826	4803	3833	2375	825	638	603	465
CFSM†	.36	.43	.33	.34	.34	2.00	1.60	.99	.34	.27	.25	.19
IN†	.42	.48	.38	.40	.36	2.31	1.78	1.14	.38	.31	.29	.22

CAL YR 1978 TOTAL 492096 MEAN 1348 MAX 11700 MIN 253 MEAN† 1368 CFSM† .57 IN† 7.74

WTR YR 1979 TOTAL 537092 MEAN 1471 MAX 9390 MIN 253 MEAN† 1496 CFSM† .62 IN† 8.47

* Diversion in cubic feet per second, for industrial use; furnished by Dow Chemical Co.

† Adjusted for diversion made by Dow Chemical Co.

STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°24'46", long 83°57'47", in NW¼ SE¼ sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft (305 m) downstream from bridge on Rust Avenue in Saginaw, 1.9 mi (3.1 km) downstream from Tittabawassee River and 20.3 mi (32.7 km) upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue. Water quality monitor located 1,000 ft (305 m) downstream on downstream side of bridge on Court Street.

DRAINAGE AREA.--6,060 mi² (15,700 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084: December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966, Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft (172.246 m), International Great Lakes datum. Prior to Oct. 1, 1972, non-recording gage at site 1.9 mi (3.1 km) downstream at same datum. Auxiliary water-stage recorder on right bank near Alpin Beach, 19.9 mi (32.0 km) downstream.

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft³/s (1,930 m³/s) Mar. 30, 1904, gage height, 24.9 ft (7.59 m), site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 22,200 ft³/s (629 m³/s) Mar. 9; maximum daily gage height, 16.61 ft (5.063 m) Mar. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						---	13900					
2						---	15400					
3						---	12600					
4						---	11400					
5						11400	12000					
6						15700	11300					
7						17400	---					
8						19400	---					
9						22200	---					
10						21700	---					
11						19500	---					
12						18400	---					
13						16200	---					
14						13600	---					
15						13900	---					
16						13400	---					
17						11200	---					
18						11100	---					
19						12100	---					
20						13700	---					
21						14800	---					
22						14600	---					
23						13700	---					
24						12200	---					
25						12200	---					
26						11600	---					
27						10200	---					
28						---	---					
29						---	---					
30						---	---					
31						10900	---					

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to current year.

WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since Nov. 6, 1976.

REMARKS.--Interruptions in the daily record were due to malfunctions of the instrument. Instantaneous water-discharge measurements are made at times of monthly sampling. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1975-1979): Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.

WATER TEMPERATURES (water years 1975-79): Maximum, 30.0°C July 10, 14, 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 1140 micromhos Dec. 7; minimum, 445 micromhos Apr. 6.

WATER TEMPERATURES: Maximum, 27.5°C July 13-16; minimum 0.0°C on many days during winter period.

WATER QUALITY DATA. WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOC- CI, FECAL, KF AGAR (COLS./ 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
25...	1300	1230	632	8.3	10.5	8.2	76	530	140	250	78
NOV											
14...	1130	2410	924	8.2	7.0	11.6	97	K300	460	300	110
DEC											
12...	1430	1250	999	8.0	.5	10.2	72	K10	K51	340	120
JAN											
10...	1400	914	800	7.8	.0	10.4	71	190	260	320	110
FEB											
22...	1330	1330	707	7.7	.0	10.0	69	84	50	270	62
MAR											
22...	1100	15600	478	8.0	4.5	11.6	94	280	K1000	210	78
APR											
26...	1330	2650	622	8.3	15.0	8.5	87	220	120	250	74
MAY											
01...	0930	808	787	8.3	18.5	10.8	117	63	42	280	84
27...	1300	932	720	8.4	22.5	7.8	89	62	K24	250	74
JUL											
26...	1030	3750	760	7.9	26.0	3.7	45	E21000	E1300	280	98
AUG											
21...	1430	1470	772	8.0	25.5	9.3	107	K52	K20	250	73
SEP											
25...	1400	1870	766	8.4	19.0	13.4	152	K920	K35	270	80

E--ESTIMATED

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARRON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
OCT											
25...	67	21	31	.8	21	2.8	210	0	170	1.7	54
NOV											
14...	80	25	56	1.4	28	3.5	230	0	190	2.3	57
DEC											
12...	92	26	70	1.7	31	4.0	270	0	220	4.3	72
JAN											
10...	87	25	40	1.0	21	3.3	260	0	210	6.6	67
FEB											
22...	74	20	33	.9	21	2.1	250	0	200	8.0	58
MAR											
22...	59	15	14	.4	13	2.7	160	0	130	2.6	55
APR											
26...	69	20	27	.7	19	2.8	220	0	180	1.8	70
MAY											
01...	76	22	40	1.0	23	3.3	240	0	200	1.9	68
27...	69	20	46	1.3	28	3.4	210	5	180	1.4	56
JUL											
26...	72	24	47	1.2	26	4.4	220	0	180	4.4	64
AUG											
21...	67	21	--	1.5	32	59	220	0	180	3.5	52
SEP											
25...	68	--	--	--	--	4.2	220	6	190	1.5	64

STREAMS TRIBUTARY TO LAKE HURON
04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 25...	67	.2	4.4	377	351	1250	.35	.29	--	.56	.85
NOV 14...	140	.2	1.9	506	477	3290	.42	.59	--	.71	1.3
DEC 12...	140	.2	6.7	601	544	2030	.96	.81	--	.69	1.5
JAN 10...	84	.2	7.9	478	443	1180	.87	.80	--	.80	1.6
FEB 22...	67	.2	9.9	397	387	1430	.41	.64	--	.46	1.1
MAR 22...	37	.1	6.9	305	269	12800	3.6	.18	--	.92	1.1
APR 26...	53	.2	2.9	389	353	2780	1.3	.30	.36	.90	1.2
JUN 01...	80	.2	1.9	475	410	1040	.87	.35	.42	1.1	1.4
JUN 27...	90	.2	1.4	479	395	1210	.74	.30	.36	1.2	1.5
JUL 26...	110	.3	2.3	459	433	4650	.74	.20	.24	1.6	1.8
AUG 21...	110	.2	4.1	458	422	1820	.82	.11	.11	2.1	2.2
SEP 25...	110	.3	.4	460	460	2320	.97	.48	.58	1.1	1.6

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDEED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDEED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 25...	.21	.64	1.2	5.3	.13	--	.08	--	18	60	100
NOV 14...	.41	.89	1.7	7.6	.14	--	.08	6.1	13	85	100
DEC 12...	.10	1.4	2.5	11	.18	--	.12	9.4	5	17	100
JAN 10...	--	--	2.5	11	.09	--	.07	--	8	20	100
FEB 22...	--	--	1.5	6.7	.14	--	.04	7.9	8	29	100
MAR 22...	--	--	4.7	21	.07	--	.05	10	41	1730	100
APR 26...	--	--	2.5	11	.15	.46	.05	--	32	229	100
JUN 01...	--	--	2.3	10	.16	.49	.06	12	19	41	100
JUN 27...	--	--	2.2	9.9	.19	.58	.03	11	34	86	100
JUL 26...	--	--	2.5	11	.30	.92	.14	--	25	253	100
AUG 21...	--	--	3.0	13	.28	.86	.15	9.7	20	79	100
SEP 25...	--	--	2.6	11	.21	.64	.04	9.3	34	172	100

STREAMS TRIBUTARY TO LAKE HURON
04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 25...	1300	2	1	100	100	2	--	10	0	1
JAN 10...	1400	1	1	100	100	--	1	<10	0	0
APR 26...	1330	3	3	0	0	0	0	10	10	0
JUL 26...	1030	4	4	0	70	--	1	20	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 25...	1	7	2	460	10	22	--	40	20	<.5
JAN 10...	0	4	2	330	30	7	3	30	30	<.5
APR 26...	0	8	3	1200	50	7	3	90	30	.5
JUL 26...	0	13	3	650	30	9	3	90	--	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 25...	<.5	0	0	0	--	40	--	7.8	1.4
JAN 10...	<.5	0	0	0	0	50	20	8.2	--
APR 26...	.5	0	0	0	0	60	10	6.8	1.0
JUL 26...	<.5	0	0	0	0	40	--	11	.0

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
DEC 12...	1430	28	--	.160	.240	.280	.000
JUL 26...	1030	29	.00	18.9	18.9	2.13	1.47
AUG 21...	1430	26	2688	12.4	14.9	.930	1.41

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 11,77 0945	MAR 7,78 1430	MAY 10,78 1315	JUN 7,78 1400
TOTAL CELLS/ML	5900	3800	19000	11000
DIVERSITY: DIVISION	1.6	0.2	1.8	0.9
..CLASS	1.6	0.2	1.8	0.9
...ORDER	2.2	0.7	2.5	1.1
...FAMILY	2.9	0.7	3.2	2.0
....GENUS	3.3	0.9	3.4	2.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	37	1	--	--	--	--	--	--
...COELASTRACEAE								
....COELASTRUM	--	--	--	--	--	--	660	6
...HYDRODICTYACEAE								
....PEDIASTRUM	--	--	--	--	--	--	--	--
...MICRACTINIACEAE								
....GOLENKINIA	--	--	--	--	460	2	--	--
....MICRACTINIUM	37	1	--	--	--	--	--	--
...OOCYSTACEAE								
....ANKISTRODESMUS	2100#	36	--	--	990	5	73	1
....CHODATELLA	--	--	--	--	--	--	--	--
....DICTYOSPHAERIUM	--	--	--	--	--	--	--	--
....KIRCHNERIELLA	330	6	--	--	230	1	*	0
....OOCYSTIS	--	--	*	0	--	--	150	1
....SELENASTRUM	--	--	*	0	--	--	110	1
....TETRAEDRON	37	1	--	--	--	--	--	--
...SCENEDESMACEAE								
....ACTINASTRUM	--	--	--	--	--	--	--	--
....CRUCIGENIA	290	5	--	--	--	--	590	5
....SCENEDESMUS	150	2	--	--	--	--	6300#	59
....TETRASTRUM	--	--	--	--	5800#	30	--	--
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	110	2	--	--	680	4	--	--
...PHACOTACEAE								
....PHACOTUS	110	2	--	--	--	--	--	--
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	400	7	--	--	1400	7	150	1
....MELOSIRA	180	3	--	--	1400	7	810	8
....SKELETONEMA	--	--	--	--	--	--	--	--
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	37	1	--	--	--	--	--	--
....COCCONEIS	--	--	--	--	--	--	180	2
...CYMBELLACEAE								
....AMPHORA	37	1	*	0	--	--	--	--
....CYMBELLA	37	1	*	0	--	--	--	--
...DIATOMACEAE								
....DIATOMA	--	--	*	0	*	0	--	--
...FRAGILARIACEAE								
....ASTERIONELLA	37	1	--	--	610	3	590	5
....FRAGILARIA	--	--	*	0	--	--	--	--
....SYNEDRA	73	1	*	0	230	1	--	--
...NAVICULACEAE								
....NAVICULA	110	2	32	1	230	1	370	3
...NITZSCHACEAE								
....NITZSCHIA	110	2	57	1	1400	7	290	3
...SURIPELLACEAE								
....CYMATOPLEURA	--	--	--	--	--	--	180	2
...TABELLARIACEAE								
....TABELLARIA	--	--	--	--	300	2	73	1
..CHRYSTOPHYCEAE								
...CHRYSOMONADALES								
...MALLOMONADACEAE								
....MALLOMONAS	37	1	--	--	--	--	--	--
...OCHROMONADACEAE								
....DINOBYRON	--	--	--	--	*	0	--	--
....OCHROMONAS	--	--	--	--	--	--	--	--
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	37	1	--	--	--	--	--	--
...CRYPTOMONADACEAE								
....CRYPTOMONAS	37	1	--	--	230	1	--	--

STREAMS TRIBUTARY TO LAKE HURON

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04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 11,77 0945		MAR 7,78 1430		MAY 10,78 1315		JUN 7,78 1400	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	730	13	320	8	2600	13	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	2200	11	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	76	2	--	-	--	-
...OSCILLATORIA	730	13	3300#	86	--	-	--	-
....SPIRULINA	--	-	--	-	*	0	--	-
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	110	1
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
....EUGLENACEAE								
....EUGLENA	73	1	*	0	--	-	--	-
....TRACHELOMONAS	--	-	--	-	530	3	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 18,78 1345		AUG 16,78 1015		SEP 14,78 1315	
TOTAL CELLS/ML	120000		200000		31000	
DIVERSITY: DIVISION	1.6		1.5		1.6	
..CLASS	1.7		1.5		1.6	
...ORDER	1.9		2.0		2.1	
...FAMILY	2.7		3.0		3.1	
...GENUS	3.3		3.5		3.4	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
...CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	*	0
...COELASTRACEAE						
....COELASTRUM	4200	4	46000#	23	3200	10
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	--	-	720	2
...MICRACTINIACEAE						
....GOLENKINIA	1000	1	--	-	--	-
....MICRACTINIUM	9400	8	13000	6	720	2
...OOCYSTACEAE						
....ANKISTRODESMUS	3100	3	1000	1	1000	3
....CHODATELLA	*	0	--	-	*	0
....DICTYOSPHAERIUM	17000	14	8300	4	580	2
....KIRCHNERIELLA	3600	3	--	-	--	-
....OOCYSTIS	--	-	4200	2	--	-
....SELENASTRUM	--	-	2600	1	--	-
....TETRAEDRON	1000	1	--	-	--	-
...SCENEDESMACEAE						
....ACTINASTRUM	2100	2	--	-	--	-
....CRUCIGENIA	2100	2	6300	3	--	-
....SCENEDESMUS	9400	8	21000	10	9400#	30
....TETRASTRUM	--	-	--	-	580	2
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	2600	2	2100	1	*	0
...PHACOTACEAE						
....PHACOTUS	--	-	*	0	290	1
CHRYSOPHYTA						
..BACILLARIOPHYCEAE						
...CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	23000#	20	18000	9	2200	7
....MFLOSIRA	--	-	--	-	290	1
....SKELETONEMA	4700	4	2100	1	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
....COCONEIS	--	-	--	-	--	-
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-
...NAVICULACEAE						
....NAVICULA	--	-	--	-	290	1
...NITZSCHIACEAE						
....NITZSCHIA	1000	1	11000	5	4900#	16
...SURIPELLACEAE						
....CYMATOPLEURA	--	-	--	-	--	-
...TABELLARIACEAE						
....TABELLARIA	--	-	--	-	--	-
..CHRYSOPHYCEAE						
...CHRYSOMONADALES						
...MALLOMONADACEAE						
....MALLOMONAS	--	-	--	-	--	-
...OCHROMONADACEAE						
....DINOBRYON	--	-	--	-	--	-
....OCHROMONAS	1000	1	1000	1	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
..CRYPTOPHYCEAE						
...CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	1600	1	2600	1	--	-

STREAMS TRIBUTARY TO LAKE HURON

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04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 18,78 1345		AUG 16,78 1015		SEP 14,78 1315	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	16000	8	3500	11
....ANACYSTIS	29000#	25	32000#	16	--	-
...HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	720	2
....APHANIZOMENON	--	-	14000	7	--	-
...OSCILLATORIACEAE						
....LYNGRYA	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	1600	5
....SPIRULINA	--	-	--	-	--	-
...CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
...EUGLENACEAE						
....EUGLENA	*	0	--	-	*	0
....TRACHELOMONAS	--	-	--	-	870	3

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE HURON
04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	820	810	813	857	839	846	757	622	673	949	864	910
2	823	813	817	839	832	836	803	741	771	1040	881	944
3	840	814	829	824	814	819	908	771	812	960	900	924
4	838	831	835	829	808	811	895	790	848	1050	853	958
5	832	815	823	842	814	823	1120	900	1020	857	782	824
6	839	819	826	855	824	843	1070	848	944	844	788	820
7	833	819	827	892	837	871	1140	854	958	844	761	812
8	827	800	808	916	874	887	1020	848	898	893	824	854
9	797	787	793	921	898	915	917	847	872	1040	895	972
10	808	788	799	907	895	902	888	820	858	1030	855	908
11	795	765	776	916	885	893	896	832	855	872	820	844
12	775	752	770	902	882	890	1050	873	964	923	867	890
13	769	756	765	864	848	861	1080	979	1020	967	898	934
14	760	747	754	882	850	870	993	869	940	986	869	904
15	747	744	746	931	604	691	928	738	845	930	857	889
16	748	734	741	680	649	659	933	755	843	1080	936	995
17	755	741	749	784	692	735	890	834	862	1050	923	992
18	766	742	753	735	662	710	839	806	822	964	854	922
19	763	749	757	657	593	631	949	879	925	955	832	883
20	753	730	747	776	627	686	975	893	947	923	826	857
21	741	724	732	888	778	836	906	845	872	906	843	867
22	728	714	723	762	610	678	1080	895	971	936	876	899
23	718	662	676	737	625	680	999	855	913	1090	935	1020
24	669	659	663	717	642	666	959	863	892	1060	891	953
25	666	658	661	879	653	794	989	868	935	966	894	923
26	---	---	---	769	624	696	984	953	963	941	825	892
27	---	---	---	840	670	760	1000	955	970	884	771	838
28	---	---	---	922	688	825	1040	938	1010	890	803	831
29	---	---	---	753	630	706	933	846	888	969	905	931
30	---	---	---	729	648	695	945	885	913	1050	978	1020
31	873	818	857	---	---	---	967	868	921	1040	935	984
MONTH				931	593	784	1140	622	901	1090	761	909

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	957	925	942	---	---	---	582	564	576	654	585	609
2	988	931	958	---	---	---	584	529	553	617	578	599
3	981	934	963	---	---	---	556	525	546	630	585	612
4	1000	924	947	---	---	---	555	533	543	609	528	581
5	954	902	921	---	---	---	543	449	508	592	549	577
6	998	948	965	---	---	---	580	445	547	617	581	605
7	991	877	936	---	---	---	597	576	585	627	596	609
8	937	864	897	---	---	---	609	594	603	619	591	606
9	924	812	872	---	---	---	632	603	615	625	607	615
10	844	749	804	---	---	---	662	628	643	663	582	637
11	864	777	804	---	---	---	661	653	657	704	617	677
12	948	856	899	---	---	---	663	654	658	646	529	609
13	1080	961	1030	---	---	---	664	648	656	751	531	655
14	1060	924	981	---	---	---	662	634	648	775	735	763
15	953	874	908	---	---	---	669	651	661	831	659	760
16	939	869	895	---	---	---	650	571	602	721	663	687
17	1030	907	976	---	---	---	598	567	582	759	678	725
18	1070	907	993	---	---	---	599	583	593	741	614	694
19	980	907	940	---	---	---	659	592	610	737	610	676
20	1050	980	1020	---	---	---	721	586	646	752	606	679
21	1090	1030	1060	---	---	---	660	606	628	843	672	767
22	1020	776	910	520	491	507	771	656	716	882	691	772
23	---	---	---	567	516	545	835	738	780	747	648	686
24	---	---	---	587	563	574	856	794	822	797	678	720
25	---	---	---	588	493	550	864	817	837	822	689	727
26	---	---	---	503	475	489	841	540	697	711	645	673
27	---	---	---	625	476	496	677	564	620	838	672	728
28	---	---	---	558	488	534	624	583	611	817	706	762
29	---	---	---	664	554	616	625	589	611	852	745	787
30	---	---	---	676	604	626	647	595	629	817	785	798
31	---	---	---	656	586	622	---	---	---	890	750	822
MONTH							864	445	633	890	528	684

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	792	779	787	709	681	689	857	745	784	782	716	742
2	792	748	763	762	736	745	943	837	882	789	742	760
3	790	742	762	776	681	707	843	779	802	798	736	754
4	772	714	743	696	676	686	818	789	799	934	792	827
5	852	642	705	738	716	725	814	769	795	935	893	915
6	879	746	799	781	731	771	857	771	795	943	917	926
7	774	685	725	765	750	757	850	776	800	935	840	899
8	754	650	701	735	729	732	909	781	814	876	818	843
9	758	645	699	709	692	699	949	800	906	843	761	820
10	773	579	685	724	667	690	914	785	832	856	758	804
11	755	592	652	703	685	695	850	779	813	871	797	836
12	915	752	815	697	592	645	833	746	778	879	850	861
13	832	645	679	625	571	594	785	693	734	---	---	---
14	720	643	686	622	577	596	717	702	710	---	---	---
15	733	655	697	681	572	629	822	709	744	---	---	---
16	726	627	691	724	775	688	857	741	800	---	---	---
17	701	622	667	824	693	769	766	715	737	---	---	---
18	719	697	709	858	729	768	735	724	728	---	---	---
19	888	711	801	771	716	737	757	716	727	---	---	---
20	920	870	896	758	728	743	783	734	764	---	---	---
21	871	803	829	792	748	768	772	742	754	---	---	---
22	875	847	862	813	781	798	971	778	921	---	---	---
23	859	645	699	793	761	790	879	780	805	---	---	---
24	670	608	638	810	768	792	878	794	847	---	---	---
25	755	656	708	833	779	810	836	790	817	799	762	776
26	907	744	862	905	798	830	797	661	726	931	777	846
27	918	781	824	934	888	912	746	661	718	934	837	882
28	812	684	724	910	873	893	850	715	794	862	796	833
29	779	684	738	892	869	884	862	742	771	830	793	815
30	684	656	695	883	750	793	760	735	748	843	801	823
31	---	---	---	821	748	766	784	729	751	---	---	---
MONTH	920	579	741	934	571	745	971	661	787			

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	15.5	15.0	15.0	9.5	9.0	9.5	1.0	.5	1.0	1.0	.5	.5
2	15.5	15.0	15.5	10.0	9.0	9.5	.5	.0	.5	.5	.0	.5
3	15.5	15.0	15.0	10.0	9.5	9.5	1.0	.5	.5	.0	.0	.0
4	15.0	14.0	14.0	11.0	10.0	10.5	.5	.0	.5	.5	.0	.0
5	14.5	14.0	14.5	12.0	10.5	11.0	1.0	.5	.5	.5	.0	.0
6	14.0	13.5	13.5	11.5	11.0	11.0	1.0	.5	.5	.0	.0	.0
7	13.5	12.0	12.5	11.0	10.5	11.0	1.0	.5	1.0	.5	.0	.5
8	12.0	11.0	11.5	10.5	8.5	9.0	1.0	.5	1.0	.5	.0	.0
9	11.0	10.0	10.5	9.0	8.5	8.5	.5	.0	.5	.5	.0	.0
10	11.0	10.0	10.5	8.5	8.5	8.5	.0	.0	.0	.5	.0	.0
11	12.5	11.0	12.0	8.5	8.5	8.5	.5	.0	.5	.0	.0	.0
12	12.5	12.5	12.5	8.5	7.5	8.0	.5	.5	.5	.5	.0	.0
13	12.5	12.5	12.5	7.5	6.5	7.0	.5	.0	.0	1.0	.5	.5
14	12.5	12.0	12.0	7.5	7.0	7.0	.5	.0	.0	.5	.0	.5
15	12.0	11.5	12.0	7.0	6.0	6.5	.5	.0	.0	.5	.0	.0
16	11.5	10.5	11.5	6.0	5.5	6.0	.5	.5	.5	.5	.0	.5
17	10.0	9.0	9.5	6.5	6.0	6.0	.5	.0	.5	.5	.0	.5
18	9.5	9.0	9.0	6.0	6.0	6.0	.5	.0	.5	.5	.0	.0
19	9.5	9.0	9.5	6.0	5.5	6.0	.5	.0	.0	.5	.0	.5
20	10.0	9.0	9.5	5.5	4.5	5.0	.5	.0	.5	1.0	.5	.5
21	11.0	10.0	10.5	4.5	3.0	3.5	.5	.0	.5	1.0	.5	.5
22	12.0	11.0	11.5	4.0	3.5	3.5	.5	.0	.5	.5	.5	.5
23	11.5	11.0	11.5	4.0	4.0	4.0	.5	.5	.5	.5	.5	.5
24	11.5	10.0	10.5	4.0	4.0	4.0	1.0	.5	.5	1.0	.5	1.0
25	10.0	9.5	10.0	4.0	3.5	3.5	1.0	.0	.5	1.0	.5	.5
26	---	---	---	3.5	3.0	3.5	.5	.0	.5	1.0	.5	1.0
27	---	---	---	3.0	1.5	2.5	.5	.0	.0	1.0	1.0	1.0
28	---	---	---	1.5	1.0	1.5	.5	.0	.0	1.0	1.0	1.0
29	---	---	---	1.5	1.0	1.0	.5	.5	.5	1.0	.5	1.0
30	---	---	---	1.5	1.0	1.0	1.0	.5	1.0	.5	.5	.5
31	9.5	9.0	9.0	---	---	---	1.0	1.0	1.0	.5	.0	.5
MONTH				12.0	1.0	6.5	1.0	.0	.5	1.0	.0	.5

STRFAMS TRIBUTARY TO LAKE HURON
04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	.5	.0	.0	---	---	---	5.5	5.0	5.5	10.0	9.0	9.5
2	.0	.0	.0	---	---	---	6.0	4.5	5.5	10.5	9.5	10.0
3	.5	.0	.0	---	---	---	6.5	5.5	6.0	12.0	11.0	11.5
4	.5	.0	.0	---	---	---	7.5	6.5	7.0	11.5	10.5	11.0
5	.0	.0	.0	---	---	---	7.5	6.0	7.5	10.5	9.5	10.0
6	.0	.0	.0	---	---	---	6.0	2.0	3.5	11.0	10.0	10.5
7	.0	.0	.0	---	---	---	3.5	2.0	3.0	13.0	11.0	11.5
8	.0	.0	.0	---	---	---	3.5	2.5	3.0	16.5	13.0	14.5
9	.0	.0	.0	---	---	---	2.5	2.0	2.5	18.5	16.0	17.0
10	.0	.0	.0	---	---	---	4.5	2.5	4.0	20.5	17.0	19.5
11	.0	.0	.0	---	---	---	5.0	4.5	4.5	22.0	20.5	21.0
12	.0	.0	.0	---	---	---	7.0	5.0	6.0	21.0	18.5	19.5
13	.0	.0	.0	---	---	---	8.5	7.0	7.5	18.5	17.5	18.0
14	.0	.0	.0	---	---	---	8.5	7.5	8.0	18.5	17.0	17.5
15	.0	.0	.0	---	---	---	8.5	8.0	8.5	17.5	17.0	17.0
16	.0	.0	.0	---	---	---	8.0	7.5	8.0	16.0	16.0	17.0
17	.0	.0	.0	---	---	---	9.0	7.5	8.0	17.5	16.5	17.0
18	.0	.0	.0	---	---	---	10.0	8.5	9.0	18.5	17.5	18.0
19	.0	.0	.0	---	---	---	11.0	8.5	9.5	19.0	18.5	18.5
20	.0	.0	.0	---	---	---	9.5	8.5	9.0	19.5	18.0	19.0
21	.5	.0	.0	---	---	---	11.0	9.0	10.0	19.5	19.0	19.5
22	.5	.0	.0	6.5	4.5	4.5	13.5	11.0	12.5	19.5	18.5	19.0
23	---	---	---	5.5	4.5	5.0	15.0	13.0	14.0	19.0	17.5	18.0
24	---	---	---	5.5	5.5	5.5	16.0	14.5	15.0	18.0	16.0	17.5
25	---	---	---	5.0	4.0	5.0	16.5	15.0	15.5	16.0	13.5	15.0
26	---	---	---	5.5	5.0	5.5	16.0	13.0	15.0	13.5	12.5	13.0
27	---	---	---	7.0	5.5	6.0	13.5	12.5	13.0	13.5	13.0	13.0
28	---	---	---	7.5	7.0	7.5	12.5	12.0	12.5	14.5	13.5	14.0
29	---	---	---	7.5	4.5	6.5	12.0	11.0	11.0	16.0	14.5	15.0
30	---	---	---	8.0	5.5	7.5	11.0	10.5	10.5	17.5	15.0	16.0
31	---	---	---	8.0	5.0	6.0	---	---	---	18.5	16.0	17.0
MONTH							16.5	2.0	8.5	22.0	9.0	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	20.0	18.0	19.0	21.5	20.0	20.5	26.0	25.5	25.5	24.0	23.0	23.5
2	19.5	18.0	19.0	20.5	19.5	19.5	25.5	24.5	25.0	24.5	23.5	24.0
3	21.0	19.5	20.0	20.5	20.0	20.0	25.5	24.5	24.5	24.0	23.5	23.5
4	21.0	20.0	20.5	21.0	20.0	20.5	25.5	24.5	25.0	25.0	23.0	23.5
5	21.5	20.5	21.0	21.5	20.5	21.0	25.0	24.5	25.0	24.5	23.0	23.5
6	22.5	21.0	21.0	22.5	21.5	22.0	25.0	24.0	24.5	24.0	23.0	23.5
7	22.5	21.0	21.5	23.5	22.0	23.0	25.0	24.0	24.5	22.5	21.5	22.0
8	24.5	22.0	23.0	24.0	23.0	23.5	24.5	24.0	24.5	21.5	19.0	20.5
9	24.5	23.5	24.0	24.5	23.5	24.0	24.5	24.0	24.0	19.0	18.0	18.5
10	25.5	24.5	25.0	25.0	23.5	24.0	24.5	23.5	24.0	19.5	18.0	18.5
11	24.5	22.5	24.0	25.0	24.5	25.0	24.0	23.0	23.5	19.5	18.0	18.5
12	22.5	21.5	21.5	26.5	25.5	25.5	24.0	23.0	23.5	18.5	18.5	18.5
13	22.5	21.0	21.5	27.5	26.5	27.0	23.0	22.0	22.5	---	---	---
14	22.5	21.0	21.5	27.5	27.0	27.0	22.5	21.5	22.0	---	---	---
15	23.5	22.0	22.5	27.5	27.0	27.0	21.5	21.0	21.5	---	---	---
16	24.0	22.5	23.5	27.5	26.5	27.0	21.0	20.5	21.0	---	---	---
17	24.5	23.0	24.0	27.0	25.5	26.5	21.0	20.5	21.0	---	---	---
18	23.0	22.5	22.5	27.0	25.0	25.5	21.5	20.5	21.0	---	---	---
19	22.5	21.5	22.0	26.0	24.5	25.5	22.0	20.5	21.0	---	---	---
20	22.0	21.0	21.5	27.0	25.0	25.5	21.5	21.0	21.5	---	---	---
21	22.5	21.5	22.0	26.0	25.0	25.5	22.0	21.5	21.5	---	---	---
22	23.0	22.0	22.5	26.5	25.0	25.5	23.0	22.0	22.5	---	---	---
23	22.0	20.0	21.0	27.0	25.5	26.0	23.5	22.5	23.0	---	---	---
24	20.0	19.0	20.5	26.5	26.0	26.5	23.5	22.5	23.0	---	---	---
25	21.0	20.0	20.0	26.5	26.5	26.5	22.5	22.0	22.5	17.5	17.0	17.5
26	20.5	19.5	20.0	26.5	25.5	26.0	22.5	22.0	22.0	19.0	17.0	17.5
27	21.5	20.5	21.0	26.5	25.5	26.0	22.5	22.0	22.0	19.0	18.0	18.5
28	24.0	20.5	21.5	26.0	25.0	25.5	22.5	22.0	22.0	19.5	18.5	18.5
29	23.0	21.5	22.0	27.0	25.5	26.0	22.0	21.5	22.0	20.5	18.5	19.0
30	22.0	21.5	21.5	26.0	26.0	26.0	23.0	21.5	22.0	20.0	19.0	19.5
31	---	---	---	26.5	25.5	26.0	23.5	21.5	22.5	---	---	---
MONTH	25.5	18.0	21.5	27.5	19.5	24.5	26.0	20.5	23.0			

STREAMS TRIBUTARY TO LAKE HURON

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04158500 PIGEON RIVER NEAR OWENDALE, MI

LOCATION.--Lat 43°45'49", long 83°14'46", in SW¼ SE¼ sec.36, T.16 N., R.10 E., Huron County, Hydrologic Unit 04080103, on left bank 600 ft (183 m) downstream from bridge on Kilmanagh Road, 2.5 mi (4.0 km) downstream from confluence of East and West Branches, and 2.5 mi (4.0 km) northeast of Owendale.

DRAINAGE AREA.--53.2 mi² (138 km²), revised.

PERIOD OF RECORD.--October 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m), from topographic map. Prior to June 10, 1954, nonrecording gage at site 600 ft (183 m) upstream at same datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 31.9 ft³/s (0.903 m³/s), 8.14 in/yr (207 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,550 ft³/s (72.2 m³/s) Mar. 25, 1954, gage height, 10.75 ft (3.277 m), from rating curve extended above 1,200 ft³/s (34.0 m³/s), site and datum then in use; minimum, 0.1 ft³/s (0.003 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	2330	ice jam	*10.12 3.085	Apr. 14	2300	*780 22.1	8.69 2.649
Mar. 31	2000	570 16.1	7.48 2.280				

Minimum discharge, 0.5 ft³/s (0.014 m³/s) Sept. 20, gage height, 2.66 ft (0.811 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	12	12	9.0	5.0	7.6	342	83	13	74	3.1	1.3
2	13	13	10	26	5.0	8.3	170	69	10	61	4.4	1.2
3	12	12	12	45	4.9	9.0	195	133	11	42	5.5	1.1
4	14	13	16	26	4.8	160	102	266	10	28	4.2	1.2
5	15	12	20	17	4.7	480	87	109	8.9	21	4.0	1.2
6	22	12	19	14	4.6	420	160	85	8.2	16	3.8	1.1
7	29	12	17	13	4.6	260	90	84	7.6	12	3.3	1.0
8	27	11	16	11	4.6	245	68	69	7.5	9.5	3.1	1.1
9	23	9.9	13	8.0	4.6	225	62	56	9.5	7.9	2.9	1.2
10	21	9.8	13	5.2	4.5	180	79	47	20	8.9	3.3	1.2
11	20	9.6	13	4.8	4.5	160	94	44	29	8.3	3.5	1.4
12	18	8.4	11	4.6	4.5	150	86	44	27	6.8	3.0	1.3
13	17	9.1	11	4.5	4.5	100	84	42	20	6.4	2.7	1.2
14	14	13	10	4.6	4.5	160	526	38	15	5.3	2.8	1.8
15	13	13	10	4.6	4.5	105	478	34	12	4.7	2.6	2.1
16	13	12	9.5	4.7	4.5	60	153	31	10	3.7	2.4	1.6
17	12	12	9.0	4.7	4.5	50	88	28	8.6	3.4	2.5	1.2
18	12	16	8.5	4.8	4.5	82	70	26	6.6	3.2	2.8	.93
19	12	16	8.2	4.9	4.5	150	56	23	5.8	3.1	2.9	.75
20	12	13	8.4	4.9	4.4	116	49	22	5.4	3.0	2.8	.56
21	12	12	9.2	5.0	4.5	92	44	20	7.0	3.2	2.5	.60
22	11	11	9.2	5.0	4.7	88	47	20	7.0	3.2	2.2	.64
23	9.6	15	8.6	5.0	5.0	85	43	18	6.2	3.1	2.1	.77
24	9.6	26	8.4	5.0	5.4	85	38	17	6.1	3.2	2.3	.92
25	10	25	8.4	5.0	5.8	91	38	16	5.9	4.2	2.2	1.0
26	13	22	7.4	5.0	6.4	72	93	16	5.6	4.7	2.1	.98
27	15	18	7.5	5.0	7.1	64	313	18	5.5	4.5	1.9	.94
28	15	14	5.6	5.0	7.3	64	135	18	6.5	3.8	2.0	.83
29	14	13	5.0	5.0	---	210	83	17	6.9	3.5	2.1	1.1
30	13	13	5.4	5.0	---	321	79	17	20	3.2	2.1	1.2
31	13	---	5.9	5.0	---	547	---	14	---	3.1	1.6	---
TOTAL	468.2	407.8	327.2	276.3	138.4	4846.9	3952	1524	321.8	367.9	88.7	33.42
MEAN	15.1	13.6	10.6	8.91	4.94	156	132	49.2	10.7	11.9	2.86	1.11
MAX	29	26	20	45	7.3	547	526	266	29	74	5.5	2.1
MIN	9.6	8.4	5.0	4.5	4.4	7.6	38	14	5.4	3.0	1.6	.56
CFSM	.28	.26	.20	.17	.09	2.93	2.48	.93	.20	.22	.05	.02
IN.	.33	.29	.23	.19	.10	3.39	2.76	1.07	.23	.26	.06	.02
CAL YR 1978	TOTAL	10757.50	MEAN	29.5	MAX	900	MIN	1.0	CFSM	.56	IN	7.52
WTR YR 1979	TOTAL	12752.62	MEAN	34.9	MAX	547	MIN	.56	CFSM	.66	IN	8.92

STREAMS TRIBUTARY TO LAKE HURON

04159010 PIGEON RIVER NEAR CASEVILLE, MI
(National stream-quality network station)

LOCATION.--Lat 43°56'22", long 83°14'30" in SW¼ NW¼ sec.31, T.18 N., R.11 E., Huron County, Hydrologic Unit 04080103, at bridge on Kinde Road, 1.5 mi (2.4 km) east of Caseville, and 3.1 mi (5.0 km) upstream from mouth.

DRAINAGE AREA, --125 mi² (324 km²).

PERIOD OF RECORD.--January 1978 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1978 to current year.
WATER TEMPERATURES: April 1978 to current year.

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements, by a local observer, between 1700 and 1900 hours. Water-discharge measurements are made at times of monthly sampling. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: (water years 1978, 1979) Maximum daily recorded, 1150 micromhos Nov. 4, 1978; minimum daily recorded, 175 micromhos Mar. 6, 1979.

WATER TEMPERATURES: (water years 1978, 1979) Maximum daily recorded, 27.5°C July 7, 1978; minimum daily recorded, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 1240 micromhos was observed Dec. 11, 1978.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum, 25.5°C July 21, 28, 29; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

[illegible]

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

[illegible]

STREAMS TRIBUTARY TO LAKE HURON

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04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DTS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO ₂)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO ₂ +NO ₃ TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH ₄)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 26...	84	.2	.8	998	639	22.9	2.4	.20	--	1.1	1.3
NOV 13...	61	.2	1.5	579	536	10.8	.00	.01	--	1.2	1.2
DEC 11...	74	.2	6.0	736	648	45.7	8.1	.06	--	.64	.70
JAN 09...	60	.2	8.4	664	604	19.7	5.0	.16	--	.72	.88
FEB 21...	51	.3	10	630	583	9.90	1.4	.19	--	.49	.68
MAR 21...	38	.1	5.1	410	350	266	7.0	.17	--	.79	.96
APR 25...	49	.2	.4	417	479	72.7	6.1	.09	.11	.71	.80
MAY 31...	38	.2	.0	580	459	23.0	1.1	.03	.04	.54	.57
JUN 26...	42	.4	.2	524	430	7.50	.59	.08	.10	.59	.67
JUL 24...	47	.2	1.1	470	486	1.52	.06	.14	.17	.69	.83
AUG 23...	36	.3	.4	451	424	1.58	.13	.07	.08	.76	.83

DATE	NITRO- GEN, NH ₄ + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO ₃)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS PO ₄)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 26...	.20	1.1	3.7	16	.26	--	.17	--	10	.23	100
NOV 13...	.78	.42	1.2	5.3	.19	--	.10	7.5	6	.11	100
DEC 11...	.23	.47	8.8	39	.04	--	.03	--	16	.99	100
JAN 09...	--	--	5.9	26	.07	--	.06	--	12	.36	100
FEB 21...	--	--	2.1	9.2	.09	--	.08	6.1	57	.90	100
MAR 21...	--	--	8.0	35	.10	--	.09	7.7	14	9.1	100
APR 25...	--	--	6.9	31	.06	.18	.04	--	51	8.9	100
MAY 31...	--	--	1.7	7.4	.07	.21	.05	9.4	54	2.1	100
JUN 26...	--	--	1.3	5.6	.07	.21	.04	9.6	7	.10	100
JUL 24...	--	--	.89	3.9	.16	.49	.13	--	7	.02	100
AUG 23...	--	--	.96	4.3	.14	.43	.10	7.4	3	.01	100

STREAMS TRIBUTARY TO LAKE HURON
04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 26...	1045	1	1	0	0	--	8	<10	1	1
JAN 09...	1630	1	1	100	100	0	0	10	0	0
APR 25...	1515	3	3	0	0	0	0	10	10	0
JUL 24...	1400	5	5	0	60	0	0	20	10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 26...	1	2	1	170	40	5	--	30	20	<.5
JAN 09...	0	2	1	170	40	4	5	30	10	<.5
APR 25...	0	3	3	230	40	2	4	30	9	.5
JUL 24...	0	4	1	260	10	3	0	80	50	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 26...	<.5	0	0	0	--	0	10	8.5	2.2
JAN 09...	<.5	1	1	0	0	30	0	7.8	.4
APR 25...	.5	1	1	0	0	50	0	7.9	.4
JUL 24...	<.5	1	0	0	0	100	20	9.2	.0

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON TOTAL CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 13...	1700	18	--	5.35	6.46	10.6	1.12
JUN 26...	1330	26	697	.000	.230	.330	.000
AUG 23...	0900	30	20.9	3.15	3.46	14.8	4.82

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 6,78 1500	MAY 3,78 1215	JUN 8,78 1130	JUL 17,78 1630	AUG 17,78 0845	SEP 13,78 1500				
TOTAL CELLS/ML	21	4300	430	840	290	990				
DIVERSITY: DIVISION	0.9	1.4	1.0	1.5	0.8	1.2				
..CLASS	0.9	1.5	1.0	1.5	0.8	1.2				
...ORDER	0.9	2.0	1.0	1.6	0.8	1.3				
...FAMILY	0.9	2.0	1.5	2.1	1.9	1.4				
....GENUS	0.9	2.1	1.5	2.2	2.1	1.6				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
....HYDRODICTYACEAE										
.....PEDIASTRUM	--	-	--	-	--	-	350#	42	--	-
.....OOCYSTACEAE										
.....ANKISTRODESMUS	--	-	110	3	--	-	44	5	44#	15
.....KIRCHNERIELLA	--	-	74	2	--	-	--	-	--	-
.....OOCYSTIS	--	-	--	-	--	-	22	3	--	-
.....SELENASTRUM	--	-	190	4	--	-	--	-	--	-
.....TETRAEDRON	--	-	--	-	--	-	--	-	22	8
.....SCENEDESMACEAE										
.....SCENEDESMUS	--	-	--	-	230#	55	--	-	--	-
...VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	7#	33	2000#	47	--	-	--	-	--	-
....POLYRLEPHARIDACEAE										
....SPERMATOOZOPSIS	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
...COSCINODISCAEAE										
....CYCLOTELLA	--	-	710#	16	--	-	22	3	--	-
...PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	29	7	44	5	44#	15
....RHODICOSPHEA	--	-	--	-	--	-	22	3	--	-
....NAVICULACEAE										
.....NAVICULA	14#	67	--	-	130#	31	88	11	110#	38
.....NITZSCHIAEAE										
.....NITZSCHIA	--	-	260	6	29	7	--	-	66#	23
..CHRYSOPHYCEAE										
...CHRYSOMONADALES										
...OCHROMONADACEAE										
....OCHROMONAS	--	-	37	1	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
..CYANOPHYCEAE										
...CHROOCOCCALES										
....CHROOCOCCACEAE										
.....ANACYSTIS	--	-	930#	21	--	-	--	-	--	-
...HORMOGONALES										
....OSCILLATORIAEAE										
.....OSCILLATORIA	--	-	--	-	--	-	240#	29	--	-
....SPIRULINA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
..EUGLENOPHYCEAE										
...EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE HURON
04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	964	910	1050	---	902	911	---	---	---	950	---	1000
2	954	946	1070	---	---	901	---	---	---	875	---	---
3	---	1120	1050	---	---	908	801	---	---	950	---	770
4	994	1150	1060	---	---	622	---	---	---	---	---	781
5	999	---	1090	---	909	254	830	---	---	972	---	682
6	989	1120	1020	---	776	175	864	---	---	994	---	781
7	990	1020	1040	---	922	242	805	---	---	853	---	858
8	987	1020	1010	---	947	329	812	---	---	---	---	869
9	994	1050	1050	---	654	396	822	---	---	---	---	---
10	988	1070	1070	---	---	441	870	---	---	---	---	880
11	1000	1050	---	---	---	475	835	734	---	---	---	924
12	1010	996	---	---	---	545	810	---	---	---	---	869
13	1010	---	1040	---	---	599	818	---	---	---	734	869
14	1010	914	1110	---	---	576	761	---	---	---	691	---
15	---	910	1100	---	---	591	---	---	---	---	702	1080
16	988	924	1070	---	---	579	656	---	---	---	680	1110
17	1100	872	994	---	---	602	764	---	---	778	---	1110
18	---	901	1040	---	---	---	804	---	---	832	---	---
19	---	918	969	---	---	586	---	---	---	842	---	---
20	---	882	1040	---	---	582	---	---	---	778	---	---
21	---	912	1030	---	---	---	840	---	---	810	---	---
22	---	912	1020	---	955	702	834	---	---	810	---	---
23	1130	---	1030	---	---	---	830	---	---	799	---	---
24	1120	1000	---	---	947	740	---	---	745	810	715	---
25	---	1010	---	---	---	776	---	---	767	810	---	---
26	---	1020	---	---	962	822	---	---	659	724	---	---
27	1010	1010	---	---	---	852	---	---	767	702	---	---
28	965	1010	---	---	930	852	---	---	767	702	---	---
29	932	1040	---	---	---	836	---	---	756	745	---	---
30	932	1050	---	900	---	765	---	---	778	972	---	---
31	910	---	---	903	---	700	---	---	---	745	---	---

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	9.0	1.5	---	.5	.5	.5	11.5	20.0	17.0	---	23.0
2	15.0	10.0	1.0	---	---	.5	.5	13.5	---	20.0	---	---
3	---	11.0	1.5	---	---	1.5	8.0	13.0	---	20.0	---	22.0
4	15.0	11.5	1.0	---	---	1.5	1.5	10.5	---	---	---	22.0
5	14.0	---	2.0	---	.5	2.5	5.0	10.5	21.0	20.0	---	22.0
6	13.0	10.5	2.0	---	.5	2.5	2.0	11.0	---	21.5	---	22.0
7	11.0	8.5	3.0	---	.5	1.5	3.0	16.5	---	22.0	---	15.0
8	10.5	8.0	.5	---	.5	2.5	2.0	17.5	21.0	---	---	17.0
9	10.5	9.0	.5	---	.5	1.5	1.5	---	---	---	---	---
10	12.5	9.5	.5	---	---	1.0	2.5	---	22.5	---	---	18.0
11	13.5	8.0	---	---	---	.5	5.0	20.0	19.0	---	---	19.0
12	14.0	6.0	---	---	---	.5	7.0	---	---	---	---	20.0
13	12.0	---	1.5	---	---	1.0	9.0	---	---	---	19.0	22.0
14	11.0	8.0	1.5	---	---	1.0	9.5	---	---	---	17.0	---
15	---	6.5	3.0	---	---	1.0	1.0	---	---	---	17.5	17.0
16	9.0	6.0	1.5	---	---	1.5	10.0	---	---	---	19.5	18.0
17	9.0	6.0	1.0	---	---	2.0	11.0	---	23.0	24.0	17.5	19.0
18	9.0	7.0	.5	---	---	---	11.0	---	---	24.0	---	---
19	9.5	5.5	.0	---	---	2.0	2.0	---	23.0	25.0	---	---
20	11.0	3.5	.0	---	---	2.5	2.5	---	21.0	25.0	---	---
21	13.0	3.5	.0	---	---	---	12.5	---	21.5	25.5	---	---
22	---	4.0	.5	---	.0	5.5	14.5	---	---	25.0	---	---
23	10.0	---	---	---	---	---	16.0	---	---	25.0	---	---
24	9.0	5.5	---	---	1.5	6.5	18.0	13.0	19.0	25.0	21.5	---
25	---	4.5	---	---	---	3.0	3.0	14.0	19.0	25.5	---	---
26	---	4.0	---	---	.0	3.0	16.0	12.0	19.0	25.0	---	---
27	10.0	2.5	---	---	---	5.0	13.0	---	18.0	25.0	---	---
28	9.5	3.0	---	---	.5	7.0	7.0	---	17.5	25.5	---	---
29	---	3.5	---	---	---	8.0	12.0	16.0	18.0	25.5	---	---
30	10.0	1.5	---	.0	---	8.0	14.0	16.0	17.0	25.0	---	---
31	9.5	---	---	.0	---	7.0	---	18.0	---	25.0	---	---

04159130 ST. CLAIR RIVER AT PORT HURON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°59'19", long 82°25'29", in SE¼ sec.3, T.6 N., R.17 E., St. Clair County, Hydrologic Unit 04090001, at Port Huron municipal water treatment plant at Pine Grove Park at Port Huron.

DRAINAGE AREA.--222,400 mi² (576,000 km²), approximately.

PERIOD OF RECORD.--Water years 1970-73, January 1978 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1978 to current year.

WATER TEMPERATURES: April 1978 to current year.

REMARKS.--Daily specific conductance and water-temperature records are once-daily measurements made by a local observer, between 0600 and 1800 hours. Samples are collected from a stilling well located in the Port Huron municipal water treatment plant. Depth-integrated samples for November, April, and July were collected by boat along river cross section in the vicinity of the water treatment plant. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 224 micromhos Jan. 28, Feb. 8, 1979; minimum daily, 200 micromhos Apr. 19, 1978.

WATER TEMPERATURES: Maximum daily, 23.0°C July 24, 1979; Sept. 9; minimum daily, 0.0°C Jan. 3-6, 1979.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance value of 230 micromhos Feb. 16, 1971, (revised from 224) and 164 micromhos July 3, 1972 were observed. A water temperature of 23.0°C was observed on Aug. 3, 17, 1970.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 224 micromhos Jan. 28, Feb. 8; minimum daily, 202 micromhos, on many days during November and December.

WATER TEMPERATURES: Maximum daily, 23.0°C July 24; minimum, 0.0°C Jan. 3-6.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L AS CACO3)
OCT											
19...	1045	204000	202	8.1	11.0	10.3	94	E2	E14	99	17
NOV											
08...	1500	194000	214	8.2	10.5	10.3	95	--	K2	98	18
DEC											
07...	1030	204000	200	7.8	5.5	12.2	97	5	6	93	15
JAN											
02...	1500	193000	209	7.9	1.0	10.4	75	<1	E47	100	20
FEB											
05...	1530	138000	210	8.2	.0	13.0	90	<1	<1	98	16
MAR											
12...	1500	193000	209	8.0	.5	13.6	95	<1	K3	95	13
APR											
18...	1230	194000	201	7.9	3.5	13.6	102	K1	K2	97	17
MAY											
25...	1030	233000	200	8.1	9.5	11.0	98	K7	K11	97	15
JUN											
21...	1100	219000	201	8.3	13.5	10.0	97	K1	10	100	23
JUL											
19...	1130	219000	210	8.2	18.5	9.5	102	K1	K4	100	18
AUG											
16...	1100	2238000	196	8.4	19.0	7.8	84	K1	K6	97	13
SEP											
14...	1045	2193000	197	8.0	18.5	8.6	93	K14	24	98	16

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT 19...	27	7.6	3.4	.1	7	1.0	100	0	82	1.3	16
NOV 08...	27	7.5	3.5	.2	7	1.0	98	0	80	1.0	16
DEC 07...	25	7.3	3.4	.2	7	1.1	94	0	77	2.4	16
JAN 02...	28	7.9	3.6	.2	7	.9	98	0	80	2.0	15
FEB 05...	27	7.4	3.5	.2	7	1.0	100	0	82	1.0	16
MAR 12...	26	7.2	3.6	.2	8	1.0	100	0	82	1.6	16
APR 18...	27	7.3	3.3	.1	7	.9	98	0	80	2.0	17
MAY 25...	27	7.1	3.5	.2	7	.9	100	0	82	1.3	16
JUN 21...	29	7.4	3.4	.1	7	.9	98	0	80	.8	16
JUL 19...	28	7.4	3.4	.1	7	.8	100	0	82	1.0	15
AUG 16...	27	7.1	3.6	.2	7	.8	100	1	84	.6	16
SEP 14...	28	6.9	3.3	.1	7	.8	100	0	82	1.6	15

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DTS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 19...	5.5	.1	1.1	114	111	62800	.25	.00	--	.20	.20
NOV 08...	5.8	.1	1.2	123	110	64400	.24	.09	--	.03	.12
DEC 07...	5.5	.1	1.3	108	106	59500	.27	.03	--	.10	.13
JAN 02...	6.5	.1	1.1	105	112	54700	.25	.01	--	.20	.21
FEB 05...	6.6	.1	1.1	122	112	45500	.28	.00	--	.16	.16
MAR 12...	6.1	.1	1.2	110	111	57300	.30	.00	--	.00	.00
APR 18...	5.8	.1	1.1	119	111	62300	.31	.00	.00	.04	.04
MAY 25...	6.2	.1	.9	120	111	75500	.26	.01	.01	.29	.30
JUN 21...	5.6	.1	.8	140	112	82800	.25	.01	.01	.17	.18
JUL 19...	5.8	.1	.6	133	110	78600	.28	.05	.06	.15	.20
AUG 16...	6.0	.1	.8	109	112	--	.26	.00	.00	.16	.16
SEP 14...	6.1	.1	.8	111	111	--	.23	.02	.02	.55	.57

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 19...	.00	.24	.45	2.0	.01	--	.00	2.8	--	--	--
NOV 08...	.00	.33	.36	1.6	.20	--	.00	--	0	.00	100
DEC 07...	.06	.07	.40	1.8	.00	--	.00	1.3	--	--	--
JAN 02...	--	--	.46	2.0	.00	--	.00	--	--	--	--
FEB 05...	--	--	.44	1.9	.00	--	.00	2.5	--	--	--
MAR 12...	--	--	.30	1.3	.01	--	.01	3.0	--	--	--
APR 18...	--	--	.35	1.6	.01	.03	.00	--	4	2100	100
MAY 25...	--	--	.56	2.5	.02	.06	.00	3.1	--	--	--
JUN 21...	--	--	.43	1.9	.01	.03	.00	2.8	--	--	--
JUL 19...	--	--	.48	2.1	.01	.03	.00	--	2	1180	100
AUG 16...	--	--	.42	1.9	.01	.03	.00	2.0	--	--	--
SEP 14...	--	--	.80	3.5	.03	.09	.00	2.2	--	--	--

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
NOV 08...	1500	1	1	0	0	12	12	10	0	0
JAN 02...	1500	1	1	100	100	0	0	10	0	0
APR 18...	1230	3	1	100	0	0	0	20	10	3
JUL 19...	1130	1	1	--	20	3	1	10	--	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PR)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
NOV 08...	0	4	2	70	0	130	5	10	10	<.5
JAN 02...	0	5	1	80	50	0	0	0	0	<.5
APR 18...	0	2	1	90	10	3	0	0	0	.5
JUL 19...	0	4	1	100	0	2	0	0	0	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
NOV 08...	<.5	0	0	0	0	20	10	1.5	--
JAN 02...	<.5	0	0	0	0	30	10	2.2	.3
APR 18...	.5	0	0	0	0	20	0	1.9	.1
JUL 19...	<.5	0	0	0	0	--	6	3.7	.1

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 08...	1500	20	--	.157	.315	.140	.000
FEB 05...	1530	34	--	.000	.000	.000	.000
MAY 25...	1030	37	1071	.240	.390	.140	.000

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 14,78 1500	MAY 17,78 1245	JUN 12,78 1500	JUL 13,78 1145	AUG 21,78 1545	SEP 18,78 1600				
TOTAL CELLS/ML	0	2500	2000	420	250	4100				
DIVERSITY: DIVISION	0.0	1.2	0.9	1.0	1.5	0.8				
..CLASS	0.0	1.3	1.5	1.0	1.5	0.8				
...ORDER	0.0	2.0	1.6	1.0	2.1	1.5				
....FAMILY	0.0	2.5	2.0	1.0	3.0	1.8				
.....GENUS	0.0	2.5	0.0	1.0	3.4	2.6				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
....CHARACIACEAE										
....SCHROEDERIA	--	-			11	1	--	-	2	1
....COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-		32
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-		68
...MICRACINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	2	1
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	38	2	--	-	43	10	7	3
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	78
....OOCYSTIS	--	-	--	-	--	-	--	-	14	6
....QUADRIGULA	--	-	76	3	--	-	--	-	7	3
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	--	-	--	-	28	11
..TETRASPORALES										71
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	*
..VOLVOCALES										0
...CHLAMYDOMONADACEAE	--	-	--	-	22	1	--	-	--	-
....CHLAMYDOMONAS	--	-	19	1	11	1	--	-	2	1
CHRYSTOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
....COSCINODISCACEAE										
....CYCLOTELLA	--	-	--	-	--	-	29	7	16	6
...MELOSTIRA	--	-	190	8	--	-	--	-	9	4
...STEPHANODISCUS	--	-	--	-	--	-	--	-	2	1
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	--	-	2	1
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										*
....ASTERIONELLA	--	-	770#	31	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	160	8	--	-	30	12
....SYNEDRA	--	-	--	-	--	-	--	-	--	-
...GOMPHONFMAACEAE										
....GOMPHONEMA	--	-	--	-	22	1	--	-	2	1
...NAVICULACEAE										
....NAVICULA	--	-	19	1	--	-	--	-	4	1
...NITZSCHACEAE										*
....NITZSCHIA	--	-	76	3	--	-	--	-	--	-
...TABELLARIACEAE										*
....TABELLARIA	--	-	190	8	920#	46	--	-	--	-
..CHRYSTOPHYCEAE										
...CHRYSONOMADALES										
....OCHROMONADACEAE										
....DINORRYON	--	-	38	2	350#	18	--	-	--	-
....OCHROMONAS	--	-	--	-	34	2	--	-	--	-
..XANTHOPHYCEAE										
...HETEROCOCCALES										
....CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
..CRYPTOPHYCEAE										
...CRYPTOMONADALES										
....CRYPTOMONADACEAE										
.....CRYPTOMONAS	--	-	--	-	--	-	14	3	--	-

STREAMS TRIBUTARY TO ST. CLAIR RIVER

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04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 14,78 1500		MAY 17,78 1245		JUN 12,78 1500		JUL 13,78 1145		AUG 21,78 1545		SEP 18,78 1600	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
..CYANOPHYCEAE												
...CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	14	6	100	3
....ANACYSTIS	--	-	870#	35	460#	23	330#	79	7	3	1700#	41
...HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	48#	19	97	2
...OSCILLATORIACEAE												
....LYNGBYA	--	-	210	8	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	53#	21	650#	16
...CHROOCOCCALES												
...CHROOCOCCACEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	940#	23
EUGLENOPHYTA (EUGLENOIDS)												
..EUGLENOPHYCEAE												
...EUGLENALES												
...EUGLENACEAE												
....PHACUS	--	-	--	-	--	-	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)												
..DINOPHYCEAE												
...PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	203	206	202	209	221	213	210	204	211	210	212	209
2	202	206	202	206	221	210	220	203	212	210	212	208
3	203	207	202	205	220	---	208	206	212	209	211	208
4	203	207	202	205	216	---	210	205	212	209	211	208
5	204	207	202	209	---	---	216	204	213	210	209	208
6	204	206	202	213	212	212	216	204	213	210	211	208
7	204	207	202	212	214	209	218	206	212	210	211	208
8	---	205	203	212	224	209	220	207	212	210	211	210
9	203	204	202	214	222	---	216	208	213	211	211	210
10	202	206	205	212	220	209	---	208	214	211	211	209
11	203	205	204	213	217	211	218	210	212	211	213	209
12	202	---	203	214	218	211	211	207	211	211	213	208
13	203	204	204	212	218	215	211	206	211	211	211	209
14	204	204	203	212	214	210	208	207	211	---	211	208
15	204	204	202	215	214	215	212	207	214	---	211	210
16	205	204	205	215	213	212	214	206	213	209	213	209
17	205	204	205	212	212	212	214	205	214	210	220	208
18	205	204	206	211	212	210	214	205	214	211	212	208
19	205	203	205	219	215	210	---	208	213	211	209	210
20	207	204	206	219	212	210	211	209	213	211	208	210
21	206	---	206	212	217	210	209	---	213	---	212	209
22	206	202	206	211	211	208	208	205	212	---	208	211
23	207	202	206	211	211	208	208	205	211	211	208	211
24	207	202	207	217	210	208	210	---	211	211	209	212
25	208	202	207	212	220	208	208	---	211	209	---	212
26	206	202	206	222	219	208	207	214	211	209	---	210
27	206	202	204	222	211	208	208	211	211	212	209	212
28	206	202	205	224	218	208	205	211	211	212	211	210
29	206	202	205	220	---	208	207	211	211	212	211	210
30	206	202	209	216	---	208	206	212	210	212	---	210
31	205	---	208	218	---	210	---	212	---	212	207	---
MEAN			204	214					212			209

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	9.5	6.5	4.0	1.0	2.0	2.5	6.0	10.5	16.0	22.0	21.0
2	14.5	10.0	5.5	1.5	1.0	2.0	3.0	6.0	12.0	16.0	22.0	21.0
3	14.5	11.0	5.5	.0	1.0	---	3.0	6.5	12.0	16.0	22.0	21.0
4	14.0	11.0	5.5	.0	1.0	2.5	4.0	6.0	13.0	16.0	22.0	21.0
5	14.0	11.5	5.0	.0	1.0	2.5	4.0	5.5	13.0	16.0	22.0	21.0
6	14.0	10.0	4.5	.0	1.0	2.0	4.0	5.5	13.5	16.5	22.5	22.0
7	13.0	10.0	4.5	1.0	1.0	2.5	3.0	6.5	14.0	17.0	22.5	20.5
8	---	13.0	4.5	1.0	1.0	2.5	3.0	7.0	14.0	18.0	22.5	21.0
9	12.0	10.0	5.0	1.0	1.0	2.5	3.0	7.0	14.0	18.0	22.0	20.5
10	12.0	10.0	4.0	1.0	1.0	2.5	3.5	7.5	14.0	18.0	22.0	20.0
11	12.0	10.0	3.0	1.0	1.0	2.0	3.0	8.0	14.0	21.0	22.0	19.5
12	13.0	---	3.5	2.0	2.0	2.0	3.0	8.5	14.0	21.5	21.0	20.5
13	12.5	9.0	3.5	1.0	2.0	2.0	3.0	8.5	14.0	22.0	21.0	20.0
14	12.0	9.0	3.5	1.5	2.0	2.0	3.0	9.0	14.5	---	21.0	19.5
15	11.5	9.0	3.0	1.0	2.0	2.0	3.0	9.0	14.5	---	20.0	19.5
16	11.0	10.0	3.0	1.0	2.0	2.0	3.5	9.0	16.0	22.0	20.0	19.0
17	10.5	10.0	3.0	1.0	1.5	2.0	3.5	9.0	16.0	20.0	20.0	19.0
18	11.0	10.0	3.0	1.0	2.0	2.0	4.0	9.5	15.0	21.0	19.0	19.0
19	11.0	9.0	3.0	1.0	2.0	2.0	5.5	9.0	16.0	20.0	19.0	19.0
20	10.5	10.0	3.0	1.0	2.0	2.0	5.5	9.0	17.0	21.0	20.0	19.0
21	11.0	8.5	3.5	---	2.0	2.0	5.0	---	18.5	---	20.0	19.0
22	11.5	8.5	3.5	2.5	2.0	2.0	5.5	9.0	18.5	---	21.0	17.0
23	11.0	8.0	3.0	1.0	2.0	2.0	5.5	10.0	14.5	22.0	21.0	17.0
24	10.5	8.5	3.5	1.5	2.0	2.5	6.5	---	14.0	23.0	21.0	16.5
25	10.0	7.5	4.0	1.5	2.0	2.5	6.0	9.0	14.0	22.0	---	16.5
26	10.5	7.0	3.5	1.0	2.0	2.5	6.5	10.0	15.0	22.0	---	18.0
27	10.0	6.0	3.5	1.5	2.0	3.0	6.0	9.5	16.0	21.5	21.0	18.0
28	10.0	6.5	2.5	1.0	2.0	2.5	6.0	9.5	16.0	21.5	21.0	18.0
29	9.5	6.0	2.5	1.0	---	2.5	6.5	9.5	17.0	21.5	21.0	18.0
30	9.5	6.5	3.0	1.0	---	2.5	6.5	9.0	16.0	22.0	21.0	18.0
31	10.0	---	3.5	1.0	---	2.0	---	10.5	---	22.0	21.0	---
MEAN			4.0		1.5		4.5		14.5			19.5

STREAMS TRIBUTARY TO ST. CLAIR RIVER

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04159488 SILVER CREEK NEAR JEDDO, MI

LOCATION.--Lat 43°08'40", long 82°39'07", in SE¼ NW¼ sec.12, T.8 N., R.15 E., St. Clair County, Hydrologic Unit 04090001, on left bank 10 ft (3 m) downstream of bridge on Camstock Road, 3.5 mi (5.6 km) west of Jeddo.

DRAINAGE AREA.--20.6 mi² (53.4 km²).

PERIOD OF RECORD (revised).--January 1978 to current year. Daily discharges for the period January 1 to May 10, 1978 were inadvertently omitted in NDR-78 and are published herein.

GAGE.--Water-stage recorder. Datum of gage is 707.43 ft (215.625 m) National Geodetic Vertical Datum of 1929 (levels by local surveying firm).

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 495 ft³/s (14.0 m³/s) Mar. 23, 1978, gage height, 7.80 ft (2.377 m); maximum gage height, 9.71 ft (2.960 m) Mar. 4, 1979, backwater from ice; minimum discharge, 0.14 ft³/s (0.004 m³/s) June 19, 20, 21, 25, 26, Aug. 17, 18, 1978; minimum gage height, 3.62 ft (1.103 m) Aug. 17, 18, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	--	380 10.8	*a9.71 2.960	Apr. 14	0500	*483 13.7	7.72 2.353

a Ice jam.

Minimum discharge, 0.27 ft³/s (0.008 m³/s) Oct. 5; minimum gage height, 3.68 ft (1.122 m) Oct. 3, 4, 5, Feb. 14, 15, Sept. 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1				1.2	2.0	.40	120	.83	1.1	.45	.64	.25
2				1.2	1.8	.40	60	.74	1.2	.51	.49	.21
3				1.2	1.7	.45	45	.51	1.1	.45	.51	.44
4				1.2	1.5	.50	62	.38	.93	.45	.50	.37
5				1.2	1.4	.60	53	1.7	.81	.43	.43	.30
6				1.2	1.3	.70	33	.58	.72	.31	.38	.25
7				1.2	1.2	.80	35	.51	.68	.27	.38	.22
8				1.2	1.1	.80	19	41	.80	.42	.34	.23
9				1.2	1.0	.80	11	36	.40	.51	.30	.27
10				1.2	.95	.90	11	23	.32	.43	.30	.31
11				1.1	.90	.90	33	9.7	.29	.45	.27	.86
12				1.1	.80	1.0	23	49	1.1	.42	.25	3.0
13				1.1	.80	1.5	7.1	121	1.9	.56	.21	.80
14				1.1	.70	2.0	4.6	97	.75	.63	.23	4.8
15				1.1	.70	3.0	3.6	44	.65	.49	.26	4.7
16				1.1	.65	7.0	2.9	17	.49	.45	.24	1.3
17				1.1	.60	12	2.3	9.2	.42	.42	.17	.69
18				1.1	.55	20	2.1	6.9	.33	.38	.19	3.5
19				1.1	.55	35	2.3	5.3	.19	.49	.62	1.7
20				1.0	.50	60	6.8	31	.14	.65	.28	.93
21				1.0	.50	200	4.9	76	.61	1.0	.22	.73
22				1.0	.50	350	3.3	14	.25	.49	.27	.55
23				1.0	.45	420	1.6	6.2	.42	.37	.24	.38
24				1.0	.45	344	8.8	4.4	.40	.43	.25	.28
25				1.0	.45	184	5.8	3.4	.21	.45	.21	.22
26				5.0	.40	61	2.4	2.6	.17	.60	.20	.22
27				4.5	.40	60	1.5	2.2	.26	.89	.18	.28
28				4.0	.40	115	1.5	1.8	.33	.48	.32	.31
29				3.5	---	90	1.1	1.5	.28	.47	.25	.33
30				3.0	---	52	1.0	1.3	.27	.60	.27	.43
31				2.5	---	116	---	1.3	---	.60	.27	---
TOTAL	---	---	---	50.4	24.25	2140.75	568.6	610.05	17.52	15.55	9.67	28.86
MEAN	---	---	---	1.63	.87	69.1	19.0	19.7	.58	.50	.31	.96
MAX	---	---	---	5.0	2.0	420	120	121	1.9	1.0	.64	4.8
MIN	---	---	---	1.0	.40	.40	1.0	.38	.14	.27	.17	.21
CFSM	---	---	---	.08	.04	3.35	.92	.96	.03	.02	.02	.05
IN.	---	---	---	.09	.04	3.87	1.03	1.10	.03	.03	.02	.05

STREAMS TRIBUTARY TO ST. CLAIR RIVER
04159488 SILVER CREEK NEAR JEDDO, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.49	.41	7.3	80	.96	1.9	18	4.9	2.7	99	18	1.5
2	.40	.56	7.6	20	.94	2.5	25	4.0	2.3	92	10	1.5
3	.35	.63	4.4	7.0	.93	23	27	12	2.1	24	9.4	1.6
4	.32	.96	6.5	2.0	.90	270	13	17	2.0	15	9.4	1.6
5	.33	1.2	6.0	1.6	.89	150	32	8.5	1.7	10	9.4	1.6
6	.50	.95	3.8	1.4	.87	43	81	6.3	1.8	6.8	9.4	1.6
7	.41	.74	4.0	1.3	.86	35	22	4.6	2.0	6.5	9.1	1.6
8	.39	.66	3.5	1.2	.85	41	12	3.4	3.4	7.9	9.1	1.6
9	.39	.62	3.1	1.1	.83	33	12	3.3	5.8	9.4	9.1	1.6
10	.46	.76	2.9	1.1	.80	24	49	2.7	7.1	17	9.4	1.6
11	.42	.96	2.9	1.0	.78	19	80	2.3	7.1	16	9.4	1.6
12	.83	1.0	2.9	1.0	.77	15	69	2.4	7.6	17	9.1	1.6
13	1.5	1.0	2.9	1.0	.76	10	71	2.4	4.9	15	9.7	1.6
14	1.2	1.1	3.0	1.0	.75	23	348	2.9	5.1	16	11	1.7
15	.94	.92	3.0	1.0	.74	20	45	3.3	5.1	20	11	1.6
16	1.1	1.2	3.0	1.0	.83	15	22	3.1	5.6	26	10	1.6
17	.49	1.6	3.0	1.0	.83	11	14	3.1	5.6	26	7.9	1.6
18	.51	1.6	3.1	1.0	.83	19	9.4	3.1	5.8	17	7.1	1.7
19	.55	.92	3.2	1.0	.83	26	7.6	3.1	5.8	9.4	7.1	1.8
20	.67	.83	3.3	1.0	.83	19	5.6	3.1	6.5	14	7.1	1.7
21	.73	2.4	3.4	1.0	.83	17	4.6	3.1	6.8	14	7.1	1.2
22	.83	2.7	3.5	1.0	.90	15	4.4	3.1	7.1	14	7.1	.92
23	.74	4.0	3.6	1.1	1.2	14	4.0	2.9	7.1	14	7.1	.66
24	.74	3.6	1.8	1.1	1.5	17	3.6	3.1	7.3	14	6.8	.66
25	.65	3.1	2.7	1.2	4.5	18	3.4	3.6	7.6	14	6.8	.74
26	.79	3.1	3.0	1.1	3.4	11	3.4	10	8.2	14	6.8	.74
27	.83	6.0	2.6	1.1	2.9	8.8	17	6.8	8.8	14	6.8	.83
28	.83	4.4	2.6	1.1	2.3	8.2	12	6.0	8.2	22	6.8	1.0
29	.78	5.8	2.6	1.0	---	10	7.9	5.3	6.3	22	6.8	1.1
30	.69	4.4	3.0	1.0	---	56	5.8	4.6	6.8	22	6.5	1.3
31	.54	---	20	.98	---	33	---	3.3	---	22	2.3	---
TOTAL	20.40	58.12	128.2	138.38	34.31	1008.4	1028.7	147.3	164.2	650.0	262.6	41.45
MEAN	.66	1.94	4.14	4.46	1.23	32.5	34.3	4.75	5.47	21.0	8.47	1.38
MAX	1.5	6.0	20	80	4.5	270	348	17	8.8	99	18	1.8
MIN	.32	.41	1.8	.98	.74	1.9	3.4	2.3	1.7	6.5	2.3	.66
CFSM	.03	.09	.20	.22	.06	1.58	1.67	.23	.27	1.02	.41	.07
IN.	.04	.10	.23	.25	.06	1.82	1.86	.27	.30	1.17	.47	.07
CAL YR 1978	TOTAL	3672.37	MEAN	10.1	MAX	420	MIN	.14	CFSM	.49	IN	6.63
WTR YR 1979	TOTAL	3682.06	MEAN	10.1	MAX	348	MIN	.32	CFSM	.49	IN	6.65

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW¼ sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft (6 m) downstream from bridge on Norman Road, 2.1 mi (3.4 km) east of Fargo, 5.3 mi (8.5 km) upstream from Mill Creek, and 12 mi (19 km) northwest of Port Huron.

DRAINAGE AREA.--480 mi² (1,243 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1944 to current year.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft (187.071 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor.

AVERAGE DISCHARGE.--35 years, 276 ft³/s (7.816 m³/s), 7.81 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft³/s (408 m³/s) Apr. 5, 1947, gage height, 16.06 ft (4.895 m), from flood-mark, from rating curve extended above 9,500 ft³/s (269 m³/s); maximum gage height observed, 18.05 ft (5.502 m) Feb. 20, 1951, backwater from ice; minimum discharge observed, 1.8 ft³/s (0.051 m³/s) Sept. 18, 19, 1946.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	--	3500 99.1	*a14.32 4.365	Apr. 14	2100	*4340 123	10.62 3.237

a Ice jam.

Minimum discharge, 14 ft³/s (0.40 m³/s) Oct. 25, Sept. 25, 26; minimum gage height, 1.78 ft (0.543 m) Sept. 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	17	31	740	21	38	985	229	90	234	50	22
2	27	17	39	500	20	42	678	204	84	1060	89	22
3	26	16	35	250	19	60	1050	212	73	967	129	21
4	24	17	50	120	19	1000	884	436	65	478	152	24
5	21	17	45	70	18	3000	561	449	66	274	111	20
6	24	16	35	45	18	2400	1100	322	60	173	77	19
7	24	17	32	37	18	1900	961	270	55	122	62	18
8	22	21	30	34	18	1500	560	240	61	97	55	19
9	23	19	28	32	18	1200	409	201	60	84	52	19
10	26	18	26	30	18	900	420	165	55	99	49	19
11	23	18	25	29	18	740	1070	143	64	320	47	24
12	20	18	25	28	17	600	1360	160	70	652	44	24
13	18	18	25	27	17	482	1260	140	67	882	43	24
14	18	20	26	26	17	485	3500	123	58	412	42	27
15	19	20	26	25	17	576	3700	114	52	234	41	25
16	18	20	27	24	17	386	2610	103	47	166	38	31
17	18	21	28	23	17	386	1180	95	44	127	34	33
18	18	33	28	22	17	427	611	89	41	101	33	30
19	18	27	27	22	17	628	446	86	115	76	33	25
20	18	25	28	21	17	712	349	83	38	64	32	23
21	17	25	31	21	18	618	284	79	38	65	32	21
22	17	25	30	20	19	564	242	77	42	57	33	21
23	17	28	33	20	20	524	214	86	44	52	35	17
24	16	37	30	19	22	521	197	90	40	52	32	16
25	15	37	29	20	25	570	173	90	35	46	31	15
26	16	38	25	21	50	503	165	123	37	50	30	17
27	17	37	24	22	45	381	281	147	38	48	27	17
28	24	36	23	24	40	319	389	139	33	54	28	17
29	24	33	22	25	---	339	326	121	42	54	27	19
30	21	32	27	24	---	740	254	109	56	51	30	16
31	19	---	40	23	---	1080	---	98	---	53	27	---
TOTAL	639	723	930	2344	597	23621	26219	5023	1670	7204	1545	645
MEAN	20.6	24.1	30.0	75.6	21.3	762	874	162	55.7	232	49.8	21.5
MAX	31	38	50	740	50	3000	3700	449	115	1060	152	33
MIN	15	16	22	19	17	38	165	77	33	46	27	15
CFSM	.04	.05	.06	.16	.04	1.59	1.82	.34	.12	.48	.10	.05
IN.	.05	.06	.07	.18	.05	1.83	2.03	.39	.13	.56	.12	.05

CAL YR 1978 TOTAL 88571.8 MEAN 243 MAX 6000 MIN 6.0 CFSM .51 IN 6.86
WTR YR 1979 TOTAL 71160.0 MEAN 195 MAX 3700 MIN 15 CFSM .41 IN 5.51

STREAMS TRIBUTARY TO ST. CLAIR RIVER
04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: August 1978 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 4, 1978.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum, 28.0°C Aug. 14, 1978; minimum, 0.0°C on many days during winter period.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum recorded, 27.0°C June 16; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1							---	---	---	24.5	17.5	21.0
2							---	---	---	25.0	19.0	22.0
3							---	---	---	23.5	21.0	22.0
4							25.5	20.0	23.0	24.5	18.0	21.0
5							26.0	20.0	23.0	25.5	20.5	22.5
6							25.0	21.0	23.0	25.5	21.0	23.0
7							23.5	21.0	22.0	25.5	21.0	23.0
8							26.5	21.0	23.0	27.0	21.5	23.5
9							24.5	22.5	23.5	25.0	22.0	23.0
10							25.5	21.0	23.0	25.5	20.0	22.0
11							25.0	20.5	23.0	26.5	21.0	23.5
12							25.5	21.0	23.0	23.5	19.5	21.5
13							27.0	21.5	24.5	19.0	16.0	17.5
14							28.0	23.0	25.5	19.0	16.0	17.5
15							27.0	24.0	25.5	20.0	17.5	18.5
16							27.0	24.5	25.5	20.5	18.0	19.0
17							27.5	22.5	24.5	19.5	17.5	18.5
18							26.5	23.0	25.0	19.0	17.5	18.5
19							26.5	24.0	25.0	20.0	17.5	18.5
20							25.5	20.5	23.0	21.5	18.5	20.0
21							25.5	19.5	22.5	21.0	18.5	20.0
22							25.5	20.0	23.0	18.0	16.0	17.0
23							25.5	21.0	23.5	17.0	15.0	16.0
24							25.0	22.0	23.5	17.5	14.5	16.0
25							25.5	22.5	24.0	17.0	15.0	16.0
26							24.5	21.5	23.0	16.0	13.0	14.5
27							24.0	21.5	23.0	16.0	14.0	15.0
28							25.0	22.0	23.5	15.0	13.0	14.0
29							25.0	21.5	23.0	15.0	12.0	13.5
30							24.0	21.0	22.5	15.0	12.5	13.5
31							24.0	20.0	21.5	---	---	---
MONTH										27.0	12.0	19.0

STREAMS TRIBUTARY TO ST. CLAIR RIVER
04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

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TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	15.0	13.5	14.0				1.0	.0	.0	.5	.0	.0
2	15.0	12.0	13.5				.0	.0	.0	.5	.0	.0
3	13.5	12.5	13.0				.0	.0	.0	.5	.0	.0
4	14.5	12.5	13.5				.0	.0	.0	.0	.0	.0
5	14.5	12.5	13.5				.5	.0	.0	.0	.0	.0
6	13.5	12.5	13.0				.5	.0	.0	.0	.0	.0
7	12.0	10.5	11.5				.0	.0	.0	.0	.0	.0
8	11.0	9.0	10.0				.0	.0	.0	.0	.0	.0
9	10.5	8.0	9.5				.0	.0	.0	.0	.0	.0
10	13.0	9.5	11.0				.0	.0	.0	---	---	---
11	13.0	11.0	12.0				.0	.0	.0	---	---	---
12	14.5	12.5	13.5				.0	.0	.0	---	---	---
13	13.0	12.0	12.5				.0	.0	---	---	---	---
14	12.0	10.0	11.0				.5	.0	.0	---	---	---
15	9.5	8.5	9.0				.5	.0	.0	---	---	---
16	11.0	8.5	9.0				1.0	.0	.0	---	---	---
17	9.0	7.0	8.0				.5	.0	.0	---	---	---
18	9.0	8.0	8.5				1.0	.0	.0	---	---	---
19	9.5	8.5	9.0				.0	.0	.0	---	---	---
20	11.0	7.5	9.0				.5	.0	.5	---	---	---
21	12.0	9.0	10.5				.5	.5	.5	---	---	---
22	13.0	10.5	12.0				1.0	.0	.5	---	---	---
23	12.5	9.5	11.5				1.0	.0	.5	---	---	---
24	10.0	8.0	9.0				.5	.0	.5	.0	.0	.0
25	10.0	7.5	8.5				.5	.0	.5	.0	.0	.0
26	10.5	9.0	10.0				1.0	.0	.5	.0	.0	.0
27	10.5	8.5	9.0				.5	.0	.5	.0	.0	.0
28	10.0	8.0	9.0				.5	.0	.0	.0	.0	.0
29	---	---	---				.5	.0	.5	.0	.0	.0
30	---	---	---				.5	.5	.5	.0	.0	.0
31	---	---	---				.5	.5	.5	.0	.0	.0
MONTH							1.0	.0				

STREAMS TRIBUTARY TO ST. CLAIR RIVER
04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	.0	.0	.0	.0	.0	.0				---	---	---
2	.0	.0	.0	.0	.0	.0				---	---	---
3	.0	.0	.0	.0	.0	.0				---	---	---
4	.0	.0	.0	.0	.0	.0				---	---	---
5	.0	.0	.0	.0	.0	.0				---	---	---
6	.0	.0	.0	.0	.0	.0				---	---	---
7	.0	.0	.0	.0	.0	.0				---	---	---
8	.0	.0	.0	.5	.0	.0				---	---	---
9	.0	.0	.0	.0	.0	.0				---	---	---
10	.0	.0	.0	.5	.0	.0				---	---	---
11	.0	.0	.0	.0	.0	.0				---	---	---
12	.0	.0	.0	1.0	.0	.5				---	---	---
13	.0	.0	.0	2.0	.0	1.0				---	---	---
14	.0	.0	.0	2.0	.0	1.0				---	---	---
15	.0	.0	.0	1.0	.0	.5				---	---	---
16	.0	.0	.0	2.0	.0	.5				---	---	---
17	.0	.0	.0	3.0	.0	1.5				---	---	---
18	.0	.0	.0	3.0	1.5	2.0				---	---	---
19	.0	.0	.0	2.5	1.5	2.0				---	---	---
20	.0	.0	.0	3.5	2.0	3.0				---	---	---
21	.5	.0	.0	5.0	3.5	4.0				---	---	---
22	.5	.0	.0	6.5	4.0	5.0				---	---	---
23	---	---	---	7.5	5.5	6.0				18.0	16.5	17.0
24	---	---	---	8.0	7.0	7.5				16.5	13.5	14.5
25	---	---	---	7.5	4.5	6.0				13.5	10.0	11.5
26	---	---	---	5.0	3.5	4.5				10.0	9.5	10.0
27	---	---	---	7.0	4.5	5.0				11.5	9.5	10.5
28	---	---	---	7.5	7.0	7.5				12.5	11.0	11.5
29	---	---	---	---	---	---				14.0	11.5	12.5
30	---	---	---	---	---	---				15.0	12.0	13.5
31	---	---	---	---	---	---				18.5	13.0	16.0

STREAMS TRIBUTARY TO ST. CLAIR RIVER
04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

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TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MAX	MIN	MAX	MIN
	JUNE			JULY		AUGUST		SEPTEMBER	
1	20.0	16.5	18.5	20.0	19.0	24.0	23.0	25.0	22.0
2	21.0	18.0	19.5	19.0	18.0	24.0	22.5	24.5	23.0
3	22.0	18.5	20.0	19.5	18.5	24.0	22.0	24.5	22.0
4	22.0	19.0	21.0	21.0	19.5	25.0	22.5	24.5	21.5
5	21.5	19.0	20.5	21.5	19.5	24.5	23.0	25.5	21.0
6	22.0	18.0	20.0	22.5	19.5	25.5	23.0	24.5	22.0
7	22.5	19.5	21.0	23.5	19.5	25.5	22.5	23.0	20.0
8	25.5	21.0	23.0	23.5	21.0	25.0	22.5	20.0	17.5
9	26.0	23.5	24.5	23.5	21.0	22.5	21.0	18.5	15.5
10	---	---	---	22.0	20.5	23.5	22.5	19.0	17.0
11	---	---	---	22.5	21.0	23.5	21.5	20.5	17.0
12	---	---	---	23.0	21.5	23.5	20.0	21.5	17.0
13	---	---	---	23.0	22.0	21.5	20.5	22.0	20.0
14	23.0	19.0	21.0	25.0	23.0	21.0	19.5	21.5	19.5
15	25.5	21.0	23.5	27.0	24.0	21.0	19.5	21.0	17.5
16	27.0	16.5	24.5	27.0	25.0	21.0	17.5	20.5	17.5
17	26.5	16.0	23.5	25.5	23.0	20.5	19.5	21.0	18.0
18	23.5	20.5	22.0	24.0	21.0	20.5	19.0	21.0	18.0
19	24.5	22.5	---	24.0	21.0	23.0	20.0	20.0	17.0
20	23.0	20.0	---	25.5	22.5	22.5	21.0	19.0	15.5
21	25.5	21.5	---	25.0	23.0	24.5	20.0	18.0	16.5
22	24.5	21.5	---	26.0	23.0	24.0	21.0	18.0	15.5
23	21.5	18.0	---	27.0	24.0	24.0	22.5	18.0	14.0
24	20.5	16.5	---	27.5	25.0	25.0	22.5	17.5	14.0
25	22.0	17.5	---	26.5	24.5	24.0	22.0	19.0	16.0
26	24.0	19.0	---	24.5	22.5	23.0	21.0	19.5	16.0
27	23.0	21.0	---	24.5	21.5	23.0	21.0	19.5	16.0
28	25.0	20.5	---	24.0	23.5	23.0	22.0	19.5	17.5
29	22.5	21.0	---	24.5	21.5	23.0	22.0	21.0	18.0
30	21.5	20.0	---	23.5	22.5	25.0	21.0	21.5	19.0
31	---	---	---	24.5	23.0	25.0	21.0	---	---
MONTH				27.5	18.0	25.5	17.5	25.5	14.0

LOCATION.--Lat 43°01'49", long 83°04'02", in SW¼ NW¼ sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft (4 m) upstream from bridge on State Highway 21, and 0.6 mi (1.0 km) northeast of Imlay City.

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 800 ft (244 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 11.2 ft³/s (0.317 m³/s), 8.45 in/yr (215 mm/yr).

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 334 ft³/s (9.46 m³/s) Apr. 19, 1975, gage height, 9.33 ft (2.844 m); no flow part of each day June 27, 28, 1977, June 26-28, 1979, caused by irrigation pumpage.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft³/s (1.70 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Mar. 4	--	110	3.12	*a6.64	2.024	Apr. 14	0700	*124	3.51	6.21	1.893

a Ice jam.

No flow part of each day June 26-28, caused by irrigation pumpage.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	2.8	3.6	17	3.4	8.0	15	9.0	2.3	28	2.2	1.0
2	2.0	2.8	3.6	14	3.2	15	18	8.1	2.0	20	10	.87
3	2.2	2.6	4.0	10	3.1	25	18	11	1.8	11	5.4	.99
4	2.3	2.6	5.7	7.5	3.0	50	12	12	3.2	8.7	4.2	.80
5	2.3	2.6	5.2	6.5	2.9	85	12	10	3.4	5.4	3.6	.86
6	3.0	2.6	4.7	5.8	2.9	50	21	8.7	4.7	3.8	3.0	.90
7	3.0	2.8	4.4	5.3	2.8	40	12	7.8	4.7	3.0	2.6	1.0
8	2.5	2.8	4.2	5.0	2.8	37	9.3	6.9	4.0	2.5	2.3	1.0
9	2.5	2.8	4.0	4.8	2.8	32	12	6.2	4.7	13	2.2	1.0
10	2.3	2.6	3.8	4.5	2.8	28	23	5.2	4.4	42	2.6	.91
11	2.3	2.6	3.7	4.3	2.7	24	28	5.2	4.9	18	2.3	.77
12	2.2	2.6	3.6	4.1	2.7	21	24	4.9	4.7	9.6	1.8	.74
13	2.2	2.8	3.5	4.0	2.7	20	33	5.2	3.8	6.2	1.4	4.5
14	2.0	3.6	3.4	3.9	2.7	31	113	4.4	3.0	4.7	1.4	3.8
15	2.0	3.4	3.3	3.8	2.7	34	67	4.0	2.5	3.8	1.9	2.0
16	2.3	3.0	3.3	3.7	2.7	22	45	3.6	1.9	3.2	1.3	1.6
17	2.5	4.0	3.2	3.6	2.7	16	31	4.0	1.6	2.6	1.2	1.3
18	2.5	5.2	3.2	3.5	2.8	27	23	2.6	1.4	2.2	1.7	1.2
19	2.5	4.2	3.1	3.5	2.9	30	17	2.3	1.1	1.6	1.7	1.1
20	2.5	3.8	3.4	3.4	3.0	24	13	2.3	1.2	1.3	1.5	1.0
21	2.3	3.6	4.0	3.4	3.2	22	10	2.3	1.5	1.2	1.4	.99
22	2.2	3.4	3.8	3.3	4.0	19	11	2.2	1.4	1.2	1.4	.98
23	2.8	5.7	3.6	3.3	6.0	16	10	2.2	1.4	1.1	1.4	.95
24	3.0	5.9	3.4	3.2	5.4	17	8.7	2.8	1.2	1.3	1.5	.96
25	3.0	5.4	3.2	3.2	5.0	14	8.4	3.4	.72	1.9	1.4	.98
26	3.6	4.4	2.9	3.3	4.5	12	9.9	5.4	.44	1.5	1.2	.96
27	3.4	3.6	2.7	3.5	4.0	9.9	17	7.8	.39	1.5	1.3	.94
28	3.0	4.0	2.4	3.8	5.0	9.0	12	9.0	.50	3.0	1.4	1.6
29	2.8	3.8	2.8	4.2	---	12	10	6.4	3.6	2.5	2.1	.80
30	2.8	3.6	7.0	4.0	---	23	10	3.4	7.2	1.9	1.6	.64
31	2.6	---	10	3.7	---	21	---	2.6	---	2.2	1.3	---
TOTAL	78.8	105.6	122.7	157.1	94.4	793.9	653.3	170.9	79.65	209.9	70.3	37.14
MEAN	2.54	3.52	3.96	5.07	3.37	25.6	21.8	5.51	2.66	6.77	2.27	1.24
MAX	3.6	5.9	10	17	6.0	85	113	12	7.2	42	10	4.5
MIN	2.0	2.6	2.4	3.2	2.7	8.0	8.4	2.2	.39	1.1	1.2	.64
CFSM	.14	.20	.22	.28	.19	1.42	1.21	.31	.15	.38	.13	.07
IN.	.16	.22	.25	.32	.20	1.64	1.35	.35	.16	.43	.15	.08
CAL YR 1978	TOTAL	3414.73	MEAN	9.36	MAX	165	MIN	.27	CFSM	.52	IN	7.06
WTP YR 1979	TOTAL	2573.69	MEAN	7.05	MAX	113	MIN	.39	CFSM	.39	IN	5.32

STREAMS TRIBUTARY TO ST. CLAIR RIVER

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04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW¼ SE¼ sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right bank, at downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi² (391 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP-2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 84.3 ft³/s (2.387 m³/s), 7.58 in/yr (193 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft³/s (128 m³/s) Apr. 19, 1975, gage height, 8.96 ft (2.731 m); minimum, 2.3 ft³/s (0.065 m³/s) Sept. 6, 10, 1978; minimum gage height, 1.17 ft (0.357 m) Sept. 6, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft (2.7 m), from information by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft³/s (17.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	1200	931 26.4	5.66 1.725	Apr. 14	2300	*1070 30.3	*6.07 1.850

Minimum discharge, 2.8 ft³/s (0.079 m³/s) Sept. 29; minimum gage height, 1.28 ft (0.390 m) Sept. 26, 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.5	11	14	71	13	20	168	75	30	29	30	8.2
2	7.0	10	12	60	12	23	139	64	31	61	41	7.3
3	7.3	11	14	45	11	47	171	84	27	64	43	6.6
4	7.2	11	15	30	11	640	132	150	24	49	37	6.4
5	7.2	14	17	25	11	809	124	122	22	34	28	6.0
6	8.5	14	18	20	10	644	233	87	21	27	21	5.7
7	8.5	14	17	18	10	488	196	72	21	22	17	5.1
8	9.3	12	16	17	10	400	134	62	22	18	15	5.2
9	9.2	12	12	16	10	300	128	55	21	17	13	5.7
10	8.7	14	12	15	10	200	203	48	98	58	14	6.1
11	8.1	11	12	14	9.8	170	308	63	145	239	13	6.3
12	8.0	11	13	14	9.8	150	274	166	77	186	13	5.5
13	7.9	11	12	14	9.8	141	256	118	50	86	12	5.2
14	7.4	12	12	13	9.8	141	857	76	29	52	12	5.8
15	8.7	12	12	13	9.8	162	892	58	27	39	10	7.6
16	10	12	13	13	9.8	152	589	52	23	31	9.1	9.2
17	9.4	14	13	12	9.8	122	349	45	19	23	9.3	7.1
18	9.4	13	13	12	9.8	88	215	40	17	20	9.3	6.2
19	9.8	16	13	12	10	139	147	36	15	18	10	5.5
20	10	16	13	12	10	150	109	33	14	16	11	4.9
21	11	15	14	12	11	124	87	30	14	14	11	4.2
22	12	14	13	11	12	111	74	28	14	13	10	3.9
23	12	16	13	11	20	101	68	26	14	12	9.7	4.1
24	11	16	12	11	19	105	59	26	13	13	9.2	4.6
25	11	19	12	11	17	112	54	28	12	12	8.8	4.8
26	13	18	11	11	16	97	56	36	11	12	8.2	3.8
27	13	17	11	13	17	80	160	53	11	12	8.5	4.2
28	13	14	11	14	18	69	181	52	10	15	8.3	3.8
29	13	13	11	15	---	76	116	38	9.9	16	8.0	3.2
30	12	13	13	15	---	154	87	33	13	15	7.8	4.1
31	11	---	22	14	---	218	---	31	---	25	8.3	---
TOTAL	301.1	406	416	584	336.4	6233	6566	1887	854.9	1248	465.5	166.3
MEAN	9.71	13.5	13.4	18.8	12.0	201	219	60.9	28.5	40.3	15.0	5.54
MAX	13	19	22	71	20	809	892	166	145	239	43	9.2
MIN	7.0	10	11	11	9.8	20	54	26	9.9	12	7.8	3.2
CFSM	.06	.09	.09	.13	.08	1.33	1.45	.40	.19	.27	.10	.04
IN.	.07	.10	.10	.14	.08	1.54	1.62	.46	.21	.31	.11	.04

CAL YR 1978 TOTAL 28641.8 MEAN 78.5 MAX 1910 MIN 2.4 CFSM .52 IN 7.06
WTR YR 1979 TOTAL 19464.2 MEAN 53.3 MAX 892 MIN 3.2 CFSM .35 IN 4.80

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04160800 SASHARAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE¼ sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank 25 ft (8 m) upstream from bridge on Maybee Road, 1.1 mi (1.8 km) upstream from mouth, and 2.5 mi (4.0 km) northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi² (54.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft (296 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 12.0 ft³/s (0.340 m³/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 161 ft³/s (4.56 m³/s) Feb. 23, 1974, gage height, 4.38 ft (1.335 m); minimum, 0.2 ft³/s (0.006 m³/s) on many days during 1961, 1963, 1964, 1965, 1966; minimum gage height, 1.59 ft (0.485 m) Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 45 ft³/s (1.27 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0300	57 1.61	3.38 1.030	Apr. 14	0900	*95 2.69	*3.86 1.177

Minimum discharge, 0.48 ft³/s (0.014 m³/s) Sept. 28, 29, 30, gage height, 1.89 ft (0.576 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	1.9	3.7	18	5.2	7.5	26	23	13	19	10	3.8
2	1.7	1.8	4.7	12	5.1	7.1	26	22	12	16	12	3.6
3	1.7	1.7	4.6	9.0	5.0	6.5	24	30	12	11	9.4	3.3
4	1.8	1.8	6.5	7.5	4.9	25	21	32	11	9.9	7.3	3.0
5	1.8	2.0	5.9	7.0	4.8	48	22	27	11	8.4	5.7	3.0
6	2.5	2.0	5.4	6.7	4.8	30	28	24	10	7.4	5.3	2.9
7	2.5	2.1	5.4	6.5	4.7	27	24	23	9.7	6.4	4.9	2.5
8	2.1	2.1	5.7	6.3	4.7	29	23	22	9.4	5.0	5.1	2.3
9	1.8	2.1	5.2	6.1	4.7	30	27	21	9.9	4.7	4.4	2.3
10	1.6	2.0	4.5	5.8	4.7	26	32	20	9.9	5.0	4.5	2.2
11	1.4	2.0	4.2	5.6	4.7	24	29	20	9.4	4.3	4.5	1.9
12	1.6	2.0	4.5	5.5	4.7	22	29	20	8.6	3.8	3.7	1.8
13	1.3	2.1	4.3	5.4	4.6	20	31	20	8.4	3.8	3.4	1.8
14	1.2	2.9	4.2	5.2	4.6	29	80	19	7.6	3.6	3.5	2.4
15	1.1	2.6	4.1	5.1	4.6	29	62	18	7.4	3.4	2.9	2.1
16	2.1	2.6	4.2	5.0	4.6	25	52	17	6.9	3.0	2.7	1.9
17	2.2	3.5	4.1	5.0	4.6	20	44	16	6.7	2.5	3.3	1.7
18	1.9	4.6	4.0	4.9	4.7	29	37	15	6.2	2.1	4.8	1.5
19	2.0	4.0	4.2	4.9	4.7	34	35	14	5.2	1.7	4.6	1.2
20	1.8	3.5	4.3	4.9	4.8	34	34	13	4.7	1.4	4.1	.99
21	1.7	3.4	5.3	4.9	5.3	33	33	12	5.0	1.3	3.8	.89
22	1.7	3.2	5.6	4.9	6.5	31	31	12	4.7	1.3	3.4	.79
23	2.1	5.0	5.0	4.9	7.4	29	26	12	4.3	1.2	3.2	.79
24	2.3	5.9	4.8	5.7	7.8	30	24	13	3.8	1.2	3.4	.87
25	2.5	4.8	4.6	5.9	8.0	27	23	15	4.1	1.5	3.2	.87
26	3.6	4.4	4.5	5.7	8.0	23	24	20	3.8	2.0	3.3	.77
27	3.6	4.1	4.5	5.5	7.9	21	32	20	3.6	1.8	3.6	.70
28	3.0	4.1	4.2	5.3	7.7	20	28	18	4.3	2.1	3.6	.56
29	2.6	4.8	4.3	5.0	---	21	26	16	6.4	2.1	4.1	.48
30	2.3	3.7	5.4	5.1	---	31	24	15	10	1.9	4.7	.52
31	2.0	---	9.1	5.2	---	30	---	14	---	6.3	4.1	---
TOTAL	63.3	92.7	151.0	194.5	153.8	798.1	957	583	229.0	145.1	146.5	53.43
MEAN	2.04	3.09	4.87	6.27	5.49	25.7	31.9	18.8	7.63	4.68	4.73	1.78
MAX	3.6	5.9	9.1	18	8.0	48	80	32	13	19	12	3.8
MIN	1.1	1.7	3.7	4.9	4.6	6.5	21	12	3.6	1.2	2.7	.48
CFSM	.10	.15	.23	.30	.26	1.23	1.53	.90	.37	.22	.23	.09
IN.	.11	.16	.27	.35	.27	1.42	1.70	1.04	.41	.26	.26	.10
CAL YR 1978 TOTAL	3269.55			MEAN 8.96	MAX 56	MIN .25	CFSM .43	IN 5.82				
WTR YR 1979 TOTAL	3567.43			MEAN 9.77	MAX 80	MIN .48	CFSM .47	IN 6.35				

STREAMS TRIBUTARY TO LAKE ST. CLAIR

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04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE¼ sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank 14 ft (4 m) downstream from bridge on State Highway 59, 1.0 mi (1.6 km) downstream from State fish hatchery, and 2.0 mi (3.2 km) south of Drayton Plains.

DRAINAGE AREA.--79.2 mi² (205.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft (287 m) from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, non-recording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 50.3 ft³/s (1.424 m³/s), 8.62 in/yr (219 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft³/s (7.82 m³/s) Mar. 12, 1974, gage height, 4.95 ft (1.509 m); minimum, 2.4 ft³/s (0.068 m³/s) May 31, 1961; minimum gage height, 1.23 ft (0.375 m) Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 123 ft³/s (3.48 m³/s) Apr. 18, gage height, 3.60 ft (1.097 m); minimum, 7.9 ft³/s (0.22 m³/s) Sept. 23, 24, gage height, 1.96 ft (0.597 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	35	31	40	34	28	72	90	45	13	14	18
2	11	33	33	40	36	28	73	88	58	27	37	18
3	13	33	35	42	37	30	79	89	58	49	61	17
4	16	37	34	43	38	45	79	91	61	53	64	17
5	27	35	34	42	39	42	78	90	62	57	73	17
6	25	33	35	42	39	43	74	88	55	57	85	17
7	21	29	38	42	38	46	75	88	33	53	78	17
8	20	27	37	42	38	50	76	77	41	34	69	17
9	18	26	35	41	37	52	80	61	48	17	44	16
10	18	27	35	41	36	54	76	29	48	20	17	16
11	17	29	36	42	35	55	75	28	41	18	18	17
12	17	29	38	42	35	55	77	30	33	20	19	15
13	17	28	39	43	34	56	78	33	32	27	19	15
14	16	27	38	44	34	57	102	35	25	31	32	14
15	16	24	34	45	33	58	104	39	13	31	31	13
16	28	23	34	47	32	58	113	78	13	29	15	11
17	35	26	33	45	31	57	121	73	13	28	18	10
18	41	28	33	45	31	59	122	65	13	24	19	10
19	44	28	31	43	30	59	120	59	13	15	17	11
20	44	27	32	41	28	60	115	49	13	13	17	13
21	46	27	29	40	29	60	114	34	12	11	16	14
22	45	26	27	39	29	62	109	32	12	10	16	11
23	45	30	26	39	28	63	107	31	12	9.7	16	9.9
24	41	29	26	38	29	65	104	22	11	11	16	8.6
25	38	28	27	38	29	66	100	25	11	12	15	9.7
26	41	27	26	38	29	70	99	28	11	11	15	9.4
27	43	29	26	37	28	72	100	33	11	11	15	9.3
28	50	30	26	35	27	70	97	68	11	12	15	9.5
29	49	30	26	35	---	70	95	63	11	11	19	9.5
30	44	29	30	34	---	70	93	59	13	9.9	18	9.5
31	36	---	36	34	---	72	---	46	---	13	17	---
TOTAL	933	869	1000	1259	923	1732	2807	1721	833	737.6	925	399.4
MEAN	30.1	29.0	32.3	40.6	33.0	55.9	93.6	55.5	27.8	23.8	29.8	13.3
MAX	50	37	39	47	39	72	122	91	62	57	85	18
MIN	11	23	26	34	27	28	72	22	11	9.7	14	8.6
CFSM	.38	.37	.41	.51	.42	.71	1.18	.70	.35	.30	.38	.17
IN.	.44	.41	.47	.59	.43	.81	1.32	.81	.39	.35	.43	.19
CAL YR 1978	TOTAL	13570.0	MEAN	37.2	MAX	119	MIN	5.4	CFSM	.47	IN	6.37
WTR YR 1979	TOTAL	14139.0	MEAN	38.7	MAX	122	MIN	8.6	CFSM	.49	IN	6.64

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161000 CLINTON RIVER AT AUBURN HEIGHTS, MI

LOCATION.--Lat 42°38'00", long 83°13'28", in NW¼ sec.36, T.3 N., R.10 E., Oakland County, Hydrologic Unit 04090003, on right bank 30 ft (9 m) upstream from bridge on Auburn Road at Auburn Heights, and 2.8 mi (4.5 km) upstream from Galloway Creek.

DRAINAGE AREA.--123 mi² (319 km²).

PERIOD OF RECORD.--May 1935 to June 1939 and February to September 1940 (published as "at Pontiac"), October 1956 to current year.

REVISED RECORDS.--WSP 1307: 1937(M). WSP 1507: Drainage area at former site.

GAGE.--Water-stage recorder. Datum of gage is 846.50 ft (258.013 m) National Geodetic Vertical Datum of 1929. Prior to October 1940, nonrecording gage at site 3.3 mi (5.3 km) upstream at datum 876.01 ft (267.008 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Some regulation by many lakes above station. Flow includes waste from city of Pontiac water supply, most of which is obtained from sources outside the basin. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years (water years 1936-38, 1957-79), 101 ft³/s (2.860 m³/s), 11.15 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,720 ft³/s (48.7 m³/s) Apr. 19, 1975, gage height, 5.37 ft (1.637 m); minimum observed, 4.8 ft³/s (0.14 m³/s) Sept. 4, 1936, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 460 ft³/s (13.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Dec. 31	1900	542 15.3	3.17 0.966	May 3	0800	579 16.4	3.32 1.012
Apr. 13	2400	*1020 28.9	*4.23 1.289	June 8	2400	970 27.5	4.12 1.256
Apr. 26	1900	579 16.4	3.32 1.012	June 30	1900	502 14.2	3.13 0.954

Minimum discharge, 32 ft³/s (0.91 m³/s) Sept. 2, 3, 4, 10; minimum gage height, 1.11 ft (0.338 m) Sept. 3, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	86	79	166	111	82	184	225	77	108	66	38
2	48	90	82	88	112	70	208	220	75	73	106	39
3	47	87	144	78	105	123	191	380	69	67	63	33
4	47	84	153	80	98	308	200	317	77	88	69	36
5	56	77	84	78	90	124	223	253	85	72	161	38
6	57	78	87	76	86	97	218	225	88	77	117	38
7	49	81	87	75	84	102	182	220	93	82	111	41
8	58	79	124	73	80	104	195	228	161	79	122	39
9	55	77	72	72	76	128	281	218	232	101	139	36
10	70	78	67	72	74	137	245	215	161	89	159	38
11	100	77	75	72	72	106	215	225	169	79	113	39
12	114	75	108	72	70	118	228	205	169	73	90	41
13	132	78	146	72	68	170	310	182	194	73	83	44
14	131	100	132	70	66	161	476	166	171	93	80	68
15	125	79	126	70	66	133	272	127	166	93	65	50
16	190	78	120	70	66	140	240	74	147	68	47	46
17	102	167	110	70	66	160	240	68	127	70	84	72
18	122	118	109	68	66	138	250	66	122	71	92	47
19	158	72	98	68	64	113	248	61	104	70	52	47
20	113	70	73	67	64	115	243	58	81	69	46	47
21	109	74	130	62	80	113	245	68	63	68	43	51
22	105	75	120	79	102	114	233	81	67	61	44	46
23	126	163	117	100	121	122	223	75	55	59	71	43
24	92	94	114	135	97	133	205	99	52	59	83	47
25	99	78	112	123	81	121	230	124	51	63	87	50
26	114	75	93	136	80	119	290	109	51	50	81	56
27	100	74	99	140	87	143	238	72	60	49	75	49
28	94	81	97	125	87	153	233	70	90	75	74	56
29	87	81	94	144	---	183	223	70	79	52	114	53
30	85	78	141	107	---	214	230	74	137	51	62	47
31	88	---	283	106	---	230	---	72	---	157	40	---
TOTAL	2923	2604	3476	2814	2319	4274	7199	4647	3273	2339	2639	1375
MEAN	94.3	86.8	112	90.8	82.8	138	240	150	109	75.5	85.1	45.8
MAX	190	167	283	166	121	308	476	380	232	157	161	72
MIN	47	70	67	62	64	70	182	58	51	49	40	33

CAL YR 1978 TOTAL 37413 MEAN 103 MAX 296 MIN 30
WTR YR 1979 TOTAL 39882 MEAN 109 MAX 476 MIN 33

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE¼ sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft (4 m) downstream from wooden bridge on Oakland University property, and 2.7 mi (4.3 km) northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi² (46.4 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Concrete control since Aug. 20, 1960. Datum of gage is 820.78 ft (250.174 m) National Geodetic Vertical Datum of 1929 (levels by Johnson and Anderson, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 9.74 ft³/s (0.276 m³/s), 7.39 in/yr (188 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft³/s (10.4 m³/s) June 25, 1968, gage height, 6.27 ft (1.911 m); minimum, 0.01 ft³/s (<0.001 m³/s) on several days during July and August, 1964; minimum gage height, 0.82 ft (0.250 m) Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 90 ft³/s (2.55 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	1800	139 3.94	4.93 1.503
Apr. 14	0400	*158 4.47	*5.08 1.548

Minimum discharge, 0.90 ft³/s (0.025 m³/s) Nov. 12, 13, July 22; minimum gage height, 1.59 ft (0.485 m) Sept. 18, 19, 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.5	4.0	39	2.3	8.8	43	17	7.4	9.6	8.6	3.0
2	1.4	1.4	4.0	24	2.3	11	38	15	6.6	8.0	12	2.6
3	1.4	1.4	6.5	15	2.3	23	32	41	5.8	6.2	7.3	2.2
4	1.5	1.4	16	9.0	2.3	107	26	35	5.1	7.6	5.5	1.9
5	1.7	1.3	8.3	6.0	2.2	106	28	27	4.7	5.3	7.4	1.8
6	2.2	1.3	7.6	5.0	2.2	65	37	22	4.4	4.3	5.0	1.7
7	1.7	1.5	6.8	4.5	2.2	42	28	18	4.2	3.6	3.9	1.5
8	1.4	1.3	9.7	4.0	2.2	40	25	15	4.3	2.9	3.1	1.5
9	1.2	1.2	7.0	3.7	2.2	33	42	13	12	4.7	2.6	1.4
10	1.2	1.2	5.6	3.5	2.2	26	51	12	9.0	4.5	4.1	1.4
11	1.3	1.2	5.0	3.3	2.1	22	43	11	7.9	3.4	2.9	1.3
12	1.4	.90	4.7	3.2	2.1	19	45	12	6.5	3.0	2.4	1.3
13	1.3	1.2	4.5	3.1	2.1	16	50	12	5.4	2.6	2.1	1.3
14	1.2	2.7	4.1	3.0	2.1	21	119	11	4.6	2.4	2.1	2.1
15	1.2	1.7	4.0	2.9	2.1	16	82	10	3.9	4.8	1.7	1.4
16	3.2	1.6	3.8	2.8	2.0	14	59	9.2	3.2	3.2	1.5	1.2
17	1.8	8.0	3.9	2.7	2.0	14	43	8.1	2.9	2.6	2.4	1.2
18	1.5	6.2	3.6	2.7	2.2	22	33	7.5	2.7	2.0	7.4	1.2
19	1.5	4.1	3.3	2.7	2.0	21	27	6.9	2.4	1.7	4.2	1.2
20	1.3	3.4	3.9	2.6	1.9	20	23	6.5	4.7	1.4	3.5	1.2
21	1.3	3.1	5.2	2.6	2.1	19	20	6.0	4.1	1.3	3.0	1.3
22	1.3	2.8	4.0	2.6	2.1	17	19	5.6	3.3	1.1	2.6	1.3
23	1.9	12	3.8	2.6	3.7	17	17	5.3	2.6	1.1	2.7	1.2
24	1.5	8.0	3.8	2.7	5.9	20	15	7.0	2.4	1.1	2.8	1.2
25	1.6	6.5	4.0	2.4	4.5	19	15	15	2.1	1.7	2.2	1.2
26	3.1	5.6	3.5	2.4	3.8	18	20	24	2.0	1.8	2.0	1.2
27	1.9	5.0	3.1	2.4	4.1	16	29	17	2.2	1.5	1.9	1.2
28	2.4	4.7	2.9	2.4	5.6	15	24	14	8.4	3.2	1.9	1.3
29	2.3	4.3	2.9	2.4	---	18	20	12	5.6	2.6	4.4	1.3
30	2.0	4.4	6.7	2.4	---	38	19	9.8	8.8	1.8	4.2	1.3
31	1.8	---	23	2.4	---	54	---	8.6	---	11	3.5	---
TOTAL	52.1	100.90	179.2	170.0	74.8	897.8	1072	433.5	149.2	112.0	120.9	44.9
MEAN	1.68	3.36	5.78	5.48	2.67	29.0	35.7	14.0	4.97	3.61	3.90	1.50
MAX	3.2	12	23	39	5.9	107	119	41	12	11	12	3.0
MIN	1.2	.90	2.9	2.4	1.9	8.8	15	5.3	2.0	1.1	1.5	1.2
CFSM	.09	.19	.32	.31	.15	1.62	1.99	.78	.28	.20	.22	.08
IN.	.11	.21	.37	.35	.16	1.87	2.23	.90	.31	.23	.25	.09
CAL YR 1978	TOTAL	2972.83	MEAN 8.14	MAX 92	MIN .90	CFSM .46	IN 6.18					
WTR YR 1979	TOTAL	3407.30	MEAN 9.34	MAX 119	MIN .90	CFSM .52	IN 7.08					

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW¼ SE¼ sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi (2.4 km) upstream from mouth.

DRAINAGE AREA.--70.9 mi² (183.6 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft (230.158 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 50.4 ft³/s (1.427 m³/s), 9.65 in/yr (245 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft³/s (26.0 m³/s) Feb. 1, 1968; maximum gage height, 5.95 ft (1.814 m) Feb. 10, 1965, backwater from ice; minimum discharge, 1.2 ft³/s (0.034 m³/s) Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft (0.384 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	1800	278 7.87	3.21 0.978	Apr. 14	0900	*456 12.9	*3.79 1.155

Minimum discharge, 11 ft³/s (0.31 m³/s) Sept. 20, 21; minimum gage height, 1.52 ft (0.463 m) Dec. 19, 20, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	29	16	60	24	27	84	57	43	33	48	22
2	30	29	15	34	23	29	86	90	39	30	63	21
3	31	27	19	32	23	47	75	118	34	27	45	19
4	31	27	33	29	23	182	68	98	30	31	36	18
5	31	27	24	27	23	156	77	92	26	25	33	18
6	33	29	20	26	23	93	102	82	26	24	31	17
7	31	29	18	26	23	80	84	78	26	21	27	17
8	29	28	22	25	22	80	84	71	34	18	26	18
9	28	26	19	24	22	78	113	62	37	37	26	17
10	27	25	19	23	22	75	121	58	37	37	32	16
11	27	19	18	23	22	62	114	56	32	26	30	14
12	27	17	16	22	22	56	116	55	27	27	27	14
13	26	18	16	22	22	56	143	56	25	24	25	14
14	26	22	16	22	22	72	350	51	23	26	24	17
15	26	19	15	21	22	61	186	50	21	27	22	15
16	34	16	15	21	22	56	162	46	21	28	19	14
17	30	29	15	21	22	57	162	42	25	30	23	13
18	31	28	15	21	22	81	132	39	23	26	31	13
19	34	21	14	21	22	82	106	36	22	33	27	12
20	38	19	16	21	22	78	90	34	43	36	23	12
21	41	19	20	21	23	74	81	32	40	24	23	12
22	43	19	17	23	29	70	78	22	31	24	20	17
23	44	36	15	26	38	68	68	18	22	24	21	29
24	44	29	15	29	43	70	70	23	21	24	23	31
25	43	23	16	32	37	67	66	36	20	22	21	24
26	47	22	15	30	29	64	75	60	19	24	19	20
27	38	22	15	28	26	60	82	51	20	20	19	18
28	34	19	15	26	26	58	75	68	34	26	23	18
29	32	16	15	25	---	66	69	49	31	20	33	16
30	32	16	21	24	---	100	64	43	34	17	31	15
31	32	---	50	24	---	109	---	41	---	64	24	---
TOTAL	1029	705	575	809	699	2314	3183	1714	866	855	875	521
MEAN	33.2	23.5	18.5	26.1	25.0	74.6	106	55.3	28.9	27.6	28.2	17.4
MAX	47	36	50	60	43	182	350	118	43	64	63	31
MIN	26	16	14	21	22	27	64	18	19	17	19	12
CFSM	.47	.33	.26	.37	.35	1.05	1.50	.78	.41	.39	.40	.25
IN.	.54	.33	.30	.42	.37	1.21	1.67	.90	.45	.45	.46	.27

CAL YR 1978 TOTAL 15619 MEAN 42.8 MAX 240 MIN 12 CFSM .60 IN 8.19
WTR YR 1979 TOTAL 14145 MEAN 38.8 MAX 350 MIN 12 CFSM .55 IN 7.42

STREAMS TRIBUTARY TO LAKE ST. CLAIR

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04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW¼ sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi (6.4 km) west of Romeo.

DRAINAGE AREA.--25.6 mi² (66.3 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft (262.628 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 17.5 ft³/s (0.496 m³/s), 9.28 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) Apr. 19, 1975, gage height, 5.19 ft (1.582 m); minimum, 0.92 ft³/s (0.026 m³/s) Oct. 5, 9, 1967; minimum gage height, 1.28 ft (0.390 m) July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 89 ft³/s (2.52 m³/s) Apr. 15, gage height, 3.49 ft (1.064 m), no peak above base of 100 ft³/s (2.83 m³/s); minimum, 1.7 ft³/s (0.048 m³/s) Dec. 2, result of freezeup; minimum gage height, 1.47 ft (0.448 m) Sept. 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.7	7.0	7.9	22	8.2	7.8	29	24	5.8	15	9.1	6.1
2	8.0	5.5	7.3	14	8.0	9.0	27	22	5.3	13	16	7.1
3	7.5	9.4	9.2	12	7.8	12	24	32	4.7	13	14	6.1
4	7.5	9.9	13	11	7.6	36	21	34	4.7	16	11	5.7
5	7.3	8.8	11	11	7.5	33	23	29	4.4	12	8.1	5.5
6	11	7.7	9.9	10	7.3	23	29	26	4.3	6.7	6.7	5.3
7	11	8.8	9.8	9.5	7.2	22	25	24	4.0	6.3	6.5	5.0
8	8.5	8.0	9.0	9.0	7.0	26	22	21	4.5	6.1	6.4	5.0
9	7.6	8.6	8.4	8.7	6.9	28	26	13	16	12	6.0	5.0
10	7.1	9.5	7.8	8.5	6.8	27	37	11	11	29	8.4	5.1
11	6.7	11	8.1	8.2	6.7	27	36	11	11	23	7.9	5.4
12	6.5	10	8.3	8.0	6.7	21	36	9.9	10	21	6.2	5.2
13	8.0	9.5	8.3	7.8	6.6	22	44	11	15	15	5.9	5.1
14	8.0	11	7.4	7.6	6.6	28	84	9.3	16	11	5.3	5.1
15	6.6	9.2	7.9	7.5	6.5	25	88	9.8	15	9.5	4.7	3.9
16	10	10	7.5	7.4	6.5	21	77	9.7	14	9.3	4.3	3.3
17	8.4	12	8.0	7.4	6.5	20	62	7.8	11	6.9	4.5	2.9
18	8.4	14	10	7.3	6.5	30	53	6.8	6.9	5.9	6.2	2.6
19	9.0	11	9.8	7.2	6.5	30	45	6.2	3.9	5.4	5.8	2.4
20	9.4	9.4	11	7.2	6.5	27	39	5.7	4.2	5.1	5.3	2.3
21	9.8	8.8	13	7.2	7.0	26	34	5.2	8.5	4.9	5.7	2.4
22	10	8.5	12	8.0	8.5	24	32	4.8	7.5	4.5	5.4	2.3
23	12	13	11	9.0	8.8	23	28	4.3	5.7	4.3	5.6	2.2
24	11	13	11	9.5	8.8	24	25	5.1	5.0	4.0	6.2	2.2
25	10	9.6	10	10	8.2	22	24	8.8	4.3	4.4	5.4	2.3
26	13	8.2	9.5	10	7.0	20	28	19	3.9	4.9	5.3	2.2
27	12	6.7	9.0	9.8	6.8	20	34	13	3.6	4.6	6.9	2.2
28	14	8.8	9.1	9.5	7.2	20	30	11	3.5	5.9	7.2	2.3
29	11	7.7	9.5	9.0	---	25	27	9.4	4.4	5.5	7.3	2.3
30	9.2	7.8	9.6	8.7	---	31	26	8.0	14	4.8	7.8	2.2
31	8.4	---	14	8.4	---	30	---	6.9	---	9.0	7.0	---
TOTAL	286.6	282.4	297.3	290.4	202.2	739.8	1115	418.7	232.1	298.0	218.1	116.7
MEAN	9.25	9.41	9.59	9.37	7.22	23.9	37.2	13.5	7.74	9.61	7.04	3.89
MAX	14	14	14	22	8.8	36	88	34	16	29	16	7.1
MIN	6.5	5.5	7.3	7.2	6.5	7.8	21	4.3	3.5	4.0	4.3	2.2
CFSM	.36	.37	.38	.37	.28	.93	1.45	.53	.30	.38	.28	.15
IN.	.42	.41	.43	.42	.29	1.07	1.62	.61	.34	.43	.32	.17

CAL YR 1978 TOTAL 4831.1 MEAN 13.2 MAX 107 MIN 1.7 CFSM .52 IN 7.02
WTR YR 1979 TOTAL 4497.3 MEAN 12.3 MAX 88 MIN 2.2 CFSM .48 IN 6.53

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft (305 m) east of bridge over dam on Stony Creek, and 2.7 mi (4.3 km) west of Washington.

DRAINAGE AREA.--68.0 mi² (176.1 km²).

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft (240.792 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations NGVD.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft (242.6 m), maximum of 802 ft (244.4 m); and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft (5.73 hm³) at elevation of 802 ft (244.4 m). The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft (6.78 hm³) May 17, 18, 1974, Apr. 20, 1975, elevation 803.6 ft (244.94 m); minimum recorded, 1,758 acre-ft (2.17 hm³) Nov. 21, 1967, elevation, 794.7 ft (242.22 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 4,961 acre-ft (6.12 hm³) May 5, elevation, 802.6 ft (244.63 m); minimum, 3,243 acre-ft (4.00 hm³) sometime during period Feb. 9-27, elevation, 799.0 ft (243.54 m).

MONTHEND ELEVATION AND CONTENTS AT: 2400, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month	
			Acre-feet	Equivalent in ft ³ /s
Sept. 30	802.1	4701	--	--
Oct. 31	802.1	4701	0	0
Nov. 30	801.4	4349	-352	-5.9
Dec. 31	799.3	3373	-976	-15.9
CAL YR 1978	--	--	-44	-0.1
Jan. 31	799.1	3285	-88	-1.4
Feb. 28	799.1	3285	0	0
Mar. 31	801.0	4153	+868	+14.1
Apr. 30	802.1	4701	+548	+9.2
May 31	802.3	4805	+104	+1.7
June 30	802.2	4753	-52	-0.9
July 31	802.2	4753	0	0
Aug. 31	802.2	4753	0	0
Sept. 30	802.0	4649	-104	-1.7
WTR YR 1979	--	--	-52	-0.1

STREAMS TRIBUTARY TO LAKE ST. CLAIR

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04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW $\frac{1}{4}$ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 15 ft (5 m) downstream from bridge on Mt. Vernon Road, 500 ft (152 m) downstream from Stony Lake Dam, and 2.9 mi (4.7 km) west of Washington.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft (235.485 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (station 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 41.2 ft³/s (1.167 m³/s), 8.20 in/yr (208 mm/yr), adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft³/s (12.1 m³/s) Feb. 2, 1968, gage height, 5.86 ft (1.786 m); maximum gage height, 6.71 ft (2.045 m) Mar. 6, 1959, backwater from ice; minimum discharge 0.9 ft³/s (0.025 m³/s) July 10, 1963; minimum gage height, 1.79 ft (0.546 m) Apr. 6, 1979; minimum daily discharge, 1.3 ft³/s (0.037 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 247 ft³/s (7.00 m³/s) Nov. 27, gage height, 4.90 ft (1.494 m); minimum, 1.9 ft³/s (0.054 m³/s) Apr. 6, gage height, 1.79 ft (0.546 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	16	95	57	23	23	88	58	34	33	32	17
2	13	15	60	58	22	24	85	41	33	35	43	16
3	14	14	35	40	21	27	62	40	27	33	42	15
4	15	14	67	32	22	61	47	47	23	33	40	13
5	16	15	110	28	21	113	22	65	23	29	35	13
6	19	16	133	26	21	106	2.1	70	20	25	30	12
7	18	17	79	24	20	88	2.5	66	19	22	23	12
8	17	15	45	22	20	85	24	59	22	19	22	10
9	16	17	30	21	20	86	64	57	24	23	19	8.6
10	15	18	23	20	19	90	66	52	29	38	21	9.8
11	15	22	19	19	19	80	87	46	33	49	21	8.9
12	16	21	19	19	19	71	97	44	29	54	17	8.6
13	17	15	18	19	19	66	104	42	25	53	15	11
14	15	22	18	19	19	74	170	38	24	44	15	14
15	13	20	18	19	19	69	186	36	24	36	14	8.9
16	20	20	18	19	19	64	180	32	23	30	11	8.6
17	16	25	19	19	19	62	162	29	23	23	13	8.3
18	16	33	19	19	19	69	140	27	23	17	18	9.2
19	18	30	20	19	19	47	119	25	15	15	18	8.6
20	18	29	23	19	19	2.5	105	24	14	14	18	6.2
21	19	24	26	19	22	6.9	94	23	18	13	17	6.9
22	19	23	27	20	26	31	89	20	18	12	16	9.5
23	24	30	26	23	27	52	79	20	16	12	17	4.8
24	21	33	26	24	27	63	71	25	15	10	18	4.2
25	19	32	27	24	25	69	66	37	12	12	17	4.6
26	23	29	25	23	20	68	70	42	11	14	16	5.0
27	21	91	23	23	21	62	82	46	11	13	15	5.0
28	20	106	22	24	22	58	81	48	18	16	15	5.6
29	18	78	21	23	---	57	75	45	20	16	18	6.0
30	18	65	24	23	---	71	70	42	32	14	21	6.9
31	18	---	35	23	---	91	---	37	---	23	19	---
TOTAL	539	905	1150	767	589	1936.4	2589.6	1283	658	780	656	277.2
MEAN	17.4	30.2	37.1	24.7	21.0	62.5	86.3	41.4	21.9	25.2	21.2	9.24
MAX	24	106	133	58	27	113	186	70	34	54	43	17
MIN	12	14	18	19	19	2.5	2.1	20	11	10	11	4.2
MEAN+	17.4	24.3	21.2	23.3	21.0	76.6	95.5	43.1	21.0	25.2	21.2	7.54
CFSM+	.26	.36	.31	.34	.31	1.12	1.40	.63	.31	.37	.31	.11
IN+	.29	.40	.36	.39	.32	1.29	1.56	.73	.34	.43	.36	.12

CAL YR 1978 TOTAL 12652.3 MEAN 34.7 MAX 219 MIN 3.9 MEAN+ 34.6 CFSM+ .51 IN+ 6.90
WTR YR 1979 TOTAL 12130.2 MEAN 33.2 MAX 186 MIN 2.1 MEAN+ 33.1 CFSM+ .49 IN+ 6.59

+ Adjusted for change in contents in Stony Lake.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI

LOCATION.--Lat 42°36'52", long 83°01'36", in NE¼ SW¼ sec.3, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on Riverland Road at Sterling Heights.

DRAINAGE AREA.--309 mi² (800 km²).

PERIOD OF RECORD.--October 1978 to September 1979.

GAGE.--Water-stage recorder. Altitude of gage is 625 ft (190 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for periods of no gage-height record, Oct. 1 to Dec. 20, Jan. 2 to Mar. 1, and Mar. 9 to May 15, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft³/s (25.5 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0400	1120 31.7	12.09 3.685	Apr. 14	unknown	*2500 70.8	unknown

Minimum discharge, 65 ft³/s (1.84 m³/s) Sept. 7, 10, gage height, 6.77 ft (2.063 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	150	210	404	170	155	440	390	187	255	265	92
2	99	150	180	250	180	172	460	400	184	184	267	92
3	99	140	220	190	170	206	430	630	172	155	190	82
4	98	140	290	170	160	680	380	550	161	190	166	79
5	98	130	250	160	150	761	390	480	167	162	215	82
6	120	140	270	150	145	410	400	430	170	152	197	82
7	110	140	210	140	140	363	320	420	175	152	175	79
8	110	135	220	160	135	354	350	390	189	142	167	81
9	115	130	150	145	130	230	550	370	323	164	171	74
10	130	130	130	130	125	350	520	350	246	219	212	68
11	150	125	130	130	120	300	500	330	270	181	181	74
12	170	120	150	130	120	240	550	340	253	183	150	69
13	190	120	210	125	120	330	700	320	254	173	130	73
14	190	160	190	125	120	360	1250	290	242	168	132	100
15	180	140	180	125	120	310	1050	240	232	205	118	90
16	260	130	170	125	120	300	700	198	216	155	98	80
17	165	250	160	125	120	320	660	187	200	150	100	91
18	200	200	160	125	120	340	600	177	190	140	183	82
19	230	140	150	125	120	290	540	168	176	137	119	78
20	200	130	125	125	120	250	500	157	172	138	103	79
21	180	130	196	115	130	240	480	148	181	124	100	80
22	180	135	188	140	150	260	460	162	153	116	93	86
23	220	270	192	170	170	290	430	148	131	114	100	88
24	170	200	184	210	190	330	390	169	119	110	135	93
25	180	160	170	200	160	320	400	240	110	109	131	88
26	200	140	150	210	145	310	490	316	110	121	129	90
27	180	210	160	240	150	310	470	232	110	101	121	85
28	160	240	155	200	160	310	450	214	198	127	123	85
29	150	200	150	220	---	350	430	206	155	122	140	89
30	150	180	205	180	---	340	410	199	176	99	172	80
31	150	---	303	170	---	520	---	190	---	257	106	---
TOTAL	4934	4765	5808	5214	3960	10301	15700	9041	5622	4805	4689	2491
MEAN	159	159	187	168	141	332	523	292	187	155	151	83.0
MAX	260	270	303	404	190	761	1250	630	323	257	267	100
MIN	98	120	125	115	120	155	320	148	110	99	93	68
CFSM	.52	.52	.61	.54	.46	1.07	1.69	.95	.61	.50	.49	.27
IN.	.59	.57	.70	.63	.48	1.24	1.89	1.09	.68	.58	.56	.30

WTR YR 1979 TOTAL 77330 MEAN 212 MAX 1250 MIN 68 CFSM .69 IN 9.31

STREAMS TRIBUTARY TO LAKE ST. CLAIR

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04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW¼ SW¼ sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi (1.6 km) north of Warren, and 2.0 mi (3.2 km) upstream from mouth.

DRAINAGE AREA.--Indeterminate since 1976. Prior to 1976, 23.5 mi² (60.9 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft (182.514 m) Macomb County datum. Prior to Aug. 26, 1960, non recording gage and crest-stage gage at same site and datum.

REMARKS--Records poor. Diversion from the basin via Henry-Graham drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft³/s (35.1 m³/s) June 26, 1968, gage height, 14.45 ft (4.404 m); no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum natural discharge, 0.01 ft³/s (<0.001 m³/s) Sept. 26, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 221 ft³/s (6.26 m³/s) Apr. 14, gage height, 8.35 ft (2.545 m); minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 26; minimum gage height, 4.71 ft (1.436 m) Feb. 11, 12, 13, 14, 15, 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.40	.27	.54	19	.20	5.0	3.1	1.7	.71	1.1	1.7	.18
2	.33	.27	.39	2.8	.14	6.0	21	1.5	.71	1.5	2.1	.14
3	.33	.33	22	.80	.11	18	9.0	8.5	.54	.46	.71	.09
4	.39	.27	24	.35	.11	50	4.0	2.6	.82	1.7	.22	.09
5	.39	.27	.82	.27	.09	25	26	2.1	.71	.71	.22	.07
6	.39	.22	.46	.25	.09	7.2	34	2.1	1.1	.33	.18	.11
7	.33	.33	.71	.23	.07	2.6	2.8	2.1	1.2	.22	.18	.11
8	.33	.33	3.4	.22	.07	2.3	8.1	1.7	3.6	.22	.27	.11
9	.33	.33	.71	.20	.06	2.2	72	1.2	3.3	21	.27	.11
10	.22	.27	.39	.18	.05	2.2	33	1.2	2.8	5.8	.33	.09
11	.11	.27	.62	.18	.05	2.1	20	.94	2.8	.94	.18	.18
12	.14	.27	.46	.18	.04	2.3	6.2	2.1	1.7	.33	.14	.18
13	.18	.27	.39	.18	.04	2.6	22	2.1	.62	.22	.11	.18
14	.14	3.4	.33	.18	.04	2.8	93	2.1	.54	.18	.14	.71
15	.11	1.2	.33	.17	.05	2.0	4.9	1.5	.71	.62	.14	.33
16	4.4	.39	.27	.17	.05	1.7	3.7	.94	.62	.33	.11	.18
17	.82	10	.27	.17	.05	1.5	2.3	.82	.62	.22	1.1	.14
18	.39	3.4	.27	.16	.05	9.7	2.3	.71	.54	.18	2.6	.07
19	.33	.46	.27	.16	.05	7.6	2.1	.62	.54	.18	.46	.04
20	.18	.54	.54	.15	.05	3.4	1.7	.62	2.8	.18	.22	.04
21	.18	.39	.71	.15	.10	2.8	1.5	.62	2.3	.18	.33	.03
22	.14	.33	.39	.15	.20	2.3	1.4	.62	.94	.18	.82	.03
23	.39	18	.33	.17	.60	4.0	1.2	.82	.54	.18	.62	.03
24	.33	3.1	.27	.17	4.7	7.6	2.1	2.3	.39	.33	.46	.03
25	.33	.54	.62	.20	4.5	4.9	1.4	5.8	.33	1.2	.22	.03
26	4.0	.39	.39	.25	4.3	12	3.4	4.0	.39	1.4	.18	.02
27	.94	.33	.27	.33	4.1	3.7	4.4	1.9	.54	.39	.18	.03
28	.39	.82	.22	.39	4.0	2.3	2.1	1.7	4.9	1.5	.22	.03
29	.33	.62	.18	.27	---	8.1	2.1	2.1	2.1	.46	.22	.05
30	.33	.62	3.4	.27	---	36	1.9	.94	1.5	.27	.54	.05
31	.33	---	28	.24	---	12	---	.62	---	.27	.27	---
TOTAL	17.93	48.23	91.95	28.59	23.96	251.9	392.7	58.57	40.91	42.78	15.44	3.48
MEAN	.58	1.61	2.97	.92	.86	8.13	13.1	1.89	1.36	1.38	.50	.12
MAX	4.4	18	28	19	4.7	50	93	8.5	4.9	21	2.6	.71
MIN	.11	.22	.18	.15	.04	1.5	1.2	.62	.33	.18	.11	.02
CAL YR 1978	TOTAL	1013.39	MEAN	2.78	MAX	51	MIN	.06				
WTR YR 1979	TOTAL	1016.44	MEAN	2.78	MAX	93	MIN	.02				

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE¼ NE¼ sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi (1.6 km) southwest of Utica.

DRAINAGE AREA.--16.5 mi² (42.7 km²).

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft (188.912 m) National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson Inc.).

REMARKS.--Records good except those for the winter period, which are poor. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 12.8 ft³/s (0.362 m³/s), 10.53 in/yr (267 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft³/s (32.9 m³/s) June 26, 1968, gage height, 10.36 ft (3.158 m); no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft (0.375 m) Sept. 16, 1967.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	2100	294 8.33	7.09 2.161	Apr. 14	0600	*449 12.7	*8.20 2.499

Minimum discharge, 0.25 ft³/s (0.007 m³/s) Sept. 26, gage height, 1.61 ft (0.491 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.2	1.6	4.7	80	2.1	10	32	22	8.1	8.4	28	2.5
2	1.1	2.0	3.6	35	2.1	15	40	14	7.6	8.1	27	1.8
3	1.4	1.9	13	10	2.1	35	30	94	5.8	7.0	13	1.4
4	2.1	1.6	36	6.0	2.1	200	22	54	5.1	6.9	7.6	2.1
5	3.9	1.6	17	5.0	2.1	106	34	27	5.3	6.3	12	2.5
6	3.0	1.6	9.9	4.2	2.1	40	68	22	4.5	4.5	10	1.5
7	1.8	2.0	7.6	3.7	2.1	31	27	20	5.1	3.5	8.0	1.0
8	1.7	1.7	15	3.4	2.0	25	29	16	11	2.6	6.3	.93
9	1.8	1.6	12	3.1	2.0	21	96	12	6.8	10	5.4	1.0
10	1.4	1.5	8.0	2.9	2.0	18	100	11	7.0	15	4.8	1.0
11	1.3	1.6	5.9	2.8	2.0	15	68	9.8	7.6	8.0	8.7	.92
12	1.8	1.5	5.7	2.7	2.0	14	54	9.5	6.8	4.5	6.8	1.4
13	1.5	1.6	4.4	2.6	2.0	12	72	12	4.8	4.7	5.6	1.7
14	1.5	5.6	5.5	2.5	2.0	16	320	12	4.4	4.8	4.0	2.5
15	1.4	3.5	4.7	2.5	2.0	14	69	11	4.0	13	3.9	1.5
16	12	2.1	4.0	2.4	2.0	13	39	8.1	3.2	5.5	3.4	1.0
17	6.3	10	3.9	2.4	2.0	11	27	6.3	3.7	3.2	3.4	.97
18	2.8	17	4.7	2.4	2.0	23	24	6.3	3.4	3.8	9.3	1.3
19	2.0	5.4	3.6	2.3	2.0	25	21	6.6	3.7	2.8	5.5	1.4
20	1.7	3.9	4.4	2.3	2.0	22	19	7.0	3.5	2.2	5.5	1.6
21	1.6	2.8	7.9	2.3	3.0	19	14	7.0	8.8	2.0	5.1	1.5
22	1.6	2.4	5.4	2.2	4.0	17	14	6.0	5.6	1.9	3.1	1.4
23	3.2	15	4.5	2.2	6.6	16	16	5.1	3.4	2.0	2.8	.96
24	3.8	15	4.2	2.2	11	21	14	8.5	3.4	2.1	3.1	.99
25	4.0	6.1	3.8	2.2	8.8	20	14	21	2.8	4.1	2.3	1.1
26	7.6	3.9	3.5	2.2	8.0	20	28	33	3.0	8.8	2.0	.77
27	5.6	2.8	3.3	2.2	7.5	18	61	18	2.7	4.1	2.1	1.1
28	2.1	7.5	3.1	2.2	7.3	15	28	14	5.8	5.7	2.5	1.2
29	1.7	8.7	3.3	2.1	---	22	21	15	8.5	4.0	3.8	1.1
30	2.5	7.2	12	2.1	---	56	21	12	9.0	3.5	4.0	1.1
31	2.3	---	41	2.1	---	46	---	11	---	14	2.7	---
TOTAL	87.7	140.7	265.6	202.2	96.9	936	1422	531.2	164.4	177.0	211.7	41.24
MEAN	2.83	4.69	8.57	6.52	3.46	30.2	47.4	17.1	5.48	5.71	6.83	1.37
MAX	12	17	41	80	11	200	320	94	11	15	28	2.5
MIN	1.1	1.5	3.1	2.1	2.0	10	14	5.1	2.7	1.9	2.0	.77
CFSM	.17	.28	.52	.40	.21	1.83	2.87	1.04	.33	.35	.41	.08
IN.	.20	.32	.60	.46	.22	2.11	3.21	1.20	.37	.40	.48	.09

CAL YR 1978 TOTAL 3634.99 MEAN 9.96 MAX 221 MIN .07 CFSM .60 IN 8.19
WTR YR 1979 TOTAL 4276.64 MEAN 11.7 MAX 320 MIN .77 CFSM .71 IN 9.64

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW¼ sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft (244 m) downstream from bridge on Garfield Road, 2.8 mi (4.5 km) north of Fraser, and 4.0 mi (6.4 km) upstream from North Branch.

DRAINAGE AREA.--444 mi² (1,150 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft (176.086 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft (244 m) upstream at same datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--32 years, 368 ft³/s (10.42 m³/s), 11.26 in/yr (286 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,000 ft³/s (227 m³/s) May 11, 1948, gage height, 19.5 ft (5.94 m), from graph based on gage readings, from rating curve extended above 4,000 ft³/s (113 m³/s); minimum, 47 ft³/s (1.33 m³/s) Sept. 6, 1955; minimum gage height, 4.29 ft (1.308 m) Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 5 or 6, 1947, reached a stage of 20 ft (6.1 m), from floodmarks, discharge, 9,000 ft³/s (255 m³/s), from rating curve extended above 4,000 ft³/s (113 m³/s).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,000 ft³/s (56.6 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Apr. 9	0400	2390 67.7	13.57 4.136	July 9	2300	2390 67.7	13.79 4.203
Apr. 14	0500	*5110 145	*16.34 4.980				

Minimum discharge, 92 ft³/s (2.61 m³/s) Sept. 10, gage height, 5.11 ft (1.558 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	225	280	1200	232	385	684	597	297	345	491	133
2	175	227	350	474	216	358	756	545	291	292	449	122
3	185	224	450	337	229	419	697	1020	267	233	326	112
4	200	220	620	309	221	1220	554	1050	247	312	239	110
5	198	210	400	282	227	1370	750	739	254	252	260	121
6	262	199	350	235	218	837	1150	646	251	217	278	118
7	204	233	400	222	221	570	626	580	262	203	235	116
8	182	219	450	222	208	529	732	564	441	188	220	114
9	178	213	300	218	210	513	1980	529	405	609	227	105
10	181	204	230	204	221	598	1440	509	399	1040	254	101
11	202	203	220	195	207	486	1040	493	425	310	259	113
12	228	195	230	206	203	409	947	512	366	286	203	101
13	256	190	240	218	207	418	1070	541	341	255	172	111
14	256	361	240	223	199	574	3840	441	333	239	182	265
15	250	236	240	229	203	468	2230	449	313	334	161	136
16	556	210	230	227	201	418	1320	359	302	239	143	116
17	363	448	210	218	200	425	1010	307	271	214	158	108
18	263	526	210	220	200	562	895	284	259	195	422	132
19	275	267	210	208	195	513	812	273	250	186	195	113
20	289	224	240	227	188	446	732	255	242	191	152	114
21	260	225	260	230	205	405	687	243	338	177	145	114
22	251	215	236	218	245	401	649	259	237	161	136	117
23	283	526	226	223	445	428	615	246	200	159	155	121
24	292	428	219	237	549	517	589	342	166	162	224	125
25	249	270	239	272	274	493	574	733	155	170	173	132
26	431	250	204	251	215	461	770	762	155	260	164	128
27	295	250	185	275	287	457	1140	444	154	168	155	128
28	254	300	169	276	356	457	730	390	513	255	159	121
29	231	320	195	256	---	500	647	351	298	205	169	124
30	229	320	366	264	---	900	623	335	347	152	315	116
31	242	---	584	240	---	778	---	310	---	250	159	---
TOTAL	7914	8138	8983	8616	6782	17315	30289	15108	8779	8259	6980	3687
MEAN	255	271	290	278	242	559	1010	487	293	266	225	123
MAX	556	526	620	1200	549	1370	3840	1050	513	1040	491	265
MIN	175	190	169	195	188	358	554	243	154	152	136	101
CFSM	.57	.61	.65	.63	.55	1.26	2.28	1.10	.66	.60	.51	.28
IN.	.66	.68	.75	.72	.57	1.45	2.54	1.27	.74	.69	.58	.31

CAL YR 1978	TOTAL	121703	MEAN 333	MAX 1760	MIN 102	CFSM .75	IN 10.20
WTR YR 1979	TOTAL	130850	MEAN 358	MAX 3840	MIN 101	CFSM .81	IN 10.96

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE¼ SE¼ sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on State Highway 53, and 1.4 mi (2.3 km) north of Romeo.

DRAINAGE AREA.--21.8 mi² (56.5 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft (238 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 15.2 ft³/s (0.430 m³/s), 9.47 in/yr (241 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft³/s (10.1 m³/s) Feb. 10, 1965, gage height, 4.48 ft (1.366 m); maximum gage height, 4.56 ft (1.390 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft³/s (0.023 m³/s) July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft (0.216 m) July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	--	*180 5.10	*3.71 1.131	July 10	0100	93 2.63	2.51 0.765
Apr. 14	0700	88 2.49	2.43 0.741				

a Ice jam.

Minimum discharge, 2.2 ft³/s (0.062 m³/s) July 21, Sept. 21; minimum gage height, 0.96 ft (0.293 m) Sept. 6, 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.4	11	7.6	23	6.5	11	29	22	15	6.3	20	4.5
2	8.3	11	11	20	6.4	15	31	21	14	14	30	3.9
3	5.5	10	8.8	15	6.4	30	31	28	12	11	25	12
4	4.5	7.5	13	11	6.3	90	28	28	7.8	13	20	9.7
5	2.7	6.0	10	9.5	6.3	160	30	24	7.4	11	18	6.7
6	4.5	5.0	9.1	9.0	6.2	90	37	23	7.3	8.6	17	2.7
7	3.4	4.0	9.1	8.5	6.2	60	31	22	7.3	4.7	16	2.6
8	3.0	3.1	9.0	8.0	6.2	35	29	21	10	3.9	15	2.6
9	2.8	2.7	8.8	7.7	6.1	34	34	20	25	21	6.7	2.6
10	3.2	2.7	8.6	7.5	6.1	31	36	18	37	63	11	2.4
11	3.0	3.8	8.4	7.4	6.1	30	35	18	34	39	14	2.4
12	2.8	4.0	8.5	7.2	6.0	31	33	17	32	41	13	2.4
13	2.6	3.5	8.5	7.0	6.0	26	37	16	28	26	13	2.6
14	2.9	5.0	8.0	6.9	6.0	32	81	16	25	21	11	4.0
15	3.4	3.7	7.3	6.8	6.0	35	64	16	22	19	9.3	3.9
16	6.9	13	7.1	6.7	6.0	24	56	17	20	16	3.4	11
17	6.4	15	7.3	6.7	6.0	24	49	16	18	14	3.1	10
18	6.5	14	7.0	6.6	6.0	30	42	15	15	13	4.6	8.6
19	6.8	11	7.0	6.6	6.0	29	37	14	8.7	10	4.1	6.0
20	6.7	8.6	6.9	6.6	6.0	28	33	13	8.1	2.9	12	2.6
21	6.0	7.9	8.6	6.6	6.6	28	30	13	9.4	2.5	12	2.3
22	5.4	7.4	7.7	6.6	8.0	27	28	11	9.5	6.8	11	2.5
23	6.6	13	7.4	6.6	12	27	27	9.8	13	7.0	10	2.7
24	5.5	12	7.3	7.4	11	29	25	11	13	6.3	10	2.7
25	5.0	9.9	7.0	7.8	9.5	29	24	14	10	7.1	8.8	2.9
26	7.3	9.2	6.8	7.6	8.0	27	25	19	5.7	7.2	7.0	2.8
27	6.2	10	6.7	7.3	7.4	26	32	16	4.0	3.3	3.7	2.9
28	4.9	8.8	6.6	7.0	9.0	25	27	17	3.1	7.1	4.3	3.2
29	4.4	13	6.5	6.8	---	26	24	17	3.1	3.7	4.8	9.3
30	14	8.0	7.6	6.8	---	33	23	17	5.0	6.8	3.6	3.9
31	11	---	13	6.6	---	32	---	16	---	22	4.4	---
TOTAL	167.6	243.8	256.2	264.8	194.3	1154	1048	545.8	429.4	438.2	345.8	138.4
MEAN	5.41	8.13	8.26	8.54	6.94	37.2	34.9	17.6	14.3	14.1	11.2	4.61
MAX	14	15	13	23	12	160	81	28	37	63	30	12
MIN	2.6	2.7	6.5	6.6	6.0	11	23	9.8	3.1	2.5	3.1	2.3
CFSM	.25	.37	.38	.39	.32	1.71	1.60	.81	.66	.65	.51	.21
IN.	.29	.42	.44	.45	.33	1.97	1.79	.93	.73	.75	.59	.24

CAL YR 1978 TOTAL 4559.7 MEAN 12.5 MAX 93 MIN 2.0 CFSM .57 IN 7.78
WTR YR 1979 TOTAL 5226.3 MEAN 14.3 MAX 160 MIN 2.3 CFSM .66 IN 8.92

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE¼ sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) downstream from bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft (224 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 6.50 ft³/s (0.184 m³/s), 6.79 in/yr (172 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft³/s (25.8 m³/s) Apr. 19, 1975, gage height, 6.69 ft (2.039 m); no flow Jan. 25 to Feb. 10, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	2400	240 6.80	3.79 1.155	Apr. 14	0500	*382 10.8	*4.57 1.393

Minimum daily discharge, 0.06 ft³/s (0.002 m³/s) Nov. 4, Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.11	.08	.27	14	.18	.90	11	4.4	1.4	1.2	8.8	.14
2	.08	.11	.24	4.5	.18	1.0	12	3.8	1.2	1.1	11	.17
3	.17	.08	.75	2.0	.18	10	12	14	1.0	.73	14	.14
4	.17	.06	1.4	1.1	.17	93	7.3	16	.86	.54	4.6	.17
5	.17	.11	.56	.80	.17	163	14	8.8	.69	.35	2.5	.29
6	.34	.11	.39	.64	.16	74	38	6.3	.58	.22	1.6	.17
7	.20	.24	.44	.50	.16	41	15	4.6	.62	.16	1.1	.20
8	.14	.08	.91	.43	.16	30	9.3	3.8	.85	.13	.84	.20
9	.08	.11	.50	.35	.16	25	14	3.1	.73	1.2	.69	.17
10	.08	.11	.39	.30	.15	21	32	2.6	.99	1.5	1.1	.14
11	.11	.14	.22	.28	.15	15	45	2.3	.78	3.6	.83	.11
12	.08	.08	.20	.26	.15	12	25	2.2	.78	6.1	.83	.11
13	.18	.20	.20	.25	.15	8.3	29	2.2	.76	2.9	.68	.14
14	.22	.29	.18	.24	.14	11	223	1.9	.49	1.5	.50	.24
15	.23	.14	.25	.23	.14	7.9	58	1.8	.39	.98	.36	.20
16	.50	.14	.31	.22	.14	5.3	28	1.6	.24	.69	.24	.17
17	.23	.99	.19	.21	.14	4.1	13	1.5	.18	.48	.33	.17
18	.11	.31	.17	.21	.14	6.7	8.4	1.3	.13	.35	.49	.20
19	.11	.18	.17	.20	.14	11	5.7	1.1	.12	.26	.42	.24
20	.08	.14	.59	.20	.15	8.5	4.7	.96	.12	.19	.34	.29
21	.08	.14	.46	.19	.17	6.9	4.0	.84	.18	.13	.26	.20
22	.11	.16	.35	.19	.20	6.1	3.5	.74	.16	.12	.24	.11
23	.24	1.0	.31	.18	.30	5.8	3.2	.58	.11	.22	.24	.11
24	.14	.46	.30	.21	.60	7.1	3.2	.82	.13	.14	.26	.14
25	.17	.30	.30	.27	.55	7.8	2.8	1.6	.12	.42	.20	.11
26	.68	.23	.29	.34	.60	6.2	4.0	3.0	.12	.26	.19	.14
27	.14	.24	.26	.30	.64	5.2	19	2.4	.11	.17	.18	.17
28	.08	.29	.22	.23	.80	5.0	12	2.2	.23	.48	.15	.20
29	.08	.30	.23	.21	---	7.4	7.0	2.1	.21	1.4	.17	.11
30	.08	.30	.70	.20	---	24	5.2	1.8	.44	.84	.15	.06
31	.11	---	5.8	.19	---	21	---	1.6	---	3.6	.14	---
TOTAL	5.30	7.12	17.55	29.43	6.97	651.20	668.3	101.94	14.72	31.96	53.43	5.01
MEAN	.17	.24	.57	.95	.25	21.0	22.3	3.29	.49	1.03	1.72	.17
MAX	.68	1.0	5.8	14	.80	163	223	16	1.4	6.1	14	.29
MIN	.08	.06	.17	.18	.14	.90	2.8	.58	.11	.12	.14	.06
CFSM	.01	.02	.04	.07	.02	1.62	1.72	.25	.04	.08	.13	.01
IN.	.02	.02	.05	.08	.02	1.86	1.91	.29	.04	.09	.15	.01
CAL YR 1978 TOTAL	2166.23			MEAN 5.93	MAX 225	MIN .02	CFSM .46	IN 6.20				
WTR YR 1979 TOTAL	1592.93			MEAN 4.36	MAX 223	MIN .06	CFSM .34	IN 4.56				

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW¼ sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft (9 m) upstream from bridge on State Highway 59, 2 mi (3 km) north of Mount Clemens, and 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--199 mi² (515 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft (175.681 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at times by mill above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--32 years, 119 ft³/s (3,370 m³/s), 8.12 in/yr (206 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft³/s (190 m³/s) Feb. 2, 1968, gage height, 18.62 ft (5.675 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft (0.951 m) Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft (6.10 m), from floodmark.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	1800	*2050 58.1	*13.83 4.215	Apr. 15	0700	1930 54.7	13.66 4.164

Minimum discharge, 2.2 ft³/s (0.062 m³/s) Sept. 28, gage height, 3.95 ft (1.204 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	14	29	230	16	40	380	133	66	51	91	13
2	6.8	17	27	314	16	60	272	117	57	82	120	12
3	7.2	16	30	213	16	120	297	162	49	83	142	10
4	7.6	15	50	50	16	598	242	355	42	63	131	10
5	9.0	12	66	35	16	1670	198	325	35	50	91	13
6	10	12	50	30	16	1520	398	196	31	38	66	11
7	8.0	12	38	25	16	918	478	143	30	30	51	10
8	6.8	14	32	23	16	600	332	119	33	24	41	7.9
9	6.4	13	28	20	16	400	336	103	37	23	34	7.5
10	6.6	13	26	19	15	270	496	89	85	65	29	7.1
11	8.0	10	25	18	15	280	539	81	118	214	30	6.6
12	9.0	8.3	24	17	15	240	506	90	95	338	33	6.2
13	10	8.6	24	16	15	187	418	86	76	100	30	6.2
14	8.8	11	25	16	15	180	928	84	64	45	27	8.4
15	6.9	13	26	16	15	242	1720	77	52	80	25	9.2
16	7.4	14	25	16	15	194	958	71	43	70	22	9.6
17	7.5	15	24	16	15	133	508	66	37	55	19	8.4
18	11	28	23	16	15	121	296	58	32	45	18	12
19	11	32	22	16	15	162	202	53	27	35	22	10
20	12	25	22	16	16	185	157	49	22	31	21	9.2
21	12	21	26	16	17	163	132	45	21	25	21	7.3
22	10	18	29	16	18	149	121	41	24	22	22	5.0
23	9.5	19	29	16	32	142	115	38	24	21	21	3.6
24	9.1	33	27	17	31	157	105	37	24	21	20	7.2
25	11	37	26	18	27	197	97	51	24	21	21	4.6
26	12	29	20	17	25	181	98	84	21	23	19	4.2
27	11	26	22	17	26	153	217	121	16	27	17	3.2
28	13	24	20	16	27	137	298	112	19	24	15	2.5
29	12	27	18	16	---	137	230	96	19	31	13	2.8
30	10	30	21	16	---	262	161	84	26	29	15	4.6
31	8.7	---	41	16	---	390	---	74	---	29	14	---
TOTAL	284.7	566.9	845	1303	513	10188	11235	3240	1249	1795	1241	232.3
MEAN	9.18	18.9	28.9	42.0	18.3	329	375	105	41.6	57.9	40.0	7.74
MAX	13	37	66	314	32	1670	1720	355	118	338	142	13
MIN	6.4	8.3	18	16	15	40	97	37	16	21	13	2.5
CFSM	.05	.10	.15	.21	.09	1.65	1.88	.53	.21	.29	.20	.04
IN.	.05	.11	.17	.24	.10	1.90	2.10	.61	.23	.34	.23	.04
CAL YR 1978 TOTAL	32943.60			MEAN 90.3	MAX 1990	MIN .22	CFSM .45	IN 6.16				
WTR YR 1979 TOTAL	32742.90			MEAN 89.7	MAX 1720	MIN 2.5	CFSM .45	IN 6.12				

LOCATION.--Lat 42°42'23", long 82°57'33", in SW¹/₄ sec.5, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Romeo Plank Road, 0.4 mi (0.6 km) north of Macomb.

PERIOD OF RECORD.--Water years 1959-62, 1969 (annual maximum and occasional low-flow measurements), October 1962 to September 1968, October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 603.23 ft (183.865 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Oct. 28, 1958, to Nov. 14, 1962, and Oct. 12, 1968, to Dec. 17, 1969, crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) June 26, 1968; maximum gage height, 16.16 ft (4.926 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.10 ft³/s (0.003 m³/s) July 22, 1971; minimum gage height, 4.68 ft (1.426 m) July 11, 1964.

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Mar. 4	--	740	21.0	*a13.14	4.005	Apr. 14	0500	*902	25.5	12.35	3.764

Minimum discharge, 1.3 ft³/s (0.037 m³/s) Sept. 9; minimum gage height, 4.96 ft (1.512 m) Sept. 3, 9.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	7.4	11	140	8.9	16	61	38	15	21	25	3.7
2	4.5	7.4	9.7	58	9.4	20	72	32	16	18	53	3.4
3	4.9	6.8	19	27	8.9	100	58	152	12	11	23	2.8
4	5.3	7.4	41	20	8.8	450	42	100	11	15	14	3.1
5	3.7	7.4	19	17	9.0	300	78	62	9.7	10	11	3.1
6	6.8	7.4	14	15	9.4	170	116	49	9.7	7.4	10	3.4
7	5.7	7.9	14	13	9.7	120	53	37	9.1	5.7	8.5	2.5
8	4.1	7.4	24	13	9.0	80	56	28	15	4.9	7.9	3.1
9	4.1	6.8	18	12	8.8	58	150	22	14	31	7.4	2.8
10	3.7	7.4	15	11	9.0	60	137	18	13	41	11	3.1
11	3.7	6.2	13	11	9.1	42	90	17	14	55	8.5	2.8
12	4.9	6.2	12	11	9.2	40	76	18	11	83	7.4	2.2
13	4.5	5.7	12	11	9.3	32	144	24	9.1	25	6.2	2.2
14	4.5	11	11	11	9.5	53	546	18	7.4	16	6.8	4.1
15	4.5	6.8	10	11	9.6	30	120	16	6.2	12	5.7	3.7
16	9.7	5.3	10	11	9.3	31	75	14	5.3	9.1	5.3	2.8
17	6.8	18	10	11	8.4	23	57	12	4.9	7.9	5.3	2.2
18	4.9	18	10	11	8.2	52	46	10	4.5	6.2	12	2.2
19	4.5	7.9	11	11	8.4	52	38	9.7	4.1	5.3	7.9	2.0
20	5.7	6.2	11	11	9.0	41	32	9.1	4.1	4.5	5.7	2.0
21	5.7	5.3	20	11	10	38	29	8.5	9.1	3.7	5.7	2.2
22	5.3	5.3	13	10	13	37	32	8.5	5.3	3.7	4.5	2.2
23	7.4	26	9.7	9.6	16	37	28	7.9	4.9	4.5	4.9	2.2
24	8.5	17	9.1	9.6	13	51	25	13	4.9	4.9	6.2	2.5
25	6.8	9.1	9.0	9.6	12	44	25	34	4.1	5.7	4.9	2.2
26	11	7.9	8.8	9.2	11	36	76	69	3.4	9.7	4.1	2.2
27	9.7	6.8	8.6	9.0	12	35	140	43	3.4	7.4	4.1	2.0
28	8.5	9.7	8.4	8.8	13	38	68	32	22	10	4.1	2.2
29	7.9	20	8.5	8.7	---	46	51	27	10	8.5	5.3	2.5
30	8.5	7.9	22	8.7	---	113	46	21	37	5.7	7.9	2.5
31	7.9	---	90	8.5	---	105	---	18	---	40	4.9	---
TOTAL	189.4	279.6	501.8	538.7	280.9	2350	2567	967.7	299.2	492.8	298.2	79.9
MEAN	6.11	9.32	16.2	17.4	10.0	75.8	85.6	31.2	9.97	15.9	9.62	2.66
MAX	11	26	90	140	16	450	546	152	37	83	53	4.1
MTN	3.7	5.3	8.4	8.5	8.2	16	25	7.9	3.4	3.7	4.1	2.0
CF5M	.15	.23	.40	.42	.24	1.85	2.09	.76	.24	.39	.24	.07
INF.	.17	.25	.46	.49	.25	2.13	2.33	.88	.27	.45	.27	.07

CAL YR 1978	TOTAL	7430.25	MEAN	20.4	MAX	400	MIN	.49	CFSM	.50	IN	6.74
WTR YR 1979	TOTAL	8845.20	MEAN	24.2	MAX	546	MIN	2.0	CFSM	.59	IN	8.03

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank 20 ft (6 m) downstream from bridge on Moravian Drive, 0.2 mi (0.3 km) downstream from North Branch, and 0.5 mi (0.8 km) west of Mount Clemens.

DRAINAGE AREA.--734 mi² (1,901 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi (3.2 km) downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi (2.6 km) downstream from base gage at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--45 years, 523 ft³/s (14.81 m³/s), 9.68 in/yr (246 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft³/s (600 m³/s) Apr. 6, 1947, gage height, 23.55 ft (7.178 m), from flood-mark; minimum not determined; minimum gage height, 2.72 ft (0.829 m) Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft³/s (85.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	1800	3710 105	10.05 3.063	Apr. 14	1100	*6000 170	*12.60 3.840

Minimum daily discharge, 115 ft³/s (3.26 m³/s) Sept. 13; minimum gage height, 4.56 ft (1.390 m) Dec. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	208	251	354	1780	280	450	1390	834	399	450	666	180
2	199	265	374	900	260	500	1320	753	380	520	646	150
3	213	261	577	600	270	700	1320	1430	337	350	534	140
4	224	255	902	450	260	2120	1030	1800	320	420	402	130
5	228	248	520	380	270	3420	1230	1280	320	350	366	140
6	296	231	450	320	260	2640	1990	987	320	290	359	140
7	217	256	480	280	270	1620	1430	836	320	260	290	140
8	206	250	540	270	250	1300	1300	773	518	240	266	130
9	211	258	350	270	260	1050	2590	695	459	700	254	130
10	203	246	300	260	260	1000	2680	648	477	1220	289	120
11	211	247	270	240	250	912	2100	611	555	620	290	130
12	241	213	280	250	250	749	1850	647	500	760	238	120
13	268	228	290	260	250	719	1840	705	450	450	216	115
14	258	396	290	270	240	937	4950	571	430	310	246	297
15	263	290	290	270	240	790	4700	567	400	450	200	169
16	517	247	280	270	240	681	2790	470	370	350	190	140
17	438	439	260	260	240	684	1790	430	340	300	186	130
18	299	726	250	260	240	858	1370	390	320	270	494	150
19	302	220	260	260	230	869	1160	370	300	240	250	140
20	314	260	280	260	230	800	1010	350	300	230	200	130
21	291	260	320	270	250	721	904	320	372	202	190	130
22	277	250	300	260	300	693	850	330	256	190	180	130
23	308	560	280	270	500	705	798	320	250	190	200	130
24	333	650	270	280	848	844	754	388	210	183	298	140
25	283	377	290	320	400	857	717	882	200	214	211	150
26	464	307	250	300	300	789	921	1000	190	289	192	150
27	347	309	230	310	350	768	1740	666	170	213	201	140
28	295	376	210	320	400	746	1240	578	562	285	189	140
29	263	408	220	300	---	763	1030	511	339	248	214	130
30	268	410	350	310	---	1510	897	463	420	199	350	130
31	277	---	743	300	---	1530	---	423	---	294	232	---
TOTAL	8722	9694	11060	11350	8398	32725	49691	21028	10784	11287	9039	4291
MEAN	281	323	357	366	300	1056	1656	678	359	364	292	143
MAX	517	726	902	1780	848	3420	4950	1800	562	1220	666	297
MIN	199	213	210	240	230	450	717	320	170	183	180	115
CFSM	.38	.44	.49	.50	.41	1.44	2.26	.92	.49	.50	.40	.20
IN.	.44	.49	.56	.58	.43	1.66	2.52	1.07	.55	.57	.46	.22

CAL YR 1978	TOTAL	177151	MEAN 485	MAX 4230	MIN 115	CFSM .66	IN 8.98
WTR YR 1979	TOTAL	188069	MEAN 515	MAX 4950	MIN 115	CFSM .70	IN 9.53

STREAMS TRIBUTARY TO LAKE ST. CLAIR
04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

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WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1974 to current year.

WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since Aug. 13, 1975.

REMARKS.--Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum (water years 1975, 1978, 1979), 3,580 micromhos Jan. 26, 1978; minimum recorded (water year 1975, 1976, 1978, 1979), 126 micromhos, July 29, 1976.

WATER TEMPERATURES: Maximum, 29.5°C Sept. 20, 1978; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 2,540 micromhos Feb. 23, minimum, 260 micromhos July 9.

WATER TEMPERATURES: Maximum, 25.5°C July 16, 25; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS./ 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L AS CACO3)
OCT											
18...	1100	270	688	8.0	9.5	8.9	78	47000	2700	220	76
NOV											
09...	1030	282	795	8.0	8.0	10.0	86	--	230	240	78
DEC											
06...	1130	450	897	8.0	2.0	12.1	88	1200	1700	270	94
JAN											
03...	1200	600	951	8.0	.5	12.1	85	K11000	K18000	290	130
FEB											
06...	1200	260	983	7.9	.0	9.2	63	240	K30	290	93
MAR											
13...	1130	735	822	8.1	1.0	11.1	80	220	640	270	77
APR											
19...	1015	1150	792	8.1	9.5	10.0	88	280	120	270	85
MAY											
24...	1200	349	864	8.1	14.0	7.7	75	470	540	300	91
JUN											
20...	1030	248	780	8.2	20.0	7.0	77	540	330	250	75
JUL											
20...	1200	232	830	7.2	22.5	6.5	75	1600	270	260	85
AUG											
15...	1200	231	800	8.2	18.0	7.6	81	E9000	1200	240	72
SEP											
13...	1145	115	848	8.2	20.5	8.3	93	F240	180	250	94

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARRON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
OCT											
18...	60	18	47	1.4	31	4.9	180	0	148	2.9	66
NOV											
09...	64	20	60	1.7	34	5.5	200	0	164	3.2	78
DEC											
06...	72	23	75	2.0	37	4.0	220	0	180	3.5	71
JAN											
03...	77	23	75	1.9	36	5.0	200	0	164	3.2	72
FEB											
06...	77	23	82	2.1	38	4.8	240	0	197	4.8	75
MAR											
13...	75	21	55	1.4	30	3.9	240	0	197	3.1	72
APR											
19...	75	21	46	1.2	26	3.8	230	0	189	2.9	77
MAY											
24...	79	24	74	1.9	35	5.2	250	0	205	3.2	89
JUN											
20...	66	20	61	1.7	34	5.4	210	0	172	2.1	67
JUL											
20...	70	20	64	1.7	34	6.0	210	0	172	21	70
AUG											
15...	63	19	61	1.7	35	5.5	200	0	164	2.0	59
SEP											
13...	67	19	68	1.9	37	7.2	190	0	156	1.9	69

E--ESTIMATED

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE ST. CLAIR
04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO ₂)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO ₂ +NO ₃ TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH ₄)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 18...	82	.3	5.1	405	372	--	3.5	.11	--	1.2	1.3
NOV 09...	90	.3	4.3	491	421	345	4.2	.12	--	.83	.95
DEC 06...	130	.3	5.4	523	489	635	3.0	.20	--	.79	.99
JAN 03...	140	.2	5.9	528	497	855	3.1	.46	--	1.1	1.6
FEB 06...	140	.4	6.7	586	527	411	4.7	.40	--	.80	1.2
MAR 13...	95	.2	6.8	482	447	--	2.8	.29	--	.71	1.0
APR 19...	87	.2	5.0	460	428	1430	2.4	.13	.16	1.2	1.3
MAY 24...	110	.5	2.4	543	507	512	3.4	.19	.23	1.5	1.7
JUN 20...	100	.5	3.4	521	427	349	3.7	.10	.12	.90	1.0
JUL 20...	100	.5	4.4	514	439	322	4.1	.13	.16	.97	1.1
AUG 15...	95	.5	5.2	454	407	283	4.3	.08	.10	.82	.90
SEP 13...	110	.7	5.0	497	466	154	6.8	.10	.12	4.8	4.9

DATE	NITRO- GEN, NH ₄ + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO ₃)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 18...	.44	.86	4.8	21	.19	--	.10	--	21	--	100
NOV 09...	.21	.74	5.2	23	.18	--	.16	12	8	5.6	100
DEC 06...	.10	.89	4.0	18	.11	--	.07	6.7	17	21	100
JAN 03...	--	--	4.7	21	.15	--	.08	--	42	68	100
FEB 06...	--	--	5.9	26	.15	--	.09	7.0	12	8.4	100
MAR 13...	--	--	3.8	17	.12	--	.08	5.8	22	--	100
APR 19...	--	--	3.7	16	.08	.25	.02	--	46	143	100
MAY 24...	--	--	5.1	23	.18	.55	.11	11	19	18	100
JUN 20...	--	--	4.7	21	.26	.80	.18	6.6	24	16	100
JUL 20...	--	--	5.2	23	.20	.61	.13	--	20	13	100
AUG 15...	--	--	5.2	23	.26	.80	.19	7.5	24	15	100
SEP 13...	--	--	12	52	.28	.86	.23	7.1	16	5.0	100

STREAMS TRIBUTARY TO LAKE ST. CLAIR

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04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 18...	1100	2	1	0	0	1	0	10	2	0
JAN 03...	1200	2	1	100	100	1	1	<10	2	1
APR 19...	1015	3	2	0	0	0	0	20	10	1
JUL 20...	1200	3	3	--	80	5	0	20	20	1

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 18...	0	9	3	940	50	26	6	60	30	<.5
JAN 03...	1	8	5	1200	80	3	0	70	70	<.5
APR 19...	0	7	2	1600	20	12	0	80	40	.5
JUL 20...	1	8	3	900	10	13	7	60	40	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C)
OCT 18...	<.5	0	0	0	0	80	30	6.1	1.4
JAN 03...	<.5	1	1	0	0	50	20	6.7	.9
APR 19...	.5	0	0	2	0	50	0	6.5	--
JUL 20...	<.5	0	0	0	0	30	10	6.7	--

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 09...	1030	22	7.56	8.82	49.8	8.97

STREAMS TRIBUTARY TO LAKE ST. CLAIR
04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	CHLOR- DANE, TOTAL (UG/L)	CHLOR- DANE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 09...	1030	ND	--	ND	--	ND	--	ND	--	ND	--
FEB 06...	1200	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 24...	1200	ND	ND	ND	ND	ND	17	ND	12	ND	6.8
AUG 15...	1200	ND	--	ND	--	ND	--	ND	--	ND	--

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- AZINON, TOTAL (UG/L)	DI- AZINON, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- ELDRIN, TOTAL (UG/L)	DI- ELDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 09...	ND	--	ND	--	ND	--	ND	--	ND	--
FEB 06...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG 15...	ND	--	ND	--	ND	--	ND	--	ND	--

DATE	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL (UG/L)	METH- OXY- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	METH- OXY- CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	HEPTA- CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	MALA- THION, TOTAL (UG/L)	MALA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
NOV 09...	ND	--	ND	ND	--	--	--	ND	--	ND	--
FEB 06...	ND	--	ND	ND	--	--	--	ND	--	ND	--
MAY 24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG 15...	ND	--	ND	ND	--	--	--	ND	--	ND	--

DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	METHYL TRI- THION, TOTAL (UG/L)	METHYL TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	PARA- THION, TOTAL (UG/L)	PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOX- APHENE, TOTAL (UG/L)	TOX- APHENE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	TOTAL TRI- THION (UG/L)	TOTAL TRI- THION IN BOT- TOM MA- TERIAL (UG/KG)
NOV 09...	ND	--	ND	--	ND	--	ND	--	ND	--
FEB 06...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY 24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG 15...	ND	--	ND	--	ND	--	ND	--	ND	--

ND--NOT DETECTED

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED
 QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
 IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 15,77 1530		MAR 15,78 1230		MAY 18,78 1145		JUN 13,78 1200	
TOTAL CELLS/ML	2300		1900		5200		2600	
DIVERSITY: DIVISION	1.4		1.1		1.5		1.0	
..CLASS	1.5		1.1		1.7		1.0	
...ORDER	2.0		1.2		2.0		1.5	
...FAMILY	2.6		0.0		3.2		3.3	
....GENUS	2.6		0.0		3.8		3.7	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
...OOCYSTACEAE	--	-	39	2	--	-	--	-
....ANKISTRODESMUS	14	1	--	-	83	2	130	5
....KIRCHNERIELLA	--	-	--	-	56	1	--	-
....OOCYSTIS	56	2	--	-	--	-	22	1
....TETRAEDRON	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	560	11	--	-
....SCENEDESMUS	210	9	--	-	950#	18	400#	15
...TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	180	7
...VOLVOCALES								
...CHLAMYDOMONADACEAE								
...CHLAMYDOMONAS	120	5	--	-	140	3	--	-
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
...PENNALES								
...NAVICULACEAE								
...ENTOMONEIS	*	0	--	-	--	-	--	-
...CENTRALES								
...COSCINODISCACEAE								
...CYCLOTELLA	14	1	19	1	140	3	--	-
...MELOSIRA	35	2	--	-	110	2	90	3
...STEFHANODISCUS	--	-	--	-	--	-	45	2
...PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	45	2
....COCCONEIS	--	-	--	-	--	-	45	2
....RHOICOSPHENIA	91	4	--	-	56	1	400#	15
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	22	1
...DIATOMACEAE								
....DIATOMA	*	0	560#	30	140	3	110	4
...FRAGILARIACEAE								
....ASTERTONELLA	110	5	--	-	220	4	--	-
....SYNEDRA	--	-	19	1	670	13	160	6
...GOMPHONEMACEAE								
....GOMPHONEMA	--	-	39	2	110	2	45	2
...NAVICULACEAE								
....CALONEIS	--	-	--	-	28	1	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-
....NAVICULA	110	5	97	5	420	8	250	9
....NEIDIUM	--	-	--	-	--	-	130	5
...NITZSCHIACEAE								
....NITZSCHIA	270	12	120	6	420	8	310	12
...SURIRELLACEAE								
....SURIRELLA	--	-	120	6	56	1	160	6
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	190	4	--	-
...CHRYSOPHYCEAE								
...CHRYSOMONADALES								
...OCHROMONADACEAE								
...DINOBRYON	14	1	--	-	110	2	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOMONADACEAE								
...CRYPTOMONAS	--	-	--	-	28	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	110	5	--	-	670	13	--	-
...HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	1100#	49	--	-	--	-	--	-
...HORMOGONALES	--	-	870#	46	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	22	1
...TRACHELOMONAS	--	-	--	-	83	2	45	2

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSIS OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 14,78 1045	AUG 22,78 1215	SEP 19,78 1230
TOTAL CELLS/ML	8200	2400	3300
DIVERSITY: DIVISION	0.8	1.1	1.4
..CLASS	0.8	1.1	1.4
..ORDER	1.0	1.8	2.0
...FAMILY	1.4	2.7	2.6
....GENUS	1.6	3.2	2.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
..CHLOROPHYCEAE						
..CHLOROCOCCALES						
...OOCYSTACEAE	--	-	--	-	--	-
....ANKISTRODESMUS	5800#	70	56	2	*	0
....KIRCHNERIELLA	150	2	--	-	--	-
...OOCYSTIS	--	-	--	-	--	-
....TETRAEDRON	--	-	74	3	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	74	3	--	-
....SCENEDESMUS	610	7	480#	20	160	5
..TETRASPORALES						
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	19	1	32	1
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	760	9	540#	23	80	2
....MELOSIRA	--	-	190	8	1100#	34
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
....COCCONEIS	--	-	19	1	*	0
....RHOICOSPHENIA	--	-	130	5	160	5
..CYMBELLACEAE						
....CYMBELLA	--	-	--	-	--	-
..DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
....FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....SYNEDRA	--	-	74	3	*	0
...GOMPHONEMACEAE						
....GOMPHONEMA	--	-	--	-	*	0
..NAVICULACEAE						
....CALONEIS	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	*	0
....NAVICULA	--	-	190	8	210	6
....NEIDIUM	--	-	--	-	--	-
...NITZSCHACEAE						
....NITZSCHIA	610	7	410#	17	48	1
..SURIARELLACEAE						
....SURIARELLA	76	1	56	2	32	1
..TABELLARIACEAE						
....TABELLARIA	--	-	--	-	--	-
..CHRYSOPHYCEAE						
...CHRYSOMONADALES						
...OCHROMONADACEAE						
....DINORRYON	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
..CYANOPHYCEAE						
...CHROOCOCCALES						
....CHROOCOCCACEAE						
....ANACYSTIS	--	-	--	-	80	2
...HORMOGONALES						
....NOSTOCACEAE						
....ANABAENA	--	-	--	-	240	7
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	960#	29
..HORMOGONALES	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
..EUGLENOPHYCEAE						
...EUGLENALES						
....EUGLENACEAE						
....EUGLENA	150	2	74	3	80	2
....TRACHELOMONAS	76	1	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	656	650	654	751	726	734	768	719	735	796	676	700
2	667	662	664	751	740	744	841	722	740	700	673	682
3	673	673	673	759	748	752	1150	845	1010	819	689	787
4	686	679	682	768	753	758	1110	944	1080	807	766	779
5	699	692	694	781	765	771	1110	1040	1070	782	771	777
6	711	705	707	779	762	771	1040	1030	1040	787	776	781
7	726	719	722	841	778	806	1030	987	1010	797	783	791
8	736	732	733	887	815	847	1030	979	1010	816	794	806
9	744	740	742	862	820	840	1040	939	982	873	810	846
10	754	748	751	832	815	823	978	930	949	897	869	887
11	764	758	762	812	805	810	1110	991	1030	933	893	918
12	774	770	771	809	805	807	1150	1060	1090	964	933	951
13	786	778	782	838	775	813	1080	1020	1060	975	960	971
14	797	790	794	868	763	819	1090	1050	1070	976	953	968
15	807	803	805	777	766	771	1060	1040	1050	954	943	949
16	820	671	757	798	759	768	1050	1020	1040	977	954	963
17	682	677	679	875	663	797	993	943	960	973	958	967
18	690	684	687	685	653	675	993	965	977	970	959	963
19	698	694	696	683	675	679	985	965	981	963	952	956
20	706	699	703	684	678	680	988	971	983	975	960	971
21	716	705	710	695	677	683	1000	977	990	980	968	972
22	714	705	709	674	660	666	1100	1000	1020	984	976	981
23	715	707	711	936	660	810	1010	1000	1010	1100	981	1030
24	729	717	725	789	746	772	1010	988	1000	1090	1070	1080
25	737	722	729	739	693	713	988	957	968	1080	998	1060
26	767	669	722	736	700	722	977	960	970	1010	987	1000
27	676	672	675	745	693	714	976	949	955	1040	1000	1040
28	701	680	686	720	689	707	1050	979	1020	1050	1040	1050
29	776	698	718	812	711	764	1070	1010	1040	1060	1050	1050
30	805	716	742	737	722	730	1010	967	991	1060	1050	1060
31	738	717	721	---	---	---	1010	828	955	1050	1020	1040
MONTH	820	650	720	936	653	758	1150	719	993	1100	673	928
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	1020	1010	1010	1140	1120	1120	783	765	771	823	808	815
2	1020	995	1000	1140	1110	1130	888	784	821	835	817	821
3	1010	988	996	1120	785	1040	827	775	795	833	639	748
4	989	898	951	803	607	707	857	780	806	664	628	645
5	969	898	951	603	465	524	908	798	866	716	669	695
6	962	946	954	629	530	596	787	659	696	767	720	752
7	957	877	920	708	615	673	683	660	668	775	761	769
8	898	885	894	751	720	740	854	684	732	788	764	781
9	909	899	904	777	758	766	919	631	723	784	775	781
10	920	907	913	917	793	880	884	643	732	804	788	798
11	928	914	921	887	784	820	672	644	660	815	790	808
12	939	929	934	861	827	843	696	677	689	846	796	812
13	953	940	945	853	829	834	750	694	718	871	760	797
14	957	951	955	901	792	845	672	448	497	801	761	786
15	975	968	971	800	735	767	493	429	450	842	798	827
16	989	979	985	806	748	785	640	500	564	844	826	834
17	994	973	985	814	789	800	751	640	703	852	837	842
18	1010	984	996	930	812	873	794	752	780	871	855	864
19	1050	1020	1030	911	796	828	823	792	804	876	863	870
20	1080	1030	1050	824	788	801	827	816	821	880	865	876
21	1080	1070	1080	837	802	822	845	820	832	892	881	886
22	1120	1090	1100	883	826	846	865	834	845	885	866	875
23	2540	1100	1560	880	830	846	855	840	847	890	868	882
24	2070	1110	1390	928	881	900	875	845	858	955	876	894
25	1130	1120	1130	905	849	876	887	870	880	912	609	704
26	1140	1130	1130	936	829	858	956	728	876	759	611	696
27	1250	1130	1150	1190	947	1070	736	664	702	834	762	804
28	1220	1140	1180	1040	918	960	762	725	741	884	838	854
29	---	---	---	1040	900	927	796	763	777	885	845	851
30	---	---	---	1130	807	910	822	792	811	862	849	854
31	---	---	---	802	766	788	---	---	---	897	869	883
MONTH	2540	877	1040	1190	465	844	956	429	749	955	609	810

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	907	881	895	757	696	735	750	603	642	797	764	773
2	908	887	894	801	692	758	709	682	688	839	804	828
3	896	871	884	811	779	802	737	671	697	849	834	844
4	878	869	873	826	776	808	774	742	762	854	833	848
5	879	863	870	790	751	778	785	770	777	844	829	837
6	893	867	883	804	747	777	779	737	755	846	831	839
7	899	883	894	827	804	815	787	762	778	854	836	845
8	897	790	834	870	830	853	798	789	794	841	838	839
9	825	678	804	874	260	766	801	793	798	865	840	854
10	811	670	769	703	263	515	810	789	802	871	861	867
11	820	654	720	726	567	639	785	752	764	859	840	849
12	711	653	681	582	488	524	792	765	784	865	842	856
13	754	716	743	613	527	555	790	779	785	867	854	865
14	766	744	753	751	620	679	791	776	787	851	856	871
15	802	769	788	790	756	775	808	774	793	774	690	730
16	805	776	788	769	693	724	833	807	817	804	772	781
17	796	782	789	793	737	768	854	832	849	841	812	836
18	797	766	789	812	793	799	850	641	726	842	821	835
19	783	767	777	845	812	822	707	651	672	824	768	802
20	801	778	791	848	825	842	794	710	753	817	769	797
21	866	757	825	823	808	816	858	801	829	844	817	835
22	857	759	809	829	814	822	879	860	869	883	847	869
23	857	836	844	838	829	834	891	865	886	884	871	878
24	851	839	846	845	815	831	900	787	843	875	862	871
25	857	845	853	828	818	825	823	794	811	856	815	829
26	871	858	864	826	792	811	812	795	804	821	813	816
27	881	874	879	817	801	806	808	792	800	827	814	818
28	885	575	719	825	769	802	799	788	793	846	831	842
29	707	658	682	788	763	776	809	798	803	859	849	852
30	730	694	707	784	752	766	810	645	710	876	863	868
31	---	---	---	822	784	800	763	676	700	---	---	---
MONTH	908	575	808	874	260	762	900	603	776	884	656	831
YEAR	2540	260	833									

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	16.0	15.0	15.5	10.0	9.0	9.5	2.5	2.0	2.5	3.5	1.5	2.0
2	15.5	14.5	15.0	10.0	8.5	9.5	3.0	2.0	2.5	1.5	.5	1.0
3	15.5	14.5	15.0	10.5	9.0	10.0	4.5	1.5	2.5	.5	.0	.5
4	16.0	14.5	15.0	11.5	10.0	11.0	4.0	2.0	3.5	1.0	.5	.5
5	15.0	14.5	15.0	12.5	11.0	11.5	2.0	1.5	1.5	1.0	.5	.5
6	15.0	13.0	14.0	12.5	11.0	12.0	2.0	2.0	2.0	1.0	.5	.5
7	13.0	12.0	12.5	11.0	9.5	10.5	2.5	2.0	2.0	1.0	.5	.5
8	12.0	10.5	11.0	9.5	7.5	8.5	4.5	2.5	3.5	1.0	.5	.5
9	11.0	10.0	10.5	9.0	7.5	8.5	2.5	2.0	2.0	.5	.5	.5
10	13.0	11.0	12.0	10.5	9.0	9.5	1.0	.0	.0	.5	.5	.5
11	13.5	12.5	13.0	10.5	9.0	10.0	.5	.0	.0	.5	.5	.5
12	14.5	13.5	14.0	10.0	8.5	9.0	1.5	.5	1.5	1.0	.5	.5
13	14.5	14.0	14.5	9.0	8.0	8.5	2.5	1.5	2.0	1.0	.5	.5
14	14.0	12.5	13.0	12.0	9.0	10.5	2.0	1.5	2.0	1.0	.5	1.0
15	12.5	11.0	11.5	10.0	8.0	8.5	2.5	1.5	2.0	.5	.5	.5
16	11.0	10.5	11.0	7.5	6.0	7.0	3.5	2.0	2.5	.5	.5	.5
17	10.5	9.0	9.5	10.5	6.5	8.0	3.5	2.0	3.0	.5	.5	.5
18	11.5	10.0	10.5	10.0	7.5	8.5	3.0	2.0	2.5	.5	.5	.5
19	12.0	11.5	11.5	7.5	6.0	6.5	2.0	1.5	2.0	.5	.5	.5
20	12.5	11.0	11.5	6.0	4.5	5.5	2.5	1.5	2.0	1.0	.5	1.0
21	13.0	11.5	12.5	4.5	4.0	4.5	4.5	2.5	3.0	1.5	1.0	1.5
22	14.5	13.0	13.5	5.0	4.0	4.5	3.0	2.0	2.5	1.5	1.0	1.5
23	14.0	12.0	13.0	7.5	5.0	6.0	3.0	2.0	2.5	1.5	1.5	1.5
24	12.0	10.0	10.5	6.0	5.0	5.5	3.5	2.5	3.0	1.5	1.0	1.5
25	10.5	9.5	10.0	5.0	4.5	4.5	4.0	2.5	3.5	1.5	1.0	1.5
26	13.0	10.5	12.0	4.5	3.5	4.0	2.0	1.0	1.5	2.0	1.0	1.5
27	12.0	10.5	11.5	3.5	1.5	2.0	1.0	.0	1.0	2.5	1.5	2.0
28	11.5	10.0	10.5	2.5	1.5	2.0	1.0	.0	.5	2.0	1.5	2.0
29	10.0	9.0	9.5	3.0	2.0	2.5	1.5	.5	1.0	2.0	1.5	1.5
30	9.5	8.0	9.0	4.0	2.5	3.0	4.5	1.0	2.5	2.0	1.5	2.0
31	10.5	9.0	9.5	---	---	---	3.5	3.0	3.5	2.0	1.5	2.0
MONTH	16.0	8.0	12.0	12.5	1.5	7.5	4.5	.0	2.0	3.5	.0	1.0

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04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	1.5	.5	1.0	2.5	1.5	2.0	8.0	6.0	7.0	10.5	8.5	9.5
2	1.0	.0	.5	2.5	1.5	2.0	6.5	5.5	6.0	12.0	9.5	11.0
3	1.5	.5	1.0	2.0	1.5	1.5	7.5	5.5	6.5	12.0	11.5	11.5
4	1.0	.0	1.0	1.5	.5	1.0	6.5	5.0	6.0	11.5	10.0	10.5
5	.0	.0	.0	.0	.0	.0	5.5	4.5	5.0	10.5	9.0	9.5
6	.0	.0	.0	.0	.0	.0	5.5	3.0	4.0	13.0	9.5	11.0
7	.5	.0	.0	1.0	.0	.5	4.0	2.0	3.0	16.0	12.5	14.0
8	.5	.0	.0	1.5	.5	1.0	4.0	3.0	4.0	19.0	15.5	17.0
9	1.0	.0	.0	1.0	.5	1.0	3.5	2.0	2.5	22.0	18.5	20.0
10	1.0	.0	.5	1.0	.0	.5	5.5	2.5	3.5	22.0	20.5	21.5
11	.5	.0	.0	.0	.0	.0	5.5	5.0	5.5	22.0	20.5	21.5
12	.0	.0	.0	1.0	.0	.0	6.5	5.5	6.0	22.0	17.5	20.0
13	.0	.0	.0	2.0	.5	1.0	8.0	6.5	7.0	17.5	15.5	16.5
14	.0	.0	.0	3.0	1.5	2.5	10.0	8.0	9.0	18.0	16.0	17.0
15	.0	.0	.0	1.0	.0	.5	10.0	9.0	9.5	18.5	16.5	17.5
16	.0	.0	.0	1.5	.0	1.0	9.0	8.0	8.5	18.0	15.5	17.0
17	.0	.0	.0	4.0	1.5	2.5	9.0	7.5	8.5	18.0	15.0	16.5
18	.0	.0	.0	6.0	4.0	5.0	11.0	8.5	9.5	18.5	16.0	17.5
19	.0	.0	.0	5.5	5.0	5.0	11.5	10.0	10.5	19.0	17.0	18.0
20	.0	.0	.0	5.5	4.5	5.0	13.0	11.0	12.0	19.5	17.5	18.5
21	.0	.0	.0	8.0	5.5	6.5	12.5	11.5	12.0	19.5	17.5	18.5
22	.5	.0	.0	9.0	6.0	7.5	13.0	11.0	12.0	18.5	16.0	17.5
23	2.0	.5	1.5	9.0	8.0	8.5	14.5	12.5	13.5	17.5	16.0	16.5
24	2.0	1.0	1.5	9.0	8.0	8.5	14.5	14.0	14.5	16.5	13.0	14.0
25	1.0	.0	.5	8.0	4.5	6.5	16.0	14.5	15.0	12.5	10.5	11.5
26	.5	.0	.0	4.5	3.0	4.0	16.0	14.0	15.5	10.5	9.5	10.0
27	3.0	.0	1.0	4.5	2.0	3.0	14.0	11.0	12.5	12.0	10.0	10.5
28	3.0	1.0	1.5	5.0	3.0	4.0	11.0	9.0	10.0	13.0	11.5	12.0
29	---	---	---	7.0	5.0	6.0	10.0	8.5	9.5	14.0	12.5	13.5
30	---	---	---	8.5	6.5	7.5	10.0	9.0	9.5	14.0	13.0	13.5
31	---	---	---	8.5	8.0	8.5	---	---	---	17.0	13.0	14.5
MONTH	3.0	.0	.5	9.0	.0	3.5	16.0	2.0	8.5	22.0	8.5	15.0
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	18.5	16.0	17.0	19.5	18.0	18.5	23.0	22.0	22.5	23.5	22.5	23.0
2	19.5	18.0	18.5	19.0	17.5	18.0	22.0	21.5	22.0	23.5	23.0	23.0
3	20.5	18.0	19.0	18.5	18.0	18.5	22.5	21.0	22.0	23.0	22.5	23.0
4	21.5	18.5	20.0	20.0	17.5	18.5	23.5	22.0	22.5	23.0	22.0	22.5
5	21.5	20.0	20.5	20.5	17.5	19.0	23.5	22.0	23.0	23.5	22.0	22.5
6	21.0	18.5	19.5	21.5	18.0	19.5	24.0	22.0	23.0	23.5	22.5	23.0
7	21.5	20.0	20.5	22.0	19.5	21.0	24.5	22.0	23.0	23.0	20.0	22.0
8	22.5	19.5	21.0	22.5	20.5	21.5	24.0	23.0	23.5	20.0	17.5	18.5
9	23.5	22.0	22.5	22.0	20.0	21.0	23.0	22.0	22.0	18.0	16.0	17.0
10	24.5	23.0	23.5	22.0	19.5	20.5	23.5	22.0	22.5	19.5	18.0	18.5
11	22.5	20.0	21.0	22.0	21.0	21.5	23.0	21.0	22.0	19.5	18.5	19.0
12	20.0	18.0	19.0	22.0	21.0	21.5	21.0	18.5	20.0	20.5	19.0	19.5
13	20.0	17.5	19.0	23.5	22.0	22.5	20.5	19.0	19.5	21.5	21.0	21.5
14	21.5	18.5	20.0	24.5	22.5	23.5	19.5	18.5	19.0	21.5	19.5	20.5
15	23.5	20.5	22.0	25.0	23.5	24.5	19.0	17.5	18.5	20.0	18.0	19.0
16	24.0	22.0	23.0	25.5	23.5	24.5	19.5	17.0	18.0	19.0	17.5	18.5
17	24.0	22.5	23.0	24.5	22.0	23.0	19.5	18.0	18.5	19.0	18.0	19.0
18	23.0	20.5	21.5	22.5	20.5	22.0	18.5	17.5	18.0	19.5	18.0	19.0
19	21.5	19.0	20.5	23.0	21.0	22.0	21.0	18.5	19.5	19.5	17.5	18.0
20	21.5	20.0	20.5	23.5	22.0	23.0	21.0	20.0	20.5	17.5	16.0	17.0
21	22.5	19.5	21.0	23.5	22.0	23.0	21.5	19.0	20.5	17.5	16.5	17.0
22	23.0	21.5	22.0	24.5	22.5	23.5	21.5	20.5	21.0	16.5	15.5	16.0
23	22.0	17.5	19.5	24.5	23.5	24.0	21.5	21.0	21.5	15.5	14.0	15.0
24	18.0	16.0	17.0	25.0	24.0	24.5	22.0	21.0	21.5	15.5	14.0	15.0
25	19.0	16.5	17.5	25.5	24.0	24.5	22.0	20.5	21.5	17.5	15.5	16.5
26	20.5	18.0	19.0	24.0	22.5	23.0	21.5	20.0	21.0	18.0	17.0	17.5
27	21.5	19.5	20.5	24.0	22.0	22.5	21.5	20.0	20.5	18.5	17.5	18.0
28	22.0	19.0	21.0	24.0	22.5	23.0	22.0	21.0	21.5	19.0	18.5	19.0
29	21.5	20.0	21.0	24.0	22.0	22.5	22.0	21.5	22.0	19.0	18.0	18.5
30	20.5	19.5	19.5	24.0	22.5	23.0	23.5	21.5	22.5	19.5	19.0	19.0
31	---	---	---	23.5	23.0	23.5	23.5	22.0	22.5	---	---	---
MONTH	24.5	16.0	20.5	25.5	17.5	22.0	24.5	17.0	21.0	23.5	14.0	19.0
YEAR	25.5	.0	11.0									

STREAMS TRIBUTARY TO DETROIT RIVER

04165700 DETROIT RIVER AT DETROIT, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, Hydrologic Unit 04090004, at Detroit municipal water treatment facility at Water Works Park at Detroit.

DRAINAGE AREA.--228,800 mi² (592,600 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: February 1974 to current year.

WATER TEMPERATURES: October 1973 to current year.

REMARKS.--During the winter months a surface sample is collected near the municipal water intake. The intake is in a lagoon at north end of Belle Isle in the Detroit River. During summer months depth-integrated samples are collected by boat along river cross section at north end of Belle Isle. Daily temperature values are the mean of three measurements. Daily mean water discharges are reported for sampling times. Biological Data (Phytoplankton) is for the 1978 water year.

COOPERATION.--Daily mean temperature and specific conductance records are collected by Detroit municipal treatment facility employees. Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8, 1979; minimum daily, 194 micromhos July 24, 1976.

WATER TEMPERATURES: Maximum daily, 24.5°C July 21, 1977; minimum daily, 0.5°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8; minimum daily, 198 micromhos Apr. 7, July 17.

WATER TEMPERATURES: Maximum daily, 23.0°C Aug. 24, 25, 28-31, Aug. 1, 5, 6-10; minimum daily, 0.5°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COI I- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
18...	1700	212000	202	8.2	10.5	10.6	95	E5	K2	100	18
NOV											
07...	1745	209000	200	7.9	10.0	10.5	95	K3	K2	95	13
DEC											
05...	1100	212000	215	7.7	2.5	12.8	96	K1	K4	93	11
JAN											
04...	1300	197000	222	7.9	.5	14.1	98	K1	<1	98	9
FEB											
07...	1230	198000	229	8.1	.0	14.0	99	<1	K1	110	16
MAR											
14...	1030	222000	218	8.0	.5	10.9	77	K1	K51	93	13
APR											
17...	1300	230000	211	7.8	4.5	9.4	73	K1	K1	100	18
MAY											
23...	1215	208000	205	8.3	14.0	10.6	104	1	<1	100	13
JUN											
19...	1230	207000	211	8.3	17.5	9.4	99	<1	K4	100	18
JUL											
18...	1330	215000	212	8.2	20.5	9.1	100	K4	K1	100	21
AUG											
14...	1130	232000	218	8.4	20.5	8.3	92	K7	K3	100	16
SEP											
12...	1200	212000	185	8.3	20.0	8.7	94	K6	<1	98	16
DATE		CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
OCT											
18...	28	7.7	3.6	.2	7	1.0	100	0	82	1.0	17
NOV											
07...	26	7.4	4.2	.2	9	1.0	100	0	82	2.0	16
DEC											
05...	25	7.4	3.8	.2	8	1.1	100	0	82	3.2	16
JAN											
04...	27	7.4	4.4	.2	9	.8	--	0	89	--	17
FEB											
07...	30	7.6	4.4	.2	8	1.0	110	0	90	1.4	18
MAR											
14...	26	6.8	5.2	.2	11	1.2	98	0	80	1.6	17
APR											
17...	28	7.4	4.3	.2	8	1.0	100	0	82	2.5	18
MAY											
23...	29	7.5	5.4	.2	10	1.0	110	0	90	.9	18
JUN											
19...	28	7.2	4.3	.2	9	.9	100	0	82	.8	18
JUL											
18...	29	7.5	4.6	.2	9	.9	100	0	82	1.0	18
AUG											
14...	28	7.2	4.3	.2	9	.9	100	1	84	.6	15
SEP											
12...	28	6.9	4.8	.2	10	.9	100	0	82	.8	15

E--ESTIMATED

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO DETROIT RIVER
04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 18...	6.0	.1	1.1	118	114	67500	.24	.01	--	.26	.27
NOV 07...	6.7	.1	1.2	128	112	72200	.24	.04	--	.14	.18
DEC 05...	6.1	.1	1.2	114	110	65300	.27	.03	--	.18	.21
JAN 04...	7.4	.1	1.2	121	119	64400	.27	.01	--	.11	.12
FEB 07...	8.0	.1	1.1	130	124	69500	.32	.00	--	.12	.12
MAR 14...	9.2	.1	1.1	124	115	74300	.40	.04	--	.04	.08
APR 17...	7.7	.1	1.2	133	117	82600	.38	.04	--	.02	.06
MAY 23...	8.8	.1	.9	142	125	79700	.53	.00	.00	.36	.36
JUN 19...	7.2	.1	.5	125	116	69900	.30	.01	.01	.18	.19
JUL 18...	7.7	.1	.6	140	118	81300	.28	.00	.00	.31	.31
AUG 14...	6.9	.1	1.1	124	114	77700	.23	.01	.01	.10	.11
SEP 12...	6.9	.1	1.0	123	114	70400	.19	.00	.00	.18	.18

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 18...	.10	.17	.51	2.3	.02	--	.00	3.3	--	--	--
NOV 07...	.00	.24	.42	1.9	.26	--	.00	--	10	5640	100
DEC 05...	.19	.02	.48	2.1	.02	--	.01	2.2	--	--	--
JAN 04...	--	--	.39	1.7	.00	--	.00	--	--	--	--
FEB 07...	--	--	.44	1.9	.00	--	.00	2.8	--	--	--
MAR 14...	--	--	.48	2.1	.02	--	.01	2.9	--	--	--
APR 17...	--	--	.44	1.9	.02	--	.00	--	10	6210	100
MAY 23...	--	--	.89	3.9	.02	.06	.00	3.7	13	7300	100
JUN 19...	--	--	.49	2.2	.01	.03	.00	4.2	13	7270	100
JUL 18...	--	--	.59	2.6	.02	.06	.00	--	14	8130	100
AUG 14...	.10	.01	.34	1.5	.02	.06	.00	3.5	9	5640	100
SEP 12...	--	--	.37	1.6	.01	.03	.00	.8	5	2860	100

STREAMS TRIBUTARY TO DETROIT RIVER
04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
NOV 07...	1745	1	1	0	0	0	0	10	0	0
JAN 04...	1300	1	1	0	0	1	0	10	0	1
APR 17...	1300	2	2	0	0	0	0	10	10	2
JUL 18...	1330	0	0	--	20	15	1	30	20	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
NOV 07...	0	4	1	280	0	9	0	10	0	<.5
JAN 04...	0	--	4	80	40	5	--	0	0	<.5
APR 17...	2	5	3	310	10	6	4	0	0	.5
JUL 18...	0	6	2	470	0	9	2	10	0	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
NOV 07...	<.5	0	0	0	0	70	10	1.9	.4
JAN 04...	<.5	0	0	0	0	30	10	2.4	.3
APR 17...	.5	0	0	0	0	20	10	1.8	.4
JUL 18...	<.5	0	0	1	0	20	9	2.3	.5

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 07...	1745	20	--	.079	.079	.000	.000
FEB 07...	1230	34	--	.080	.080	.000	.000
MAY 23...	1215	36	828	1.26	1.50	.290	.000
AUG 14...	1130	27	327	.310	.470	.490	.000

STREAMS TRIBUTARY TO DETROIT RIVER
04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

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QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 16,77 1600	MAY 16,78 1300	JUN 14,78 1430	JUL 12,78 1215	AUG 23,78 1215	SEP 20,78 1430
TOTAL CELLS/ML	4200	1800	970	1400	1700	370
DIVERSITY: DIVISION	1.1	1.4	1.3	0.9	1.1	1.4
..CLASS	1.1	1.4	1.3	0.9	1.1	1.4
...ORDER	1.2	1.9	1.4	1.2	1.3	1.8
...FAMILY	1.5	2.5	1.7	1.5	1.8	2.3
....GENUS	1.6	2.7	1.9	1.5	1.8	3.1

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
..CHLOROPHYCEAE												
...CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-			21	1	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-			67	4	25	7
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-			53	3	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	120	3	--	-	--	-			--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	*	0	--	-	--	-	14	1	14	1	4	1
....KIRCHNERIELLA	--	-	--	-	--	-	14	1	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-			*	0	*	0
....TETRAEDRON	*	0	--	-	--	-			--	-	*	0
....WESTELLA	--	-	--	-	--	-			--	-	4	1
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	--	-	--	-			--	-	85#	23
...SCENEDESMUS	240	6	110	6	88	9			110	6	92#	25
...TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	*	0	--	-	--	-			--	-	--	-
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	110	8	14	1	--	-
...VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	--	-	--	-			28	2	--	-
...ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARUM	--	-	--	-	15	2			--	-	5	1
CHRYSOPHYTA												
..BACILLARIOPHYCEAE												
...PENNALES												
...NAVICULACEAE												
...ENTOMONEIS	--	-	--	-	--	-	29	2	--	-	--	-
...CENTRALES												
...COSCTINODISCACEAE												
....COSCTINODISCUS	--	-	--	-	--	-			21	1	--	-
...CYCLOTELLA	--	-	95	5	--	-	43	3	60	3	32	9
...MELOSTRA	--	-	190	11	--	-			--	-	7	2
...PENNALES												
...ACHNANTHACEAE												
....COCCONEIS	--	-	--	-	15	2			--	-	--	-
....RHOTICOSPHEIA	*	0	--	-	--	-			--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	450	11	38	2	150#	15			--	-	--	-
....FRAGILARIA	72	2	--	-	29	3	1000#	74	43	2	--	-
....SYNEFRA	--	-	19	1	29	3			18	1	--	-
...NAVICULACEAE												
....NAVICULA	--	-	--	-	--	-			--	-	*	0
...NITZSCHIA												
....NITZSCHIA	170	4	340#	19	15	2	29	2	*	0	4	1
...TABELLARIACEAE												
....TABELLARIA	50	1	430#	24	44	5			--	-	--	-
...CHRYSOPTOPHYCEAE												
...CHRYSONOMADACEAE												
...OCHROMONADACEAE												
....DINORRYON	*	0	--	-	--	-			--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
..CRYPTOPHYCEAE												
...CRYPTOMONADACEAE												
....CHROOMONAS	--	-	38	2	--	-			--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	29	2	--	-	--	-

STREAMS TRIBUTARY TO DETROIT RIVER
04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 16,77 1600		MAY 16,78 1300		JUN 14,78 1430		JUL 12,78 1215		AUG 23,78 1215		SEP 20,78 1430	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
..CYANOPHYCEAE												
...CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	42	12
....ANACYSTIS	3000#	72	490#	28	--	-	86	6	--	-	28	8
...HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	28	2	--	-
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	--	-	590#	61	--	-	1200#	72	32	9
...RIVULARIACEAE												
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	*	0	--	-
EUGLENOPHYTA (EUGLENOIDS)												
..EUGLENOPHYCEAE												
...EUGLENALES												
....EUGLENACEAE												
....TRACHELOMONAS	--	-	19	1	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
..DINOPHYCEAE												
...GYMNODINIALES												
....GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	*	0	--	-
...PERIDINIALES												
....PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO DETROIT RIVER

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04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	209	209	218	212	221	220	212	200	210	227	213	224
2	198	208	208	212	219	219	218	219	209	227	212	228
3	208	208	209	217	216	227	217	216	218	226	211	224
4	224	207	208	218	229	217	213	199	208	227	208	219
5	210	211	210	208	219	229	200	208	226	218	217	207
6	202	218	216	218	218	220	208	204	220	228	216	202
7	204	215	210	224	212	219	209	210	214	229	212	202
8	204	218	208	218	211	210	383	215	208	227	207	202
9	206	218	206	216	204	198	312	209	225	218	216	202
10	205	208	210	206	213	228	209	217	220	228	217	202
11	204	212	216	200	218	229	225	218	220	228	209	201
12	203	218	210	210	215	204	221	210	219	219	208	205
13	213	208	208	215	210	208	220	218	228	220	208	205
14	201	198	209	220	220	214	216	215	240	219	209	212
15	212	216	208	215	202	228	218	218	230	217	210	207
16	207	206	208	218	211	209	216	218	218	216	209	207
17	210	208	198	218	213	218	213	216	215	218	213	212
18	209	208	208	218	212	208	212	218	210	218	211	210
19	218	208	200	229	216	211	227	214	219	218	211	213
20	208	200	200	227	208	220	229	220	218	219	211	205
21	208	208	218	220	220	209	225	217	225	227	211	208
22	208	208	225	221	219	208	227	217	205	225	218	207
23	208	208	212	223	220	212	223	229	205	219	218	207
24	208	210	211	226	224	218	221	229	205	220	217	208
25	218	205	206	228	223	215	227	216	208	218	207	207
26	218	214	204	229	219	218	221	219	220	216	218	202
27	213	218	205	229	221	215	227	219	220	214	218	204
28	208	219	209	223	222	215	203	219	221	213	218	215
29	206	211	218	229	---	227	207	213	215	211	225	212
30	209	209	217	223	---	219	209	220	226	211	225	214
31	209	---	215	228	---	217	---	226	---	215	218	---
MEAN	209	210	210	219	216	216	226	216	218	221	214	209
WTR YR 1979	MEAN	215	MAX	383	MIN	198						

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.5	10.0	3.5	.5	.5	.5	3.0	7.0	12.0	18.0	23.0	21.5
2	15.5	10.0	3.5	.5	.5	.5	3.0	6.5	13.0	18.0	22.0	21.5
3	15.5	10.0	3.5	.5	.5	.5	3.0	7.0	14.0	17.0	22.0	21.5
4	15.5	10.5	3.0	.5	.5	.5	4.0	8.0	14.0	17.0	22.0	21.5
5	15.5	10.5	3.0	.5	.5	.5	3.5	8.0	15.0	17.0	23.0	21.5
6	15.0	11.0	3.5	.5	.5	.5	3.0	8.0	15.5	18.0	23.0	22.0
7	14.0	10.5	3.5	.5	.5	.5	3.0	8.0	16.0	18.5	23.0	22.0
8	13.5	10.5	3.5	.5	.5	.5	4.0	9.0	16.5	19.0	23.0	20.5
9	12.0	10.0	3.5	.5	.5	.5	3.0	9.5	16.5	19.5	23.0	19.5
10	12.0	10.0	2.0	.5	.5	1.0	2.0	10.0	16.5	19.0	23.0	19.5
11	12.0	10.0	2.0	.5	.5	.5	2.0	11.5	17.0	19.5	22.0	19.0
12	12.0	9.0	1.5	.5	.5	.5	3.0	13.0	16.5	20.0	21.0	19.0
13	13.0	9.0	1.5	.5	.5	1.0	3.0	13.0	17.0	20.5	21.0	19.5
14	13.0	9.0	.5	.5	.5	1.0	4.0	13.0	18.0	21.0	20.5	19.5
15	13.0	9.0	1.0	.5	.5	.5	4.0	13.0	18.0	21.0	19.5	19.0
16	12.0	8.5	1.5	.5	.5	.5	4.0	11.5	17.0	21.0	19.5	19.0
17	11.5	8.5	1.0	.5	.5	.5	4.0	11.5	17.0	20.5	19.5	19.0
18	11.5	8.0	1.5	.5	.5	.5	5.0	12.0	18.0	20.5	19.0	19.0
19	11.0	8.0	1.5	.5	.5	.5	5.5	13.0	17.0	21.0	19.0	18.5
20	10.5	7.0	1.0	.5	.5	.5	6.0	13.5	18.5	21.0	19.5	18.5
21	11.0	6.5	1.0	.5	.5	.5	6.5	14.5	18.5	21.5	20.0	18.5
22	11.5	6.0	1.5	.5	.5	.5	6.5	14.0	19.0	21.5	20.0	18.0
23	11.5	6.0	1.5	.5	.5	1.0	7.0	14.0	18.5	22.0	20.0	16.5
24	11.0	6.0	1.5	.5	.5	1.5	8.0	14.0	17.0	23.0	20.5	16.5
25	10.5	5.5	1.5	.5	.5	2.0	8.0	13.0	17.0	23.0	20.5	16.5
26	10.5	6.0	1.0	.5	.5	2.0	8.5	10.5	17.0	22.0	20.5	16.5
27	10.5	5.0	1.0	.5	.5	1.5	8.5	10.0	18.0	22.0	20.5	17.0
28	10.0	4.5	1.0	.5	.5	2.0	8.0	10.0	17.0	23.0	20.5	17.0
29	10.0	3.5	.5	.5	---	2.0	8.0	10.0	18.0	23.0	21.0	18.0
30	10.0	4.0	.5	.5	---	2.0	8.0	11.0	18.0	23.0	21.0	18.5
31	10.0	---	.5	.5	---	3.0	---	11.0	---	23.0	21.5	---
MEAN	12.5	8.0	2.0	.5	.5	1.0	5.0	11.0	16.5	20.5	21.0	19.0
WTR YR 1979	MEAN	10.0	MAX	23.0	MIN	.5						

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW¼ sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi (6.8 km) east of Farmington.

DRAINAGE AREA.--87.9 mi² (227.7 km²).

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft (185.812 m) city of Southfield datum. Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 57.7 ft³/s (1.634 m³/s), 8.91 in/yr (226 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft³/s (139 m³/s) June 26, 1968, gage height, 19.04 ft (5.803 m); minimum, 0.1 ft³/s (0.003 m³/s) Aug. 2, 1964, gage height, 1.15 ft (0.351 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Jan. 1	0100	532	15.1	8.12	2.475	Apr. 9	1100	624	17.7	8.46	2.579
Mar. 4	2200	1,220	34.6	11.01	3.356	Apr. 14	0900	*1,640	46.4	*12.24	3.731

Minimum discharge, 7.9 ft³/s (0.22 m³/s) Sept. 9, 10, gage height, 2.47 ft (0.753 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	19	29	385	29	58	111	90	38	59	61	15
2	14	17	28	110	29	66	138	80	35	49	89	14
3	14	16	93	56	28	130	125	261	34	31	48	14
4	18	17	165	45	28	820	94	270	31	40	28	14
5	17	19	71	40	28	812	124	131	24	31	26	18
6	26	19	48	40	28	185	268	105	24	21	22	13
7	20	20	43	37	27	124	115	93	24	18	18	12
8	16	18	81	34	25	118	131	83	35	16	16	13
9	14	18	54	32	24	105	519	73	45	42	17	8.9
10	14	18	36	30	23	125	414	65	55	68	18	8.6
11	14	18	42	27	22	82	225	61	54	27	18	10
12	18	18	33	25	23	76	210	60	34	39	14	9.8
13	16	18	31	28	23	62	253	75	28	21	13	10
14	14	53	32	30	24	84	1330	62	25	25	15	21
15	14	29	27	31	24	63	602	56	22	53	12	15
16	93	21	30	32	22	56	245	50	19	32	11	11
17	57	83	26	33	21	53	176	44	18	20	21	11
18	27	106	24	33	22	76	141	41	17	17	95	10
19	21	40	25	33	23	78	118	38	16	14	36	10
20	19	29	28	33	24	67	104	34	16	13	22	11
21	18	25	44	32	25	62	93	33	28	13	20	12
22	18	25	31	32	29	60	94	28	21	13	18	12
23	22	105	26	32	40	60	94	26	16	15	21	12
24	25	84	25	32	70	77	82	46	15	17	27	10
25	21	40	28	32	50	76	80	105	14	17	21	10
26	59	32	27	32	36	69	115	157	12	49	18	11
27	32	30	25	32	35	64	303	78	13	21	17	11
28	28	31	23	32	47	58	131	64	105	27	17	9.4
29	22	32	26	32	---	76	103	55	63	20	21	9.8
30	16	33	48	31	---	276	94	46	69	16	35	11
31	16	---	140	29	---	159	---	44	---	17	18	---
TOTAL	741	1033	1389	1462	829	4277	6632	2454	950	861	833	357.5
MEAN	23.9	34.4	44.8	47.2	29.6	138	221	79.2	31.7	27.8	26.9	11.9
MAX	93	106	165	385	70	820	1330	270	105	68	95	21
MIN	14	16	23	25	21	53	80	26	12	13	11	8.6
CFSM	.27	.39	.51	.54	.34	1.57	2.51	.90	.36	.32	.31	.14
IN.	.31	.44	.59	.62	.35	1.81	2.81	1.04	.40	.36	.35	.15

CAL YR 1978 TOTAL 18342.6 MEAN 50.3 MAX 665 MIN 8.0 CFSM .57 IN 7.76
WTR YR 1979 TOTAL 21818.5 MEAN 59.8 MAX 1330 MIN 8.6 CFSM .68 IN 9.23

STREAMS TRIBUTARY TO DETROIT RIVER

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE¼ sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft (6 m) upstream from bridge on Nine-Mile Road, at Southfield, 1.6 mi (2.6 km) upstream from mouth, and 5.5 mi (8.8 km) east of Farmington.

DRAINAGE AREA.--9.49 mi² (24.58 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft (187.473 m) city of Southfield datum.

REMARKS.--Records fair except those for the winter period and those for period of no gage-height record, Aug. 24 to Sept. 24, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 8.16 ft³/s (0.231 m³/s), 11.68 in/yr (297 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 903 ft³/s (25.6 m³/s) June 25, 1968, gage height, 12.95 ft (3.947 m), from rating curve extended above 410 ft³/s (11.6 m³/s); no flow part of each day Aug. 30, 31, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Apr. 8	2400	261 7.39	8.08 2.463	July 11	1800	465 13.2	9.68 2.950
Apr. 14	0100	*598 16.9	*10.70 3.261				

Minimum daily discharge, 0.14 ft³/s (0.004 m³/s) Oct. 11; minimum gage height, 5.59 ft (1.704 m) Aug. 11, 12, 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	1.8	3.5	27	2.4	6.0	7.7	6.8	3.7	11	1.6	2.7
2	.40	1.8	3.7	6.1	2.4	10	18	6.2	3.5	10	11	2.0
3	.84	1.8	35	5.3	2.4	32	8.5	45	3.5	5.5	2.4	1.8
4	4.2	1.8	17	4.8	2.4	80	10	11	3.5	5.0	2.5	1.7
5	3.5	1.9	5.3	4.5	2.4	14	30	8.1	3.3	4.0	2.5	1.6
6	2.9	2.2	4.2	4.3	2.4	9.3	27	7.1	2.9	3.0	1.4	1.6
7	.73	2.7	6.7	4.0	2.3	8.5	9.0	6.2	3.5	3.0	2.7	1.5
8	.30	2.3	14	3.7	2.3	7.6	53	5.8	12	3.1	1.3	1.3
9	.22	2.0	5.6	3.5	2.2	8.9	83	5.3	3.3	2.9	2.3	1.1
10	.24	2.0	3.7	3.3	2.1	13	18	4.8	8.9	2.6	2.2	1.1
11	.14	2.0	3.3	3.1	2.1	6.0	13	4.6	4.5	61	1.1	1.1
12	1.8	2.2	3.1	3.1	2.0	4.9	16	8.0	3.1	12	1.1	1.1
13	.94	8.8	2.9	3.4	2.0	5.4	48	5.8	2.4	4.5	1.2	2.0
14	.61	16	2.8	3.6	2.0	11	183	4.4	2.4	5.5	1.4	8.0
15	.78	3.3	2.7	3.8	2.0	5.1	16	5.8	2.2	8.0	1.3	1.5
16	27	2.9	2.6	4.0	2.0	4.7	12	4.0	2.4	4.0	1.3	1.3
17	2.8	41	2.6	4.0	2.0	4.8	9.8	3.6	2.4	2.6	9.5	1.2
18	2.3	6.1	2.6	4.0	2.0	10	8.7	3.4	2.4	2.6	20	1.2
19	2.7	2.5	2.6	4.0	2.1	6.6	8.1	3.1	2.4	2.6	2.7	1.2
20	2.3	2.4	4.0	4.0	2.2	5.8	7.6	3.1	4.4	2.6	2.0	1.3
21	2.9	2.4	3.5	4.0	2.4	5.1	7.1	2.9	5.0	2.6	1.7	1.4
22	3.2	3.3	3.0	4.0	3.0	4.7	6.7	2.8	2.9	2.6	2.0	1.4
23	7.3	36	2.6	4.0	4.0	6.3	6.4	2.9	2.2	2.6	4.2	1.4
24	2.9	5.3	3.4	4.0	10	8.9	6.4	16	2.0	2.6	4.0	1.4
25	4.9	3.5	2.4	3.9	5.0	6.5	7.1	25	2.0	2.6	2.5	1.6
26	14	3.1	2.4	3.8	3.8	7.5	37	15	2.0	2.7	2.0	1.5
27	2.2	2.6	2.4	3.7	3.8	5.7	16	7.1	6.2	1.7	2.0	1.6
28	2.1	4.2	2.6	3.5	4.5	5.2	8.6	6.5	51	8.6	2.0	1.9
29	2.0	4.2	3.3	3.4	---	24	8.1	5.6	39	2.0	2.5	1.9
30	1.9	4.8	15	2.9	---	26	7.9	5.0	12	2.4	25	1.8
31	1.9	---	31	2.6	---	12	---	4.4	---	2.1	8.0	---
TOTAL	101.40	176.9	199.5	143.3	80.2	365.5	697.7	245.3	201.0	188.0	127.4	52.2
MEAN	3.27	5.90	6.44	4.62	2.86	11.8	23.3	7.91	6.70	6.06	4.11	1.74
MAX	27	41	35	27	10	80	183	45	51	61	25	8.0
MIN	.14	1.8	2.4	2.6	2.0	4.7	6.4	2.8	2.0	1.7	1.1	1.1
CFSM	.35	.62	.68	.49	.30	1.24	2.46	.83	.71	.64	.43	.18
IN.	.40	.69	.78	.56	.31	1.43	2.73	.96	.79	.74	.50	.20
CAL YR 1978 TOTAL	2528.99			MEAN 6.93	MAX 100	MIN .10	CFSM .73	IN 9.91				
WTR YR 1979 TOTAL	2578.40			MEAN 7.06	MAX 183	MIN .14	CFSM .74	IN 10.11				

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LOCATION.--Lat 42°27'52", long 83°22'11", in NW¼ sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft (244 m) downstream from bridge on Shiawassee Road at Farmington.

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft (210.43 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 11.3 ft³/s (0.320 m³/s), 8.77 in/yr (223 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 25, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.07 ft³/s (0.002 m³/s) Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft³/s (0.009 m³/s) Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Jan. 1	0200	106	3.00	3.97	1.210	Apr. 14	0400	*363	10.3	*5.36	1.634
Mar. 4	1800	250	7.08	4.81	1.466	May 3	1300	92	2.61	3.87	1.180
Apr. 9	0100	96	2.72	3.91	1.192						

Minimum discharge, 1.3 ft³/s (0.037 m³/s) Sept. 29; minimum gage height, 2.79 ft (0.850 m) Dec. 26, Aug. 16, 17.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.5	2.7	4.5	58	4.5	15	24	15	7.8	30	3.4	2.6
2	2.8	2.7	4.1	19	4.5	20	28	14	7.4	17	7.8	2.2
3	2.7	3.2	16	10	4.5	40	22	59	6.7	10	5.1	2.1
4	3.3	2.8	27	8.0	4.5	194	18	41	5.8	9.6	3.6	2.1
5	3.1	2.7	11	7.0	4.5	79	23	25	5.4	7.0	3.4	2.2
6	4.9	2.9	8.4	6.5	4.5	35	36	20	5.2	5.1	3.1	2.3
7	4.0	3.3	7.2	6.0	4.5	26	21	17	4.7	4.2	2.5	2.2
8	3.3	3.0	12	5.5	4.0	28	32	14	4.9	4.2	2.7	1.9
9	3.0	2.9	7.7	5.5	4.0	26	81	12	6.6	5.8	3.4	2.1
10	2.9	2.9	5.7	5.0	4.0	26	63	11	7.3	6.7	3.4	2.0
11	2.9	2.9	5.2	4.5	3.8	16	38	10	7.4	9.8	2.9	1.9
12	3.3	2.6	4.9	4.5	3.8	14	38	11	5.9	19	2.6	2.1
13	3.3	2.8	5.2	4.5	3.8	13	54	13	5.0	8.2	2.3	2.0
14	3.1	6.4	4.7	5.0	3.8	19	235	11	4.1	11	2.4	4.1
15	2.9	4.1	4.8	5.5	3.8	12	70	10	3.7	13	2.0	2.6
16	16	3.3	4.6	5.5	3.8	10	45	9.0	3.3	7.8	2.0	2.2
17	9.1	15	4.6	5.5	3.8	9.9	34	8.2	3.0	5.1	5.0	2.0
18	5.3	13	4.3	5.5	3.8	16	27	7.4	2.7	4.2	17	2.3
19	4.1	6.7	4.0	5.5	3.8	16	22	6.4	2.5	3.6	7.8	1.9
20	3.4	5.0	4.7	5.5	3.8	13	19	6.4	3.4	3.6	5.1	1.8
21	3.0	4.6	6.4	5.0	3.8	13	16	6.1	5.8	3.1	4.2	1.7
22	3.1	5.0	4.9	5.0	4.0	12	16	5.8	3.4	2.9	3.6	1.8
23	3.9	20	4.5	5.0	4.5	11	14	5.1	2.9	2.9	3.9	1.7
24	3.8	13	4.4	5.0	20	14	13	9.8	2.9	2.7	4.6	1.7
25	3.4	7.6	4.5	4.5	15	13	14	19	2.5	3.6	3.4	1.7
26	9.3	5.7	4.2	4.5	12	11	30	26	2.3	8.6	2.9	1.8
27	5.0	5.1	4.0	4.5	10	10	38	15	2.7	4.8	3.0	1.9
28	3.9	4.8	3.8	4.4	13	9.7	22	12	16	3.6	3.0	1.8
29	3.6	4.7	4.0	4.4	---	16	18	10	9.8	3.1	3.3	1.4
30	3.1	5.2	8.0	4.4	---	46	16	9.0	34	2.9	4.7	1.4
31	2.8	---	37	4.4	---	34	---	8.6	---	3.1	3.2	---
TOTAL	131.8	166.6	236.3	233.1	163.8	817.6	1127	446.8	185.1	226.2	127.3	61.5
MEAN	4.25	5.55	7.62	7.52	5.85	26.4	37.6	14.4	6.17	7.30	4.11	2.05
MAX	16	20	37	58	20	194	235	59	34	30	17	4.1
MIN	2.7	2.6	3.8	4.4	3.8	9.7	13	5.1	2.3	2.7	2.0	1.4
CFSM	.24	.32	.44	.43	.33	1.51	2.15	.82	.35	.42	.24	.12
IN.	.28	.35	.50	.50	.35	1.74	2.40	.95	.39	.48	.27	.13

CAL YR 1978	TOTAL	4293.1	MEAN	11.8	MAX	164	MIN	1.6	CFSM	.67	IN	9.13
WTR YR 1979	TOTAL	3923.1	MEAN	10.7	MAX	235	MIN	1.4	CFSM	.61	IN	8.34

STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW¼ sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft (152 m) upstream from bridge on Plymouth Road in Detroit, and 4 mi (6 km) upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi² (484 km²).

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi (2 km) downstream at datum 4.6 ft (1.4 m) lower.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--49 years, 113 ft³/s (3.200 m³/s), 8.21 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft³/s (368 m³/s) Apr. 5, 1947; maximum gage height, 23.0 ft (7.01 m) Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft³/s (0.051 m³/s) Aug. 1, 2, 1964, gage height, 3.00 ft (0.914 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0500	1440 40.8	12.51 3.813	Apr. 14	2100	*2640 74.8	*15.46 4.712
Apr. 9	1300	1250 35.4	11.86 3.615				

Minimum discharge, 12 ft³/s (0.34 m³/s) Sept. 10, 26-30; minimum gage height, 3.93 ft (1.198 m) Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	40	58	718	55	115	219	161	78	190	67	26
2	36	38	56	150	55	140	257	144	65	145	167	22
3	33	37	194	80	55	295	255	298	60	84	104	94
4	56	40	323	70	54	1060	182	511	58	90	61	42
5	44	43	153	66	54	1260	235	246	52	83	60	24
6	67	44	89	62	54	356	546	187	48	53	50	21
7	48	57	82	58	52	199	237	161	44	43	41	17
8	38	50	158	56	50	193	264	144	101	38	35	18
9	32	45	113	53	49	182	1110	128	60	357	38	16
10	32	44	84	52	47	232	795	114	83	298	48	13
11	33	45	78	52	46	163	390	107	122	73	40	15
12	47	43	67	52	45	136	355	106	62	146	33	15
13	45	46	62	54	45	129	420	144	46	104	30	20
14	33	171	60	56	45	175	2030	119	40	53	33	48
15	30	77	56	59	45	139	1560	110	38	94	27	36
16	251	47	49	60	45	112	488	96	32	82	25	20
17	154	169	52	60	45	116	305	83	30	50	50	17
18	62	275	50	60	46	170	240	76	28	39	200	17
19	45	88	45	60	48	162	199	70	27	34	80	15
20	41	57	56	58	50	142	170	65	37	31	49	15
21	36	49	91	58	54	131	152	61	60	30	44	18
22	35	47	64	56	64	125	145	56	45	30	39	17
23	52	184	52	56	90	126	144	52	32	33	45	15
24	63	208	50	56	145	155	130	66	29	37	55	15
25	46	85	61	56	100	161	129	216	27	53	45	14
26	134	62	46	56	77	146	218	311	24	94	41	12
27	87	58	61	56	74	137	565	180	24	55	34	13
28	52	58	54	56	94	123	262	131	288	52	27	13
29	49	63	46	56	---	169	191	118	293	49	34	13
30	41	66	97	56	---	574	171	94	348	38	77	14
31	36	---	230	56	---	322	---	87	---	39	36	---
TOTAL	1804	2336	2737	2554	1683	7645	12364	4442	2281	2597	1715	655
MEAN	58.2	77.9	88.3	82.4	60.1	247	412	143	76.0	83.8	55.3	21.8
MAX	251	275	323	718	145	1260	2030	511	348	357	200	94
MIN	30	37	45	52	45	112	129	52	24	30	25	12
CFSM	.31	.42	.47	.44	.32	1.32	2.20	.77	.41	.45	.30	.12
IN.	.36	.46	.54	.51	.33	1.52	2.46	.88	.45	.52	.34	.13
CAL YR 1978	TOTAL	40334	MEAN 111	MAX 1140	MIN 26	CFSM .59	IN 8.02					
WTR YR 1979	TOTAL	42813	MEAN 117	MAX 2030	MIN 12	CFSM .63	IN 8.52					

STREAMS TRIBUTARY TO DETROIT RIVER

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04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW¼ SE¼ sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft (3 m) downstream from bridge on John Daly Road, 0.6 mi (1.0 km) northeast of Inkster, and 4.8 mi (7.7 km) upstream from mouth.

DRAINAGE AREA.--83.2 mi² (215.5 km²).

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft (180.789 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 51.4 ft³/s (1.456 m³/s), 8.39 in/yr (213 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft³/s (102 m³/s) June 26, 1968, gage height, 13.62 ft (4.151 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 13, 1955, Jan. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,700 ft³/s (76.5 m³/s) Apr. 14, gage height, 12.36 ft (3.767 m), only peak above base of 900 ft³/s (25.5 m³/s); minimum, 1.5 ft³/s (0.042 m³/s) Oct 2, 3, Sept. 25; minimum gage height, 2.63 ft (0.802 m) Sept. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.9	3.3	9.4	258	6.5	45	150	79	25	145	6.6	4.5
2	1.8	3.7	10	50	6.5	60	172	62	18	101	40	4.0
3	7.9	5.8	87	22	6.5	162	168	221	14	57	18	19
4	32	3.5	89	17	6.5	480	112	201	12	44	13	33
5	12	4.0	45	15	7.0	517	141	102	14	29	11	9.1
6	15	4.0	30	14	7.0	156	301	74	13	19	6.6	6.4
7	8.6	9.4	31	13	7.5	90	137	59	19	16	5.5	4.7
8	4.9	11	65	12	8.0	99	144	51	21	12	5.5	3.9
9	3.4	3.9	33	11	8.0	92	543	40	9.0	82	5.8	5.1
10	3.9	3.0	23	11	8.0	113	410	33	30	60	12	3.4
11	4.0	3.2	16	10	8.5	66	188	29	24	229	8.0	3.0
12	13	2.9	16	9.5	8.5	54	199	37	11	601	3.9	2.8
13	18	3.4	21	9.0	8.5	43	283	34	9.3	283	3.9	13
14	6.4	57	17	9.0	8.5	96	1710	30	8.4	96	5.5	27
15	4.1	21	12	9.0	8.5	58	1030	28	5.9	69	3.3	8.0
16	102	11	11	9.0	8.5	42	225	18	5.0	44	3.3	3.9
17	24	82	11	9.0	8.5	40	147	15	4.7	29	30	3.2
18	9.0	63	10	9.0	8.5	73	105	15	4.8	21	53	3.0
19	5.6	20	9.3	9.0	9.0	80	83	15	4.8	18	18	2.5
20	4.0	9.9	28	9.0	9.5	71	72	12	23	16	13	3.6
21	3.1	7.9	23	9.0	11	65	62	12	20	12	12	2.9
22	3.6	11	12	9.0	15	59	57	10	8.7	8.6	9.5	2.7
23	11	70	10	8.5	35	58	51	10	9.6	7.6	56	2.6
24	11	44	9.7	8.0	60	64	49	48	5.3	7.2	23	2.4
25	11	19	13	8.0	40	66	53	104	3.9	26	20	2.1
26	22	11	8.7	7.5	35	56	113	104	6.0	31	9.3	7.0
27	11	9.2	8.9	7.0	35	48	158	58	6.0	12	7.0	7.7
28	5.2	13	6.5	7.0	40	44	110	44	99	8.6	8.2	2.3
29	4.6	15	5.3	6.5	---	99	124	33	55	5.8	4.9	2.2
30	3.5	14	34	6.5	---	370	103	29	173	5.2	6.4	2.2
31	3.2	---	119	6.5	---	253	---	28	---	8.6	5.0	---
TOTAL	371.7	539.1	823.8	598.0	429.0	3619	7200	1635	662.4	2103.6	427.2	197.2
MEAN	12.0	18.0	26.6	19.3	15.3	117	240	52.7	22.1	67.9	13.8	6.57
MAX	102	82	119	258	60	517	1710	221	173	601	56	33
MIN	1.8	2.9	5.3	6.5	6.5	40	49	10	3.9	5.2	3.3	2.1
CFSM	.14	.22	.32	.23	.18	1.41	2.89	.63	.27	.82	.17	.08
IN.	.17	.24	.37	.27	.19	1.62	3.22	.73	.30	.94	.19	.09

CAL YR 1978 TOTAL 19886.58 MEAN 54.5 MAX 1220 MIN .63 CFSM .66 IN 8.89
WTR YR 1979 TOTAL 18606.00 MEAN 51.0 MAX 1710 MIN 1.8 CFSM .61 IN 8.32

STREAMS TRIBUTARY TO LAKE ERIE

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE¼ sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft (12 m) downstream from bridge on General Motors Road, 0.5 mi (0.8 km) downstream from Sherwood Creek, and 0.5 mi (0.8 km) west of Milford.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft (268.224 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1970, at site 240 ft (73 m) upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft³/s (8.50 m³/s) regulated by powerplant 1.5 mi (2.4 km) above station prior to May 20, 1957; occasional regulation for lake level control since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 96.8 ft³/s (2.741 m³/s), 9.96 in/yr (253 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 645 ft³/s (18.3 m³/s) Apr. 5, 1950; maximum gage height, 8.26 ft (2.518 m) June 28, 1968; minimum daily discharge, 5.2 ft³/s (0.15 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 298 ft³/s (8.44 m³/s) Apr. 16, gage height, 6.78 ft (2.067 m); minimum, 12 ft³/s (0.34 m³/s) Sept. 18, gage height, 3.90 ft (1.189 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	60	61	116	64	70	148	98	76	157	69	52
2	37	57	62	120	67	73	149	80	75	177	102	54
3	39	53	72	116	64	76	169	106	76	166	86	53
4	45	50	97	103	64	112	180	179	72	131	75	52
5	50	50	108	87	62	131	193	183	72	112	72	50
6	54	49	126	82	63	143	193	174	44	102	73	50
7	55	51	125	78	61	145	180	166	46	95	67	50
8	52	50	103	76	60	144	166	145	59	89	64	47
9	50	49	100	74	63	145	173	136	107	82	58	45
10	47	50	95	73	58	145	184	136	125	82	60	45
11	47	50	118	72	58	144	189	134	121	85	57	45
12	48	50	101	66	57	141	191	130	96	91	54	43
13	48	50	72	67	57	135	192	127	83	86	53	42
14	47	58	68	76	57	133	210	116	71	74	50	42
15	46	57	68	75	57	109	243	118	67	76	48	41
16	67	54	68	71	57	98	295	112	57	84	48	41
17	69	63	66	70	57	99	280	102	52	76	47	39
18	61	73	67	68	57	101	255	97	50	68	47	21
19	57	66	64	66	57	104	231	93	47	65	58	29
20	52	60	65	62	57	105	224	88	49	59	53	37
21	48	57	69	66	55	114	217	77	57	50	55	39
22	48	55	68	68	59	125	208	68	54	47	55	39
23	57	70	66	68	65	123	200	67	50	45	56	37
24	56	78	64	68	71	119	189	68	48	44	57	37
25	56	70	65	68	72	119	180	84	46	49	54	37
26	69	66	63	68	71	122	171	89	39	59	51	41
27	72	64	61	68	70	134	175	85	37	54	48	39
28	66	64	59	68	69	142	177	81	42	52	44	38
29	62	64	59	68	---	140	167	78	40	54	47	39
30	59	60	68	67	---	141	132	76	100	50	52	39
31	58	---	86	67	---	146	---	78	---	61	52	---
TOTAL	1660	1748	2434	2362	1729	3778	5861	3371	1958	2522	1812	1263
MEAN	53.5	58.3	78.5	76.2	61.8	122	195	109	65.3	81.4	58.5	42.1
MAX	72	78	126	120	72	146	295	183	125	177	102	54
MIN	37	49	59	62	55	70	132	67	37	44	44	21
CFSM	.41	.44	.60	.58	.47	.92	1.48	.83	.50	.62	.44	.32
IN.	.47	.49	.69	.67	.49	1.06	1.65	.95	.55	.71	.51	.36

CAL YR 1978 TOTAL 26790 MEAN 73.4 MAX 210 MIN 25 CFSM .56 IN 7.55
WTR YR 1979 TOTAL 30498 MEAN 83.6 MAX 295 MIN 21 CFSM .63 IN 8.59

STREAMS TRIBUTARY TO LAKE ERIE

415

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE¼ sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft (46 m) downstream from Kent Lake Dam, 2 mi (3 km) upstream from Woodruff Creek, and 3 mi (5 km) west of New Hudson.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft (264.566 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Kent Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 111 ft³/s (3.144 m³/s), 10.18 in/yr (259 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Dec. 29, 1950, gage height, 5.05 ft (1.539 m), from rating curve extended above 600 ft³/s (17.0 m³/s); minimum, 2.6 ft³/s (0.074 m³/s) May 27, 1963, gage height, 0.53 ft (0.162 m); minimum daily, 6.4 ft³/s (0.18 m³/s) May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 264 ft³/s (7.48 m³/s) Apr. 17, gage height, 2.33 ft (0.710 m); minimum daily, 36 ft³/s (1.02 m³/s) Sept. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	84	155	125	83	87	100	142	103	143	86	71
2	45	84	163	131	83	87	96	126	101	171	108	69
3	46	85	145	126	83	89	129	130	101	179	107	73
4	50	85	139	123	82	114	160	146	99	166	101	74
5	53	84	139	115	78	139	166	167	98	141	99	73
6	59	152	145	108	79	151	179	175	90	126	97	70
7	62	158	158	100	79	157	194	178	70	116	86	69
8	60	122	157	96	78	162	197	174	72	109	84	64
9	58	108	147	92	76	157	204	169	93	106	82	61
10	59	102	140	91	75	160	196	165	109	101	81	60
11	58	100	139	87	76	161	195	157	119	108	78	61
12	58	99	143	85	76	159	200	157	111	123	70	60
13	60	166	132	89	76	155	198	153	101	116	64	59
14	59	177	121	96	76	155	220	146	94	108	63	64
15	56	142	112	92	76	147	221	142	85	104	59	55
16	72	127	109	89	77	135	220	139	81	106	57	53
17	76	118	105	89	77	128	259	133	73	99	65	51
18	75	126	103	86	76	127	262	127	68	92	74	46
19	73	125	129	84	76	127	250	123	58	84	74	38
20	70	191	173	83	76	128	238	120	57	84	75	36
21	66	188	136	82	76	128	167	115	59	78	71	40
22	64	147	116	82	75	130	127	105	62	74	68	44
23	73	138	108	82	80	135	161	102	58	71	67	42
24	71	134	103	83	85	136	107	107	57	65	68	38
25	72	128	99	82	86	136	86	114	54	70	68	39
26	85	185	96	82	86	103	135	112	49	78	68	42
27	86	179	93	82	87	63	105	112	45	76	64	45
28	87	143	88	82	87	99	91	113	61	75	61	47
29	85	130	85	82	---	101	129	109	61	76	64	49
30	83	120	90	82	---	78	150	108	101	72	73	51
31	84	---	105	82	---	125	---	106	---	77	75	---
TOTAL	2052	3927	3873	2890	2220	3959	5142	4172	2390	3194	2357	1644
MEAN	66.2	131	125	93.2	79.3	128	171	135	79.7	103	76.0	54.8
MAX	87	191	173	131	87	162	262	178	119	179	108	74
MIN	45	84	85	82	75	63	86	102	45	65	57	36
CFSM	.45	.89	.85	.63	.54	.87	1.16	.91	.54	.70	.51	.37
IN.	.52	.99	.97	.73	.56	1.00	1.29	1.05	.60	.80	.59	.41
CAL YR 1978	TOTAL	32776	MEAN	89.8	MAX	283	MIN	25	CFSM	.61	IN	8.24
WTR YR 1979	TOTAL	37820	MEAN	104	MAX	262	MIN	36	CFSM	.70	IN	9.51

STREAMS TRIBUTARY TO LAKE ERIE

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi (1.8 km) north of Hamburg, and 3 mi (5 km) upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi² (798 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft (259.080 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Kent Lake, 11 mi (18 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 208 ft³/s (5.891 m³/s), 9.17 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft³/s (44.2 m³/s) May 15, 1956; maximum gage height, 8.46 ft (2.579 m) June 30, 1968; minimum discharge, 32 ft³/s (0.91 m³/s) July 2, 3, 1965; minimum gage height, 3.16 ft (0.963 m) Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 577 ft³/s (16.3 m³/s) Apr. 18, gage height, 5.82 ft (1.774 m); minimum, 69 ft³/s (1.95 m³/s) Oct. 1, 2, 3; minimum gage height, 3.47 ft (1.058 m) Oct. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	115	162	204	130	135	286	317	186	209	146	115
2	69	113	179	210	130	140	286	313	178	264	188	112
3	70	110	206	200	130	181	280	319	169	306	214	111
4	72	108	213	190	125	199	289	327	161	337	219	112
5	75	105	209	180	125	289	305	332	155	342	216	109
6	81	105	205	170	125	352	323	343	151	321	207	105
7	87	141	207	160	125	389	326	352	143	286	192	101
8	90	174	219	150	120	436	341	353	132	253	180	96
9	89	159	219	150	120	474	371	346	132	229	173	93
10	89	139	235	140	120	464	389	335	146	213	166	90
11	88	126	239	140	120	432	403	322	166	200	159	89
12	89	117	230	140	120	392	420	309	176	212	149	88
13	92	114	210	140	120	368	435	298	173	220	141	87
14	96	158	183	150	120	364	474	286	164	216	128	93
15	94	196	167	150	120	338	504	273	155	207	116	94
16	107	185	154	140	120	311	538	259	145	201	104	90
17	122	165	147	140	120	290	565	245	136	199	103	87
18	127	157	141	130	120	284	576	232	124	194	124	85
19	125	154	136	130	120	285	566	221	113	185	140	81
20	120	151	156	130	120	283	539	209	107	178	144	75
21	116	182	198	130	120	278	503	197	107	173	141	74
22	110	213	187	130	125	273	456	182	107	167	135	75
23	109	202	166	130	130	273	379	170	104	159	128	77
24	110	193	153	130	130	275	346	165	99	148	126	79
25	111	184	146	130	130	277	305	180	94	145	124	80
26	119	173	138	130	130	274	275	192	90	151	120	80
27	128	199	147	130	130	233	295	199	88	154	119	80
28	132	222	188	130	130	201	291	199	96	156	116	82
29	132	200	185	130	---	213	280	197	103	152	113	82
30	126	178	163	130	---	245	299	193	135	145	115	82
31	120	---	159	130	---	263	---	192	---	143	116	---
TOTAL	3164	4738	5647	4574	3475	9211	11645	8057	4035	6465	4562	2704
MEAN	102	158	182	148	124	297	388	260	135	209	147	90.1
MAX	132	222	239	210	130	474	576	353	186	342	219	115
MIN	69	105	136	130	120	135	275	165	88	143	103	74
CFSM	.33	.51	.59	.48	.40	.96	1.26	.84	.44	.68	.48	.29
IN.	.38	.57	.68	.55	.42	1.11	1.41	.97	.49	.78	.55	.33
CAL YR 1978	TOTAL	61594	MEAN 169	MAX 702	MIN 51	CFSM .55	IN 7.44					
WTR YR 1979	TOTAL	68277	MEAN 187	MAX 576	MIN 69	CFSM .61	IN 8.25					

STREAMS TRIBUTARY TO LAKE ERIE

417

04173000 HURON RIVER NEAR DEXTER, MI

LOCATION.--Lat 42°23'10", long 83°54'40", in S½ sec.13, T.1 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on North Territorial Road, 0.5 mi (0.8 km) east of Hudson Mills, 2.0 mi (3.2 km) downstream from Portage Lake Outlet and 4.0 mi (6.4 km) north of Dexter.

DRAINAGE AREA.--522 mi² (1,352 km²).

PERIOD OF RECORD.--Water year 1971 to current year.

REMARKS.--Estimates of water discharge are based on stage-discharge relationship developed during operation of a gaging-station at this site.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CAC03)
NOV 03...	1015	E126	510	8.1	14.5	8.0	12.0	104	2.3	430	<30	--
JAN 25...	1030	E172	570	8.1	-4.0	.0	14.0	98	2.5	140	<30	--
MAR 28...	1025	E391	525	8.0	5.0	3.0	13.2	97	2.8	750	<30	240
MAY 18...	1005	E355	500	8.3	20.5	17.0	9.6	98	.9	230	<30	--
JUL 06...	0945	E378	525	8.3	19.5	19.5	9.1	98	1.6	1500	<30	--
SEP 06...	1025	E115	566	8.4	23.0	22.0	8.3	98	1.0	40	<30	240

E--ESTIMATED VALUE

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 03...	--	--	--	--	--	220	0	180	2.8	--	--	--
JAN 25...	--	--	--	--	--	260	0	210	3.3	--	--	--
MAR 28...	64	65	20	21	2.0	220	0	180	3.5	49	37	.1
MAY 18...	--	--	--	--	--	220	0	180	1.8	--	--	--
JUL 06...	--	--	--	--	--	220	0	180	1.8	--	--	--
SEP 06...	62	62	20	22	1.7	210	2	176	1.4	48	45	.2

STREAMS TRIBUTARY TO LAKE ERIE
04173000 HURON RIVER NEAR DEXTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV 03...	--	--	--	--	.06	.00	.06	--	.20	--	--	--
JAN 25...	--	--	--	--	.35	.00	.35	--	.43	--	--	--
MAR 28...	6.9	379	312	400	.46	.01	.47	.47	.17	.57	.74	1.2
MAY 18...	--	--	--	--	.49	.02	.51	--	.22	--	--	--
JUL 06...	--	--	--	--	.11	.00	.11	--	.23	--	--	--
SEP 06...	5.6	369	311	--	.12	.01	.12	.11	.35	.31	.66	.78

DATE	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 03...	--	.02	.01	--	--	--	--	--	--	--	.00
JAN 25...	--	.00	.00	--	--	--	--	--	--	--	.00
MAR 28...	5.4	.02	.00	--	--	--	10	--	10	--	.00
MAY 18...	--	.00	.00	--	--	--	--	--	--	--	.00
JUL 06...	--	.02	.00	--	--	--	--	--	--	--	.00
SEP 06...	3.5	.01	.01	2	0	0	40	0	2	<.5	.00

STREAMS TRIBUTARY TO LAKE ERIE

419

04173254 MILL CREEK NEAR LIMA CENTER, MI

LOCATION.--Lat 42°16'54", long 83°55'22", in NE¼ sec.26, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Jerusalem Road, 0.3 mi (0.5 km) upstream from North Fork Mill Creek, 2.0 mi (3.2 km) southeast of Lima Center, 2.1 mi (3.4 km) upstream from gaging station near Dexter, and 6.2 mi (10 km) upstream from Hiron River.

DRAINAGE AREA.--59.8 mi² (155 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

REMARKS.--Estimates of water discharge are based on current records of streamflow at the gaging station near Dexter and records of streamflow at the partial-record station, Mill Creek near Lima Center.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)
NOV 03...	1200	E18	645	8.1	21.0	7.0	13.0	113	2.8	430	90
JAN 25...	1245	E16	690	7.9	-4.0	.0	14.2	99	3.8	24000	40
MAR 28...	1320	E28	800	8.3	6.5	5.0	12.1	98	.6	430	<30
MAY 18...	1215	E21	740	8.3	24.5	16.5	9.4	96	1.3	280	70
JUL 06...	1130	E19	760	8.0	22.0	16.0	9.9	106	1.4	4600	230
SEP 07...	0815	E13	702	8.2	13.5	15.0	8.2	85	1.1	750	400

E--ESTIMATED VALUE

DATE	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L AS CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)
NOV 03...	--	--	--	--	--	--	340	0	280	4.3
JAN 25...	--	--	--	--	--	--	330	0	270	6.6
MAR 28...	460	220	140	27	12	2.4	290	0	240	2.3
MAY 18...	--	--	--	--	--	--	300	0	250	2.4
JUL 06...	--	--	--	--	--	--	330	0	270	5.3
SEP 07...	350	79	99	25	14	1.7	330	0	270	3.3

DATE	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)
NOV 03...	--	--	--	--	--	--	.08	.00	.08	--
JAN 25...	--	--	--	--	--	--	.76	.01	.77	--
MAR 28...	176	29	.1	7.1	590	554	4.0	.02	4.0	4.0
MAY 18...	--	--	--	--	--	--	.96	.02	.98	--
JUL 06...	--	--	--	--	--	--	1.7	.03	1.7	--
SEP 07...	65	32	.2	12	459	412	.15	.01	.16	.11

STREAMS TRIBUTARY TO LAKE ERIE
04173254 MILL CREEK NEAR LIMA CENTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)
NOV 03...	.15	--	--	--	--	.03	.02	--	--	--
JAN 25...	.24	--	--	--	--	.01	.00	--	--	--
MAR 28...	.31	.60	.91	4.9	22	.01	.01	--	--	--
MAY 18...	.14	--	--	--	--	.02	.00	--	--	--
JUL 06...	.20	--	--	--	--	.02	.00	--	--	--
SEP 07...	.26	.04	.30	.46	2.0	.01	.01	3	2	10

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	ZINC, DIS- SOLVED (UG/L AS ZN)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 03...	--	--	--	--	--	--	--	--	--	.00
JAN 25...	--	--	--	--	--	--	--	--	--	.00
MAR 28...	--	--	50	--	80	--	--	--	--	.00
MAY 18...	--	--	--	--	--	--	--	--	--	.00
JUL 06...	--	--	--	--	--	--	--	--	--	.00
SEP 07...	0	1	80	0	50	<.5	2	0	3	.00

STREAMS TRIBUTARY TO LAKE ERIE

421

04173310 NORTH FORK MILL CREEK NEAR CHELSEA, MI

LOCATION.--Lat 42°19'34", long 84°00'57", in SE¼ sec.1, T.2 S., R.3 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on McKinley Road, 0.4 mi (0.6 km) upstream from Letts Creek, 0.5 mi (0.8 km) north of Chelsea, and 6.6 mi (10.6 km) upstream from Mill Creek.

DRAINAGE AREA.--14.6 mi² (37.8 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CACO3)
NOV 03...	1100	8.70	480	7.9	19.0	4.0	11.9	103	1.8	230	<30	--
JAN 25...	1145	8.65	500	8.0	-4.0	.0	13.4	94	1.7	11000	230	--
MAR 28...	1150	5.16	425	8.0	6.0	2.5	13.3	98	1.8	430	<30	220
MAY 18...	1105	8.62	510	8.2	21.0	14.5	9.6	98	.7	930	230	--
JUL 06...	1050	8.67	470	8.0	21.0	14.0	9.5	102	2.6	11000	1500	--
SEP 06...	1300	8.83	493	8.2	25.0	18.5	8.7	102	.6	750	230	260

DATE	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)
NOV 03...	--	--	--	--	--	250	0	210	5.0	--	--
JAN 25...	--	--	--	--	--	260	0	210	4.2	--	--
MAR 28...	32	62	16	9.0	1.1	230	0	190	3.7	28	21
MAY 18...	--	--	--	--	--	260	0	210	2.6	--	--
JUL 06...	--	--	--	--	--	240	0	200	3.8	--	--
SEP 06...	39	73	19	10	1.1	270	0	220	2.7	30	27

STREAMS TRIBUTARY TO LAKE ERIE

04173310 NORTH FORK MILL CREEK NEAR CHELSEA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
NOV 03...	--	--	--	--	.14	.00	.14	--	.30	--	--
JAN 25...	--	--	--	--	.34	.01	.35	--	.26	--	--
MAR 28...	.1	7.6	245	259	.18	.01	.19	.18	.94	.54	.57
MAY 18...	--	--	--	--	.81	.02	.83	--	.24	--	--
JUL 06...	--	--	--	--	.26	.01	.27	--	.28	--	--
SEP 06...	.2	13	356	307	.14	.01	.15	.16	.28	.22	.50

DATE	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 03...	--	--	.02	.01	--	--	--	--	--	--	.00
JAN 25...	--	--	.01	.00	--	--	--	--	--	--	.00
MAR 28...	.76	3.4	.03	.01	--	--	50	--	20	--	.00
MAY 18...	--	--	.01	.00	--	--	--	--	--	--	.00
JUL 06...	--	--	.02	.00	--	--	--	--	--	--	.00
SEP 06...	.65	2.9	.01	.00	2	0	50	0	20	.5	.00

STREAMS TRIBUTARY TO LAKE ERIE

423

04173350 NORTH FORK MILL CREEK NEAR LIMA CENTER, MI

LOCATION.--Lat 42°17'46", long 83°57'33", in SW¼ sec.23, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Dancer Road, 1.2 mi (1.9 km) southeast of Lima Center, 5.1 mi (8.2 km) downstream from Letts Creek, and 1.1 mi (1.8 km) upstream from Mill Creek.

DRAINAGE AREA.--59.0 mi² (153 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

REMARKS.--Estimates of water discharge based on previous streamflow partial-record data and correlation with station 04173500.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CAC03)
NOV 03...	1245	E11	720	8.0	21.5	7.0	12.4	108	4.3	1500	90	--
JAN 25...	1315	E19	590	7.8	-4.0	.0	14.2	99	3.9	750	<30	--
MAR 28...	1430	E44	660	7.9	6.0	4.5	12.8	96	1.7	2100	<30	320
MAY 18...	1255	E22	710	8.2	24.5	16.5	9.4	98	1.1	280	40	--
JUL 06...	1210	E25	660	7.8	22.5	16.5	8.9	96	2.1	2400	430	--
SEP 06...	1425	E9.0	848	8.1	24.5	8.1	10.2	100	1.3	390	90	350
E--ESTIMATED VALUE												

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 03...	--	--	--	--	--	310	0	250	5.0	--	--	--
JAN 25...	--	--	--	--	--	300	0	250	7.6	--	--	--
MAR 28...	99	92	22	20	2.0	270	0	220	5.4	79	42	.1
MAY 18...	--	--	--	--	--	300	0	250	3.0	--	--	--
JUL 06...	--	--	--	--	--	290	0	240	7.4	--	--	--
SEP 06...	90	100	25	36	2.7	320	0	260	4.1	64	73	.3

STREAMS TRIBUTARY TO LAKE ERIE

04173350 NORTH FORK MILL CREEK NEAR LIMA CENTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV 03...	--	--	--	1.0	.18	1.2	--	.64	--	--	--
JAN 25...	--	--	--	.71	.04	.75	--	.62	--	--	--
MAR 28...	7.8	497	401	.64	.02	.66	.66	.56	.72	.95	1.6
MAY 18...	--	--	--	.74	.06	.80	--	.46	--	--	--
JUL 06...	--	--	--	.75	.15	.90	--	.34	--	--	--
SEP 06...	13	523	478	1.3	.13	1.4	1.4	.29	.67	.96	2.4

DATE	NITRO- GEN, TOTAL (MG/L AS N03)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 03...	--	.07	.07	--	--	--	--	--	--	--	.00
JAN 25...	--	.02	.02	--	--	--	--	--	--	--	.00
MAR 28...	7.1	.04	.02	--	--	--	30	--	60	--	.00
MAY 18...	--	.03	.02	--	--	--	--	--	--	--	.00
JUL 06...	--	.07	.05	--	--	--	--	--	--	--	.00
SEP 06...	10	.04	.04	20	1	0	70	0	70	<.5	.00

425

LOCATION.--Lat 42°18'00", long 83°53'55", in SW 1/4 sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft (4 m) downstream from bridge on Parker Road, 2.5 mi (4.0 km) south of Dexter, and 4 mi (6 km) upstream from mouth.

PERIOD OF RECORD.--February 1952 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft). Prior to May 23, 1958, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 77.5 ft³/s (2.195 m³/s), 8.22 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 26, 1968, gage height, 12.95 ft (3.947 m); minimum, 7.3 ft³/s (0.21 m³/s) Dec. 13, 1963; minimum gage height, 4.94 ft (1.506 m) Dec. 13, 1963, Feb. 22, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft ³ /s)	(m ³ /s)	(ft)	(m)			(ft ³ /s)	(m ³ /s)	(ft)	(m)
Mar. 5	0400	*740	21.0	*10.51	3.203	Apr. 14	1400	505	14.3	9.30	2.835

Minimum daily discharge, 15 ft³/s (0.42 m³/s) Oct. 10-15; minimum gage height, 5.33 ft (1.625 m) on many days in September.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	38	40	159	37	40	151	142	46	171	35	29
2	16	38	40	146	36	45	142	120	42	128	147	28
3	16	38	60	135	36	123	129	202	38	88	133	27
4	17	38	108	105	36	562	110	231	35	75	88	26
5	16	38	90	77	36	656	113	171	34	63	77	26
6	18	37	78	66	35	402	156	139	33	49	65	25
7	18	41	72	58	34	283	123	118	32	41	51	25
8	16	38	70	54	33	226	118	102	31	36	43	24
9	16	37	70	49	33	203	244	88	31	38	39	24
10	15	35	70	46	33	180	245	79	30	44	38	24
11	15	34	68	45	32	137	180	74	33	38	36	23
12	15	34	60	44	32	122	197	71	30	56	32	23
13	15	36	56	44	32	91	188	80	28	47	30	23
14	15	50	54	44	31	123	441	72	27	42	30	23
15	15	46	52	44	31	108	344	68	26	42	28	22
16	32	41	50	44	31	80	235	61	25	36	27	21
17	38	45	48	45	31	74	180	55	24	32	28	21
18	32	56	48	45	31	83	150	51	23	30	56	20
19	29	46	48	45	31	100	129	47	23	28	54	20
20	29	39	50	45	31	97	115	44	24	27	46	20
21	27	38	50	45	32	94	104	41	28	26	63	20
22	26	36	50	44	32	91	98	38	25	25	50	20
23	31	53	49	42	32	89	90	37	23	25	45	20
24	38	66	48	42	33	98	86	44	24	24	43	20
25	38	53	46	42	34	92	89	77	24	25	39	19
26	49	45	45	42	35	79	103	70	23	26	35	19
27	50	42	44	42	36	70	136	64	23	25	34	19
28	43	39	42	41	37	68	139	58	25	23	34	19
29	41	38	42	40	---	83	149	54	31	23	33	19
30	39	41	43	39	---	205	150	49	113	23	33	19
31	39	---	47	38	---	189	---	50	---	29	30	---
TOTAL	821	1256	1738	1797	933	4893	4834	2597	954	1385	1522	668
MEAN	26.5	41.9	56.1	58.0	33.3	158	161	83.8	31.8	44.7	49.1	22.3
MAX	50	66	108	159	37	656	441	231	113	171	147	29
MIN	15	34	40	38	31	40	86	37	23	23	27	19
CFSM	.21	.33	.44	.45	.26	1.23	1.26	.66	.25	.35	.38	.17
IN.	.24	.37	.51	.52	.27	1.42	1.40	.75	.28	.40	.44	.19
CAL YR 1978	TOTAL	25443	MEAN 69.7	MAX 811	MIN 15	CFSM .55	IN 7.39					
WTR YR 1979	TOTAL	23398	MEAN 64.1	MAX 656	MIN 15	CFSM .50	IN 6.80					

STREAMS TRIBUTARY TO LAKE ERIE

04174050 HURON RIVER AT DELHI MILLS, MI

LOCATION.--Lat 42°20'01", long 83°48'34", in SE¼ sec.2, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Delhi Road, 5.0 mi (8.0 km) northwest of Ann Arbor, 5.2 mi (8.4 km) downstream from Mill Creek, 5.1 mi (8.2 km) upstream from Barton Dam, and 60.0 mi (96.5 km) upstream from mouth.

DRAINAGE AREA.--699 mi² (1,810 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CAC03)
NOV 03...	0900	15.20	580	8.1	8.0	7.0	10.8	94	3.2	2400	2400	--
JAN 25...	0900	14.65	590	7.9	-5.0	.0	12.6	88	3.4	230	<30	--
MAR 28...	0845	14.37	580	8.3	1.0	2.0	13.6	100	1.9	430	<30	260
MAY 18...	0845	14.45	590	8.2	17.0	16.0	9.7	99	1.3	750	150	--
JUL 06...	0830	14.38	600	8.1	15.0	18.0	8.0	86	1.8	2100	40	--
SEP 06...	0830	15.34	572	8.2	18.5	21.0	6.9	81	.5	430	90	260

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 03...	--	--	--	--	--	230	0	190	2.9	--	--	--
JAN 25...	--	--	--	--	--	250	0	210	5.0	--	--	--
MAR 28...	77	73	20	20	2.0	230	0	190	1.8	61	38	.1
MAY 18...	--	--	--	--	--	240	0	200	2.4	--	--	--
JUL 06...	--	--	--	--	--	230	0	190	2.9	--	--	--
SEP 06...	68	68	21	22	1.8	230	0	190	2.3	49	45	.2

STREAMS TRIBUTARY TO LAKE ERIE

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'04174050 HURON RIVER AT DELHI MILLS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)
NOV 03...	--	--	--	.18	.01	.19	--	.28	--	--	--	--
JAN 25...	--	--	--	.46	.02	.48	--	.35	--	--	--	--
MAR 28...	7.1	398	338	.80	.01	.81	.79	.48	.64	.78	1.6	6.8
MAY 18...	--	--	--	.46	.02	.48	--	.24	--	--	--	--
JUL 06...	--	--	--	.33	.01	.34	--	.31	--	--	--	--
SEP 06...	6.3	389	327	.34	.01	.35	.12	.35	.20	.55	.65	2.9

DATE	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)
NOV 03...	.02	.02	--	--	--	--	--	--	--	--	--
JAN 25...	.01	.01	--	--	--	--	--	--	--	--	--
MAR 28...	.03	.01	--	--	--	--	--	20	--	20	--
MAY 18...	.03	.02	--	--	--	--	--	--	--	--	--
JUL 06...	.02	.00	--	--	--	--	--	--	--	--	--
SEP 06...	.02	.02	2	1	10	0	0	50	0	9	<.5

DATE	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC TOTAL (MG/L AS C)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	NAPH- THA- LENES, POLY- CHLOR. TOTAL (UG/L)	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR- DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)
NOV 03...	--	--	--	12	.00	.00	.0	.00	.0	.00	.00
JAN 25...	--	--	--	12	.00	.00	.0	.00	.0	.00	.00
MAR 28...	--	--	--	--	.00	.00	.0	.00	.0	.00	.00
MAY 18...	--	--	--	11	.00	.00	.0	.00	.0	.00	.00
JUL 06...	--	--	--	7.7	.00	.00	.0	.00	.0	.00	.00
SEP 06...	2	0	10	7.4	.00	.00	.0	.00	.0	.00	.00

STREAMS TRIBUTARY TO LAKE ERIE

04174050 HURON RIVER AT DELHI MILLS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	DDT, TOTAL (UG/L)	DI- AZINON, TOTAL (UG/L)	DI- ELDRIN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA- THION, TOTAL (UG/L)
NOV , 1978									
03...	.00	.00	.00	.00	.00	.00	.00	.00	.00
JAN , 1979									
25...	.00	.00	.00	.00	.00	.00	.00	.00	.00
MAR									
28...	.01	.00	.00	.00	.00	.00	.00	.00	.00
MAY									
18...	.01	.00	.00	.00	.00	.00	.00	.00	.00
JUL									
06...	.00	.00	.00	.00	.00	.00	.00	.00	.00
SEP									
06...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, TOTAL (UG/L)	PARA- THION, TOTAL (UG/L)	TOX- APHENE, TOTAL (UG/L)	TOTAL TRI- THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV , 1978								
03...	.00	.00	.00	0	.00	.06	.00	.01
JAN , 1979								
25...	.00	.00	.00	0	.00	.05	.01	.01
MAR								
28...	.00	.00	.00	0	.00	--	--	--
MAY								
18...	.00	.00	.00	0	.00	.08	.00	.01
JUL								
06...	.00	.00	.00	0	.00	.45	.00	.00
SEP								
06...	.00	.00	.00	0	.00	.07	.00	.00

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW¼ sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft (30 m) upstream from bridge on Wall Street in Ann Arbor, 0.7 mi (1.1 km) downstream from Argo Dam, and 4.2 mi (6.8 km) upstream from Geddes Dam.

DRAINAGE AREA.--729 mi² (1,888 km²).

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft (227.018 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi (6.8 km) downstream, and January 1914 to September 1947, at Barton Dam, 2.6 mi (4.2 km) upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Apr. 22 to May 22, which are fair. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962, and since by occasional lake level control operations above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--75 years, 451 ft³/s (12.77 m³/s), 8.40 in/yr (213 mm/yr), adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft³/s (165 m³/s), Mar. 14, 1918; minimum daily, 4 ft³/s (0.11 m³/s) Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,660 ft³/s (47.0 m³/s) Apr. 13, gage height, 14.46 ft (4.407 m); minimum daily discharge, 55 ft³/s (1.56 m³/s) Sept. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	112	187	381	412	230	250	763	560	436	682	233	55
2	104	406	321	392	230	266	755	740	357	384	303	157
3	97	321	366	267	230	351	757	900	335	452	327	160
4	128	203	373	365	225	947	685	1000	336	481	533	313
5	142	212	372	354	210	1270	661	850	280	478	476	106
6	127	235	350	353	210	1090	874	760	200	511	386	112
7	130	622	359	335	210	1160	936	740	256	484	349	86
8	134	296	378	352	205	1140	821	710	301	423	233	124
9	113	258	376	350	200	1030	919	680	319	489	266	151
10	129	250	328	332	200	1010	1010	570	347	407	293	116
11	140	241	335	314	198	983	967	600	230	413	306	131
12	139	238	346	281	195	900	1050	680	228	611	181	103
13	131	248	320	277	193	856	1120	650	247	448	195	87
14	125	261	319	279	190	853	1430	480	216	335	288	134
15	120	243	319	310	190	804	1410	370	230	396	198	160
16	229	242	316	271	190	750	1240	400	194	342	162	128
17	165	300	312	287	190	721	1140	430	406	344	189	126
18	141	259	315	286	190	713	1110	480	226	364	362	87
19	214	254	308	285	190	720	1060	430	145	303	150	89
20	189	257	281	263	190	714	1090	390	90	272	244	124
21	211	240	263	260	193	700	1020	350	128	221	277	90
22	204	238	245	260	203	559	800	295	106	228	259	107
23	223	301	272	245	224	599	720	326	158	303	235	91
24	189	314	273	243	215	630	770	384	162	249	270	95
25	202	300	274	250	225	706	850	463	109	345	283	69
26	210	273	279	246	205	600	700	421	125	374	156	99
27	240	304	273	250	225	564	680	398	86	199	138	103
28	357	384	197	252	232	568	680	402	125	157	166	105
29	184	379	273	255	---	610	720	329	239	344	171	90
30	206	425	293	241	---	707	700	388	550	204	162	109
31	224	---	335	235	---	789	---	359	---	208	108	---
TOTAL	5259	8691	9752	9102	5788	23560	27438	16535	7167	11451	7899	3507
MEAN	170	290	315	294	207	760	915	533	239	369	255	117
MAX	357	622	381	412	232	1270	1430	1000	550	682	533	313
MIN	97	187	197	235	190	250	661	295	86	157	108	55
MEAN+	189	309	332	312	227	779	935	556	267	395	277	143
CFSM+	.26	.42	.46	.43	.31	1.07	1.28	.76	.37	.54	.38	.20
IN+	.30	.47	.53	.49	.32	1.23	1.43	.88	.41	.62	.44	.22

CAL YR 1978 TOTAL 135903 MEAN 372 MAX 2300 MIN 40 MEAN+ 394 CFSM+ .54 IN+ 7.33

WTR YR 1979 TOTAL 136149 MEAN 373 MAX 1430 MIN 55 MEAN+ 395 CFSM+ .54 IN+ 7.34

+Adjusted for diversion for municipal supply; record furnished by City of Ann Arbor.

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW¼ sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft (9 m) downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi (7.9 km) downstream from Geddes Dam, 5.6 mi (9.0 km) upstream from Ford Dam, and at mile 42.8 (68.9 km).

DRAINAGE AREA.--807 mi² (2,090 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, May 29 to July 2, which are fair. Considerable regulation caused by many dams above station; storage capacity is small.

AVERAGE DISCHARGE.--5 years, 551 ft³/s (15.60 m³/s), 9.27 in/yr (235 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,300 ft³/s (122 m³/s) Mar. 5, 1976, gage height, 12.50 ft (3.810 m); minimum, 14 ft³/s (0.40 m³/s) June 15, 1976, gage height, 6.45 ft (1.966 m); minimum daily, 64 ft³/s (1.81 m³/s) Sept. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,770 ft³/s (107 m³/s) July 12, gage height, 12.12 ft (3.694 m); minimum daily, 99 ft³/s (2.80 m³/s) Sept. 27; minimum gage height, 6.77 ft (2.063 m) July 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	220	438	450	250	270	862	600	480	800	279	106
2	156	419	352	440	250	300	869	764	410	430	375	174
3	162	323	444	330	245	500	839	1010	380	554	347	238
4	167	239	448	444	240	1440	783	1140	360	583	624	385
5	156	231	432	431	235	1610	755	970	320	605	566	165
6	191	228	383	401	230	1290	957	840	230	601	456	162
7	161	618	396	399	230	1240	1010	840	250	550	405	162
8	171	350	444	419	225	1250	946	790	320	531	268	156
9	164	281	404	391	220	1130	1140	786	350	571	295	180
10	163	263	357	388	220	1120	1170	627	380	524	371	195
11	170	248	354	344	220	1040	1070	663	320	527	364	148
12	193	247	383	334	215	961	1130	795	260	1990	282	191
13	178	262	363	349	215	922	1270	766	270	993	215	141
14	189	339	350	330	210	911	1600	612	240	639	315	190
15	166	258	346	338	210	858	1500	408	250	515	256	220
16	326	254	342	305	210	812	1400	467	230	496	193	149
17	255	382	333	333	210	782	1300	473	450	453	232	177
18	219	313	325	330	210	783	1200	553	320	468	505	166
19	221	262	315	316	205	781	1200	487	180	376	259	167
20	219	276	338	295	205	780	1160	438	100	334	270	130
21	226	269	294	290	210	754	1130	400	140	345	333	168
22	240	268	295	285	220	619	882	363	120	323	292	168
23	230	370	280	280	225	631	816	323	180	428	323	152
24	220	332	309	275	230	694	864	461	180	357	340	124
25	237	328	292	270	230	749	968	633	130	453	325	127
26	271	314	327	270	235	666	802	495	140	454	227	164
27	236	325	295	270	245	616	762	465	100	300	172	99
28	403	398	220	270	260	613	758	405	150	236	180	156
29	209	397	305	270	---	688	837	380	320	361	195	141
30	228	436	330	270	---	898	842	400	650	312	224	139
31	226	---	390	260	---	907	---	410	---	258	193	---
TOTAL	6503	9450	10884	10377	6310	26615	30822	18764	8210	16367	9681	5040
MEAN	210	315	351	335	225	859	1027	605	274	528	312	168
MAX	403	618	448	450	260	1610	1600	1140	650	1990	624	385
MIN	150	220	220	260	205	270	755	323	100	236	172	99
CFSM	.26	.39	.44	.42	.28	1.06	1.27	.75	.34	.65	.39	.21
IN.	.30	.44	.50	.48	.29	1.23	1.42	.86	.38	.75	.45	.23
CAL YR 1978	TOTAL	158721	MEAN 435	MAX 2380	MIN 64	CFSM .54	IN 7.32					
WTR YR 1979	TOTAL	159023	MEAN 436	MAX 1990	MIN 99	CFSM .54	IN 7.33					

STREAMS TRIBUTARY TO LAKE ERIE

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04174800 HURON RIVER AT YPSILANTI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CAC03)
NOV 02...	1045	312	645	8.2	13.5	11.5	11.2	99	6.7	1500	150	--
JAN 24...	1210	275	610	8.0	2.0	.5	12.9	95	5.0	<30	<30	--
MAR 27...	1150	840	625	7.9	.0	2.0	12.7	91	3.7	430	40	270
MAY 17...	1210	610	625	8.2	19.0	17.5	9.4	99	3.4	1500	40	--
JUL 05...	1330	653	595	8.2	21.5	19.5	9.0	100	3.3	2400	40	--
SEP 05...	0830	198	640	8.2	19.0	22.5	8.0	92	3.2	430	<30	280

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 02...	--	--	--	--	--	240	0	200	2.4	--	--	--
JAN 24...	--	--	--	--	--	260	0	210	4.2	--	--	--
MAR 27...	77	75	21	29	2.5	240	0	200	4.8	69	54	.1
MAY 17...	--	--	--	--	--	240	0	200	2.4	--	--	--
JUL 05...	--	--	--	--	--	220	0	180	2.2	--	--	--
SEP 05...	87	74	22	26	2.5	230	0	190	2.3	57	54	.2

STREAMS TRIBUTARY TO LAKE ERIE
04174800 HURON RIVER AT YPSILANTI, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN+AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV 02...	--	--	--	--	.35	.36	.71	--	1.4	--	--	--
JAN 24...	--	--	--	--	.75	.11	.86	--	1.2	--	--	--
MAR 27...	6.7	444	380	1010	1.3	.09	1.4	.93	.59	.61	1.2	2.6
MAY 17...	--	--	--	--	1.1	.09	1.2	--	.50	--	--	--
JUL 05...	--	--	--	--	1.1	.05	1.2	--	.22	--	--	--
SEP 05...	7.3	412	359	220	.44	.10	.54	.48	.43	.67	1.1	1.6

DATE	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY, DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 02...	--	.05	.05	--	--	--	--	--	--	--	.00
JAN 24...	--	.02	.01	--	--	--	--	--	--	--	.00
MAR 27...	12	.05	.02	--	--	--	140	--	40	--	.00
MAY 17...	--	.03	.01	--	--	--	--	--	--	--	.00
JUL 05...	--	.02	.01	--	--	--	--	--	--	--	.00
SEP 05...	7.3	.07	.02	2	0	0	20	0	5	<.5	.00

04174900 FORD LAKE NEAR RAWSONVILLE, MI

LOCATION.--Lat 42°12'22", long 83°33'28", in SW¼ sec.24, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, at upstream side of Ford Dam at Rawsonville Road, 1 mi (1.6 km) west of Rawsonville, 3.0 mi (4.8 km) upstream from Belleville Dam, 3.5 mi (5.6 km) southeast of Ypsilanti, 4.2 mi (6.8 km) downstream from gaging station at Ypsilanti, and 37.4 mi (60.2 km) upstream from mouth.

DRAINAGE AREA.--814 mi² (2,110 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, AIR (DEG C)	TEMPERATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATURATION)	OXYGEN DEMAND, BIO-CHEMICAL, 5 DAY (MG/L)	COLIFORM, COMPLETE (MPN)	COLIFORM, FECAL, EC BROTH (MPN)
NOV 02...	1245	610	8.8	16.5	10.0	13.6	120	2.3	11000	<30
JAN 24...	1400	665	8.0	4.5	.0	13.1	97	3.1	<30	<30
MAR 27...	1450	600	7.7	1.0	4.0	10.8	84	4.4	930	<30
MAY 17...	1340	610	8.3	20.0	19.5	6.4	67	1.5	280	<30
JUL 05...	1435	625	8.1	22.0	20.5	6.5	72	2.8	140	<30
SEP 04...	1450	607	8.0	25.5	24.0	13.0	155	8.0	30	<30

DATE	HARDNESS (MG/L AS CaCO3)	HARDNESS, NONCARBONATE (MG/L AS CaCO3)	CALCIUM DIS-SOLVED (MG/L AS Ca)	MAGNESIUM, DIS-SOLVED (MG/L AS Mg)	SODIUM, DIS-SOLVED (MG/L AS Na)	POTASSIUM, DIS-SOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CaCO3)	CARBON DIOXIDE, DIS-SOLVED (MG/L AS CO2)
NOV 02...	--	--	--	--	--	--	190	16	180	.6
JAN 24...	--	--	--	--	--	--	270	0	220	4.3
MAR 27...	260	70	70	20	26	2.5	230	0	190	7.3
MAY 17...	--	--	--	--	--	--	270	0	220	2.2
JUL 05...	--	--	--	--	--	--	210	0	170	2.7
SEP 04...	240	62	64	20	25	2.7	220	0	180	3.5

DATE	SULFATE, DIS-SOLVED (MG/L AS SO4)	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 02...	--	--	--	--	--	--	.52	.07	.59	--
JAN 24...	--	--	--	--	--	--	.60	.02	.62	--
MAR 27...	62	47	.1	6.7	402	352	1.0	.04	1.0	.94
MAY 17...	--	--	--	--	--	--	.74	.09	.83	--
JUL 05...	--	--	--	--	--	--	.72	.07	.79	--
SEP 04...	58	54	.2	6.5	381	341	.44	.10	.54	.54

STREAMS TRIBUTARY TO LAKE ERIE

04174900 FORD LAKE NEAR RAWSONVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)
NOV 02...	1.3	--	--	--	--	.02	.02	--	--	--
JAN 24...	1.3	--	--	--	--	.01	.01	--	--	--
MAR 27...	.94	.64	1.3	2.2	9.9	.04	.02	--	--	--
MAY 17...	.38	--	--	--	--	.01	.00	--	--	--
JUL 05...	.48	--	--	--	--	.01	.00	--	--	--
SEP 04...	.76	.64	1.4	1.9	8.6	.06	.00	2	1	10

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	ZINC, DIS- SOLVED (UG/L AS ZN)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 02...	--	--	--	--	--	--	--	--	--	.00
JAN 24...	--	--	--	--	--	--	--	--	--	.00
MAR 27...	--	--	40	--	30	--	--	--	--	.00
MAY 17...	--	--	--	--	--	--	--	--	--	.00
JUL 05...	--	--	--	--	--	--	--	--	--	.00
SEP 04...	0	4	20	0	0	<.5	7	0	10	.00

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LOCATION.--Lat 42°05'05", long 83°34'43", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.34, T.4 S., R.7 E., Washtenaw County, Hydrologic Unit 04100001, on left bank at downstream side of bridge on Tuttle Hill Road, 300 ft (91 m) downstream from Paint Creek, and 0.2 mi (0.3 km) northeast of Oakville.

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map (nearest 5 ft). Prior to July 31, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 44.3 ft³/s (1.255 m³/s), 8.85 in/yr (225 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--maximum discharge, 860 ft³/s (24.4 m³/s) Mar. 21, 1978, gage height, 8.24 ft (2.512 m); maximum gage height, 8.31 ft (2.533 m) Feb. 20, 1971, backwater from ice; minimum discharge, 2.7 ft³/s (0.076 m³/s) Aug. 24, 1971, gage height, 1.00 ft (0.305 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Mar. 5	1200	516	14.6	7.46	2.274	Apr. 14	1700	*800	22.7	*8.12	2.475
Apr. 9	1900	448	12.7	7.26	2.213	July 1	0400	502	14.2	7.46	2.274

Minimum discharge, 5.4 ft³/s (0.15 m³/s) Oct. 1, 2, gage height, 1.31 ft (0.399 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.1	15	21	58	15	18	103	66	30	422	15	13
2	5.6	14	22	70	15	35	103	55	25	189	20	13
3	6.2	13	30	60	15	150	92	118	22	80	18	13
4	10	13	56	35	15	364	68	129	20	68	17	42
5	7.9	13	57	27	15	449	78	79	19	57	19	22
6	9.0	13	29	25	15	162	142	63	20	39	16	17
7	8.6	14	26	24	15	76	76	53	19	29	13	15
8	5.9	14	34	22	15	72	70	45	19	23	11	14
9	5.6	14	33	21	15	66	323	38	17	37	10	13
10	7.7	14	33	20	15	75	304	34	16	106	11	12
11	8.0	14	25	19	16	57	123	31	18	50	11	13
12	8.4	14	24	19	16	52	132	30	16	34	9.3	13
13	10	14	24	18	16	40	146	37	15	28	11	12
14	8.6	23	22	17	17	60	679	31	14	23	12	17
15	6.6	23	22	17	17	45	507	32	14	20	11	15
16	17	17	21	16	17	46	205	26	13	17	11	12
17	24	18	21	16	18	35	119	23	12	15	11	11
18	14	36	19	16	18	41	88	22	12	14	30	9.9
19	13	24	19	16	19	49	72	21	11	13	26	9.0
20	12	20	20	15	20	50	64	20	11	11	17	8.8
21	11	18	20	15	20	49	57	19	13	9.9	18	9.0
22	9.5	18	20	15	21	48	55	18	25	10	14	8.0
23	11	22	20	15	21	48	50	18	22	9.2	20	6.5
24	17	34	19	15	21	53	48	22	15	9.5	51	6.5
25	15	24	19	15	21	51	51	57	13	12	29	6.4
26	19	21	18	15	20	44	63	83	12	18	21	6.1
27	20	21	13	15	19	39	89	67	11	14	19	5.7
28	15	22	14	15	18	38	81	50	11	14	17	6.2
29	14	24	16	15	---	55	102	43	13	12	17	6.7
30	13	22	19	15	---	213	82	35	116	11	18	6.5
31	14	---	27	15	---	168	---	33	---	14	15	---
TOTAL	352.7	566	763	696	485	2748	4172	1398	594	1408.6	538.3	362.3
MEAN	11.4	18.9	24.6	22.5	17.3	88.6	139	45.1	19.8	45.4	17.4	12.1
MAX	24	36	57	70	21	449	679	129	116	422	51	42
MIN	5.6	13	13	15	15	18	48	18	11	9.2	9.3	5.7
CFSM	.17	.28	.36	.33	.25	1.30	2.04	.66	.29	.67	.26	.18
IN.	.19	.31	.42	.38	.27	1.50	2.28	.76	.32	.77	.29	.20
CAL YR 1978	TOTAL	17055.7	MEAN	46.7	MAX	718	MIN	3.3	CFSM	.69	IN	9.33
WTR YR 1979	TOTAL	14083.9	MEAN	38.6	MAX	679	MIN	5.6	CFSM	.57	IN	7.70

STREAMS TRIBUTARY TO LAKE ERIE

04175597 RIVER RAISIN NEAR SHARONVILLE, MI

LOCATION.--Lat 42°10'04", long 84°07'21", in SW¼ sec.31, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Sharon Valley Road, 2.0 mi (3.2 km) southwest of Sharonville, 4.0 mi (6.4 km) upstream from gaging station near Manchester, 4.0 mi (6.4 km) northwest of Manchester, and 113 mi (182 km) upstream from mouth.

DRAINAGE AREA.--121 mi² (313 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

REMARKS.--Estimates of water discharge are based on streamflow records at gaging station near Manchester.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CAC03)
NOV 03...	1355	E38	480	8.1	24.0	8.0	12.2	106	2.7	46000	40	--
JAN 25...	1430	E54	480	7.9	-4.0	.0	14.2	99	1.8	750	<30	--
MAR 29...	0915	E136	425	8.1	14.0	6.0	12.0	99	.5	430	<30	210
MAY 18...	1410	E61	480	8.3	27.0	19.0	9.0	92	1.3	230	40	--
JUL 06...	1310	E89	460	8.1	24.0	21.5	8.9	96	3.9	2400	430	--
SEP 07...	1030	E31	428	8.3	17.0	22.0	7.9	93	1.2	390	90	240

E--ESTIMATED VALUE

DATE	HARD- NESS, NONCAR- BONATE (MG/L AS CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 03...	--	--	--	--	--	260	0	210	3.3	--	--	--
JAN 25...	--	--	--	--	--	260	0	210	5.2	--	--	--
MAR 29...	30	57	17	8.4	1.6	220	0	180	2.8	37	18	.1
MAY 18...	--	--	--	--	--	240	0	200	1.9	--	--	--
JUL 06...	--	--	--	--	--	240	0	200	3.1	--	--	--
SEP 07...	40	62	20	8.8	1.4	240	0	200	1.9	26	20	.2

STREAMS TRIBUTARY TO LAKE ERIE

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04175597 RIVER RAISIN NEAR SHARONVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV 03...	--	--	--	.28	.01	.29	--	.33	--	--	--
JAN 25...	--	--	--	.70	.01	.71	--	.30	--	--	--
MAR 29...	5.0	264	254	.39	.01	.40	.40	.03	.34	.37	.77
MAY 18...	--	--	--	.64	.02	.66	--	.26	--	--	--
JUL 06...	--	--	--	.64	.03	.67	--	.33	--	--	--
SEP 07...	6.3	298	265	.52	.02	.54	.44	.24	.31	.55	1.1

DATE	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 03...	--	.04	.03	--	--	--	--	--	--	--	.00
JAN 25...	--	.01	.01	--	--	--	--	--	--	--	.00
MAR 29...	3.4	.02	.00	--	--	--	20	--	20	--	.00
MAY 18...	--	.01	.00	--	--	--	--	--	--	--	.00
JUL 06...	--	.03	.00	--	--	--	--	--	--	--	.00
SEP 07...	4.8	.01	.00	2	1	0	80	2	10	<.5	.00

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI

LOCATION.--Lat 42°10'05", long 84°04'34", in NE¼ SE¼ sec.33, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, on left bank 8 ft (2 m) downstream from bridge on Sharon Valley Road, and 2.5 mi (4.0 km) northwest of Manchester.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 30, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by many dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 99.7 ft³/s (2.824 m³/s), 10.26 in/yr (261 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 565 ft³/s (16.0 m³/s) Mar. 5, 1976, gage height, 6.46 ft (1.969 m); minimum, 4.5 ft³/s (0.13 m³/s) Nov. 29, 1971; minimum gage height, 1.16 ft (0.354 m) Oct. 12, Nov. 4, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 280 ft³/s (7.93 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	2200	*420 11.9	*5.79 1.765	Apr. 15	0800	309 8.75	5.11 1.558

Minimum discharge, 5.6 ft³/s (0.16 m³/s) Nov. 4; minimum gage height, 1.16 ft (0.354 m) Oct. 12, Nov. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	35	63	165	59	66	224	174	85	71	31	48
2	25	42	63	179	59	70	220	162	84	76	109	46
3	25	40	76	185	58	104	208	183	77	68	142	43
4	26	31	117	140	57	318	191	203	70	72	138	40
5	21	11	117	122	57	393	195	196	66	93	146	38
6	14	37	112	106	57	346	220	182	63	97	141	36
7	34	39	102	99	58	323	207	169	62	90	118	34
8	32	34	115	92	58	273	203	153	61	83	102	32
9	31	36	121	88	58	264	233	145	60	87	89	29
10	25	35	106	83	59	261	248	135	43	102	83	26
11	27	31	111	79	59	257	260	126	34	98	76	25
12	18	53	99	76	59	269	260	127	43	92	68	24
13	25	60	89	73	59	235	251	126	45	85	62	21
14	26	59	86	71	58	243	273	122	44	77	58	18
15	28	60	77	69	58	241	298	116	45	69	52	22
16	30	54	76	67	59	214	264	102	43	67	43	21
17	33	56	73	66	60	204	238	95	36	58	44	20
18	36	74	73	65	62	198	218	74	31	53	66	22
19	33	69	70	64	64	207	205	70	30	48	79	24
20	34	62	69	63	66	202	189	71	27	44	76	21
21	31	56	72	62	69	196	179	67	30	41	77	22
22	32	54	79	61	71	188	173	64	82	37	75	22
23	28	68	73	60	73	182	145	58	68	36	72	13
24	43	89	70	59	74	184	143	66	28	38	69	7.0
25	39	84	70	59	73	179	150	97	23	34	65	12
26	40	71	67	59	71	169	163	111	22	32	61	15
27	33	68	69	60	68	156	170	107	13	32	55	16
28	34	71	80	60	65	146	170	101	12	26	53	18
29	35	65	71	60	---	156	172	95	15	21	52	16
30	39	72	63	60	---	208	173	93	31	32	50	15
31	38	---	87	60	---	228	---	91	---	26	47	---
TOTAL	943	1616	2616	2612	1748	6680	6243	3681	1373	1885	2399	746.0
MEAN	30.4	53.9	84.4	84.3	62.4	215	208	119	45.8	60.8	77.4	24.9
MAX	43	89	121	185	74	393	298	203	85	102	146	48
MIN	14	11	63	59	57	66	143	58	12	21	31	7.0
CFSM	.23	.41	.64	.64	.47	1.63	1.58	.90	.35	.46	.59	.19
IN.	.27	.46	.74	.74	.49	1.88	1.76	1.04	.39	.53	.68	.21
CAL YR 1978	TOTAL	32990.5	MEAN 90.4	MAX 406	MIN 9.5	CFSM .69	IN 9.30					
WTR YR 1979	TOTAL	32542.0	MEAN 89.2	MAX 393	MIN 7.0	CFSM .68	IN 9.17					

STREAMS TRIBUTARY TO LAKE ERIE

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04175610 RIVER RAISIN AT MANCHESTER, MI

LOCATION.--Lat 42°08'52", long 84°00'56", in SE¼ sec.1, T.4 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Austin Road, 1.0 mi (1.6 km) east of Manchester, 0.6 mi (1.0 km) downstream from Ford Dam, 5.3 mi (8.5 km) downstream from gaging station near Manchester, and 104 mi (167 km) upstream from mouth.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CACO3)
NOV 03...	1445	12.23	500	8.1	24.0	9.5	12.5	109	2.9	930	90	--
JAN 25...	1530	12.02	480	7.8	-3.0	.0	13.9	97	2.5	2100	150	--
MAR 24...	1055	11.37	440	8.3	15.0	6.0	12.0	99	.9	1200	<30	220
MAY 18...	1500	11.85	490	8.3	27.5	19.5	9.0	92	1.6	430	<30	--
JUL 06...	1410	11.05	475	8.1	25.5	20.5	8.9	96	2.6	110000	930	--
SEP 07...	1225	11.55	458	8.2	18.5	21.0	8.3	98	2.0	1100	<10	240

DATE	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 03...	--	--	--	--	--	270	0	220	3.4	--	--	--
JAN 25...	--	--	--	--	--	270	0	220	6.8	--	--	--
MAR 29...	29	59	17	8.6	1.6	220	0	180	1.8	39	19	.1
MAY 18...	--	--	--	--	--	240	0	200	1.9	--	--	--
JUL 06...	--	--	--	--	--	230	0	190	2.9	--	--	--
SEP 07...	37	64	20	9.9	1.5	250	0	210	2.5	28	23	.2

STREAMS TRIBUTARY TO LAKE ERIE
04175610 RIVER RAISIN AT MANCHESTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+N03 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV 03...	--	--	--	.36	.01	.37	--	.54	--	--	--
JAN 25...	--	--	--	.93	.01	.94	--	.83	--	--	--
MAR 29...	4.7	272	259	.51	.01	.52	.42	.33	.37	.41	.93
MAY 18...	--	--	--	.26	.02	.28	--	.32	--	--	--
JUL 06...	--	--	--	.51	.01	.52	--	.25	--	--	--
SEP 07...	7.6	317	279	.50	.02	.52	.38	.20	.48	.68	1.0

DATE	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 03...	--	.04	.03	--	--	--	--	--	--	--	.00
JAN 25...	--	.01	.00	--	--	--	--	--	--	--	.00
MAR 29...	3.7	.02	.02	--	--	--	20	--	20	--	.00
MAY 18...	--	.01	.01	--	--	--	--	--	--	--	.00
JUL 06...	--	.01	.00	--	--	--	--	--	--	--	.00
SEP 07...	4.6	.03	.01	2	1	0	30	0	10	<.5	.00

STREAMS TRIBUTARY TO LAKE ERIE

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04175700 RIVER RAISIN NEAR TECUMSEH, MI

LOCATION.--Lat 41°56'35", long 83°56'45", in NE¼ sec.21, T.6 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, on right bank 12 ft (4 m) downstream from former bridge site on North Raisin Center Highway, 3.4 mi (5.5 km) upstream from South Branch River Raisin, and 4.5 mi (7.2 km) south of Tecumseh.

DRAINAGE AREA.--267 mi² (692 km²).

PERIOD OF RECORD.--September 1956 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 707.0 ft (215.49 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant 5.5 mi (8.8 km) above station prior to June 27, 1968. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 179 ft³/s (5.069 m³/s), 9.10 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,920 ft³/s (82.7 m³/s) June 26, 1968, gage height, 12.66 ft (3.859 m); minimum, 6.4 ft³/s (0.18 m³/s) Aug. 26, 1964, gage height, 2.57 ft (0.783 m); minimum daily, 8.3 ft³/s (0.24 m³/s) Oct. 30, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 700 ft³/s (19.8 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 4	2100	*1320 37.4	*10.25 3.124	Apr. 15	0100	868 24.6	9.32 2.841

Minimum discharge, 19 ft³/s (0.54 m³/s) Sept. 19, gage height, 3.38 ft (1.030 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	85	127	225	116	130	492	324	157	95	87	90
2	52	88	126	249	116	170	441	304	151	109	145	87
3	58	99	138	327	115	427	409	329	144	114	194	86
4	63	89	179	250	115	983	379	420	139	151	203	83
5	68	87	216	220	115	1170	355	388	134	168	231	80
6	75	81	193	196	112	888	374	350	120	141	220	78
7	80	72	178	180	110	715	389	319	104	134	177	74
8	60	88	186	160	110	602	367	291	131	127	163	70
9	52	87	182	148	108	561	463	266	124	196	145	67
10	61	81	180	140	105	497	624	242	95	508	132	65
11	65	83	194	136	102	445	541	217	139	352	125	62
12	67	85	152	130	100	393	492	181	108	201	116	61
13	76	83	157	127	102	365	508	210	77	172	108	61
14	67	115	146	125	106	402	674	209	81	163	104	66
15	63	119	140	122	110	401	772	183	89	146	99	61
16	76	119	134	120	112	340	606	180	87	121	96	56
17	83	155	131	120	114	334	528	178	85	101	97	53
18	81	140	128	120	115	319	457	166	82	105	106	49
19	80	114	126	120	120	309	388	155	77	98	113	32
20	80	123	127	120	123	312	345	141	76	93	128	49
21	78	123	134	118	128	312	317	137	84	88	120	52
22	77	118	130	118	130	305	299	132	83	83	119	56
23	80	123	128	115	132	294	270	127	82	80	167	53
24	82	129	127	115	132	290	259	136	101	78	263	46
25	83	139	124	115	130	286	247	188	88	84	142	49
26	123	141	120	115	130	279	255	183	71	88	95	49
27	116	137	116	115	126	265	291	181	63	79	111	44
28	92	136	120	115	124	249	325	173	64	77	107	44
29	83	129	126	115	---	248	345	176	65	75	103	45
30	80	126	122	115	---	392	335	167	85	69	104	44
31	83	---	132	116	---	499	---	160	---	66	96	---
TOTAL	2339	3294	4519	4607	3258	13182	12547	6813	2986	4162	4216	1812
MEAN	75.5	110	146	149	116	425	418	220	99.5	134	136	60.4
MAX	123	155	216	327	132	1170	772	420	157	508	263	90
MIN	52	72	116	115	100	130	247	127	63	66	87	32
CFSM	.28	.41	.55	.56	.43	1.59	1.57	.82	.37	.50	.51	.23
IN.	.33	.46	.63	.64	.45	1.84	1.75	.95	.42	.58	.59	.25

CAL YR 1978	TOTAL	67604	MEAN	185	MAX	1240	MIN	41	CFSM	.69	IN	9.42
WTR YR 1979	TOTAL	63735	MEAN	175	MAX	1170	MIN	32	CFSM	.66	IN	8.88

STREAMS TRIBUTARY TO LAKE ERIE

04176365 SALINE RIVER ABOVE SALINE, MI

LOCATION.--Lat 42°10'16", long 83°49'32", in SW¼ sec.34, T.3 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Dell Road, 2.5 mi (4.0 km) east of Saline, 6.9 mi (11.1 km) upstream from gaging station near Saline, 33 mi (53 km) upstream from River Raisin.

DRAINAGE AREA.--46 mi² (119 km²), approximately.

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CAC03)
NOV 02...	1545	9.95	725	8.2	20.0	6.0	10.4	92	2.3	4600	70	--
JAN 24...	1630	10.24	700	7.2	1.5	.0	11.5	85	3.4	2400	90	--
MAR 29...	1230	10.12	750	8.2	16.0	8.0	11.3	93	3.5	1500	<30	410
MAY 17...	1640	10.24	750	8.3	22.0	16.0	9.4	99	1.7	430	<30	--
JUL 05...	1650	9.58	810	8.1	22.0	17.5	9.4	104	1.4	11000	930	--
SEP 05...	1340	9.96	777	8.2	26.0	19.5	10.2	117	1.0	1100	230	420

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 02...	--	--	--	--	--	340	0	280	3.4	--	--	--
JAN 24...	--	--	--	--	--	320	0	260	3.2	--	--	--
MAR 29...	200	120	26	10	2.9	260	0	210	2.6	170	29	.2
MAY 17...	--	--	--	--	--	300	0	250	2.4	--	--	--
JUL 05...	--	--	--	--	--	300	0	250	3.8	--	--	--
SEP 05...	140	120	28	9.8	2.6	340	0	280	3.4	120	24	.3

STREAMS TRIBUTARY TO LAKE ERIE

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04176365 SALINE RIVER ABOVE SALINE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV 02...	--	--	--	.06	.00	.06	--	.18	--	--	--
JAN 24...	--	--	--	.61	.00	.61	--	.86	--	--	--
MAR 29...	4.9	534	503	2.7	.02	2.7	2.6	.35	.55	.61	3.1
MAY 17...	--	--	--	1.6	.03	1.6	--	.25	--	--	--
JUL 05...	--	--	--	3.6	.05	3.7	--	.32	--	--	--
SEP 05...	13	575	487	.46	.02	.48	.39	.26	.36	.62	1.1

DATE	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 02...	--	.06	.02	--	--	--	--	--	--	--	.00
JAN 24...	--	.01	.01	--	--	--	--	--	--	--	.00
MAR 29...	14	.03	.02	--	--	--	30	--	80	--	.00
MAY 17...	--	.01	.01	--	--	--	--	--	--	--	.00
JUL 05...	--	.07	.06	--	--	--	--	--	--	--	.00
SEP 05...	4.9	.03	.02	1	3	0	70	0	60	<.5	.00

STREAMS TRIBUTARY TO LAKE ERIE

04176418 SALINE RIVER ABOVE MILAN, MI

LOCATION.--Lat 42°05'02", long 83°41'45", in SE¼ sec.34, T.4 S., R.6 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Platt Road, at Milan, 0.7 mi (1.1 km) upstream from dam at Milan, 9.9 mi (15.9 km) downstream from gaging station near Saline, and 16.2 mi (26.1 km) upstream from River Raisin.

DRAINAGE AREA.--112 mi² (290 km²), approximately.

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)
NOV 02...	1410	15.84	975	8.0	20.0	5.5	6.2	55	5.9	>240000	11000
JAN 24...	1530	15.88	890	7.8	4.5	.0	7.6	56	4.1	11000	40
MAR 27...	1555	15.70	820	7.8	5.5	4.0	12.6	100	3.9	4600	40
MAY 17...	1520	15.79	850	8.1	21.0	15.5	8.0	84	2.4	1500	40
JUL 05...	1550	14.90	775	7.9	22.5	19.5	5.7	63	3.3	4600	430
SEP 05...	1130	15.02	861	8.1	22.5	20.5	6.5	75	1.8	430	230

DATE	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)
NOV 02...	--	--	--	--	--	--	320	0	260	5.1
JAN 24...	--	--	--	--	--	--	320	0	260	8.1
MAR 27...	380	160	110	25	32	3.1	260	0	210	6.6
MAY 17...	--	--	--	--	--	--	300	0	250	3.8
JUL 05...	--	--	--	--	--	--	260	0	210	5.2
SEP 05...	380	140	110	26	36	3.9	290	0	240	3.7

DATE	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)
NOV 02...	--	--	--	--	--	--	2.5	.13	2.6	--
JAN 24...	--	--	--	--	--	--	1.9	.02	1.9	--
MAR 27...	150	54	.1	5.9	591	522	3.2	.04	3.2	3.1
MAY 17...	--	--	--	--	--	--	2.2	.11	2.3	--
JUL 05...	--	--	--	--	--	--	5.7	.07	5.8	--
SEP 05...	100	61	.3	12	567	503	2.4	.03	2.4	2.3

STREAMS TRIBUTARY TO LAKE ERIE

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04176418 SALINE RIVFR ABOVE MILAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO. TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)
NOV 02...	.60	--	--	--	--	.23	.23	--	--	--
JAN 24...	1.7	--	--	--	--	.32	.25	--	--	--
MAR 27...	.70	.76	1.0	4.2	19	.14	.07	--	--	--
MAY 17...	.42	--	--	--	--	.12	.10	--	--	--
JUL 05...	.38	--	--	--	--	.09	.06	--	--	--
SEP 05...	.19	1.0	1.2	3.6	16	.25	.12	2	3	<10

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	ZINC, DIS- SOLVED (UG/L AS ZN)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 02...	--	--	--	--	--	--	--	--	--	.00
JAN 24...	--	--	--	--	--	--	--	--	--	.00
MAR 27...	--	--	20	--	70	--	--	--	--	.00
MAY 17...	--	--	--	--	--	--	--	--	--	.00
JUL 05...	--	--	--	--	--	--	--	--	--	.00
SEP 05...	0	4	60	1	50	<.5	15	0	6	.00

STREAMS TRIBUTARY TO LAKE ERIE

04176500 RIVER RAISIN NEAR MONROE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi (1.3 km) downstream from bridge on Ida Maybee Road, 5.0 mi (8.0 km) downstream from Saline River, and 7.5 mi (12.1 km) west of Monroe.

DRAINAGE AREA.--1,042 mi² (2,699 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft (187.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1953, at site 9 mi (14 km) downstream at datum 46.26 ft (14.100 m) lower.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968.

AVERAGE DISCHARGE.--42 years, 695 ft³/s (19.68 m³/s), 9.06 in/yr (230 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,900 ft³/s (365 m³/s) May 19, 1945, Mar. 29, 1950; maximum gage height, 10.7 ft (3.26 m) Feb. 1, 1949, backwater from ice, site and datum then in use; minimum discharge, about 2 ft³/s (0.06 m³/s) Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
Mar. 5	0800	4200 119	6.70 2.042	Apr. 14	1900	*5850 166	*7.74 2.359

Minimum discharge, 95 ft³/s (2.69 m³/s) Oct. 5, gage height, 2.11 ft (0.643 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	158	238	350	230	340	2420	1130	585	1370	199	319
2	108	145	238	500	225	450	2470	1010	522	1170	243	283
3	119	143	280	640	220	1700	2480	1080	476	837	233	253
4	126	145	360	470	220	2930	2140	1350	441	735	363	235
5	103	149	425	400	220	3820	1790	1380	413	1230	622	237
6	112	155	400	365	220	3300	1970	1410	391	1160	614	232
7	124	156	380	335	215	2500	1860	1260	384	968	585	211
8	143	151	365	305	210	2100	1780	1070	359	703	554	197
9	150	149	360	285	210	1850	2850	888	320	572	466	188
10	151	143	350	265	200	1650	3000	754	328	1430	396	177
11	136	158	340	250	200	1520	2790	672	319	1450	334	173
12	126	143	320	245	195	1400	2930	625	303	1490	307	168
13	148	150	310	240	195	1330	2890	547	321	1470	265	169
14	162	178	290	235	200	1280	5080	501	298	1170	251	179
15	145	169	280	235	210	1220	4720	536	250	794	225	164
16	157	189	270	230	210	1220	4190	526	212	618	207	156
17	153	245	260	230	215	1160	3910	493	201	523	206	157
18	157	240	255	230	220	1010	3080	460	190	429	223	154
19	158	274	250	230	220	993	2290	458	187	340	284	145
20	154	305	255	230	220	1030	1660	433	190	298	569	136
21	143	263	260	230	225	1100	1280	403	190	259	757	129
22	137	235	260	230	230	1020	1090	362	235	240	711	118
23	137	240	255	230	235	1040	960	330	371	223	666	120
24	146	243	250	230	240	1020	864	330	332	254	1310	124
25	146	255	240	230	250	987	800	446	247	211	1110	132
26	149	260	225	230	250	904	816	825	218	218	986	133
27	154	263	215	230	270	802	888	1280	203	238	640	124
28	156	270	215	230	290	729	1010	1150	185	270	455	115
29	186	257	220	230	---	768	1200	912	170	227	396	109
30	183	249	235	230	---	2000	1210	740	457	199	365	107
31	168	---	265	230	---	2290	---	649	---	193	354	---
TOTAL	4443	6080	8866	8800	6245	45463	66418	24010	9298	21289	14896	5144
MEAN	143	203	286	284	223	1467	2214	775	310	687	481	171
MAX	186	305	425	640	290	3820	5080	1410	585	1490	1310	319
MIN	103	143	215	230	195	340	800	330	170	193	199	107
CFSM	.14	.20	.27	.27	.21	1.41	2.13	.74	.30	.66	.46	.16
IN.	.16	.22	.32	.31	.22	1.62	2.37	.86	.33	.76	.53	.18

CAL YR 1978	TOTAL	277977	MEAN 762	MAX	12000	MIN 82	CFSM .73	IN 9.92
WTR YR 1979	TOTAL	220952	MEAN 605	MAX	5080	MIN 103	CFSM .58	IN 7.89

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1978 to current year.

PERIOD OF DAILY RECORD (REVISED).--

SPECIFIC CONDUCTANCE: April 1978 to current year.

WATER TEMPERATURES: March 1966 to September 1972, April 1978 to current year.

SUSPENDED SEDIMENT DISCHARGE: March 1966 to September 1972.

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements by a local observer, between 1600 and 1900 hours. Depth-integrated monthly samples are collected as a cross-section sample at gaging station or at bridge .8 mi (1.3 km) upstream on Ida Maybee Road. Biological Data (Phytoplankton) is for the 1978 water year.

EXTREMES FOR PERIOD OF DAILY RECORD (REVISED).--

SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16, 1979; minimum daily, 334 micromhos, Mar. 4, 1979.

WATER TEMPERATURES: Maximum daily recorded (water years 1967, 1970-1972) 32.0°C July 18, 1972; minimum daily, 0.0°C on many days during winter periods.

SEDIMENT CONCENTRATIONS: Maximum daily 1,430 mg/l Dec. 22, 1967; minimum daily, 1 mg/l on several days in 1969 and 1970.

SEDIMENT LOADS: Maximum daily, 28,000 tons (25,400 tonnes), Dec. 22, 1967; minimum daily, 0.29 ton (0.26 tonne) Aug. 31, 1971.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16; minimum daily, 334 micromhos Mar. 4.

WATER TEMPERATURES: Maximum daily, 28.0°C Aug. 4; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
OCT											
16...	1515	158	916	8.8	10.5	15.6	141	K150	K360	370	140
NOV											
06...	1430	155	834	8.2	10.0	8.7	78	K60	140	400	160
DEC											
04...	1330	360	826	8.1	2.0	13.4	99	1300	1200	330	110
JAN											
05...	1200	400	703	7.6	.5	12.0	83	3200	K2700	300	120
FEB											
08...	1100	210	885	7.9	.0	9.3	65	K28	K6	400	140
MAR											
15...	1000	1170	561	8.1	.0	13.4	92	330	650	260	98
APR											
16...	1330	4210	503	7.6	8.0	10.3	88	700	6700	220	95
MAY											
22...	1330	352	738	8.5	20.5	11.4	127	K11	K61	340	97
JUN											
18...	1400	199	762	8.6	24.5	8.0	99	K58	5300	340	100
JUL											
17...	1620	463	637	8.2	24.5	11.8	141	--	--	290	89
AUG											
13...	1300	262	714	8.4	23.0	8.4	98	100	230	300	88
SEP											
11...	1400	176	742	8.7	20.5	11.4	127	2100	K61	370	110

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM AD- SORP- TION RATIO	SODIUM PERCENT	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)
OCT											
16...	110	24	40	.9	18	14	250	18	235	.6	160
NOV											
06...	120	25	30	.7	14	5.4	290	0	238	2.9	140
DEC											
04...	93	24	29	.7	16	4.1	270	0	221	3.4	110
JAN											
05...	86	21	19	.5	12	12	220	0	180	8.8	100
FEB											
08...	120	25	27	.6	13	3.1	320	0	262	6.4	140
MAR											
15...	77	17	14	.4	10	4.9	200	0	164	2.5	81
APR											
16...	66	13	7.9	.2	7	3.3	150	0	123	6.0	55
MAY											
22...	98	22	19	.5	11	6.3	270	10	238	1.5	120
JUN											
18...	97	23	26	.6	14	4.6	270	10	238	1.2	110
JUL											
17...	83	19	15	.4	10	9.1	240	0	197	2.4	74
AUG											
13...	89	20	20	.5	12	4.5	260	2	217	1.7	85
SEP											
11...	110	23	24	.5	12	3.6	290	12	258	1.0	100

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

STREAMS TRIBUTARY TO LAKE ERIE

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL)	FLUORIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)
OCT 16...	60	.3	4.4	541	554	231	.49	.14	--	1.4	1.5
NOV 06...	45	.3	4.6	751	513	314	.41	.07	--	.52	.59
DEC 04...	51	.2	6.5	477	451	464	1.9	.23	--	.50	.73
JAN 05...	45	.2	6.8	439	399	474	5.2	.42	--	.88	1.3
FEB 08...	48	.2	9.9	562	531	319	1.1	.81	--	.59	1.4
MAR 15...	33	.2	3.3	380	329	1200	4.4	.35	--	1.1	1.4
APR 16...	28	.2	7.0	331	255	3760	8.5	.10	--	1.4	1.5
MAY 22...	38	.3	1.3	508	448	483	1.2	.09	.11	.87	.96
JUN 18...	45	.3	5.4	514	454	276	.78	.12	.15	.98	1.1
JUL 17...	29	.2	8.2	624	356	780	4.4	.01	.01	1.2	1.2
AUG 13...	34	.3	10	443	393	313	1.4	.02	.02	1.1	1.1
SEP 11...	39	.3	8.1	470	465	223	.38	.09	.11	1.1	1.2

DATE	NITRO- GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS P04)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARRON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDE (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDE (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 16...	1.0	.50	2.0	8.8	.29	--	.15	--	16	6.8	100
NOV 06...	.00	.61	1.0	4.4	.13	--	--	5.0	26	11	100
DEC 04...	.06	.67	2.6	12	.14	--	.11	5.1	12	12	100
JAN 05...	--	--	6.5	29	.16	--	.09	--	60	65	100
FEB 08...	--	--	2.5	11	.22	--	.18	6.0	10	5.7	100
MAR 15...	--	--	5.8	26	.14	--	.08	8.9	31	98	100
APR 16...	--	--	10	44	.31	--	.06	--	218	2480	100
MAY 22...	--	--	2.2	9.6	.13	.40	.06	9.6	21	20	100
JUN 18...	--	--	1.9	8.3	.18	.55	.11	8.5	56	30	100
JUL 17...	--	--	5.6	25	.20	.61	.12	--	46	58	100
AUG 13...	--	--	2.5	11	.21	.64	.12	9.0	36	25	100
SEP 11...	--	--	1.6	7.0	.16	.49	.06	4.8	46	22	100

STREAMS TRIBUTARY TO LAKE ERIE
04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
OCT 16...	1515	1	1	0	0	0	0	<10	2	1
JAN 05...	1200	1	1	0	0	1	0	<10	0	1
APR 16...	1330	3	2	0	0	0	0	30	10	5
JUL 17...	1620	2	2	--	60	0	0	20	20	1

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
OCT 16...	1	6	3	280	50	7	5	40	0	<.5
JAN 05...	0	--	6	2000	70	5	--	60	40	<.5
APR 16...	0	15	5	11000	130	7	2	20	7	.5
JUL 17...	1	7	3	1400	0	11	1	80	10	<.5

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 16...	<.5	0	0	0	0	130	10	5.4	2.7
JAN 05...	<.5	1	0	0	0	40	10	8.4	.8
APR 16...	.5	0	0	0	0	70	20	7.8	.3
JUL 17...	<.5	0	0	1	1	40	1	8.9	1.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 06...	1430	21	--	16.8	18.6	24.9	.000
FEB 08...	1100	34	--	.160	.160	.190	.000
JUN 18...	1400	27	82.4	17.6	19.8	26.7	5.11

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 17,78 1000	MAY 15,78 1430	JUN 15,78 1200	JUL 11,78 1515	AUG 24,78 1100	SEP 21,78 1230				
TOTAL CELLS/ML	110	13000	24000	62000	22000	14000				
DIVERSITY: DIVISION	0.0	1.4	1.1	1.4	1.2	0.9				
..CLASS	0.0	1.4	1.2	1.4	1.2	0.9				
...ORDER	0.5	2.1	1.6	1.9	1.4	1.3				
...FAMILY	2.2	2.6	2.6	2.4	2.2	2.2				
...GENUS	2.2	2.9	0.0	2.8	3.1	2.8				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
..CHLOROPHYCEAE										
...CHLOROCOCCALES										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	1300	2	890	4	1000	7
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	3800#	16	1300	2	1000	7
....SORASTRUM	--	-	--	-	490	1	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	84	1	240	1	--	-	220	1
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	670	5	240	1	--	-	1700	7
....CHODATELLA	--	-	--	-	--	-	--	-	*	0
...DICTYOSPHAERIUM										
....FRANCEIA	--	-	1300	10	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	330	1	--	-
....NEPHROCITYIUM	--	-	84	1	*	0	--	-	890	4
...OOCYSTIS										
....RADIOCOCCUS	--	-	--	-	--	-	--	-	340	2
....TETRAEDRON	--	-	340	3	640	3	2600	4	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	440	2
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMUS										
....TETRASTRUM	--	-	1700	13	7200#	29	2000	3	9800#	44
...TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	480	2	--	-	--	-
...ULOTRICHIALES										
...ULOTRICHACEAE										
....ULOTHRIX	--	-	--	-	--	-	6700	11	--	-
...VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	800	3	--	-	--	-
...CHLAMYDOMONAS										
...ZYGNEMATALES										
...DESMIDIACEAE										
...CLOSTERIUM	--	-	420	3	--	-	--	-	330	1
CHRYSTOPHYTA										
..BACILLARIOPHYCEAE										
...CENTRALES										
...COSCINODISCAEAE										
...CYCLOTELLA	--	-	4800#	37	1900	8	6200	10	2200	10
...MELOSIRA	--	-	--	-	--	-	--	-	3300#	24
...STEPHANODISCUS	14	13	--	-	--	-	--	-	230	2
...PENNALES									670	3
...ACHNANTHACEAE									--	-
...ACHNANTHES	--	-	--	-	*	0	--	-	--	-
...COCCONEIS	27#	25	--	-	--	-	*	0	--	-
...FRAGILARIACEAE									--	-
...SYNEDRA	14	13	--	-	--	-	*	0	--	-
...NAVICULACEAE									--	-
...NAVICULA	41#	38	84	1	160	1	--	-	--	-
...NITZSCHITACEAE									170	1
...NITZSCHIA	14	13	1600	12	240	1	--	-	220	1
...SURIPELLACEAE									170	1
...SURIPELLA	--	-	500	4	--	-	--	-	--	-
...CHRYSTOPHYCEAE										
...CHRYSOMONADALES										
...OCHROMONADACEAE										
...DINOBRYON	--	-	--	-	240	1	--	-	--	-
...XANTHOPHYCEAE										
...HETEROCOCCALES										
...CHLOROTHECIACEAE										
...OPHIOCYTIUM	--	-	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)										
..CRYPTOPHYCEAE										
...CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
...CHROOMONAS	--	-	--	-	--	-	--	-	330	1
...CRYPTOMONADACEAE										
...CRYPTOMONAS	--	-	--	-	--	-	330	1	330	1

STREAMS TRIBUTARY TO LAKE ERIE
04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

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QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 17,78 1000		MAY 15,78 1430		JUN 15,78 1200		JUL 11,78 1515		AUG 24,78 1100		SEP 21,78 1230	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
..CYANOPHYCEAE												
...CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	--	-	920	7	4400#	18	26000#	41	890	4	--	-
EUGLENOPHYTA (EUGLENOIDS)												
..EUGLENOPHYCEAE												
...EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	*	0	220	1	*	0
....TRACHELOMONAS	--	-	340	3	--	-	--	-	330	1	--	-
PYRRHOPHYTA (FIRE ALGAE)												
..DINOPHYCEAE												
...GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	*	0	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE ERIE

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	856	757	743	648	899	705	661	683	764	649	676	695
2	1000	908	730	676	843	442	635	670	758	648	769	688
3	908	791	745	712	763	337	640	667	729	746	755	702
4	811	792	752	727	760	334	646	664	759	733	725	693
5	781	799	867	713	773	362	670	669	725	731	666	711
6	971	732	836	744	766	342	690	642	721	749	609	764
7	843	732	821	692	767	376	682	632	765	736	585	771
8	795	745	874	695	779	348	591	630	754	698	585	754
9	762	750	805	730	822	394	588	642	728	686	579	709
10	741	750	784	767	818	454	648	642	712	687	579	681
11	745	746	788	841	805	480	620	695	707	686	623	685
12	909	760	796	870	800	535	606	654	710	686	623	731
13	---	765	855	868	840	535	598	652	792	571	624	788
14	918	779	848	819	859	576	462	652	775	530	632	777
15	927	763	862	810	869	590	522	708	783	571	716	731
16	804	748	799	808	1020	640	522	714	750	590	712	745
17	729	777	765	810	894	584	522	700	748	585	726	732
18	720	819	764	909	894	674	554	667	698	649	727	739
19	926	755	771	825	855	604	601	695	706	664	696	737
20	945	735	758	805	889	671	631	662	821	676	595	838
21	946	732	869	807	858	674	635	710	819	649	595	856
22	862	713	869	801	864	646	645	727	840	642	598	809
23	778	747	798	792	835	666	658	738	768	670	519	809
24	771	751	782	788	879	658	681	718	698	679	519	793
25	753	688	776	792	728	676	654	743	675	736	583	770
26	874	706	776	782	755	664	658	703	750	683	631	707
27	964	719	776	847	761	668	682	748	750	687	555	752
28	798	719	797	790	793	661	698	752	801	667	633	759
29	820	782	799	734	---	681	691	761	804	667	677	736
30	798	800	501	757	---	672	691	752	650	667	701	733
31	757	---	750	876	---	690	---	761	---	678	678	---
MEAN		759	789	782	828	559	626	692	749	668	642	747

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19.0	11.0	4.0	.5	.0	2.0	6.0	13.0	19.0	19.0	24.0	25.0
2	17.0	13.0	3.5	.0	.0	2.0	7.0	14.5	20.0	20.0	26.0	24.5
3	27.0	13.0	3.0	.0	.0	10.0	8.0	13.0	21.0	21.0	27.0	25.0
4	25.5	15.0	.0	.0	.0	12.0	4.0	10.0	22.0	20.0	28.0	25.0
5	15.0	15.0	2.0	.0	.0	2.0	7.5	13.0	20.0	21.0	25.5	25.5
6	13.0	16.0	4.0	.0	.0	3.5	2.0	16.0	22.0	21.0	25.5	25.0
7	13.0	18.0	3.0	.0	.0	4.5	6.0	19.0	23.0	23.0	27.0	22.0
8	12.0	11.0	1.0	.0	.0	3.5	5.0	20.0	24.0	23.0	27.5	19.0
9	14.5	11.5	1.0	.0	.0	2.5	5.0	21.5	26.5	19.0	26.0	21.5
10	14.0	10.0	2.0	.0	.0	.5	5.0	24.0	22.0	19.5	26.0	23.0
11	15.0	12.0	1.0	.0	.0	.0	4.0	23.0	22.0	19.5	25.0	21.5
12	16.0	17.0	1.5	.0	.0	2.0	8.5	23.0	23.0	20.5	24.5	22.5
13	14.0	12.0	.0	.0	.0	5.0	10.0	18.5	22.0	24.0	26.0	22.0
14	14.0	8.0	1.0	.0	.0	2.0	12.0	19.0	25.0	25.5	24.0	18.0
15	12.0	8.0	2.5	.0	.0	1.0	11.0	18.0	26.0	26.0	23.0	21.0
16	10.0	8.0	3.5	.0	.0	4.0	16.0	18.0	25.0	25.0	22.0	22.0
17	11.5	9.5	1.0	.0	.0	6.0	12.0	18.5	27.5	25.5	18.5	22.5
18	13.0	6.0	3.0	.0	.0	6.0	11.5	20.0	22.5	26.0	22.0	22.0
19	12.0	9.0	1.0	.0	.0	4.0	12.0	20.0	24.0	24.0	22.5	21.0
20	16.0	4.5	.5	.0	.0	6.0	13.0	20.0	23.0	25.5	23.0	20.0
21	18.0	3.5	.0	.0	2.0	8.0	13.5	19.5	26.0	26.5	23.5	18.0
22	18.0	4.5	1.5	1.0	1.0	9.0	15.0	20.0	26.0	25.0	22.0	18.5
23	10.5	4.0	1.0	2.0	5.0	10.0	16.5	18.0	21.0	23.0	23.5	18.5
24	12.0	4.0	2.5	1.0	1.0	8.5	15.0	14.0	21.5	24.0	23.5	20.0
25	15.5	5.0	.0	.0	.0	3.0	17.0	10.0	21.0	25.0	22.0	20.5
26	12.0	2.5	1.0	1.0	.0	3.0	12.5	13.0	25.0	25.0	22.0	20.5
27	13.0	1.0	2.0	1.0	5.0	4.0	13.5	14.5	25.5	26.0	22.0	20.0
28	10.0	.0	1.0	.0	3.0	6.5	11.0	14.0	24.0	25.0	24.0	23.0
29	10.5	3.0	.0	.0	---	10.0	11.5	16.5	22.5	26.0	23.0	24.0
30	12.5	1.5	2.0	.0	---	10.5	10.5	14.5	20.0	26.0	26.0	24.0
31	13.0	---	2.0	.0	---	7.5	---	15.0	---	27.0	24.5	---
MEAN	14.5	8.5	1.5	.0	.5	5.0	10.0	17.0	23.0	23.5	24.0	22.0
WTR YR 1979	MEAN	12.5		MAX	28.0		MIN	.0				

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited stream-flow data at sites other than stream-gaging stations. When limited stream-flow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are useable in low-flow or floodway analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1979

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Measurements Discharge (ft ³ /s)
Streams tributary to Lake Superior						
04040315	Little Gratiot River near Lac Labelle, MI	Lat 47°22'04", long 88°02'16", in SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 6, T.57 N., R.29 W., Keweenaw County, 700 ft downstream from mouth of Deer Creek, 1 mile upstream from Lac Labelle, and 1.6 miles southwest of the village of Lac Labelle.	a25	1979	07-11-79 09-14-79	5.91 16.9
04044559	Peterson Creek near Sands, MI	Lat 46°24'21" long 87°20'38", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T.46 N., R.24 W., Marquette County, 150 ft downstream from old bridge crossing, 500 ft upstream from mouth and 3.2 miles southeast of Sands.	7.24	1979	08-07-79 08-07-79	2.97 3.06
04044560	Big Creek near Sands, MI	Lat 46°24'43", long 87°19'57", in NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 5, T.46 N., R.24 W., Marquette County, at abandoned road crossing 0.7 mile downstream from mouth of Peterson Creek and 3.6 miles east of Sands.	14.4	1979	08-07-79	13.9
04044567	Big Creek near Beaver Grove, MI	Lat 46°27'55", long 87°19'07", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 16, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 1 mile upstream from mouth and 0.2 mile northwest of Beaver Grove.	24.0	1979	08-07-79	42.0
04044570	Cedar Creek near Sands, MI	Lat 46°26'11", long 87°24'20", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 26, T.47 N., R.25 W., Marquette County, at headwaters, 0.3 mile east of old County Road 553 and 1.2 miles north of Sands.	5.44	1979	08-07-79	.23
04044577	Cedar Creek near Beaver Grove, MI	Lat 46°28'23", long 87°19'46", in SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 17, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.7 mile upstream from mouth and 0.9 mile northwest of Beaver Grove.	10.6	1979	08-07-79	20.0
04044581	Cherry Creek near Sands, MI	Lat 46°27'47", long 87°23'31", in NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 23, T.47 N., R.25 W., Marquette County, about 600 ft north of County Road 480 and 3.1 miles northeast of Sands.	.33	1979	08-07-79	5.88
04044583	Cherry Creek near Harvey, MI	Lat 46°27'57", long 87°21'53", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.13, T.47 N., R.25 W., Marquette County, 0.5 mile upstream from County Highway 551 and 2.0 miles south of Harvey.	4.53	1966-70† 1971-79	11-21-78 05-23-79	18.8 20.9
04044586	Cherry Creek near Beaver Grove, MI	Lat 46°28'45", long 87°20'18", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.8 mile upstream from mouth and 1.5 miles northwest of Beaver Grove.	5.07	1979	08-07-79	26.8
04044592	Silver Creek near Sands, MI	Lat 46°28'48", long 87°23'07", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 12, T.47 N., R.25 W., Marquette County, at double culvert on Silver Creek Road, 1.7 miles southwest of Harvey and 4.3 miles northwest of Sands.	4.88	1979	08-07-79	2.46
04044597	Silver Creek near Harvey, MI	Lat 46°29'22", long 87°20'16", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T.47 N., R.24 W., Marquette County, at bridge on Lake Superior and Ishpeming Railroad, 300 ft northwest of overpass on State Highway 28 and 0.9 mile southeast of Harvey.	10.8	1979	08-07-79	8.85

See footnotes at end of the table

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at low-flow partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Measurements Discharge Date (ft ³ /s)
Streams tributary to Lake Superior--Continued					
04044744	Munising Falls Creek at Munising, MI	Lat 46°25'28", long 86°37'27", in NW¼SE¼ sec. 36, T.47 N., R.19 W., Alger County, at culvert, 0.3 mile upstream from mouth, at Munising.		1979	06-04-79 4.19 08-27-79 1.28
04044750	Miners River near Van Meer, MI	Lat 46°25'12", long 86°31'23", in SE¼NW¼ sec. 35, T.47 N., R.18 W., Alger County, at culvert on County Road H-58, 2.5 miles west of Van Meer.		1979	06-04-79 28.0 08-27-79 5.44
04044755	Miners River near Munising, MI	Lat 46°29'18", long 86°32'26", in SW¼NE¼ sec. 10, T.47 N., R.18 W., Alger County, at bridge on Pictured Rocks Trail road about 1 mile up- stream from mouth and 7.5 miles northeast of Munising.		1979	06-04-79 78.9 08-27-79 17.5
04044762	Mosquito River near Melstrand, MI	Lat 46°31'07", long 86°28'41", in NW¼NE¼ sec. 31, T.48 N., R.17 W., Alger County, 150 ft downstream from confluence with tributary from west, downstream from Mosquito Falls and 4.7 miles northwest of Melstrand.		1979	06-06-79 39.4 08-28-79 7.00
04044765	Chapel Creek near Melstrand, MI	Lat 46°32'54", long 86°26'20", in NE¼NW¼ sec. 21, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6 miles north of Melstrand.		1979	08-28-79 4.33
04044766	Spray Creek near Melstrand, MI	Lat 46°33'27", long 86°24'38", in SE¼NE¼ sec. 15, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6.5 miles north of Melstrand.		1979	08-28-79 4.96
04044770	Beaver Creek near Melstrand, MI	Lat 46°34'39", long 86°21'02", in NE¼NE¼ sec. 7, T.48 N., R.16 W., Alger County, 0.7 mile downstream from Beaver Lake, 200 ft upstream from mouth and 8 miles northeast of Melstrand.		1979	08-28-79 26.1
04044775	Sevenmile Creek near Grand Marais, MI	Lat 46°37'15", long 86°15'31", in NW¼NW¼ sec. 25, T.49 N., R.16 W., Alger County, 100 ft upstream from mouth and 13.5 miles west of Grand Marais.		1979	06-06-79 21.3 08-28-79 17.2
04044782	Sullivan Creek near Grand Marais, MI	Lat 46°39'19", long 86°11'02", in NW¼SE¼ sec. 9, T.49 N., R.15 W., Alger County, at culvert 200 ft upstream from mouth on County Road H-58 and 9.5 miles west of Grand Marais.		1979	06-05-79 7.36 08-29-79 4.01
04044785	Hurricane River near Grand Marais, MI	Lat 46°39'48", long 86°09'57", in NW¼NE¼ sec. 10, T.49 N., R.15 W., Alger County, at culvert 0.2 mile upstream from mouth, on County Road H-58 and 8.5 miles west of Grand Marais.		1979	06-05-79 27.5 08-29-79 13.4
04044786	Sable Creek near Grand Marais, MI	Lat 46°40'03", long 86°01'01", in SW¼SE¼ sec. 2, T.49 N., R.14 W., Alger County, 150 ft up- stream from path leading to Sable Falls and 1.5 miles southwest of Grand Marais.		1979	06-05-79 29.1 08-29-79 2.75
Streams tributary to Lake Michigan					
04057400	Round Lake Outlet near Trenary, MI	Lat 46°09'42", long 86°44'51", in SW¼ sec. 36, T.44 N., R.20 W., Alger County, at culvert on county road at outlet of Round Lake, 5 miles west of FFH 13, and 11 miles southeast of Trenary.	5.50	1978-79	11-21-78 5.17 07-02-79 7.24 08-22-79 3.98
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼NW¼ sec. 10, T.41 N., R.21 W., Delta County, about 800 ft downstream from Chippeny Creek, 3.5 miles northeast of Rapid River.	284	1973-79	10-10-78 b617 07-02-79 267 08-22-79 115
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec. 19, T.46 N., R.26 W., Marquette County, at bridge on County Highway 565, 4.5 miles south of Palmer.	c8.42	1961-65 1970-79	01-11-79 b18.6 02-20-79 b22.6 03-20-79 b29.2 07-11-79 b25.0 08-01-79 b43.1
04058250	Warner Creek tributary near Palmer, MI	Lat 46°25'20", long 87°36'09", in NW¼SE¼ sec. 31, T.47 N., R.26 W., Marquette County, at double culvert on County Road 565, 0.3 mile upstream from mouth and 0.8 mile south of Palmer.	4.05	1972-79	10-11-78 b3.02 11-08-78 b2.76 01-11-79 b1.50 01-30-79 b1.20 02-20-79 b1.21 03-20-79 b2.03 05-07-79 b3.19 06-13-79 b4.22 07-11-79 b1.82 08-01-79 b5.40 08-29-79 b2.82 09-25-79 b1.55

See footnotes at end of the table

Discharge measurements made at low-flow partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Measurements	
					Date	Discharge (ft ³ /s)
Streams tributary to Lake Michigan--Continued						
04058300	Warner Creek near Palmer, MI	Lat 46°24'09", long 87°32'39", in NW¼ sec. 10, T.46 N., R.26 W., Marquette County, 10 ft up- stream from bridge on county highway, 0.1 mile upstream from confluence with Schweitzer Creek, and 3.5 miles southeast of Palmer.	14.2	1961-68† 1970-72d 1972-78† 1979	11-06-78	10.7
					08-07-79	14.8
					09-12-79	16.4
04065580	Mouny's Creek near Merriman, MI	Lat 45°56'41", long 87°59'23", in SW¼SW¼ sec. 18, T.41 N., R.29 W., Dickinson County, 400 ft upstream from mouth, and 3.6 miles northeast of Merriman.	2.96	1971-79	03-13-79	6.06
					05-09-79	b45.9
					07-17-79	4.05
					09-19-79	3.77
04065590	Steel Creek near Merriman, MI	Lat 45°56'31", long 87°59'33", in NE¼NE¼ sec. 24, T.41 N., R.30 W., Dickinson County, 200 ft upstream from mouth, 3.6 miles northeast of Merriman.	3.52	1971-79	03-13-79	1.26
					05-09-79	b14.5
					07-17-79	.94
					09-19-79	1.11
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼SW¼ sec. 7, T.6 S., R.4 W., Hillsdale County, at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-79	07-07-79	1.64
					07-10-79	1.70
					07-26-79	1.76
04115450	Fish Creek at Carson City, MI	Lat 43°10'40", long 84°51'24", in SW¼ sec. 12, T.9 N., R.5 W., Montcalm County, on downstream side of footbridge in park, 300 ft upstream of bridge on State Highway 57, at Carson City.	126	1974-79	11-14-78	b63.0
					06-19-79	47.1
					07-16-79	31.4
					08-15-79	30.0
04119061	Plaster Creek at Wyoming, MI	Lat 42°56'15", long 85°41'24", NE¼ sec. 2, T.6 N., R.12 W., Kent County, at Godfrey St., at Wyoming.	57.1	1974-79	06-05-79	23.7
					07-12-79	20.5
					08-14-79	18.1
					09-19-79	15.2
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼NW¼ sec. 1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	a39	1974-79	10-11-78	53.0
					11-15-78	46.4
					03-08-79	b218
					09-18-79	27.6
*04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE¼NE¼ sec. 31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75† 1978-79	03-20-79	b358
					08-14-79	184
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼NW¼ sec. 2, T.25 N., R.15 W., Benzie County, at bridge on highway U.S.31, 1.2 miles south of Benzonia, and 1.4 miles downstream from Homestead Dam.	a170	1974-79	03-22-79	b583
					08-16-79	214
					09-27-79	164
04126610	Crystal Lake Outlet near Benzonia, MI	Lat 44°37'56", long 86°08'41", in NW¼NE¼ sec. 29, T.26 N., R.15 W., Benzie County, at culvert on State Highway 115, 0.3 mile downstream from dam at outlet of Crystal Lake, and 2.5 miles west of Benzonia.	a32	1974-79	09-27-79	.68
04126755	Platte River at M-22 near Honor, MI	Lat 44°42'39", long 86°07'08", in NE¼SE¼ sec. 28, T.27 N., R.15 W., Benzie County, at bridge on State Highway 22, 0.4 mile down- stream from Platte Lake and 6.2 miles northwest of Honor.	166	1979	05-09-79	b283
					08-14-79	179
04126758	Platte River at Weir on Loon Lake Outlet near Honor, MI	Lat 44°43'12", long 86°08'12", in SW¼SW¼ sec. 21, T.27 N., R.15 W., Benzie County, at Department of Natural Resources fish weir, 0.6 mile downstream of Loon Lake and 7.2 miles northwest of Honor.	169	1979	05-09-79	b307
					08-14-79	186
04126767	Otter Creek at Aral Road near Empire, MI	Lat 44°45'42", long 86°04'26", in SW¼SW¼ sec. 1, T.27 N., R.15 W., Benzie County, at culverts on Aral Road, 0.1 mile up- stream from mouth and 3.5 miles south of Empire.	9.55	1979	05-09-79	21.6
					08-17-79	21.1
04126802	Crystal River near Glen Arbor, MI	Lat 44°54'10", long 85°57'46", in SE¼NE¼ sec. 23, T.29 N., R.14 W., Leelanau County, at culverts on County Highway 675, 3.7 miles upstream from mouth and 1.4 miles east of Glen Arbor.	42.0	1979	05-10-79	b92.0
					08-16-79	49.4
04126810	Shalda Creek near Glen Arbor, MI	Lat 44°56'48", long 85°53'07", in SE¼NW¼ sec. 4, T.29 N., R.13 W., Leelanau County, at culverts on Lake Michigan Road, 0.1 mile upstream from mouth and 6.2 miles north- east of Glen Arbor.	33.8	1979	05-10-79	b54.9
					08-16-79	20.9

See footnotes at end of the table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at low-flow partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Measurements Discharge Date (ft ³ /s)
Streams tributary to Lake Huron					
04145930	South Branch Flint River near Lapeer, MI	Lat 43°02'35", long 83°17'04", in NW¼ sec. 10, T.7 N., R.10 E., Lapeer County, at Morris Rd., 0.2 mile south of State Highway 21 and 1.5 miles southeast of Lapeer.	77.8	1973-79	05-09-79 b53.5 06-11-79 48.3 07-18-79 14.8 08-13-79 25.8
Streams tributary to St. Clair River					
*04159900	Mill Creek near Avoca, MI	Lat 43°03'16", long 82°44'05", in NW¼ sec. 8, T.7 N., R.15 E., St. Clair County, at Bricker Road, 0.2 mile upstream from Gleason Drain, and 2.3 miles west of Avoca.	169	1963-75† 1976-79d 1979	07-16-79 28.9 08-27-79 5.89
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec. 9, T.5 N., R.16 E., St. Clair County, at bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-79	10-11-78 1.31 11-15-78 2.66 07-16-79 b24.4 09-26-79 .59
Streams tributary to Lake St. Clair					
04161585	Stony Creek near Goodison, MI	Lat 42°45'49", long 83°04'28", in SW¼ sec. 17, T.4 N., R.12 E., Macomb County, at Inwood Road, 5.2 miles northeast of Goodison.	34.6	1972-79	11-16-78 14.5 06-14-79 23.8 07-18-79 12.1 08-28-79 14.1

* Also a crest-stage station.

† Operated as a continuous-record gaging station.

a Approximately.

b Not base flow.

c Since 1970, affected by diversion for industrial use.

d Operated as a crest-stage partial-record station.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1979

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Annual maximum Gage height (feet)	Dis-charge (ft ³ /s)
Streams tributary to Lake Superior							
04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec.23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73+, 1974-79	04-24-79	11.92	2,960
04039500	South Branch Ontonagon River at Ewen, MI	Lat 46°31'58", long 89°16'37", in NW¼ sec.26, T.48 N., R.40 W., Ontonagon County, on piers of old State Highway 28 bridge, at Ewen.	348	1939-41, 1942-71+, 1972-79	04-23-79	17.18	5,480
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15+, 1957-79	04-26-79	10.22	790
04042500	Otter River near Elo, MI	Lat 46°50'09", long 88°38'12", in NE¼ NE¼ sec.8, T.51 N., R.34 W., Houghton County, 50 feet upstream from highway bridge, 1.6 miles north of Pelkie, 2.5 miles south of Elo, and 5.5 miles upstream from Otter Lake.	162	1943-72+, 1973-79	04-26-79	9.70	3,420
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, at bridge on Highway 41A, at Ishpeming.	16.5	1970-79	04-26-79	7.92	164
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-79	04-27-79	14.92	2,550
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, at bridge on county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-79	04-26-79	8.79	956
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, at bridge on county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	31.9	1973-79	04-26-79	12.75	824
Streams tributary to Lake Michigan							
04046000	Black River near Garnet, MI	Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, on right bank 10 ft upstream from foot bridge, 15 ft downstream from Peters Creek, 3.5 miles upstream from Lake Michigan and 4 miles southwest of Garnet.	28.0	1951-78+, 1979	04-26-79	6.12	397
04049500	Manistique River at Germfask, MI	Lat 46°14'00", long 85°55'40", in SE¼ sec.4, T.44 N., R.13 W., Schoolcraft County, 600 feet upstream from bridge on State Highway 77, 1.0 mile south of Germfask.	341	1938-70+, 1971-79	04-18-79	6.32	1,540
04055000	Manistique River near Blaney, MI	Lat 46°05'05", long 86°03'35", in SE¼ sec.28, T.43 N., R.14 W., Schoolcraft County, 40 feet downstream from logging bridge, 0.5 mile downstream from Duck Creek, and 7 miles southwest of Blaney.	704	1938-70+, 1971-79	04-19-79	17.87	4,790
04057000	Indian River near Manistique, MI	Lat 45°59'30", long 86°17'15", in NE¼ sec.34, T.42 N., R.16 W., Schoolcraft County, near outlet of Indian Lake, 2.4 miles northwest of Manistique.	302	1938-71+, 1972-79	04-28-79	6.27	1,150

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of Record	Date	Annual maximum Gage height (feet)	Dis-charge (ft ³ /s)
Streams tributary to Lake Michigan--Continued							
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, at bridge on county road, 4.4 miles east of Republic.	34.4	1961-68†, 1970-79	04-25-79	5.07	605
04059400	Ten mile Creek at Perronville, MI	Lat 45°48'38", long 87°22'00", in NW¼ NW¼ sec.2, T.39 N., R.25 W., Delta County, 1 mile northwest of Perronville.	38.4	1971-77†, 1978-79	04-26-79	b5.43	775
04062200	Peshekee River near Champion, MI	Lat 46°33'25", long 88°00'09", in NW¼ sec.13, T.48 N., R.30 W., Marquette County, on left bank 10 ft downstream from bridge on County Road 607, 0.6 mile downstream from West Branch and 3.5 miles northwest of Champion.	133	1961-78†, 1979	04-26-79	7.73	3,400
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec.18, T.46 N., R.29 W., Marquette County, on left bank 400 feet upstream from county highway bridge, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75†, 1976-79	04-29-79	7.64	3,580
04096020	Galien River near Union Pier, MI	Lat 41°49'39", long 86°39'21", in NE¼ sec.32, T.7 S., R.20 W., Berrien County, on downstream side of bridge on Union Pier Road, 1.5 miles east of Union Pier.	86.1	1973-79	03-05-79	c12.08	q
04096272	Beebe Creek near Hillsdale, MI	Lat 41°57'15", long 84°38'20", in NE¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, 20 ft upstream from bridge on Moore Road, 1.2 miles northwest of Hillsdale.	42.4	1975-78†, 1979	03-05-79	6.44	368
04096312	Sand Creek at Litchfield, MI	Lat 42°01'45", long 84°46'47", in NE¼ NW¼ sec.21, T.5 S., R.4 W., Hillsdale County, on right bank 20 ft upstream from bridge on Herring Road, 1.0 mile southwest of Litchfield.	20.6	1975-77†, 1978-79	03-05-79	3.99	97
04096340	St. Joseph River at Clarendon, MI	Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, on left bank 5 ft upstream from bridge on 22 Mile Road at Clarendon.	144	1975-77†, 1978-79	03-05-79	7.17	608
04097060	Little Portage Creek near Fulton, MI	Lat 42°05'19", long 85°23'29", in SW¼ sec.29, T.4 S., R.9 W., Kalamazoo County, at bridge on 38th Street, 2.8 miles southwest of Fulton.	27.0	1965-67†, 1972-79	03-06-79	6.65	460
04097370	Flowerfield Creek at Flowerfield, MI	Lat 42°03'50", long 85°39'44", in SW¼ sec.1, T.5 S., R.12 W., St. Joseph County, at Flowerfield Road, at Flowerfield.	42.6	1964-79	03-05-79	1.82	71
04098500	Fawn River near White Pigeon, MI	Lat 41°46'56", long 85°35'00", in SW¼ sec.10, T.8 S., R.11 W., St. Joseph County, on right bank 0.3 mile downstream from bridge on county highway, 3.1 miles east of White Pigeon, and 3.5 miles upstream from Sherman Mill Creek.	192	1958-75†, 1976-79	03-06-79	4.52	554
04102000	St. Joseph River at Berrien Springs, MI	Lat 41°56'56", long 86°20'02", in SW¼ sec.18, T.6 S., R.17 W., Berrien County, at bridge on U.S. Highway 33, at Berrien Springs, and at mile 24.	4,081	1902-06†, 1909-31†, 1951-56†, 1979	03-06-79	12.07	d16,000
04108645	Rabbit River at Hamilton, MI	Lat 42°40'31", long 86°00'13", in NE¼ sec.6, T.3 N., R.14 W., Allegan County, at bridge on State Highway 40, at Hamilton.	274	1979	03-05-79	17.06	2,600
04112700	Sycamore Creek near Mason, MI	Lat 42°36'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, at bridge on Harper Road, 0.7 mile downstream from Aurelius and VeVoy Drain, and 2.6 miles northwest of Mason.	39.5	1975-79	03-05-79	10.74	540
04113090	Carrier Creek near Grand Ledge MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, at bridge on St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles south-east of Grand Ledge.	7.18	1975-79	03-05-79	6.17	165

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

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Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Annual maximum Gage height (feet)	Dis-charge (ft ³ /s)
Streams tributary to Lake Michigan--Continued							
04117000	Quaker Brook near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW $\frac{1}{4}$ sec.13, T.2 N., R.7 W., Barry County, on left bank 150 feet upstream from culvert on county road, 500 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75 \pm , 1976-79	03-04-79	6.40	266
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE $\frac{1}{4}$ sec.7, T.6 N., R.11 W., Kent County, on right downstream side of bridge on 28th Street, at Grand Rapids.	46.6	1974-79	03-04-79	e	d1,700
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE $\frac{1}{4}$ sec.18, T.6 N., R.12 W., Kent County, on right downstream side of bridge on Wilson Avenue, at Grandville.	50.5	1974-79	03-04-79	9.52	920
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon.	e39	1974-79	03-08-79	3.52	218
04122025	Muskegon River at Bridgeton, MI	Lat 43°20'50", long 85°56'22", in SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.14, T.11 N., R.14 W., Newaygo County, at bridge on Warner Road, in Bridgeton.	--	1979	04-02-79	13.98	6,060
04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.5, T.15 N., R.17 W., Oceana County, at culverts on county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	e78	1975-79	04-02-79	4.43	372
04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.8, T.16 N., R.17 W., Oceana County, at bridge on U.S. Highway 31, 3.5 miles northeast of Pentwater.	e44	1975-79	04-02-79	3.13	304
04123500	Manistee River near Grayling, MI	Lat 44°41'35", long 84°50'50", in SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.31, T.27 N., R.4 W., Crawford County, on right bank 25 feet upstream from bridge on State Highway 72, 6.8 miles northwest of Grayling.	131	1942-73 \pm , 1974-79	04-27-79	1.36	300
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°31'02", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.28, T.20 N., R.10 W., Osceola County, 75 feet downstream from highway bridge, 3.0 miles west of Tustin.	e63	1953-63 \pm , 1964-79	03-31-79	5.13	460
*04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile Bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75 \pm , 1976-79	04-02-79	3.77	592
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.2, T.25 N., R.15 W., Benzie County, at bridge on U.S. Highway 31, 1.2 miles south of Benzonia.	e170	1975-79	03-31-79	5.11	1,120
04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.5, T.32 N., R.5 W., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	e65	1975-79	03-31-79	4.15	750
Streams tributary to Lake Huron							
04132500 *	Thunder Bay River near Hillman, MI	Lat 45°00'30", long 83°58'21", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.8, T.30 N., R.4 E., Montmorency County, on left bank 25 feet upstream from bridge on State Highway 32, 5.2 miles southwest of Hillman.	232	1946-72 \pm , 1973-79	03-20-79	8.23	819

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued.

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Annual maximum Gage height (feet)	Dis-charge (ft ³ /s)
Streams tributary to Lake Huron--Continued							
04138000	East Branch Au Gres River at McIvor, MI	Lat 44°13'57", long 83°42'03", in NW¼ NW¼ sec.10, T.21 N., R.6 E., Iosco County, on right bank 25 feet downstream from bridge on Whittemore Road at McIvor, and 11.5 miles upstream from mouth.	e84	1950-73‡, 1974-79	03-19-79	c6.47	330
04138700	Bixby Creek near Rose City, MI	Lat 44°26'06", long 84°07'16", in NE¼ NW¼ sec.31, T.24 N., R.3 E., Ogemaw County, at bridge on State Highway 33, 0.9 mile north of Rose City.	2.68	1953-79	03-30-79	3.09	60
04139000	Houghton Creek near Lupton, MI	Lat 44°23'45", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, 2.7 miles southwest of Lupton.	29.7	1950-72‡, 1973-79	03-30-79	4.96	256
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'46", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, at bridge on Campbell Road, 4.0 miles northwest of Selkirk.	7.51	1953-79	03-30-79	2.10	109
04141000	South Branch Shepards Creek near Selkirk, MI	Lat 44°18'28", long 84°05'13", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County, on right bank 200 feet upstream from mouth, 600 feet west of bridge on Bedtelyon Road, and 1.1 miles southwest of Selkirk.	1.15	1951-78‡, 1979	03-30-79	3.56	71
04144180	Jones Creek near Gaines, MI	Lat 42°53'02", long 83°52'27", in SE¼ sec.28, T.6 N., R.5 E., Genesee County, at bridge on Baldwin Road, 1.7 miles northeast of Gaines.	7.60	1970-79	03-04-79	7.42	118
04144200	Porter Drain near Gaines, MI	Lat 42°53'26", long 83°50'59", in SE¼ sec.27, T.6 N., R.5 E., Genesee County, at bridge on Seymour Road, 3.2 miles east of Gaines.	4.68	1970-79	03-04-79	4.78	90
04144220	Jones Creek at Duffield, MI	Lat 42°54'45", long 83°54'27", in SE¼ sec.17, T.6 N., R.5 E., Genesee County, at bridge on Grand Blanc Road, 1.0 mile south of Duffield.	23.4	1970-79	03-04-79	8.84	475
04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SE¼ sec.29, T.8 N., R.10 E., Lapeer County, on downstream right wingwall of bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-79	03-04-79	7.66	615
04147800	Powers-Cullen Drain near Genesee, MI	Lat 43°05'33", long 83°33'31", in SW¼ sec.18, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.3 miles southeast of Genesee.	9.17	1970-79	03-04-79	c4.25	d230
04147900	Lefler-Scothan Drain near Otisville, MI	Lat 43°08'11", long 83°32'27", in NE¼ sec.5, T.8 N., R.8 E., Genesee County, at bridge on Frances Road, 2.2 miles south of Otisville.	4.90	1970-79	03-04-79	4.73	76
04148120	Kearsley Creek near Atlas, MI	Lat 42°57'15", long 83°32'42", in NE¼ sec.5, T.6 N., R.8 E., Genesee County, at bridge on Jordan Road, 1.2 miles north of Atlas.	55.6	1970-79	03-04-79	7.00	295
04148139	Black Creek near Davison, MI	Lat 43°01'28", long 83°33'24", in SE¼ sec.7, T.7 N., R.8 E., Genesee County, at bridge on Irish Road, 2.0 miles west of Davison.	22.8	1970-79	03-04-79	c6.63	d240
04148144	Chipmunk Creek near Genesee, MI	Lat 43°04'01", long 83°36'59", in SE¼ sec.27, T.8 N., R.7 E., Genesee County, at bridge on Genesee Road, 3.1 miles south of Genesee.	5.49	1970-79	03-04-79	4.26	125
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec.15, T.5 N., R.7 E., Oakland County, on right bank 25 feet downstream from bridge on Elliot Road, 2.4 miles north of Holly.	12.1	1956-75‡, 1976-79	03-04-79	f2.67	34
04148255	Swartz Creek near Grand Blanc, MI	Lat 42°53'09", long 83°41'29", in SE¼ sec.25, T.6 N., R.6 E., Genesee County, at bridge on Baldwin Road, 4.1 miles southwest of Grand Blanc.	36.0	1970-79	03-04-79	4.16	70

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

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Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Annual maximum Gage height (feet)	Dis- charge (ft ³ /s)
Streams tributary to Lake Huron--Continued							
04148260	Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°45'43", in SW ¹ / ₄ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.9 miles east of Swartz Creek.	67.3	1970-79	03-04-79	7.50	610
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE ¹ / ₄ sec.14, T.6 N., R.5 E., Genesee County, at bridge on Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-79	03-04-79	8.03	250
04148270	West Branch Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°46'08", in SW ¹ / ₄ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.2 miles east of Swartz Creek.	40.6	1970-79	03-04-79	8.33	730
04148410	Thread Creek near Goodrich, MI	Lat 42°53'19", long 83°32'10", in SE ¹ / ₄ sec.29, T.6 N., R.8 E., Genesee County, at bridge on Baldwin Road, 2.4 miles southwest of Goodrich.	28.8	1970-79	03-04-79	4.65	203
04148610	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW ¹ / ₄ sec.35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing.	8.51	1970-79	03-04-79	6.39	220
04148620	Freeman Drain near Montrose, MI	Lat 43°07'04", long 83°53'37", in SE ¹ / ₄ sec.5, T.8 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose.	8.21	1970-79	03-04-79	c6.86	d140
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE ¹ / ₄ sec.35, T.9 N., R.5 E., Genesee County, at bridge on Morrish Road, 4.1 miles southeast of Montrose.	11.9	1970-79	03-04-79	6.09	270
04148740	Central-Stadler Drain near Montrose, MI	Lat 43°09'46", long 83°50'14", in SE ¹ / ₄ sec.23, T.9 N., R.5 E., Genesee County, at bridge on Wilson Road, 3.1 miles east of Montrose.	15.0	1970-79	03-04-79	c7.12	d160
04148800	Pine Run near Montrose, MI	Lat 43°12'42", long 83°48'54", in SE ¹ / ₄ sec.1, T.9 N., R.5 E., Genesee County, at bridge on Elms Road, 4.7 miles northeast of Montrose.	28.2	1970-79	03-04-79	8.42	550
04148900	Silver Creek near Clio, MI	Lat 43°12'54", long 83°45'55", in NW ¹ / ₄ sec.4, T.9 N., R.6 E., Genesee County, at bridge on Weir Road, 3.0 miles northwest of Clio.	3.70	1970-79	03-04-79	3.42	71
04149300	Misteguay Creek near Flushing, MI	Lat 43°01'31", long 83°54'41", in NE ¹ / ₄ sec.7, T.7 N., R.5 E., Genesee County, at bridge on Duffield Road, 3.7 miles southwest of Flushing.	17.3	1970-79	03-04-79	9.22	750
04151000	Cass River at Vassar, MI	Lat 43°22'15", long 83°34'52", in NW ¹ / ₄ SW ¹ / ₄ sec.7, T.11 N., R.8 E., Tuscola County, at bridge on State Highway 15, at Vassar.	710	1949-70†, 1971-79	04-15-79	g	d4,940
04153500	Salt River near North Bradley, MI	Lat 43°42'10", long 84°28'14", in NE ¹ / ₄ SE ¹ / ₄ sec.7, T.15 N., R.1 W., Midland County, at bridge on North Saginaw Road, 1.1 miles southeast of North Bradley.	138	1935-71†, 1972-79	03-20-79	12.04	1,560
Streams tributary to St. Clair River							
*04159900	Mill Creek near Avoca, MI	Lat 43°03'16", long 82°44'05", in NW ¹ / ₄ sec.8, T.7 N., R.15 E., St. Clair County, on left bank at downstream side of bridge on Bricker Road, 0.2 mile upstream from Gleason Drain, and 2.3 miles west of Avoca.	169	1963-75†, 1976-79	04-15-79	h6.58	1,240
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE ¹ / ₄ sec.9, T.5 N., R.16 E., St. Clair County, on right downstream wingwall of bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-79	04-14-79	i	d1,450

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Annual maximum Gage height (feet)	Dis-charge (ft ³ /s)
Streams tributary to Lake St. Clair							
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75+, 1976-79	04-14-79	2.95	131
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, at bridge on Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-79	04-15-79	j2.97	89
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, at bridge on State Highway 53, at Almont.	9.56	1959-62, 1963-68+, 1969-79	07-10-79	5.91	319
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, at bridge on 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64, 1965-69+, 1970-79	04-14-79	3.20	500
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, on left bank at bridge on 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67, 1968-72+, 1973-79	04-14-79	k6.29	1,010
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, at bridge on North Road, 3.4 miles south of Armada.	10.0	1959-65, 1966-70+, 1971-79	04-14-79	m5.24	145
04164250	Tupper Brook at Ray Center, MI	Lat 42°45'42", long 82°54'04", in NW¼ sec.23, T.4 N., R.13 E., Macomb County, at bridge on 29 Mile Road, at Ray Center.	8.62	1959, 1960-64+, 1965-79	04-14-79	5.85	220
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, at bridge on 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65, 1966-70+, 1971-79	04-14-79	15.31	814
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, at bridge on 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-66, 1967-72+, 1973-79	04-14-79	n7.78	1,000
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, at bridge on 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60, 1961-65+, 1966-79	04-14-79	6.77	340
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, at bridge on 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64+, 1965-79	04-14-79	g	d130
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, at bridge on Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64, 1965-69+, 1971-79	04-14-79	p10.13	670
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, 2.2 miles south of Waldenburg.	16.0	1959, 1960-64+, 1965-79	04-14-79	16.03	285
Streams tributary to Detroit River							
04167000	Middle River Rouge near Garden City, MI	Lat 42°20'55", long 83°18'45", in SW¼ NW¼ sec.6, T.2 S., R.10 E., Wayne County, on right bank 200 ft downstream from bridge on Inkster Road, 1.8 miles northeast of Garden City.	99.9	1931-33+, 1948-77+, 1978-79	04-14-79	9.71	1,970
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, at bridge on King Road, at Trenton.	19.3	1972-79	04-14-79	8.74	420

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

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Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Date	Annual maximum Gage height (feet)	Dis-charge (ft ³ /s)
Streams tributary to Lake Erie							
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 82°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, on downstream side of culvert on White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-79	--	<1.95	<58
04169500	Huron River at Commerce, MI	Lat 42°35'25", long 83°29'05", in NE¼ SE¼ sec.10, T.2 N., R.8 E., Oakland County, on downstream left abutment of bridge on Commerce Road, 10 feet upstream from Hayes Creek, and 0.2 mile east of Commerce.	57.3	1946-75†, 1976-79	04-14-79	2.11	107
04172500	Portage River near Pinckney, MI	Lat 42°25'40", long 83°57'35", in SW¼ sec.34, T.1 N., R.4 E., Livingston County, at bridge on Tiplady Road, 2.0 miles upstream from Little Portage Lake, and 2.2 miles southwest of Pinckney.	79.1	1945-71‡, 1972-79	04-14-79	3.68	155
04173000	Huron River near Dexter, MI	Lat 42°23'10", long 83°54'40", in S½ sec.13, T.1 S., R.4 E., Washtenaw County on right bank 20 ft downstream from bridge on North Territorial Road, 2.0 miles downstream from Portage Lake Outlet and 4.0 miles north of Dexter.	522	1946-72‡, 1973-75, 1976-77‡, 1978-79	04-15-79	4.56	891
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-79	03-04-79	8.85	430
04175960	South Branch River Raisin near Adrian, MI	Lat 41°55'03", long 84°00'37", in SE¼ sec.25, T.6 S., R.3 E., Lenawee County, at Howell Highway, 2.0 miles northeast of Adrian.	165	1979	03-05-79	10.20	1,300
04176000	River Raisin near Adrian, MI	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, at Academy Road, 1.7 miles east of Adrian.	463	1954-78‡, 1979	03-05-79	12.58	2,800
04176400	Saline River near Saline, MI	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, on right bank 20 ft downstream from bridge on Maple Road, 2.8 miles south of Saline.	94.6	1966-77‡, 1978-79	03-04-79	10.84	1,180

† Operated as a continuous-record gaging station

* Also a low-flow partial-record station

< Less than

a Maximum gage height, 6.51 ft Mar. 28, 1979, backwater from ice.

b Maximum gage height, 5.57 ft Mar. 28, 1979, backwater from ice.

c Backwater from ice.

d Computed on basis of correlation with nearby stations.

e Approximately.

f Maximum gage height, 2.77 ft Jan. 3, 1979, backwater from ice.

g Maximum stage not determined.

h Maximum gage height, 6.60 ft Mar. 5, 1979, backwater from ice.

i Maximum gage height, 18.25 ft Mar. 5, 1979, backwater from ice.

j Maximum gage height, 3.73 ft Mar. 5, 1979, backwater from ice.

k Maximum gage height, 6.50 ft Mar. 5, 1979, backwater from ice.

m Maximum gage height, 5.38 ft Mar. 5, 1979, backwater from ice.

n Maximum gage height, 8.20 ft Mar. 4, 1979, backwater from ice.

p Maximum gage height, 10.55 ft Mar. 5, 1979, backwater from ice.

q Maximum discharge not determined.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk(*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1979

Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Date	Measurements Discharge (ft ³ /s)
Streams tributary to Lake Superior						
Montreal River	Lake Superior	Lat 46°26'12", long 90°09'53", in SW ¹ / ₄ SE ¹ / ₄ sec. 27, T.47 N., R.47 W., Gogebic County, 1.0 mile south of Ironwood, MI.	--	--	08-21-79	*a10.5
do	do	Lat 46°27'10", long 90°10'45", in SE ¹ / ₄ sec. 21, T.47 N., R.47 W., Gogebic County, at Norrie Street, in Ironwood, MI.	--	1947, 1967	08-21-79	*a10.8
do	do	Lat 46°28'57", long 90°12'20", in SW ¹ / ₄ SE ¹ / ₄ sec. 8, T.47 N., R.47 W., Gogebic County, 2.0 miles north of Ironwood, MI.	--	--	08-21-79	*a17.1
do	do	Lat 46°32'41", long 90°24'06", in NW ¹ / ₄ sec. 23, T.48 N., R.49 W., Michigan meridian, Gogebic County, at discontinued gaging station, 2.0 miles upstream from mouth and 3.5 miles north of Saxon, WI.	262	b1938-70†, 1977	06-25-79	*b70.3
Plymouth Mine Pond Outlet	Alward Creek	Lat 46°28'14", long 89°58'56", in SE ¹ / ₄ NW ¹ / ₄ sec.18, T.47 N., R.45 W., Gogebic County, at culvert on Plymouth Road, at Ramsay, MI.	--	1974-78	12-13-78 07-25-79	*.49 *.58
Kallander Creek	Black River	Lat 46°29'22", long 90°02'55", in NW ¹ / ₄ sec. 10, T.47 N., R.46 W., Gogebic County, below Bessemer Wastewater treatment plant, 0.5 mile north of Bessemer, MI.	--	--	08-22-79	*a1.57
do	do	Lat 46°30'45", long 90°02'55", in NE ¹ / ₄ SE ¹ / ₄ sec. 34, T.48 N., R.46 W., Gogebic County, at railroad crossing 2.5 miles north of Bessemer, MI.	--	--	08-22-79	*a1.9
Deer Lake Outlet	Little Gratiot River	Lat 47°21'49", long 88°02'26", in NE ¹ / ₄ SW ¹ / ₄ sec. 6, T.57 N., R.29 W., Keweenaw County, 700 ft downstream from the outlet, 700 ft-upstream from mouth and 1.8 miles southwest of Lac LaBelle, MI.	--	--	07-11-79 09-14-79	*2.49 *4.88
Outflow of Maas and Negaunee Mines	Carp River	Lat 46°30'54", long 87°35'08", in SE ¹ / ₄ SW ¹ / ₄ sec. 32, T.48 N., R.26 W., Marquette County, near end of trail road to Negaunee Mine and 1.0 mile east-of Negaunee, MI.	--	--	10-19-78 11-08-78 12-13-78 07-16-79	*1.11 *1.10 *1.09 *1.19
Streams tributary to Lake Michigan						
Skunk Creek	East Branch Sturgeon River	Lat 46°01'51", long 87°49'46", in SE ¹ / ₄ SE ¹ / ₄ sec. 17, T.42 N., R.28 W., Dickenson County, 0.3 mile upstream from mouth, 2.2 miles north of Felch, MI.	14.5	1973-76 1978	04-20-79 06-22-79	124 45.6
St. Joseph River	Lake Michigan	Lat 41°55'12", long 84°37'39", in NW ¹ / ₄ sec. 26, T.6 S., R.3 W., Hillsdale County, at Bacon Street in Hillsdale, MI.	--	--	09-18-79	a1.0
do	do	Lat 41°56'04", long 84°38'25", in SW ¹ / ₄ sec. 22, T.6 S., R.3 W., Hillsdale County, above wastewater treatment plant, in Hillsdale, MI.	--	1970,1972	07-24-79 09-18-79	a1.91 a2.2
Winona Lake Outlet	St. Joseph River	Lat 41°56'31", long 84°37'54", in SW ¹ / ₄ sec. 14, T.6 S., R.3 W., Hillsdale County, at Hillsdale Street, at Hillsdale, MI.	--	1974-76	07-24-79 09-18-79	*a1.69 *a2.0
Beebe Creek	do	Lat 41°57'15", long 84°38'20", in NW ¹ / ₄ NE ¹ / ₄ sec. 15, T.6 S., R.3 W., Hillsdale County, at Moore Road, 1.2 miles northwest of Hillsdale, MI.	--	1975-78† 1979e	09-18-79	*a8.5
St. Joseph River	Lake Michigan	Lat 41°57'23", long 84°39'31", in SW ¹ / ₄ SE ¹ / ₄ sec.9, T.6 S., R.3 W., Hillsdale County, at Moore Road, 1.2 miles northwest-of Hillsdale, MI.	62.4	1967,1971, 1974-77	07-24-79 09-10-79	*a14.8 *a14.1
do	do	Lat 41°58'58", long 84°39'52", in NE ¹ / ₄ NW ¹ / ₄ sec. 4, T.6 S., R.3 W., Hillsdale County, at Chicago Street (US-12), at Jonesville, MI.	66.5	1974-77	07-24-79 09-18-79	*a18.4 *a16.3

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1979--CONTINUED

Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Streams tributary to Lake Michigan--Continued						
Swan Creek Tributary	Swan Creek	Lat 41°52'51", long 85°11'41", in NW¼, sec. 2, T.7 S., R.8 W., Branch County, 1.0 mile northwest of Bronson, MI.	--	--	09-18-79	*a2.1
Swan Creek	St. Joseph River	Lat 41°53'45", long 85°13'15", in NE¼ sec. 3, T.7 S., R.8 W., Branch County, 1.0 mile northwest of Bronson, MI.	--	1967	09-18-79	*a14.0
Spring Valley Drain	do	Lat 41°53'08", long 86°18'12", in NE¼ NE¼ sec. 8, T.7 S., R.17 W., Berrien County, at Mathews Road, 4.1 miles southeast of Berrien Springs, MI.	--	--	09-06-79	*.20
do	do	Lat 41°52'14", long 86°17'33", in NE¼ NW¼ sec. 16, T.7 S., R.17 W., Berrien County, at Walton Road 3.0 miles northwest of Niles, MI.	--	--	09-06-79	*2.34
Battle Creek	Kalamazoo River	Lat 42°32'20", long 84°50'55", in SW¼ sec. 24, T.2 N., R.5 W., Eaton County, at Kalamo Highway, 1.0 mile southwest of Charlotte, MI.	c67	1931 1948-54+, 1955-56, 1963-64, 1971	03-08-79	a231
Macatawa River	Lake Michigan	Lat 42°47'05", long 86°02'17", in SE¼, sec. 26, T.5 N., R.15 W., Ottawa County, at 104th Avenue, in Zeeland, MI.	--	--	08-14-79	*a4.11
Grand River	Lake Michigan	Lat 42°10'08", long 84°23'02", in SE¼ NE¼ sec. 35, T.3 S., R.1 W., Jackson County, at bridge on Draper Road, 2.0 miles south of Vander- cook, MI.	41.0	1961 1963-65d, 1974-78	04-17-79	a55.3
Spring Brook	Grand River	Lat 42°27'55", long 84°39'52", in SW¼ SE¼ sec. 16, T.1 N., R.3 W., Eaton County, at Holmes Highway, 2.0 miles south of Eaton Rapids, MI.	--	1976	03-08-79	a252
Red Cedar River	do	Lat 42°39'40", long 84°04'50" in SW¼ SE¼ sec. 10, T.3 N., R.3 E., Livingston County, at Grand River Road, in Fowlerville, MI.	--	--	11-08-78	a10.8
do	do	Lat 42°41'12", long 84°08'12", in SE¼ sec. 31, T.4 N., R.3 E., Livingston County at Stow Road, 3.0 miles northwest of Fowlerville, MI.	--	--	11-08-78	a14.2
Grand River	Lake Michigan	Lat 42°57'10", long 84°54'10", in NE¼ sec. 33, T.7 N., R.5 W., Ionia County, below Webber Dam, 1.5 miles southeast of Lyons, MI.	--	--	06-21-79 06-29-79	26 41.9
Thornapple River	Grand River	Lat 42°37'30", long 85°08'50", in NE¼ NW¼ sec. 28, T.3 N., R.7 W., Barry County, at Thornapple Lake Road, 2.3 miles northwest of Nashville, MI.	--	--	03-08-79	1940
Black Creek	Lake Michigan	Lat 43°14'03", long 86°04'03", in NE¼ NE¼ sec. 27, T.10 N., R.15 W., Muskegon County, at Maple Island Road, 7.0 miles east of Muskegon, MI.	--	--	07-06-79	*a0.9
do	do	Lat 43°13'34", long 86°04'42", in NW¼ SE¼ sec. 27, T.10 N., R.15 W., Muskegon County, 6.5 miles east of Muskegon, MI	--	--	07-06-79	*a1.6
Hersey River	Muskegon River	Lat 43°50'55", long 85°25'59", in NW¼ SE¼ sec. 19, T.17 N., R.9 W., Osceola County, 200 ft upstream from mouth and 0.6 mile east of Hersey, MI.	--	--	09-24-79	*58.4
Little Bear Creek	Bear Creek	Lat 43°18'05", long 85°14'10", in SW¼ SE¼ sec. 32, T.11 N., R.16 W., Muskegon County, 15 ft up- stream from confluence with unnamed tributary, in Barry Junction, MI.	--	1978	07-24-79	*a4.5
Unnamed tributary	Little Bear Creek	Lat 43°18'05", long 86°14'12", in SW¼ SE¼ sec. 32, T.11 N., R.16 W., Muskegon County, 15 ft below dam, in Barry Junction, MI.	--	1978	07-24-79	*a0.7
Little Bear Creek	Bear Creek	Lat 43°17'45", long 86°14'40", in SE¼ sec. 32, T.11 N., R.16 W., Muskegon County, at bridge on River Road, in Barry Junction, MI.	--	1978	07-24-79	*a5.9

See footnotes at end of the table

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1979--CONTINUED

Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Streams tributary to Lake Michigan--Continued						
Baldwin River	Pere Marquette River	Lat 43°55'35", long 85°48'03", in SW¼ NW¼ sec. 30, T.18 N., R.12 W., Lake County, at bridge on Forman Road, 2.7 miles north of Idlewild, MI.	--	--	09-19-79	*34.3
Hopkins Creek	Manistee River	Lat 44°24'26", long 85°13'02", in SE¼ NE¼ sec. 12, T.23 N., R.8 W., Missaukee County, at culvert on State Highway 66, 5.1 miles north of Lake City, MI.	--	--	09-26-79	*4.22
Slagle Creek	do	Lat 44°18'28", long 85°42'45", in NE¼ NW¼ sec. 13, T.22 N., R.12 W., Wexford County, at east boundary of Harrietta State Fish Hatchery, 0.7 mile west of Harrietta, MI.	22	1953-54d, 1966,1972	03-07-79 04-10-79 04-26-79	a13.9 a15.0 a52.0
do	do	Lat 44°19'10", long 85°45'40", in SW¼ NW¼ sec. 10, T.22 N., R.12 W., Wexford County, at State Highway 37, 3.2 miles west of Harrietta, MI.	--	--	03-07-79 04-10-79 04-26-79	a21.8 a24.0 a75.0
Platte River	Lake Michigan	Lat 44°42'39", long 86°07'08", in NE¼ SE¼ sec. 28, T.27 N., R.15 W., Benzie County, at bridge on State Highway 22, 0.4 mile downstream from Platte Lake, and 6.2 miles northwest of Honor, MI.	166	1946-48, 1957	05-09-79 08-14-79	283 *179
do	do	Lat 44°43'12", long 86°08'12", in SW¼ SW¼ sec. 21, T.27 N., R.15 W., Benzie County at Dept. of Natural Resources fish weir, 0.6 mile downstream from Loon Lake, and 7.2 miles north- west of Honor, MI.	169	--	05-09-79 08-14-79	307 *186
Otter Creek	Lake Michigan	Lat 44°44'32", long 86°03'41", in SE¼ NE¼ sec. 13, T.27 N., R.15 W., Benzie County, at outlet of Otter Lake, 1.8 miles upstream from mouth, and 4.8 miles south of Empire, MI.	1.2	--	05-10-79 08-15-79	*6.84 *3.86
do	do	Lat 44°45'42", long 86°04'26", in SW¼ SW¼ sec. 1, T.27 N., R.15 W., Benzie County, at culverts on Aral Road, 0.1 mile upstream from mouth and 3.5 miles south of Empire, MI.	9.55	--	05-09-79 08-17-79	*21.6 21.1
Crystal River	do	Lat 44°54'10", long 85°57'46", in SE¼ NE¼ sec. 23, T.29 N., R.14 W., Leelanau County, at culverts on County Highway 675, 3.7 miles upstream from mouth, and 1.4 miles east of Glen Arbor, MI	42.0	--	05-10-79 08-16-79	*92.0 *49.4
Shalda Creek	do	Lat 44°56'48", long 85°53'07", in SE¼ NW¼ sec. 4, T.29 N., R.13 W., Leelanau County, at culverts on Lake Michigan Road, 0.1 mile upstream from mouth and 6.2 miles northeast of Glen Arbor, MI.	33.8	--	05-10-79 08-16-79	*54.9 *20.0
Cedar River	Intermediate River	Lat 44°56'57", long 85°05'35", in SE¼ sec. 36, T.30 N., R.7 W., Antrim County, 4.0 miles northwest of Mancelona, MI.	--	--	12-23-78	*a38.5
do	do	Lat 44°56'35", long 85°07'20", in NW¼ NE¼ sec. 2, T.29 N., R.7 W., Antrim County, 2 miles west and 3 miles north of Mancelona, MI.	--	--	12-23-78	*a59.6
do	do	Lat 44°57'28", long 85°08'00", in NE¼ NE¼ sec. 34, T.30 N., R.7 W., Antrim County, 2 miles west and 4 miles north of Mancelona, MI.	--	--	12-23-78	*a70.9
do	do	Lat 44°58'10", long 85°08'20", in SW¼ NW¼ sec. 27, T.30 N., R.7 W., Antrim County, 3.0 miles east of Bellaire, MI.	--	--	12-23-78	*a70.4
French Farm Creek	Lake Michigan	Lat 45°44'43", long 84°48'01", in NW¼ SE¼ sec. 28, T.39 N., R.4 W., Emmet County, 4000 ft upstream from culvert on Wilderness Park Road, 3.6 miles north of Carp Lake, MI.	--	--	09-27-79	*2.53

See footnotes at end of the table

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

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DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1979--CONTINUED

Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water year)	Measurements	
					Date	Discharge (ft ³ /s)
Streams tributary to Lake Huron						
Van Etten Creek	Au Sable River	Lat 44°26'49", long 83°20'21", in SW¼ NW¼ sec. 27, T.24 N., R.9 E., Iosco County, at Detroit and Mackinac Railroad Bridge, 2.0 miles north-west of Oscoda, MI.	--	1973-78	09-11-79	*a56.9
Ogemaw Creek	West Branch Rifle River	Lat 44°16'21", long 84°13'42", in NE¼ sec. 30, T.22 N., R.2 E., Ogemaw County, 700 feet above Brewery Creek, at West Branch, MI.	--	1944,1971	09-11-79	*a9.62
Brewery Creek	Ogemaw Creek	Lat 44°16'21", long 84°13'36", in NE¼, sec. 30, T.22 N., R.2 E., Ogemaw County, at mouth, at West Branch, MI.	--	1971	09-11-79	*a1.34
Ogemaw Creek	West Branch Rifle River	Lat 44°16'04", long 84°13'04", in NE¼ SW¼ sec. 29, T.22 N., R.2 E., Ogemaw County, 0.8 mile southeast of West Branch, MI.	--	--	09-11-79	*a14.5
Cass River	Saginaw River	Lat 43°22'24", long 83°34'24", in NE¼ SW¼ sec. 7, T.11 N., R.8 E., Tuscola County, 1,500 ft upstream from Penn Central Railroad bridge, in Vassar, MI.	--	--	04-30-79 07-31-79	681 *46.9
do	do	Lat 43°22'15", long 83°34'52", in NW¼ SW¼ sec. 7, T.11 N., R.8 E., Tuscola County, at bridge on State Highway 15, at Vassar, MI.	710	1949-71+, 1975-78e	05-01-79 07-31-79	664 *60.4
Moore Drain	Cass River	Lat 43°22'35", long 83°34'43", in NW¼ NW¼ sec. 7, T.11 N., R.8 E., Tuscola County, at culvert on Grant Street, in Vassar, MI.	--	--	04-30-79 08-01-79	8.78 *1.12
do	do	Lat 43°22'22", long 83°34'57", in NW¼ SW¼ sec. 7, T.11 N., R.8 E., Tuscola County, at bridge on Oak Street, in Vassar, MI.	--	--	04-30-79 07-31-79	8.66 *1.09
do	do	Lat 43°22'14", long 83°35'04", in NW¼ SW¼ sec. 7, T.11 N., R.8 E., Tuscola County, at culvert on Spring Street, in Vassar, MI.	--	--	05-01-79 08-01-79	8.42 *1.08
Cass River	Saginaw River	Lat 43°21'51", long 83°35'15", in NE¼ NE¼ sec. 13, T.11 N., R.7 E., Tuscola County, 800 ft downstream from Chesapeake & Ohio Railroad bridge, in Vassar, MI.	--	--	05-01-79 08-01-79	707 *47.3
Newton Creek	South Branch Tobacco River	Lat 43°52'48", long 84°51'18", in SW¼ NE¼ sec. 12, T.17 N., R.5 W., Clare County, 50 ft upstream from abandoned fish hatchery, 4.2 miles upstream from mouth and 3.1 miles north of Farwell, MI.	--	--	09-04-79	*12.8
do	do	Lat 43°51'28", long 84°51'00", in SE¼ SE¼ sec. 13, T.17 N., R.5 W., Clare County, at bridge on Surrey Road, 2.6 miles upstream from mouth and 1.7 miles northeast of Farwell, MI.	--	--	09-04-79	*20.9
do	do	Lat 43°50'56", long 84°50'28", in NE¼ SW¼ sec. 19, T.17 N., R.4 W., Clare County, at culvert on Kliplinger Road, 1.8 miles upstream from mouth and 1.6 miles northeast of Farwell, MI.	--	--	09-04-79	*24.5
do	do	Lat 43°49'57", long 84°50'00", in NE¼ SE¼ sec. 30, T.17 N., R.4 W., Clare County, at bridge on old U.S. Highway 10, 0.2 mile upstream from mouth and 1.6 miles east of Farwell, MI.	--	--	09-04-79	*27.0
South Branch Tobacco River	Tobacco River	Lat 43°49'45", long 84°44'53", in NW¼ NW¼ sec. 36, T.17 N., R.4 W., Clare County, at bridge on Eberhart Road, in Clare, MI.	58	1964	09-26-79	*38.0
Salt River	Chippewa River	Lat 43°31'41", long 84°39'26", in NW¼ SE¼ sec. 10, T.13 N., R.3 W., Isabella County, at bridge on South Vroman Road, 1.5 miles east of Shepherd, MI.	--	--	09-26-79	*4.40

See footnotes at end of the table

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1979--CONTINUED

Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Streams tributary to Lake St. Clair						
Clinton River	Lake St. Clair	Lat 42°44'37", long 83°25'31", in NW¼ sec. 20, T.4 N., R.9 W., Oakland County, at Bluegrass Road, in Clarkston, MI.	--	--	08-28-79	*2.13
Parke Lake Inlet	Parke Lake	Lat 42°44'12", long 83°25'11", in SW¼ sec. 20, T.4 N., R.9 E., Oakland County, at State Highway 15, in Clarkston, MI.	--	--	08-28-79	*1.04
Clinton River	Lake St. Clair	Lat 42°44'02", long 83°25'14", in SW¼ sec. 20, T.4 N., R.9 E., Oakland County, at Depot Road, in Clarkston, MI.	--	--	08-28-79	*1.78
Parke Lake Outlet	Clinton River	Lat 42°44'12", long 83°24'51", in SE¼ sec. 20, T.4 N., R.9 E., Oakland County, 0.1 mile south of Parke Lake, in Clarkston, MI.	--	--	08-28-79	*1.34
Streams tributary to Detroit River						
River Rouge	Detroit River	Lat 42°25'26", long 83°16'09", in SE¼ sec. 4, T.1 S., R.10 E., Wayne County, at Seven Mile Road, in Detroit, MI.	101	--	11-21-78 12-19-78 03-08-79 03-26-79 03-30-79 04-27-79 05-14-79 06-04-79 06-18-79 07-02-79 07-23-79	*30.4 *24.0 126 86.8 337 278 70.3 *39.0 *20.7 61.7 *16.9
Upper River Rouge	River Rouge	Lat 42°23'04", long 83°16'35", in SE¼ NE¼ sec. 20, T.1 S., R.10 E., Wayne County, at Telegraph Road, in Detroit, MI.	c67.3	--	11-21-78 12-19-78 03-08-79 03-26-79 03-29-79 03-30-79 04-04-79 04-27-79 05-14-79 06-04-79 06-18-79 07-02-79 07-23-79	*12.2 *12.0 61.7 34.0 219 224 46.2 218 27.4 *14.6 *6.34 66.1 *8.36
Middle River Rouge	do	Lat 42°20'16", long 83°15'32", in NE¼ sec. 9, T.2 S., R.10 E., Wayne County, at Outer Drive, in Dearborn Heights, MI.	106	--	11-22-78 12-19-78 03-08-79 03-26-79 03-29-79 03-30-79 04-04-79 05-14-79 06-04-79 06-18-79 07-02-79 07-23-79	*35.0 *30.6 146 80.7 341 342 119 62.2 *34.5 *23.3 174 *29.5
Lower River Rouge	River Rouge	Lat 42°18'31", long 83°15'10", in NE¼ sec. 22, T.2 S., R.10 E., Wayne County, at Military Road, in Dearborn, MI.	c91	--	11-21-78 12-19-78 03-08-79 03-26-79 03-29-79 03-30-79 04-04-79 05-14-79 06-04-79 06-18-79 07-23-79	*7.36 *8.54 120 55.0 282 451 84.5 24.3 *12.7 *5.10 *7.72

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1979--CONTINUED

Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Streams tributary to Detroit River--Continued						
River Rouge	Detroit River	Lat 42°18'39", long 83°13'36", in Land Grant 663, T.2 S., R.10 E., Wayne County, at Evergreen Road, in Dearborn, MI.	c400	--	11-22-78	*76.3
					12-19-78	109
					03-08-79	524
					03-26-79	292
					03-30-79	1440
					05-14-79	204
					05-15-79	239
					06-18-79	*66.5
					07-02-79	428
					07-23-79	*105
					08-28-79	66.2
Streams tributary to Lake Erie						
Huron River	Lake Erie	Lat 42°12'39", long 83°26'05", in NE¼ SW¼ sec. 24, T.3 S., R.8 E., Wayne County, below Belle- ville Dam, 1.8 miles east of Belleville, MI.	--	--	05-01-79 08-16-79	a810 a129
River Raisin	do	Lat 42°09'19", long 84°13'15", in NE¼ sec. 5, T.4 S., R.2 E., Jackson County, 1.5 miles south- east of Napoleon, MI.	--	--	03-27-79 04-24-79 06-28-79	a7.56 a8.0 *a1.43
do	do	Lat 42°08'15", long 84°13'15", in NE¼ SW¼ sec. 8, T.4 S., R.2 E., Jackson County, at Wolf Lake Road, 2 miles southeast of Napoleon, MI.	--	--	03-27-79 04-24-79 06-28-79	a110 a98.0 *a15.3
do	do	Lat 42°09'00", long 84°01'25", in SE¼ SE¼ sec. 1, T.4 S., R.3 E., Washtenaw County, at Austin Road, 0.5 mile east of Manchester, MI.	148	--	08-08-79 09-11-79	a104 *a33
do	do	Lat 42°07'08", long 83°58'30", in NW¼ NE¼ sec. 20, T.4 S., R.4 E., Washtenaw County, at Wilbur Road, 3.5 miles southeast of Manchester, MI.	--	--	08-08-79 09-11-79	a119 *a34
do	do	Lat 42°00'14", long 83°55'54", in SE¼ NW¼ sec. 34, T.5 S., R.4 E., Lenawee County, at State High- way 50, in Tecumseh, MI.	259	--	08-08-79 09-11-79	a179 *a58.0
Wolf Creek	South Branch River Raisin	Lat 41°59'25", long 84°09'02", in SW¼ SW¼ sec. 36, T.5 S., R.2 E., Lenawee County, at Gilbert High- way, 3.0 miles southeast of Onsted, MI.	18.1	1970,1974	11-16-78 04-12-79	*a2.31 a36.2
Black Creek	River Raisin	Lat 41°46'25", long 84°07'05", in SE¼ SE¼ sec. 13, T.8 S., R.2 E., Lenawee County, at Terry Highway, 1.0 mile west of Weston, MI.	--	--	09-25-79	*a2.3
do	do	Lat 41°46'25", long 84°05'53", in SW¼ SW¼ sec. 17, T.8 S., R.3 E., Lenawee County, at Sand Creek Highway, 0.2 mile north of Weston, MI.	--	--	09-25-79	*a1.9
Baker and May Drain	Black Creek	Lat 41°46'45", long 84°04'45", in NE¼ NE¼ sec. 17, T.8 S., R.3 E., Lenawee County, at Lyons Highway, 1.2 miles northeast of Weston, MI.	--	--	09-25-79	*a0.6
Black Creek	River Raisin	Lat 41°47'10", long 84°02'26", in SE¼ SE¼ sec. 10, T.8 S., R.3 E., Lenawee County, at State Highway 52, 0.5 mile south of Jasper, MI.	42.4	1963,1970	08-08-79 09-25-79	a11.5 *a2.8
Bean Creek	Tiffin River	Lat 41°57'51", long 84°20'47", in SE¼ sec. 7, T.6 S., R.1 E., Lenawee County, on Manitou Road, 1.5 miles south of Addison, MI.	--	1977	04-12-79 06-28-79	a129 *a2.8
do	do	Lat 41°51'17", long 84°21'05", in NE¼ NW¼ sec. 19, T.7 S., R.1 E., Lenawee County, at Jack- son Street, in Hudson, MI.	--	--	07-25-79	a14.4
do	do	Lat 41°50'27", long 84°20'55", in SE¼ SW¼ sec. 19, T.7 S., R.1 E., Lenawee County, at Nelson Road, 1.0 mile south of Hudson, MI.	--	1967	07-25-79	a17.9

* Base flow.

† Operated as a continuous-record gaging station.

a Discharge measurement made by employees of Michigan Department of Natural Resources.

b Flow partially regulated.

c Approximately.

d Operated as a low-flow partial-record station.

e Operated as a crest-stage partial-record station.

LOW-FLOW INVESTIGATIONS
MARQUETTE IRON RANGE LOW-FLOW INVESTIGATIONS
MARQUETTE COUNTY, MI

On Aug. 7, 8, 1979 a series of discharge measurements were made at selected locations on the western tributaries of the Chocoley River Basin as part of a water resources investigation carried on in cooperation with the Michigan Department of Natural Resources. These measurements, along with streamflow records, ground-water records, water-quality records, and geologic studies serve to provide base line data to evaluate hydrologic conditions prior to development of the area. The measurements are believed to be unaffected by surface runoff due to antecedent precipitation, and thus represent base flow.

The drainage areas shown were determined from U.S. Geological Survey topographic maps having scales of 1:24,000 or 1:62,500 and a contour interval of 10 or 20 feet.

See "Surface Water Records of Michigan, 1963" (p.218), "_____ 1964" (p.220) for listing of previous measurements.

Stream	Location	Drainage area (mi ²)	Discharge (ft ³ /s)	Cfs per square mile	Water temperature (°C)
Peterson Creek	Lat 46°24'59", long 87°24'22", in NW¼ NW¼ sec.2, T.46 N., R.25 W., Marquette County, at old County Road 553, 0.3 mile south of Sands, MI.	2.93	0	0	-
do	Lat 46°24'44", long 87°21'53", in SW¼ NW¼ sec.6, T.46 N., R.24 W., Marquette County, at point where trail road nears stream, 2.0 miles east of Sands and 3.9 miles northeast of Sands Station, MI.	5.38	2.24	.42	9.0
Norby Creek	Lat 46°24'07", long 87°21'38", in NE¼ NW¼ sec.7, T.46 N., R.24 W., Marquette County, at logging bridge 1,000 ft upstream from old trail crossing, 2.5 miles southeast of Sands, MI.	1.41	.14	.10	12.5
Peterson Creek ^{b/}	Lat 46°24'21", long 87°20'38", in SW¼ SW¼ sec.5, T.46 N., R.24 W., Marquette County, 150 ft downstream from old bridge crossing, about 500 ft upstream from mouth and 3.2 miles east of Sands, MI.	7.24	2.97 a3.06	.41 .42	14.5 12.0
Big Creek ^{b/}	Lat 46°24'43", long 87°19'57", in NW¼ SE¼ sec.5, T.46 N., R.24 W., Marquette County, at abandoned road crossing, 0.7 mile downstream from mouth of Peterson Creek and 3.6 miles east of Sands, MI.	14.4	13.9	.97	13.5
do	Lat 46°25'38", long 87°20'06", in SW¼ NE¼ sec.32, T.47 N., R.24 W., Marquette County, at twin culverts on Karen Road, 3.5 miles east of Sands and 2.6 miles southwest of Green Garden, MI.	15.8	20.5	1.30	12.0
do ^{c/}	Lat 46°26'04", long 87°19'04", in SE¼ SW¼ sec.28, T.47 N., R.24 W., Marquette County, at culverts on Little Lake Road, 5 miles southeast of Harvey, MI.	17.0	30.4	1.79	12.0
do ^{b/}	Lat 46°27'55", long 87°19'07", in SE¼ SW¼ sec.16, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 1 mile upstream from mouth, 2.5 miles southeast of Harvey and 0.2 mile northwest of Beaver Grove, MI.	24.0	42.0	1.75	13.0
Cedar Creek ^{b/}	Lat 46°26'11", long 87°24'20", in SW¼ SW¼ sec.26, T.47 N., R.25 W., Marquette County, at headwaters, 0.3 mile east of old County Road 553 and 1.2 miles north of Sands, MI.	5.44	.23	.04	9.5
do	Lat 46°27'08", long 87°22'46", in NE¼ SW¼ sec.24, T.47 N., R.25 W., Marquette County, about 1 mile upstream from gaging station (04044573), 2.5 miles northeast of Sands and 4.4 miles northeast of Gentian, MI.	7.67	9.78	1.28	10.5
do ^{c/}	Lat 46°27'20", long 87°21'42", in NW¼ SW¼ sec.19, T.47 N., R.24 W., Marquette County, 60 ft upstream from man-made rock dam on privately owned property of Mr. Robert Pecotte and 2.5 miles south of Harvey, MI.	9.04	13.4	1.48	10.5
do ^{b/}	Lat 46°28'23", long 87°19'46", in SE¼ NE¼ sec.17, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.7 mile upstream from mouth, 1.8 miles south- east of Harvey and 0.9 mile northwest of Beaver Grove, MI.	10.6	20.0	1.89	14.5
Cherry Creek	Lat 46°27'43", long 87°24'20", in NW¼ NW¼ sec.23, T.47 N., R.25 W., Marquette County, at headwaters, 3.3 miles southwest of Harvey and 4.0 miles northeast of Cascade, MI.	.14	.04	.29	9.0

See footnotes at end of the table

LOW-FLOW INVESTIGATIONS

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MARQUETTE IRON RANGE LOW-FLOW INVESTIGATIONS

MARQUETTE COUNTY, MI--Continued

Stream	Location	Drainage area (mi ²)	Discharge (ft ³ /s)	Cfs per square mile	Water temperature (°C)
Cherry Creek ^{b/}	Lat 46°27'47", long 87°23'31", in NW¼ NE¼ sec.23, T.47 N., R.25 W., Marquette County, about 600 ft north of County Road 480, at point where creek bends north, 2.8 miles southwest of Harvey and 3.1 miles northeast of Sands, MI.	.33	5.88	17.8	9.0
do	Lat 46°28'02", long 87°22'52", in NW¼ SW¼ sec.13, T.47 N., R.25 W., Marquette County, at end of trail road, 2.2 miles southwest of Harvey and 4.9 miles northeast of Gentian, MI.	.61	9.22	15.1	9.5
do ^{c/}	Lat 46°27'57", (corrected) long 87°21'53", in NE¼ SE¼ sec.13, T.47 N., R.25 W., Marquette County, 0.5 mile above County Highway 551 and 2 miles south of Harvey, MI.	4.53	20.3	4.48	10.0
do ^{b/}	Lat 46°28'45", long 87°20'18", in SE¼ SW¼ sec.8, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.8 mile upstream from mouth, 1.2 miles southeast of Harvey and 1.5 miles northwest of Beaver Grove, MI.	5.07	26.8	5.29	13.5
Silver Creek	Lat 46°28'22", long 87°23'48", in SE¼ NW¼ sec.14, T.47 N., R.25 W., Marquette County, at trail crossing, 2.5 miles southwest of Harvey and 4.6 miles northeast of Cascade, MI.	4.37	3.41	.78	9.5
do ^{b/}	Lat 46°28'48", long 87°23'07", in SW¼ SW¼ sec.12, T.47 N., R.25 W., Marquette County, at double culvert on Silver Creek Road, 1.7 miles southwest of Harvey and 4.3 miles northeast of Sands, MI.	4.88	2.46	.50	10.0
Unnamed Tributary to Silver Creek	Lat 46°28'56", long 87°23'01", in NW¼ SW¼ sec.12, T.47 N., R.25 W., Marquette County, at mouth and 1.5 miles southwest of Harvey, MI.	1.09	.08	.07	9.5
Silver Creek ^{c/}	Lat 46°29'24", long 87°22'19", in NW¼ NE¼ sec.12, T.47 N., R.25 W., Marquette County, at double culverts on Silver Creek Road and 0.8 mile southwest of Harvey, MI.	8.58	9.48	1.10	9.0
do ^{b/}	Lat 46°29'22", long 87°20'16", in NE¼ NW¼ sec.8, T.47 N., R.24 W., Marquette County, at bridge on Lake Superior and Ishpeming Railroad, 300 ft northwest of overpass on State Highway 28 and 0.9 mile southeast of Harvey, MI.	9.91	8.85	.89	13.0

a Check measurement made 1,000 ft upstream.

b At site of partial-record station.

c At site of continuous-record gaging station.

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (NTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27.01)												
AUG , 1979												
27...	1115	1.3	223	8.0	18.0	12.5	20	1.0	10.2	96	K10	62
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23.01)												
AUG , 1979												
27...	1600	5.4	250	7.7	18.0	15.5	35	1.0	9.8	100	K5	46
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26.01)												
AUG , 1979												
27...	1430	17	275	8.0	21.0	15.5	20	1.0	9.4	95	K11	K12
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41.01)												
AUG , 1979												
28...	1045	7.0	285	7.3	18.5	12.0	25	1.0	10.1	94	K14	35
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20.01)												
AUG , 1979												
28...	1230	4.3	225	7.0	18.5	17.5	30	1.0	8.9	94	99	30
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38.01)												
AUG , 1979												
28...	1500	5.0	180	8.3	20.5	13.0	20	2.0	8.5	82	K13	68
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02.01)												
AUG , 1979												
28...	1630	26	150	7.8	20.5	22.0	10	1.0	8.8	102	K8	K8
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31.01)												
AUG , 1979												
28...	1745	17	150	7.5	19.5	14.5	20	1.0	9.5	94	K5	44

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	SODIUM+ POTAS- SIUM DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27.01)											
AUG , 1979 27...	120	17	33	10	5.0	8	.2	6.0	1.0	130	0
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23.01)											
AUG , 1979 27...	130	1	30	14	.9	1	.0	1.6	.7	160	0
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26.01)											
AUG , 1979 27...	150	17	33	16	.9	1	.0	1.7	.8	160	0
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41.01)											
AUG , 1979 28...	160	7	34	17	.6	1	.0	1.3	.7	180	0
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20.01)											
AUG , 1979 28...	99	8	23	10	.6	1	.0	1.2	.6	110	0
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38.01)											
AUG , 1979 28...	92	2	24	7.9	1.0	2	.0	1.6	.6	110	0
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02.01)											
AUG , 1979 28...	73	0	22	4.4	.8	2	.0	1.4	.6	100	0
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31.01)											
AUG , 1979 28...	74	0	23	4.0	.9	3	.0	1.5	.6	98	0

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27.01)											
AUG , 1979 27...	107	2.1	10	8.6	.1	9.2	143	143	.19	.50	.43
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23.01)											
AUG , 1979 27...	131	5.1	7.4	1.2	.0	6.5	153	140	.21	2.23	.07
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26.01)											
AUG , 1979 27...	131	2.6	9.7	1.3	.1	5.4	163	147	.22	7.70	.14
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41.01)											
AUG , 1979 28...	148	14	6.8	1.1	.0	5.1	180	155	.24	3.40	.09
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20.01)											
AUG , 1979 28...	90	18	8.3	.3	.0	3.9	133	101	.18	1.55	.00
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38.01)											
AUG , 1979 28...	90	.9	6.0	.1	.0	7.5	126	101	.17	1.70	.01
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02.01)											
AUG , 1979 28...	82	2.5	7.2	.2	.0	5.6	102	90	.14	7.19	.00
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31.01)											
AUG , 1979 28...	80	5.0	5.6	.3	.0	7.1	102	91	.14	4.74	.23

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS NO3)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS NO2)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27.01)											
AUG , 1979 27...	1.9	.00	.00	.43	.01	1	40	0	0	160	8
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23.01)											
AUG , 1979 27...	.31	.01	.03	.08	.00	1	10	0	0	50	13
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26.01)											
AUG , 1979 27...	.62	.00	.00	.14	.00	1	9	0	0	70	9
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41.01)											
AUG , 1979 28...	.40	.00	.00	.09	.00	1	10	4	0	50	9
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	1	20	6	0	60	33
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38.01)											
AUG , 1979 28...	.04	.00	.00	.01	.07	1	10	1	1	50	6
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	1	20	2	0	20	6
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31.01)											
AUG , 1979 28...	1.0	.00	.00	.23	.01	1	20	7	1	70	26

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, DIS- SOLVED (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PCB, DIS- SOLVED (UG/L)	ALDRIN, DIS- SOLVED (UG/L)	CHLOR- DANE, DIS- SOLVED (UG/L)	DDD, DIS- SOLVED (UG/L)	DDE, DIS- SOLVED (UG/L)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27.01)											
AUG , 1979 27...	20	<.5	0	0	10	.00	.0	.00	.0	.00	.00
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23.01)											
AUG , 1979 27...	10	<.5	0	0	20	.00	.0	.00	.0	.00	.00
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26.01)											
AUG , 1979 27...	30	<.5	0	0	10	.00	.0	.00	.0	.00	.00
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41.01)											
AUG , 1979 28...	30	<.5	0	0	2	.00	.0	.00	.0	.00	.00
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20.01)											
AUG , 1979 28...	8	<.5	0	0	20	.00	.0	.00	.0	.00	.00
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38.01)											
AUG , 1979 28...	20	<.5	0	0	1	.00	.0	.00	.0	.00	.00
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02.01)											
AUG , 1979 28...	30	<.5	0	0	2	.00	.0	.00	.0	.00	.00
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31.01)											
AUG , 1979 28...	0	<.5	0	0	20	.00	.0	.00	.0	.00	.00

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	DDT, DIS- SOLVED (UG/L)	DI- ELDRIN DIS- SOLVED (UG/L)	ENDRIN, DIS- SOLVED (UG/L)	HEPTA- CHLOR, DIS- SOLVED (UG/L)	HEPTA- CHLOR EPOXIDE DIS- SOLVED (UG/L)	LINDANE DIS- SOLVED (UG/L)	TOX- APHENE, DIS- SOLVED (UG/L)	2,4-D, DIS- SOLVED (UG/L)	2,4,5-T DIS- SOLVED (UG/L)	MIREX, DIS- SOLVED (UG/L)	SILVEX, DIS- SOLVED (UG/L)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27.01)											
AUG , 1979 27...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23.01)											
AUG , 1979 27...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26.01)											
AUG , 1979 27...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31.01)											
AUG , 1979 28...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (NTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02.01)												
AUG , 1979 29...	1015	3.8	161	8.0	18.0	15.0	30	2.0	9.5	97	53	77
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57.01)												
AUG , 1979 29...	1200	13	114	7.0	19.5	13.5	40	2.0	9.7	96	K16	100
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01.01)												
AUG , 1979 29...	1415	2.8	120	6.9	20.5	18.5	30	2.0	8.8	96	70	64
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05.01)												
AUG , 1979 30...	1330	--	205	7.9	14.5	17.5	30	1.0	8.6	92	--	--
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25.01)												
AUG , 1979 29...	1730	--	80	6.8	25.0	21.5	5	1.0	8.4	98	K2	K4
NOV 27...	1515	--	75	--	3.0	3.5	--	--	--	--	--	--
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30.01)												
AUG , 1979 29...	1600	--	105	8.8	25.0	21.0	30	2.0	9.0	102	--	--

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE
RANGE (NON-IDEAL COLONY COUNT)

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	SODIUM+ POTAS- SIUM DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02.01)											
AUG , 1979 29...	84	2	25	5.3	.8	2	.0	1.5	.7	100	0
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57.01)											
AUG , 1979 29...	61	7	17	4.5	.9	3	.1	1.6	.7	66	0
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01.01)											
AUG , 1979 29...	58	7	15	5.0	.9	3	.1	1.7	.8	62	0
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05.01)											
AUG , 1979 30...	110	11	24	12	.8	2	.0	1.5	.7	120	0
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25.01)											
AUG , 1979 29...	39	6	12	2.1	.7	4	.1	1.2	.5	40	0
NOV 27...	--	--	--	--	--	--	--	--	--	--	--
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30.01)											
AUG , 1979 29...	51	11	13	4.4	.8	5	.0	1.5	.7	48	0

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N)
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02.01)											
AUG , 1979 29...	82	1.6	5.4	.7	.0	8.3	114	96	.16	1.17	.06
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57.01)											
AUG , 1979 29...	54	11	5.7	.7	.0	8.0	95	71	.13	3.46	.20
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01.01)											
AUG , 1979 29...	51	12	6.5	.6	.0	5.9	80	66	.11	.60	.04
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05.01)											
AUG , 1979 30...	98	2.4	10	1.1	.0	4.4	128	112	.17	--	.01
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25.01)											
AUG , 1979 29...	33	10	3.9	.3	.0	4.2	56	43	.08	--	.01
NOV 27...	--	--	--	--	--	--	--	--	--	--	--
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30.01)											
AUG , 1979 29...	39	.1	5.4	.5	.0	5.3	76	54	.10	--	.01

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS NO3)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS NO2)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02.01)											
AUG , 1979 29...	.27	.00	.00	.06	.01	1	20	1	1	260	6
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57.01)											
AUG , 1979 29...	.89	.00	.00	.20	.01	1	30	3	2	210	12
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01.01)											
AUG , 1979 29...	.18	.00	.00	.04	.00	1	20	2	1	200	7
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05.01)											
AUG , 1979 30...	.04	.00	.00	.01	.00	0	0	0	2	80	0
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25.01)											
AUG , 1979 29...	.04	.00	.00	.01	.00	0	10	1	0	0	5
NOV 27...	--	--	--	--	--	--	--	--	--	--	--
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30.01)											
AUG , 1979 29...	.04	.00	.00	.01	.00	1	20	2	1	60	7

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, DIS- SOLVED (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PCB, DIS- SOLVED (UG/L)	ALDRIN, DIS- SOLVED (UG/L)	CHLOR- DANE, DIS- SOLVED (UG/L)	DDD, DIS- SOLVED (UG/L)	DDE, DIS- SOLVED (UG/L)
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02.01)											
AUG , 1979 29...	10	<.5	0	0	1	.00	.0	.00	.0	.00	.00
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57.01)											
AUG , 1979 29...	9	<.5	0	0	0	.00	.0	.00	.0	.00	.00
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01.01)											
AUG , 1979 29...	10	<.5	0	0	0	.00	.0	.00	.0	.00	.00
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05.01)											
AUG , 1979 30...	0	<.5	0	0	0	.00	.0	.00	.0	.00	.00
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25.01)											
AUG , 1979 29...	0	<.5	0	0	0	.00	.1	.00	.0	.00	.00
NOV 27...	--	--	--	--	--	--	.0	.00	.0	.00	.00
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30.01)											
AUG , 1979 29...	0	<.5	0	0	0	.00	.0	.00	.0	.00	.00

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	DDT, DIS- SOLVED (UG/L)	DI- ELDRIN DIS- SOLVED (UG/L)	ENDRIN, DIS- SOLVED (UG/L)	HEPTA- CHLOR, DIS- SOLVED (UG/L)	HEPTA- CHLOR EPOXIDE DIS- SOLVED (UG/L)	LINDANE DIS- SOLVED (UG/L)	TOX- APHENE, DIS- SOLVED (UG/L)	2,4-D, DIS- SOLVED (UG/L)	2,4,5-T DIS- SOLVED (UG/L)	MIREX, DIS- SOLVED (UG/L)	SILVEX, DIS- SOLVED (UG/L)
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02.01)											
AUG , 1979 29...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57.01)											
AUG , 1979 29...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01.01)											
AUG , 1979 29...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05.01)											
AUG , 1979 30...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25.01)											
AUG , 1979 29...	.00	.00	.00	.00	.00	.00	0	--	--	.00	--
NOV 27...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30.01)											
AUG , 1979 29...	.00	.00	.00	.00	.00	.00	0	.00	.00	.00	.00

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN

455907086185401 INDIAN LAKE, SITE 1, NEAR MANISTIQUE, MI (LAT 45 59 07 LONG 086 18 54)

DATE	TIME	SAMP- LING DEPTH (FT)	RESER- VOIR DEPTH (FEET)	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE (DEG C)	TRANS- PAR- ENCY (SECCHI DISK) (IN)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)
OCT 31...	1300	3.0	15	4.39	232	--	14.5	7.0	31	<1	<1	110
JAN 09...	1240	3.0	15	3.75	235	7.0	<-5.0	.5	81	<1	<1	130
MAR 07...	1135	3.0	15	3.77	192	7.2	-2.0	.5	89	<1	<1	110
JUN 05...	1045	3.0	16	4.87	195	7.1	16.5	16.0	86	K6	<1	97
JUL 11...	1035	3.0	16	4.67	201	7.6	24.0	22.0	79	<1	--	100
SEP 06...	1125	3.0	16	4.43	234	7.3	20.0	20.0	72	<1	<1	120

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CAC03)	CARBON DIOXIDE DIS- SOLVED (MG/L AS C02)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
OCT 31...	--	35	6.5	1.0	2	.0	.8	69	--	42	1.5	.1
JAN 09...	45	39	8.3	1.6	3	.1	1.0	87	--	33	1.7	.1
MAR 07...	23	30	7.3	1.4	3	.1	1.0	82	--	22	1.1	.0
JUN 05...	39	30	5.4	1.0	2	.0	.6	58	9.0	37	1.3	.1
JUL 11...	28	31	5.7	1.1	2	.0	.6	73	--	33	1.0	.1
SEP 06...	47	37	6.7	1.2	2	.0	.6	73	7.1	36	1.2	.1

K--BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455907086185401, INDIAN LAKE, SITE 1, NEAR MANISTIQUE, MI (LAT 45 59 07 LONG 086 18 54)--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)
OCT 31...	6.4	154	--	.21	.06	.00	.06	.00	.51	.51	.57	2.5
JAN 09...	8.4	164	146	.22	.10	.02	.12	.10	.27	.37	.49	2.2
MAR 07...	9.5	138	122	.19	.38	.00	.38	.05	.01	.06	.44	1.9
JUN 05...	4.2	133	115	.18	.05	.01	.06	.01	.29	.30	.36	1.6
JUL 11...	3.7	--	120	.16	.00	.00	.00	.02	.35	.37	.37	1.6
SEP 06...	5.8	178	133	.24	.00	.00	.00	.04	.46	.50	.50	2.2
DATE	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	CARBON, ORGANIC TOTAL (MG/L AS C)	PHYTO- PLANK- TON, TOTAL (CELLS PER ML)	SESTON, TOTAL (MG/L)	SESTON ASH WEIGHT (MG/L)	ALGAL GROWTH POTEN- TIAL, BOTTLE TEST (MG/L)	LENGTH OF EXPO- SURE (DAYS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M
OCT 31...	.02	.00	310	0	10	61000	90	3.0	.6	34	.000	.000
JAN 09...	.01	.00	240	10	6.1	35	.8	.2	1.9	--	--	--
MAR 07...	.00	.00	230	30	5.5	0	1.3	.3	1.7	57	.000	.000
JUN 05...	.00	.00	90	1	8.2	2000	3.7	1.3	1.3	--	--	--
JUL 11...	.01	.01	110	0	9.0	6800	3.0	1.0	1.4	--	--	--
SEP 06...	.01	.00	120	0	7.1	--	--	--	--	--	--	--
Sep 25...	--	--	--	--	--	--	--	--	1.8	--	--	--

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455907086185401 INDIAN LAKE, SITE 1, NEAR MANISTIQUE, MI (LAT 45 59 07 LONG 086 18 54)--CONTINUED

DATE	TIME	SAMP- LING DEPTH (FT)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)
OCT							
31...	1210	1.0	234	--	7.0	11.4	94
31...	1212	4.0	--	--	7.0	11.2	93
31...	1213	6.0	--	--	7.0	11.2	93
31...	1214	8.0	238	--	6.5	11.2	92
31...	1215	10	--	--	6.5	11.2	92
31...	1216	12	--	--	6.5	11.2	92
31...	1217	14	--	--	6.5	11.2	92
31...	1218	15	238	--	6.5	11.2	92
JAN							
09...	1239	1.0	--	--	.0	12.7	89
09...	1241	4.0	--	--	1.0	13.1	96
09...	1242	6.0	--	--	1.0	13.0	96
09...	1243	8.0	265	7.0	1.5	12.5	91
09...	1244	10	--	--	2.0	7.4	55
09...	1245	12	--	--	3.0	4.3	33
09...	1246	14	805	7.0	3.5	2.9	22
MAR							
07...	1137	6.0	--	--	2.0	10.6	79
07...	1138	8.0	--	--	3.5	8.0	62
07...	1139	10	705	7.2	4.0	1.6	12
07...	1140	12	--	--	4.0	3.2	25
07...	1141	14	929	7.2	4.0	3.7	29
JUN							
05...	1044	1.0	--	--	16.0	9.6	98
05...	1046	4.0	--	--	16.0	9.6	98
05...	1047	6.0	--	--	16.0	9.6	98
05...	1048	8.0	195	7.2	16.0	9.6	98
05...	1049	10	--	--	16.0	9.6	98
05...	1050	12	--	--	16.0	9.6	98
05...	1051	14	195	7.2	16.0	9.6	98
05...	1052	16	--	--	16.0	9.0	92
JUL							
11...	1034	1.0	--	--	22.0	8.6	100
11...	1036	4.0	--	--	22.0	8.7	100
11...	1037	6.0	--	--	21.5	8.7	100
11...	1038	8.0	205	7.6	21.5	8.7	100
11...	1039	10	--	--	21.0	8.8	100
11...	1040	12	--	--	20.5	7.5	84
11...	1041	14	211	7.7	20.0	7.2	80
11...	1042	16	--	--	19.5	6.6	23
SEP							
06...	1124	1.0	--	--	19.0	8.7	95
06...	1126	4.0	--	--	19.0	9.0	98
06...	1127	6.0	--	--	19.0	9.1	99
SEP							
06...	1128	8.0	234	7.4	19.0	9.1	99

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455907086185401 INDIAN LAKE, SITE 1, NEAR MANISTIQUE, MI (LAT 45 59 07 LONG 086 18 54)

DATE TIME	OCT 1515	NOV 1,77 1216	JAN 5,78 1500	MAR 7,78 1330				
TOTAL CELLS/ML	220000	69000	68	19				
DIVERSITY: DIVISION	0.1	0.7	1.4	0.0				
..CLASS	0.1	0.7	1.4	0.0				
...ORDER	0.2	0.8	1.6	0.9				
...FAMILY	0.2	0.9	1.6	0.9				
....GENUS	0.6	1.3	1.6	0.9				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
....CHARACIACEAE								
....SCHROEDERIA	* 0	--	--	--	--	--	--	--
...COELASTRACEAE								
....COELASTRUM	--	--	--	--	--	--	--	--
...HYDRODICTYACEAE								
....PEDIASTRUM	--	--	1300	2	--	--	--	--
...OOCYSTACEAE								
....ANKISTRODESMUS	* 0	--	--	7	10	--	--	--
....CHODATELLA	--	--	--	--	--	--	--	--
....DICTYOSPHAERIUM	--	--	1500	2	--	--	--	--
....KIRCHNERIELLA	* 0	--	520	1	--	--	--	--
....OOCYSTIS	--	--	--	--	--	--	--	--
....SELENASTRUM	--	--	--	--	--	--	--	--
....TETRAEDRON	* 0	--	--	--	--	--	--	--
....TREUBARIA	--	--	--	--	--	--	--	--
...SCENEDESMACEAE								
....ACTINASTRUM	--	--	--	--	--	--	--	--
....CRUCIGENIA	* 0	--	--	--	--	--	--	--
...SCENEDESMUS	* 0	--	630	1	--	--	13#	67
....TETRASTRUM	--	--	--	--	--	--	--	--
...TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	--	--	--	--	--	--	--
...VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	--	* 0	7	10	--	6#	33
...ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	--	--	--	--	--	--	--
....STAUSTRUM	--	--	* 0	--	--	--	--	--
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCAEAE								
....CYCLOTELLA	* 0	1200	2	--	--	--	--	--
....MELOSIRA	--	2600	4	--	--	--	--	--
...STEPHANODISCUS	--	--	--	--	--	--	--	--
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	* 0	--	--	--	--	--	--
...CYMBELLACEAE								
....CYMBELLA	--	--	--	--	--	--	--	--
...FRAGILARIACEAE								
....ASTERIONELLA	--	--	--	--	--	--	--	--
....FRAGILARIA	--	--	--	--	--	--	--	--
....SYNEDRA	* 0	840	1	--	--	--	--	--
...GOMPHONEMACEAE								
....GOMPHONEMA	* 0	--	--	--	--	--	--	--
...NAVICULACEAE								
....NAVICULA	* 0	420	1	--	--	--	--	--
...NITZSCHIAEAE								
....NITZSCHIA	* 0	--	--	--	--	--	--	--
...TABELLARIACEAE								
....TABELLARIA	--	--	--	--	--	--	--	--
..CHRYSTOPHYCEAE								
...CHRYSONOMADALES								
...OCHROMONADACEAE								
....DINOBRYON	* 0	--	--	14#	20	--	--	--
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	* 0	--	--	--	--	--	--	--

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455907086185401 INDIAN LAKE, SITE 1, NEAR MANISTIQUE, MI (LAT 45 59 07 LONG 086 18 54)--CONTINUED

DATE TIME	OCT 4,77 1515		NOV 1,77 1216		JAN 5,78 1500		MAR 7,78 1330	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	2000	1	2300	3	--	-	--	-
....ANACYSTIS	200000#	91	56000#	81	--	-	--	-
....COCCOCHLORIS	--	-	1400	2	--	-	--	-
...HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	1800	1	--	-	41#	60	--	-
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	12000	5	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-

DATE TIME	MAY 24,78 1215		JUN 28,78 1200		AUG 9,78 1045		SEP 27,78 0909	
TOTAL CELLS/ML	9000		120000		25000		770	
DIVERSITY: DIVISION	1.1		0.2		0.4		1.6	
..CLASS	1.1		0.2		0.4		1.6	
...ORDER	1.2		0.2		0.6		2.0	
....FAMILY	1.3		0.3		0.7		2.5	
....GENUS	1.4		0.5		1.3		3.1	

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	520	2	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	240	3	--	-	*	0	16	2
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	*	0	*	0	4	1
....CHODATELLA	--	-	*	0	*	0	--	-
...DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	48	1	*	0	--	-	--	-
...OOCYSTIS	--	-	*	0	--	-	82	11
....SELENASTRUM	--	-	--	-	--	-	22	3
...TETRAEDRON	*	0	*	0	*	0	*	0
...TREUBARIA	--	-	*	0	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	*	0	--	-
...CRUCIGENIA	64	1	*	0	300	1	--	-
...SCENEDESMUS	190	2	*	0	390	2	180#	23
...TETRASTRUM	--	-	--	-	*	0	--	-
...TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	*	0	--	-	--	-
...VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	80	1	--	-	--	-	--	-
...ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIVUM	--	-	*	0	--	-	--	-
...STAURASTRUM	--	-	*	0	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455907086185401 INDIAN LAKE, SITE 1, NEAR MANISTIQUE, MI (LAT 45 59 07 LONG 086 18 54)--CONTINUED

DATE TIME	MAY 24,78 1215		JUN 28,78 1200		AUG 9,78 1045		SEP 27,78 0909	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHRYSOPHYTA								
..BACILLARIOPHYCEAE								
..CENTRALES								
..COSCINODISCACEAE								
....CYCLOTELLA	*	0	*	0	--	-	120#	16
....MELOSIRA	1500#	16	--	-	*	0	51	7
....STEPHANODISCUS	--	-	--	-	190	1	--	-
..PENNALES								
....ACHNANTHACEAE			*	0	--	-	--	-
....ACHNANTHES	--	-	*	0	--	-	--	-
....CYMBELLACEAE			*	0	--	-	--	-
....CYMBELLA	--	-	*	0	--	-	--	-
....FRAGILARIACEAE			*	0	--	-	--	-
....ASTERIONELLA	--	-	*	0	--	-	12	2
....FRAGILARIA	--	-	*	0	--	-	--	-
....SYNEDRA	--	-	*	0	*	0	4	1
..GOMPHONEMACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
..NAVICULACEAE								
....NAVICULA	--	-	--	-	*	0	--	-
..NITZSCHACEAE								
....NITZSCHIA	130	1	*	0	--	-	*	0
..TABELLARIACEAE			*	0	--	-	--	-
....TABELLARIA	--	-	*	0	--	-	--	-
..CHRYSOPHYCEAE								
..CHRYSOMONADALES								
..OCHROMONADACEAE								
....DINORRYON	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
..CRYPTOMONADALES								
..CRYPTOMONADACEAE								
....CRYPTOMONAS	80	1	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
..CHROOCOCCALES								
..CHROOCOCCACEAE								
....AGMENELLUM	--	-	2600	2	3000	12	57	7
....ANACYSTIS	6700#	74	110000#	95	*	0	130#	17
....COCCOCHLORIS	--	-	--	-	*	0	--	-
..HORMOGONALES								
..NOSTOCACEAE								
....ANABAENA	--	-	--	-	660	3	--	-
..OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	82	11
....OSCILLATORIA	--	-	*	0	--	-	--	-
..CHROOCOCCALES								
..CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	20000#	78	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
..EUGLENALES								
..EUGLENACEAE								
....TRACHELONAS	*	0	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455724086203801 INDIAN LAKE, SITE 2, NEAR MANISTIQUE, MI (LAT 45 57 24 LONG 086 20 38)

DATE TIME	OCT 4.77 1646	NOV 1.77 1501	JAN 5.78 1035	MAR 7.78 1000
TOTAL CELLS/ML	160000	33000	420	130
DIVERSITY: DIVISION	0.2	0.5	1.5	0.0
..CLASS	0.2	0.5	1.6	0.0
...ORDER	0.3	0.6	2.0	0.0
...FAMILY	0.3	0.7	2.0	0.0
....GENUS	1.1	0.9	2.2	0.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	* 0		--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	230	1	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	1200	1	190	1	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	* 0		--	-	--	-	--	-
...DICTYOSPHAERIUM	* 0		--	-	--	-	--	-
....KIRCHNERIELLA	* 0		* 0		--	-	--	-
...OOCYSTIS	--	-	* 0		--	-	--	-
....QUADRIGULA	* 0		--	-	--	-	--	-
...SELENASTRUM	--	-	--	-	--	-	--	-
...TETRAEDRON	* 0		* 0		--	-	--	-
...TREUBARIA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
...CRUCIGENIA	--	-	--	-	--	-	--	-
...SCENEDESMUS	--	-	560	2	42	10	--	-
...TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
...SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	* 0		--	-	--	-	--	-
...ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	--	-
...STAURASTRUM	--	-	* 0		--	-	--	-
...ZYGNEMATAACEAE								
...MOUGEOTIA	--	-	870	3	--	-	--	-
CHRYSTOPHYTA								
..RACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTILLA	1200	1	* 0		--	-	--	-
....MELOSIRA	* 0		--	-	--	-	--	-
...STEPHANODISCUS	--	-	* 0		--	-	--	-
...PENNALES								
...ACHNANTHACEAE								
...COCCONEIS	* 0		--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
...FRAGILARIA	* 0		--	-	--	-	--	-
...SYNEDRA	* 0		420	1	7	2	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	--	-
...NITZSCHIA								
....NITZSCHIA	--	-	--	-	--	-	--	-
...SURIPELLACEAE								
...CYMATOPLEURA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	* 0		370	1	--	-	--	-
...CHRYSTOPHYCEAE								
...CHRYSONOMADACEAE								
...OCHROMONADACEAE								
....DINOBYRON	--	-	* 0		14	3	--	-
...OCHROMONAS	--	-	--	-	170#	40	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
...CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455724086203801 INDIAN LAKE, SITE 2, NEAR MANISTIQUE, MI (LAT 45 57 24 LONG 086 20 38)--CONTINUED

DATE TIME	OCT 4.77 1646	NOV 1.77 1501	JAN 5.78 1035	MAR 7.78 1000				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENFLLUM	5400	3	960	3	--	-	--	-
....ANACYSTIS	130000#	78	29000#	88	91#	22	130#	100
..HORMOGONALES								
...NOSTOCACEAE								
....APHANIZOMENON	--	-	--	-	--	-	--	-
...OSCILLATORIAEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	980	1	--	-	91#	22	--	-
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	25000#	16	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	7	2	--	-
PYRRHOPHYTA (FIRE ALGAE)								
..DINOPHYCEAE								
...GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	*	0	--	-	--	-	--	-
DATE TIME	MAY 24.78 1605	JUN 28.78 1500	AUG 9.78 1320	SEP 27.78 1155				
TOTAL CELLS/ML	15000	65000	190000	7200				
DIVERSITY: DIVISION	1.1	0.5	0.2	1.3				
..CLASS	1.1	0.5	0.2	1.3				
...ORDER	1.2	0.6	0.3	1.7				
...FAMILY	1.3	0.7	0.3	2.1				
....GENUS	1.4	1.1	0.8	2.3				
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
..CHLOROPHYCEAE								
...CHLOROCOCCALES								
...CHARACIACEAE								
...SCHROEDERIA	--	-	--	-	--	-	*	0
...COELASTRACEAE								
...COELASTRUM	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
...PEDIATRUM	--	-	--	-	--	-	350	5
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	*	0	--	-	--	-
....DICTYOSPHAERIUM	*	0	--	-	--	-	--	-
....KIRCHNERIELLA	*	0	380	1	*	0	170	2
...OOCYSTIS	--	-	470	1	*	0	49	1
...QUADRIGULA	--	-	--	-	--	-	--	-
...SELENASTRUM	*	0	--	-	--	-	--	-
...TETRAEDRON	80	1	*	0	--	-	*	0
...TREUBARIA	--	-	*	0	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	380	1	--	-	--	-
....CRUCIGENIA	*	0	1200	2	1400	1	490	7
...SCENEDESMUS	380	2	720	1	--	-	610	9
...TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	*	0	--	-	--	-
...PALMELLACEAE								
...SPHAEROCYSTIS	--	-	--	-	--	-	670	9
...VOLVOCALES								
...CHLAMYDOMONADACEAE								
...CHLAMYDOMONAS	--	-	*	0	*	0	61	1
...ZYGNEATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	*	0	--	-	--	-
...STAUROSTRUM	--	-	--	-	--	-	--	-
...ZYGNEMATAEAE								
....MOUGEOTIA	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM; MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
IDENTIFICATION OF PHYTOPLANKTON

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

455724086203801 INDIAN LAKE, SITE 2, NEAR MANISTIQUE, MI (LAT 45 57 24 LONG 086 20 38)--CONTINUED

DATE TIME	MAY 24,78 1605		JUN 28,78 1500		AUG 9,78 1320		SEP 27,78 1155	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHRYSTOPHYTA								
..BACILLARIOPHYCEAE								
...CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	80	1	*	0	*	0	490	7
....MELOSIRA	2800#	18	*	0	--	-	*	0
....STEPHANODISCUS	*	0	--	-	*	0	61	1
..PENNALES								
...ACHNANTHACEAE								
...COCCONEIS	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
...ASTERIONELLA	--	-	--	-	1000	1	73	1
...FRAGILARTA	--	-	340	1	*	0	--	-
...SYNEDRA	160	1	*	0	--	-	*	0
...NAVICULACEAE								
...NAVICULA	*	0	--	-	--	-	*	0
...NITZSCHACEAE								
...NITZSCHIA	96	1	--	-	--	-	--	-
...SURIPELLACEAE								
...CYMATOPLEURA	*	0	--	-	--	-	--	-
...TABELLARIACEAE								
...TABELLARIA	--	-	--	-	--	-	--	-
..CHRYSTOPHYCEAE								
..CHRYSONOMADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	*	0	--	-	--	-
....OCHROMONAS	*	0	--	-	*	0	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
..CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	*	0	*	0	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	*	0	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
..CYANOPHYCEAE								
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	*	0	4000#	56
....ANACYSTIS	11000#	73	55000#	84	170000#	88	--	-
...HORMOGONALES								
...NOSTOCACEAE								
....APHANIZOMENON	--	-	640	1	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	130	1	--	-	*	0	--	-
...OSCILLATORIA	--	-	510	1	3400	2	--	-
...CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	-	3900	6	15000	8	--	-
EUGLENOPHYTA (EUGLENOIDS)								
..EUGLENOPHYCEAE								
...EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	*	0	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
..PYRRHOPHYCEAE								
...GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%

* - OBSERVED ORGANISM; MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR, TOTAL (PLAT- INUM COBALT UNITS)	TUR- BID- ITY (NTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08.01)												
AUG , 1979												
14...	0845	179	295	8.3	18.0	5	2.0	9.0	97	K11	57	150
04126758 - PLATTE RIVER AT WIER ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12.01)												
AUG , 1979												
14...	1430	186	290	8.3	19.0	5	3.0	7.9	86	K8	K4	150
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40.01)												
AUG , 1979												
15...	0930	3.8	280	8.2	18.0	5	5.0	8.6	92	K1	K3	140
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26.01)												
AUG , 1979												
15...	1200	.00	335	7.6	15.0	5	4.0	9.1	91	108	--	180
17...	1130	21	345	7.6	12.0	--	1.0	6.9	65	--	--	170
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46.01)												
AUG , 1979												
16...	1410	4.9	260	8.4	19.0	5	1.0	9.9	108	33	65	130
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07.01)												
AUG , 1979												
16...	1500	20	320	8.1	16.0	11	1.0	95.0	9	K11	44	170
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40.01)												
AUG , 1979												
15...	1515	--	310	8.3	18.5	5	2.0	95.0	8	K1	<1	160
445331085564501 - GLEN LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 53 31 LONG 085 56 45.01)												
AUG , 1979												
17...	0930	--	245	8.3	16.0	5	1.0	9.5	97	21	K11	130
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08.01)												
AUG , 1979												
16...	1200	--	210	8.8	17.0	15	1.0	102	9	K1	<1	110

K--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE
RANGE (NON-IDEAL COLONY COUNT)

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	CALCIUM DIS- SOLVED (MG/L AS CAC03)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	SODIUM+ POTAS- SIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS C03)	ALKA- LINITY (MG/L AS CAC03)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08.01)												
AUG , 1979 14...	7	42	--	11	3.7	5	.1	--	.7	174	0	143
04126758 - PLATTE RIVER AT WIER ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12.01)												
AUG , 1979 14...	21	43	--	11	3.6	5	.1	--	.7	--	0	--
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40.01)												
AUG , 1979 15...	2	38	--	11	1.8	3	.1	2.5	.7	168	0	138
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26.01)												
AUG , 1979 15...	5	49	--	13	2.2	3	.1	--	.6	208	0	171
17...	1	48	--	13	2.7	3	.1	--	.5	210	0	172
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46.01)												
AUG , 1979 16...	0	31	--	13	2.5	4	.1	3.1	.6	152	4	131
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07.01)												
AUG , 1979 16...	17	45	--	14	3.3	4	.1	--	.7	186	0	153
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40.01)												
AUG , 1979 15...	9	--	42	13	2.3	0	--	--	.8	182	0	149
445331085564501 - GLEN LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 53 31 LONG 085 56 45.01)												
AUG , 1979 17...	1	32	--	13	2.7	4	.1	--	.6	162	0	133
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08.01)												
AUG , 1979 16...	0	27	--	9.8	1.5	3	.1	--	1.2	105	24	126

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS NO3)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08.01)												
AUG , 1979 14...	1.4	12	4.4	.2	2.5	174	163	.24	84.1	--	.06	.27
04126758 - PLATTE RIVER AT WIER ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12.01)												
AUG , 1979 14...	1.3	11	4.4	.2	2.4	181	--	.25	90.9	--	.09	.40
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40.01)												
AUG , 1979 15...	1.7	11	3.2	.1	6.7	168	156	.23	1.75	--	.19	.84
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26.01)												
AUG , 1979 15... 17...	8.4 8.4	14 16	2.8 3.0	.2 .2	7.0 7.2	206 197	193 194	.28 .27	.00 11.2	-- --	.38 .01	1.7 .04
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46.01)												
AUG , 1979 16...	1.0	12	1.8	4.0	6.1	155	150	.21	2.08	.02	.02	.09
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07.01)												
AUG , 1979 16...	2.4	27	3.8	.5	6.5	194	199	.26	10.9	--	.15	6.6
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40.01)												
AUG , 1979 15...	1.5	13	4.9	.1	2.9	185	--	.25	--	--	.21	.93
445331085564501 - GLEN LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 53 31 LONG 085 56 45.01)												
AUG , 1979 17...	1.3	11	1.8	.4	5.4	139	147	.19	--	--	.10	.44
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08.01)												
AUG , 1979 16...	.4	7.2	3.5	.1	5.3	130	134	.18	--	--	.54	2.4

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS NO2)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08.01)												
AUG , 1979 14...	.00	.00	.06	.00	1	40	0	0	0	0	1	<.5
04126758 - PLATTE RIVER AT WIER ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12.01)												
AUG , 1979 14...	.01	.03	.10	.00	1	30	0	0	0	0	1	<.5
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40.01)												
AUG , 1979 15...	.00	.00	.19	.00	2	30	0	1	0	0	0	<.5
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26.01)												
AUG , 1979 15... 17...	.00 .00	.00 .00	.38 .01	.01 --	1 --	40 --	0 --	0 --	40 10	0 --	4 3	<.5 --
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46.01)												
AUG , 1979 16...	.00	.00	.02	.00	1	20	1	0	0	5	1	<.5
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07.01)												
AUG , 1979 16...	.00	.00	.15	.00	1	40	1	2	10	1	3	<.5
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40.01)												
AUG , 1979 15...	.10	.03	.22	.00	1	30	0	0	11	0	0	<.5
445331085564501 - GLEN LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 53 31 LONG 085 56 45.01)												
AUG , 1979 17...	.04	.13	.14	.00	1	40	0	0	0	4	0	<.5
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08.01)												
AUG , 1979 16...	.00	.00	.54	.00	1	10	0	1	1	5	1	<.5

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	SELE- NIUM, SUS- PENDED TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, DIS- SOLVED (UG/L AS ZN)	CYANIDE DIS- SOLVED (MG/L AS CN)	CYANIDE TOTAL (MG/L AS CN)	PCB, DIS- SOLVED (UG/L)	ALDRIN, DIS- SOLVED (UG/L)	CHLOR- DANE, DIS- SOLVED (UG/L)	DDD, DIS- SOLVED (UG/L)	DDE, DIS- SOLVED (UG/L)	DDT, DIS- SOLVED (UG/L)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08.01)												
AUG , 1979 14...	--	0	0	2	.00	--	.0	.00	.0	.00	.00	.00
04126758 - PLATTE RIVER AT WIER ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12.01)												
AUG , 1979 14...	--	0	0	3	.00	--	.0	.00	.0	.00	.00	.00
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40.01)												
AUG , 1979 15...	--	0	0	0	.00	--	.0	.00	.0	.00	.00	.00
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26.01)												
AUG , 1979 15... 17...	-- --	0 --	0 --	3 --	.00 --	-- --	.0 --	.00 --	.0 --	.00 --	.00 --	.00 --
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46.01)												
AUG , 1979 16...	0	--	0	8	.00	--	.0	.00	.0	.00	.00	.00
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07.01)												
AUG , 1979 16...	--	0	0	3	.00	--	.0	.00	.0	.00	.00	.00
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40.01)												
AUG , 1979 15...	--	0	0	2	.00	--	.0	.00	.0	.00	.00	.00
445331085564501 - GLEN LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 53 31 LONG 085 56 45.01)												
AUG , 1979 17...	--	0	0	3	--	.00	.0	.00	.0	.00	.00	.00
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08.01)												
AUG , 1979 16...	--	0	0	20	.00	--	.0	.00	.0	.00	.00	.00

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	DI- ELDRIN DIS- SOLVED (UG/L)	ENDRIN, DIS- SOLVED (UG/L)	HEPTA- CHLOR, DIS- SOLVED (UG/L)	HEPTA- CHLOR EPOXIDE DIS- SOLVED (UG/L)	LINDANE DIS- SOLVED (UG/L)	TOX- APHENE, DIS- SOLVED (UG/L)	2,4-D, DIS- SOLVED (UG/L)	2,4,5-T DIS- SOLVED (UG/L)	NAPH- THA- LENES, POLY- CHLOR. TOTAL (UG/L)	MIREX, DIS- SOLVED (UG/L)	SILVEX, DIS- SOLVED (UG/L)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08.01)											
AUG , 1979 14...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00
04126758 - PLATTE RIVER AT WIER ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12.01)											
AUG , 1979 14...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40.01)											
AUG , 1979 15...	.00	.00	.00	.00	.00	0	.00	--	--	.00	.00
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26.01)											
AUG , 1979 15... 17...	.00 --	.00 --	.00 --	.00 --	.00 --	0 --	.00 --	.00 --	.00 --	.00 --	.00 --
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46.01)											
AUG , 1979 16...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07.01)											
AUG , 1979 16...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40.01)											
AUG , 1979 15...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00
445331085564501 - GLEN LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 53 31 LONG 085 56 45.01)											
AUG , 1979 17...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08.01)											
AUG , 1979 16...	.00	.00	.00	.00	.00	0	.00	.00	.00	.00	.00



FIGURE 9.--Map showing location of observation wells published in this report.

GROUND-WATER LEVELS

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDDB.

LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft (76 m) northwest of highway M-44, 0.2 mi (0.3 km) northeast of Kentucky.

Owner: U.S. Forest Service.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 66 ft (20 m).

DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of casing, 3.60 ft (1.10 m) above land-surface datum.

PERIOD OF RECORD.--June 1959 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft (1.94 m) below land-surface datum, June 29, 1960; lowest measured, 14.19 ft (4.33 m) Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	9.64	MAR 1	10.43	JUN 7	8.74

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDDA.

LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi (5 km) east and 1.5 mi (2.4 km) north of Long Rapids.

Owner: U.S. Geological Survey.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in (15 cm), depth 88 ft (27 m), screened 79 to 88 ft (24 to 27 m).

DATUM.--Altitude of land-surface datum is 713 ft (217 m). Measuring point: Plywood instrument shelf, 217 ft (0.8 m) above land-surface

REMARKS.--Bottom of hole near top of bedrock.

PERIOD OF RECORD.--November 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.75 ft (4.80 m) below land-surface datum, May 8, 1979; lowest, 28.73 ft (8.76 m)

Mar. 10, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	23.02	22.63	22.98	24.08	25.03	25.56	18.89	16.77	17.97	18.26	19.04	20.18
10	22.74	22.88	23.22	24.26	25.21	25.13	18.21	16.00	17.81	18.27	19.14	20.67
15	22.47	23.04	23.34	24.39	25.30	25.04	17.44	16.95	17.84	18.56	19.35	21.07
20	22.34	23.11	23.43	24.37	--	24.50	17.88	17.17	18.15	18.74	19.38	21.40
25	22.35	22.98	23.73	24.72	--	22.70	18.03	17.38	18.20	18.81	19.65	21.84
EOB	22.57	22.91	23.93	24.88	25.61	20.82	18.02	17.79	18.13	18.90	19.89	22.20

WTR YEAR 1979 MAX 15.75 MAY 8, 1979 MIN 25.69 MAR 2, 1979

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.

LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft (29 m) north of U.S. Highway 41 and 0.5 mi (0.8 km) south-east of Nestoria Road.

Owner: Michigan State Highway Department.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.2 cm), depth 10 ft (3 m), screened 7 to 10 ft (2 to 3 m).

DATUM.--Altitude of land-surface datum is 1,630 ft (497 m). Measuring point: Top of casing, 4.78 ft (1.46 m) above land-surface datum.

REMARKS.--Measurements made by Wisconsin-Michigan Power Company.

PERIOD OF RECORD.--September 1948 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft (1.00 m) below land-surface datum, Apr. 30, 1965; lowest measured,

8.09 ft (2.47 m) Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	6.29	JAN 2	6.54	FEB 28	6.79	MAY 31	6.13	JUL 30	6.44	SEP 27	6.72
30	6.39	31	6.72	APR 3	6.24	JUN 28	5.98	SEP 4	6.61		

BARRY COUNTY

4245400852320. Local number, 4N 9W 5DAAA.

LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Solomon Road 4 mi (6 km) east and 3.5 mi (5.6 km) north of Middleville.

Owner: State Department of Natural Resources.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in (5 cm), depth 131 ft (40 m).

DATUM.--Altitude of land-surface datum is 860 ft (262 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.

PERIOD OF RECORD.--December 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.5 ft (34.0 m) below land-surface datum, Mar. 20, 1978; lowest measured, 122.0 ft (37.2 m) Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 14	117.1	MAR 27	117.1	JUN 4	116.5	SEP 20	115.1

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.

LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.

Owner: Pinconning Township.

AQUIFER.--Saginaw Formation of Pennsylvania age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 110 ft (33 m), cased to 60 ft (18 m), open end.

DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood shelter base, 2.00 ft (0.61 m) above land-surface datum.

REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--August 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level 0.05 ft (0.02 m) below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft (3.21 m) Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	2.91	2.57	--	--	--	1.75	1.65	--	3.00	3.14	3.90	4.20
10	--	--	--	1.88	--	1.80	1.80	--	2.91	3.60	3.77	4.28
15	--	--	--	--	--	1.90	1.73	--	3.25	--	4.11	4.40
20	--	--	--	--	--	1.85	1.82	--	3.65	--	4.48	4.36
25	--	--	--	--	--	1.70	1.89	--	3.53	3.50	3.70	4.50
EOM	--	2.18	--	--	1.76	1.91	1.85	--	2.86	4.59	4.10	4.73
WTR YEAR 1979	MAX	1.38	APR 6, 1979	MIN	4.83	JUL 1979						

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CARA.

LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.

Owner: City of Coldwater.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 113 ft (34 m), screened 73 to 113 ft (22 to 34 m).

DATUM.--Altitude of land-surface datum is 970 ft (296 m). Measuring point: Plywood shelter base, 2.50 ft (0.76 m) above land-surface datum.

REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--January 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft (2.7 m) below land-surface datum, May 6, 1975; lowest, 25.9 ft (7.9 m) May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	23.4	23.6	--	17.0	15.7	15.3	--	18.3	22.9	21.1	22.8
10	--	23.8	23.5	13.9	17.0	14.9	20.2	--	12.9	23.1	23.2	23.0
15	--	--	--	--	18.7	16.1	11.5	--	18.1	13.6	23.2	14.0
20	--	--	--	--	18.4	16.1	16.1	--	18.7	23.9	22.5	23.3
25	23.0	--	--	--	14.4	14.0	15.6	--	21.9	23.1	22.5	23.6
EOM	21.9	23.7	--	--	18.3	12.9	16.3	16.6	15.3	22.8	22.6	15.8
WTR YEAR 1979	MAX	10.9	APR 16, 1979	MIN	24.2	SEP 7, 1979						

GROUND-WATER LEVELS

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.

LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi (8 km) north of Battle Creek.

Owner: Rilla Sabin.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in (38 cm), depth 12 ft (4 m), open tile bottom.

DATUM.--Land-surface datum is 907.99 ft (276.76 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.50 ft (0.46 m) above land-surface datum.

REMARKS.--Measured by observer.

PERIOD OF RECORD.--September 1946 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft (0.27 m) below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	3.64	DEC 6	4.16	FEB 21	4.14	APR 18	2.90	JUN 13	3.20	AUG 8	3.53
11	3.76	13	4.14	28	4.12	25	2.72	20	3.05	15	3.64
18	3.84	20	4.18	MAR 7	3.70	MAY 2	2.75	27	3.29	22	3.70
25	3.98	27	4.20	14	3.20	9	2.80	JUL 4	3.30	29	3.73
NOV 1	3.94	JAN 3	4.14	21	3.14	16	2.81	11	3.26	SEP 5	3.78
8	4.02	31	4.04	28	3.08	23	2.85	18	3.50	12	3.90
15	4.10	FEB 7	4.06	APR 4	3.10	30	2.86	25	3.62	19	3.97
22	4.12	14	4.10	11	3.04	JUN 6	3.02	AUG 1	3.57	26	4.02
29	4.17										

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.

LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.

Owner: City of Battle Creek.

AQUIFER: Marshall Formation of Mississippian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 127 ft (39 m), cased to 103 ft (31 m).

DATUM.--Land-surface datum is 830.79 ft (253.22 m) National Geodetic Vertical Datum of 1929. Measuring point: Recorder base, 2.10 ft (0.64 m) above land-surface datum.

REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.

PERIOD OF RECORD.--October 1939 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft (0.2 m) below land surface datum, Apr. 26-27, 1950; lowest, 16.75 ft (5.11 m) July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.30	6.50	6.90	7.00	7.30	7.10	5.00	4.80	7.50	7.10	8.70	7.90
10	7.45	6.40	6.10	7.90	8.10	6.10	5.00	5.90	6.40	7.70	8.50	8.15
15	6.60	6.40	6.50	7.10	7.30	6.00	4.65	5.75	7.50	7.15	7.00	7.80
20	6.20	6.10	5.80	7.50	6.80	6.20	5.20	5.30	7.60	7.80	7.40	9.60
25	6.60	6.25	6.20	7.65	6.80	5.10	4.95	6.80	7.10	8.30	7.90	8.90
EOM	7.45	7.00	5.70	7.50	7.00	5.10	5.15	6.55	6.70	8.20	7.80	8.30

CASS COUNTY

414651085575601. Local number, 8S 14W 17BAAA.

LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi (3 km) east of Adamsville on U.S. Highway 112.

Owner: Ted Little.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in (71 cm), depth 55 ft (17 m), cribbed with brick to open bottom.

DATUM.--Altitude of land-surface datum is 840 ft (256 m). Measuring point: Top of wooden platform, 1.00 ft (0.30 m) above land-surface datum.

REMARKS.--Measured by observer.

PERIOD OF RECORD.--September 1945 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft (14.08 m) below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	51.10	DEC 3	51.15	FEB 4	51.90	APR 24	51.40	JUN 26	52.10	AUG 23	50.30
NOV 21	51.10	JAN 6	51.30	MAR 22	51.75	MAY 25	51.85	JUL 23	51.40	SEP 24	50.35

454427084424001. Local number, 39N 3W 29CBCB1.

LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.

Owner: U.S. Geological Survey

AQUIFER.--Dundee Formation of Devonian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 121 ft (37 m) cased to 104 ft (32 m), open end.

DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.

PERIOD OF RECORD.--January 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.25 ft (1.60 m) below land-surface datum, May 12, 1979; lowest measured, 9.47 ft (2.89 m) Sep. 26, 1979.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 19	9.16	MAR 1	8.32	MAY 12	5.25	JUL 19	8.07	AUG 23	8.63	SEP 26	9.47
FEB 16	8.52	27	5.84	JUN 19	7.12	AUG 20	8.57				

454427084424002. Local number, 39N 3W 29CBCB2.

LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.

Owner: U.S. Geological Survey.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 55 ft (17 m), screened 40 to 55 ft (12 to 17 m).

DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--February 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.07 ft (0.63 m) below land-surface datum, May 12, 1979; lowest measured, 4.72 ft (1.44 m) Sep. 27, 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 16	4.21	MAR 27	2.13	JUN 19	2.98	AUG 20	3.94	AUG 23	4.04	SEP 27	4.72
MAR 1	3.99	MAY 12	2.07	JUL 19	3.73						

462159084442201. Local number, 46N 4W 24DADA.

LOCATION.--Lat 46°21'59", long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi (0.3 km) south of highway M-28 and 1 mi (2 km) west of Raco.

Owner: U.S. Forest Service.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 54 ft (16 m).

DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of shelter base, 3.07 ft (0.94 m) above land-surface datum.

PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft (5.61 m) below land-surface datum, June 7, 1971; lowest, 28.43 ft (8.67 m) Apr. 14, 1964.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	22.62	DEC 5	22.63	MAR 1	24.02	APR 26	22.56	JUN 26	20.76	AUG 22	20.64
NOV 2	22.38	19	22.95	27	24.40	MAY 24	20.42	JUL 24	20.45	SEP 18	21.13
7	22.35	JAN 18	23.44								

GROUND-WATER LEVELS

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.

LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi (10 km) south of St. Johns

Owner: State Highway Department.

AQUIFER.--Gravel of Pleistocene age.

WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in (51 cm), depth 26 ft (8 m), screened 23 to 26 ft (7 to 8 m).
DATUM.--Land-surface datum is 803.32 ft (244.85 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.30 ft (0.40 m) above land-surface datum.

REMARKS.--Federal key well.

PERIOD OF RECORD.--August 1948 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft (4.22 m) below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft (6.07 m) Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	19.06	DEC 21	18.99	FEB 22	18.97	APR 23	17.48	JUN 20	17.85	AUG 20	18.42
NOV 27	19.01	JAN 23	18.83	MAR 22	18.15	MAY 21	17.08	JUL 26	18.24	SEP 20	18.74

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.

LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi (4.2 km) south of Eldorado on Highway M-18.

Owner: U.S. Forest Service.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 56 ft (17 m), cased.

DATUM.--Altitude of land-surface datum is 1,190 ft (363 m). Measuring point: Top of shelter base, 2.95 ft (0.90 m) above land-surface datum.

PERIOD OF RECORD.--November 1948 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft (7.84 m) below land-surface datum, May 10, 1976; lowest, 35.97 ft (10.96 m) Apr. 4-6, 1951.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.37	--	30.22	30.44	30.68	30.92	31.14	29.95	29.20	28.83	29.01	29.22
10	30.35	--	30.31	30.55	30.70	30.94	30.99	29.80	29.08	28.82	29.04	29.30
15	30.28	--	30.28	30.57	30.70	30.98	30.79	29.71	29.00	28.82	29.09	29.30
20	30.22	30.20	30.35	30.56	30.71	31.15	30.62	29.55	28.96	28.83	29.10	29.32
25	--	30.17	30.39	30.56	30.88	31.20	30.32	29.44	28.91	28.86	29.16	29.32
EOM	--	30.12	30.42	30.66	30.89	30.23	30.15	29.34	28.85	28.94	29.22	29.33

WTR YEAR 1979 MAX 28.81 JUL 10, 1979 MIN 31.25 MAR 27, 1979

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.

LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi (5.6 km) east of Escanaba.

Owner: M. Blake

AQUIFER.--Munising Sandstone of Cambrian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in (13 cm), depth 530 ft (162 m).

DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of shelter base, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--July 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft (0.5 m) below land-surface datum, May 6, 1960; lowest, 8.9 ft (2.7 m) Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.31	6.37	6.15	6.44	6.52	--	5.46	5.14	5.11	--	5.91	6.24
10	6.38	6.44	6.35	6.48	6.56	6.17	5.50	5.06	5.21	--	6.05	6.38
15	6.41	6.42	6.27	6.48	5.63	6.27	5.21	5.19	5.27	--	6.02	6.28
20	6.40	6.29	6.32	6.49	--	6.05	5.15	4.89	5.32	6.16	6.08	6.47
25	6.38	6.22	6.28	6.40	--	5.61	5.08	5.05	--	6.33	6.18	6.59
EOM	6.45	6.23	6.43	6.45	--	5.61	5.13	5.15	--	5.83	6.30	6.67

WTR YEAR 1979 MAX 4.83 MAY 20, 1979 MIN 6.71 FEB 17, 1979

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.

LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109; 6.25 mi (10.06 km) north of Felch.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Augered water-table well, diameter, 1½ in (3.18 cm), depth 31 ft (9 m) screened 29 to 31 ft (8.8 to 9.4 m).

DATUM.--Altitude of land-surface datum is 1,160 ft (353 m). Measuring point: Hole in top of cap, 4.00 ft (1 m) above land-surface datum.

PERIOD OF RECORD.--October 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft (3.99 m) below land-surface datum, May 17, 1972; lowest measured, 16.50 ft (5.03 m) Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	14.81	DEC 14	14.69	FEB 7	15.12	MAR 23	15.10	AUG 15	13.41	SEP 18	13.86

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.

LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi (0.8 km) west of Lansing.

Owner: F. Wheeler.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 381 ft (116 m), cased to 140 ft (43 m).

DATUM.--Land-surface datum is 862.91 ft (263.01 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood instrument shelf, 1.00 ft (0.30 m) above land-surface datum.

REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--October 1953 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft (20.6 m) below land-surface datum, Nov. 23, 1953; lowest, 103.6 ft (31.6 m) Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	91.2	86.2	86.3	84.4	85.8	83.8	83.1	89.3	92.2	91.0	91.4	91.0
10	91.2	86.6	85.6	88.2	88.3	83.4	84.2	87.3	95.8	97.0	--	88.8
15	86.4	89.1	85.7	91.7	88.0	83.6	88.0	86.3	97.9	95.5	95.3	92.5
20	85.6	92.7	89.0	89.6	87.8	84.8	84.5	87.1	99.1	98.9	94.9	95.5
25	87.5	84.1	89.9	88.3	86.0	86.3	88.5	90.8	95.3	98.4	93.9	94.8
EOM	89.9	86.5	83.1	88.3	85.4	87.4	87.3	90.7	96.0	93.4	95.8	96.0

WTR YEAR 1979 MAX 81.7 JAN 2, 1979 MIN 99.1 JUN 20, 1979

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.

LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.

Owner: General Motors Corporation.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in (25 cm), depth 385 ft (117 m), cased to 150 ft (46 m).

DATUM.--Land-surface datum is 837.0 ft (255.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Base for recorder, 1.50 ft (0.46 m) above land-surface datum.

REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.

PERIOD OF RECORD.--January 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.3 ft (15.9 m) below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft (26.5 m) Jun. 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	63.5	60.0	63.7	--	67.7	67.0	64.8	66.2	68.5	69.6	71.4	70.6
10	61.5	60.6	64.8	68.2	67.8	69.7	65.2	68.8	69.5	68.9	66.3	69.8
15	60.6	62.1	66.9	68.0	70.3	67.5	66.8	67.3	70.2	67.5	65.6	69.9
20	60.0	59.4	68.5	70.9	69.6	67.2	64.3	66.4	81.4	71.9	67.4	69.7
25	59.6	59.3	67.6	71.2	67.6	65.6	64.9	66.4	79.0	72.5	65.5	70.7
EOM	59.9	62.6	--	66.5	67.6	66.2	65.0	64.6	81.5	72.8	69.0	72.5

WTR YEAR 1979 MAX 58.4 NOV 27, 1978 MIN 82.6 JUN 29, 1979

GROUND-WATER LEVELS

GRAND TRAVERSE COUNTY

443921085213501. Local number, 26N 9W 14ABAA.

LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi (8.8 km) north of Fife Lake.

Owner: U.S. Geological Survey.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 80 ft (24 m), PVC pipe and screen.

DATUM.--Altitude of land-surface datum is 960 ft (293 m). Measuring point: Plywood instrument shelf, 2.85 ft (0.87 m) above land-surface datum.

PERIOD OF RECORD.--June 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft (7.11 m) below land-surface datum, June 17, 1976; lowest, 26.86 ft (8.19 m), Feb. 16, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.88	26.12	26.30	26.53	26.77	--	--	25.52	24.67	24.69	25.00	25.32
10	25.92	26.15	26.34	26.57	26.81	--	26.30	25.12	24.61	24.71	25.05	25.38
15	25.97	26.18	26.37	26.60	26.85	--	25.97	25.04	24.58	24.78	25.11	25.44
20	26.01	26.21	26.40	26.64	--	--	25.71	24.96	24.57	24.83	25.16	25.48
25	26.05	26.24	26.44	26.68	--	--	25.50	24.87	24.61	24.87	25.21	25.55
EOM	26.09	26.27	26.49	26.73	--	--	25.34	24.76	24.61	24.94	25.27	25.60

WTR YEAR 1979 MAX 26.86 FEB 16, 1979 MIN 24.56 JUN 16, 1979

HILLSDALE COUNTY

415154084315401. Local number, 7S 2W 15BCBA1.

LOCATION.--Lat 41°51'54", long 084°31'54", Hydrologic Unit 04100003, at Trail and Bird Lake Roads 7 mi (11 km) southeast of Hillsdale.

Owner: U.S. Geological Survey.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 150 ft (46 m), screened 135 to 150 (41 to 46 m).

DATUM.--Altitude of land-surface datum is 1092 ft (333 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--November 1978 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 47.94 ft (14.61 m) below land-surface datum, Sep. 4, 1979; lowest measured, 49.00 ft (14.93 m) Mar. 15, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 2	48.61	MAR 15	49.00	MAY 24	48.24	JUL 26	48.63	AUG 20	48.62	SEP 4	47.94
JAN 10	48.38	APR 16	48.52	JUL 5	48.55						

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.

LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi (4.0 km) west of Pittsford on M-43.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Augered water-table well, diameter 1½ in (3.2 cm), depth 20 ft (6 m), screened 17 to 20 ft (5 to 6 m).

DATUM.--Altitude of land-surface datum is 1,070 ft (326 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.

PERIOD OF RECORD.--December 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.98 ft (2.13 m) below land-surface datum, May 22, 1978; lowest measured, 11.1 ft (3.38 m), Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	9.48	JAN 10	8.98	MAR 15	8.46	MAY 24	8.51	JUL 7	8.60	SEP 4	8.60
NOV 28	9.47	FEB 6	9.67	APR 16	7.89						

GROUND-WATER LEVELS

507

INGHAM COUNTY

424502084331301. Local number, 4N 2W 9BDAD.

LOCATION.--Lat 42°45'02", long 084°33'13", Hydrologic Unit 04050004, at North Grand River Avenue and Josephine Streets, Lansing.

Owner: City of Lansing

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 14 in (36 cm), depth 395 ft (120 m), cased to 49 ft (15 m).

DATUM.--Land-surface datum is 828.81 ft (252.62 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood shelter base, 9.4 ft (2.9 m) below land-surface datum.

REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--December 1929 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.63 ft (4.76 m) below land-surface datum, Mar. 26, 1931; lowest, 179.4 ft (54.7 m) Apr. 29, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	117.2	113.0	108.0	102.5	104.4	112.3	117.9	116.5	119.9	127.9	123.1	115.3
10	116.6	112.7	109.0	103.2	106.1	113.9	118.0	117.9	124.2	126.7	120.1	117.7
15	115.6	112.4	108.7	103.3	105.6	115.2	116.7	119.8	128.4	127.2	117.8	120.6
20	116.1	111.9	108.0	102.8	107.9	115.7	117.5	118.7	129.7	129.0	115.9	120.7
25	115.7	109.7	105.0	103.0	110.3	116.2	117.8	119.6	130.0	130.0	114.9	119.1
EOM	114.8	108.4	102.3	103.7	110.7	117.4	166.6	117.9	130.4	128.4	115.0	120.7

WTR YEAR 1979 MAX 101.7 JAN 2, 1979 MIN 131.0 JUN 28, 1979

IRON COUNTY

460455088412901. Local number, 43N 35W 33BDAD.

LOCATION.--Lat 46°04'55", long 088°41'29", Hydrologic Unit 04030106, 1.3 mi (2.1 km) south of junction U.S. 2 on highway M-73.

Owner: State Highway Department.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Driven water-table well, diameter 1½ in (3.2 cm), depth 12 ft (4 m), screened 9 to 12 ft (3 to 4 m).

DATUM.--Altitude of land-surface datum is 1,520 ft (463 m). Measuring point: Top of casing, 2.05 ft (0.62 m) above land-surface datum.

REMARKS.--Measured by Wisconsin-Michigan Power Company.

PERIOD OF RECORD.--September 1948 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.66 ft (0.51 m) below land-surface datum, June 1, 1973; lowest measured, 8.44 ft (2.57 m) Mar. 15, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	5.21	JAN 3	5.73	MAR 1	6.26	MAY 31	2.62	JUL 31	2.84	SEP 28	3.50
DEC 1	5.39	FEB 1	6.03	APR 3	5.77	JUN 29	2.18	AUG 31	3.07		

JACKSON COUNTY

421435084234801. Local number, 3S 1W 2BDBA.

LOCATION.--Lat 42°14'35", long 084°23'48", Hydrologic Unit 04050004, at end of Hamburg Street, Jackson.

Owner: City of Jackson.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 12 in (30 cm), depth 400 ft (122 m), open bottom.

DATUM.--Altitude of land-surface datum is 935 ft (285 m). Measuring point: Plywood recorder shelf, +4.00 ft (1.22 m) above land-surface datum.

REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--August 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.3 ft (5.9 m) below land-surface datum, Jan. 3, 1971; lowest, 68.8 ft (21.0 m) Jun. 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	40.2	37.8	38.2	33.9	37.6	39.0	--	36.4	39.6	35.2	38.0	37.6
10	39.6	43.0	35.8	40.2	41.8	40.2	--	41.6	40.2	36.0	44.5	38.2
15	38.0	41.3	40.4	37.4	41.4	41.3	30.0	37.6	46.6	36.2	41.4	44.2
20	40.6	38.3	40.0	41.2	39.6	39.4	37.0	37.4	46.9	45.6	38.3	43.1
25	40.8	30.6	30.8	41.9	40.2	36.2	37.1	38.3	42.5	46.6	41.2	40.0
EOM	41.0	38.2	31.7	41.3	42.4	39.8	35.0	38.0	42.5	42.6	42.9	44.0

WTR YEAR 1979 MAX 26.0 JAN 2, 1979 MIN 47.3 JUL 25, 1979

GROUND-WATER LEVELS

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.

LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Crosstown Parkway and Stockbridge Avenue, Kalamazoo.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 137 ft (42 m), screened 134 to 137 ft (41 to 42 m).

DATUM.--Land-surface datum is 764.7 ft (233.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft (0.61 m) above land surface datum.

REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--August 1960 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft (1.47 m) below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft (9.47 m) Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.23	10.09	9.67	9.20	8.91	8.75	8.53	8.35	8.31	8.62	9.05	9.20
10	10.22	10.06	9.60	9.10	8.90	8.75	8.48	8.34	8.34	8.66	9.11	9.20
15	10.21	10.01	9.54	9.06	8.85	8.72	8.45	8.32	8.41	8.73	9.15	9.20
20	10.19	9.95	9.49	9.02	8.82	8.65	8.42	8.30	8.46	8.77	9.19	9.21
25	10.16	9.85	9.38	8.97	8.80	8.62	8.40	8.30	8.53	8.85	9.20	9.22
EOM	10.12	9.75	9.28	8.93	8.78	8.57	8.37	8.31	8.58	8.98	9.20	9.25

WTR YEAR 1979 MAX 8.30 MAY 31, 1979 MIN 10.24 OCT 1, 1978

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.

LOCATION.--Lat 42°13'25", long 085°40'48", Hydrologic Unit 04050003, at Kalamazoo Community College.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in (7.6 cm), depth 248 ft (76 m).

DATUM.--Altitude of land-surface is 880 ft (268 m). Measuring point: Top of shelter base, 4.0 ft (1.2 m) above land-surface datum.

PERIOD OF RECORD.--March 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft (+0.91 m) above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft (0.32 m) below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+0.49	+0.55	+0.30	+0.33	+0.25	+0.50	+0.46	+0.58	+0.55	+0.70	+0.73	+0.88
10	+0.50	+0.50	+0.35	+0.34	+0.23	+0.39	+0.52	+0.67	+0.70	+0.75	+0.77	+0.87
15	+0.49	+0.44	+0.36	+0.35	+0.21	+0.28	+0.55	+0.45	+0.73	+0.73	+0.75	+0.86
20	+0.98	+0.43	+0.36	+0.34	+0.20	+0.39	+0.55	+0.69	+0.73	+0.62	+0.81	+0.80
25	+0.78	+0.40	+0.30	+0.23	+0.20	+0.37	+0.54	+0.66	+0.47	+0.73	+0.81	+0.75
EOM	+0.65	+0.35	+0.32	+0.24	+0.20	+0.46	+0.54	+0.68	+0.69	+0.68	+0.85	+0.75

WTR YEAR 1979 MAX +1.08 MAY 29, 1979 MIN +0.04 APR 23, 1979

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.

LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi (3.4 km) north of Byron Center and 0.4 mi (0.6 km) west of Byron Center Road.

Owner: City of Wyoming.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 86 ft (26 m).

DATUM.--Land-surface datum is 685.97 ft (209.08 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of shelter base, 2.50 ft (0.76 m) above land-surface datum.

REMARKS.--Monthly measurements begun August 1978.

PERIOD OF RECORD.--October 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft (2.52 m) below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft (3.93 m) Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	10.40	FEB 22	10.34	MAY 2	8.94	JUN 4	9.68	AUG 14	10.75	SEP 20	11.00
DEC 13	10.30	MAR 28	8.73								

GROUND-WATER LEVELS

509

LENAAWEE COUNTY

420246084150601. Local number, 5S 1E 12DDBD.

LOCATION.--Lat 42°02'46", long 084°15'06", Hydrologic Unit 04100002, 2 mi (3 km) west of Cambridge Junction on the Onsted State Game Area.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.2 cm), depth 39 ft (12 m), screened 36 to 39 ft (11 to 12 m).

DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.

PERIOD OF RECORD.--December 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.19 ft (4.93 m) below land-surface datum, Apr. 5, 1979; lowest measured, 19.33 ft (5.89 m) Sept. 2, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	17.66	DEC 28	17.21	APR 5	16.19	JUN 29	17.43	JUL 26	17.32	AUG 30	17.34
NOV 27	17.19	MAR 28	16.59	MAY 17	16.88						

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.

LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi (3 km) northwest of South Lyon on Twelve Mile Road.

Owner: American Aggregate Corporation.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in (5 cm), depth 29 ft (9 m), 1½ in (3.2 cm) diameter screen.

DATUM.--Altitude of land-surface datum is 930 ft (283 m). Measuring point: Plywood instrument shelf, 2.50 ft (0.76 m) above land-surface datum.

PERIOD OF RECORD.--April 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft (3.7 m) below land-surface datum, Apr. 22, 1974; lowest, 19.90 ft (6.06 m) Sep. 25, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	17.22	17.20	17.49	17.63	17.69	17.61	16.93	15.67	15.98	16.21	17.79	19.27
10	17.35	17.12	17.52	17.64	17.71	17.48	16.97	15.73	16.05	16.08	17.86	19.43
15	17.35	17.32	17.58	17.65	17.73	17.47	16.23	15.83	15.86	16.05	18.12	19.53
20	17.25	17.46	17.62	17.66	17.77	17.47	16.13	15.97	15.79	16.17	18.26	19.74
25	17.35	17.46	17.64	17.66	17.81	17.37	16.14	15.93	16.09	16.95	18.27	19.90
EOM	17.45	17.57	--	17.69	17.82	17.15	16.04	16.00	15.96	17.50	18.78	--
WTR YEAR 1979	MAX	15.63	MAY 11, 1979	MIN	19.90	SEP 25, 1979						

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.

LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi (3 km) north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.

Owner: U.S. Forest Service.

AQUIFER.--Manistique Dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).

DATUM.--Altitude of land-surface datum is 650 ft (198 m). Measuring point: Top of shelter floor, 2.3 ft (0.7 m) above land-surface datum.

PERIOD OF RECORD.--June 1956 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft (4.0 m) below land-surface datum, May 11, 1960; lowest, 32.3 ft (9.8 m) Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.9	25.4	24.9	--	27.4	23.3	17.4	18.2	21.8	21.8	24.8	22.5
10	24.4	25.7	25.4	--	27.7	23.4	18.9	19.1	21.9	22.6	24.9	23.7
15	24.8	25.6	25.5	--	27.9	24.2	17.2	20.0	20.8	23.3	25.2	24.0
20	24.8	24.4	25.9	27.1	--	24.1	14.5	20.6	21.8	23.8	25.4	24.4
25	24.9	24.5	26.0	27.2	--	17.3	16.2	20.7	22.4	24.2	25.5	24.8
EOM	25.3	24.8	26.4	27.5	27.4	18.1	16.8	21.4	22.9	24.4	20.5	25.0
WTR YEAR 1979	MAX	14.1	MAY 18, 1979	MIN	28.0	FEB 14, 1979						

GROUND-WATER LEVELS

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.

LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi (7.7 km) west of Ishpeming on U.S. Highway 41 and M-28.

Owner: Ely Township.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 72 ft (22 m), screened 68 to 72 ft (19 to 22 m).

DATUM.--Land-surface datum is 1,571.99 ft (479.14 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder base, 3.0 ft (0.9 m) above land-surface datum.

REMARKS.--Federal key well.

PERIOD OF RECORD.--August 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft (2.97 m) below land-surface datum, May 13, 1974; lowest, 19.26 ft (5.87 m) Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.96	12.39	13.10	13.79	14.45	--	14.51	11.29	11.32	11.08	11.25	12.18
10	11.76	12.59	13.17	13.91	14.57	--	14.50	11.33	11.32	11.22	11.44	12.33
15	11.91	12.73	13.27	14.00	14.67	--	14.38	11.37	11.20	11.27	11.64	12.36
20	--	12.84	13.35	14.06	14.73	--	13.15	11.25	10.57	11.37	11.80	12.45
25	12.15	12.86	13.51	14.20	14.87	14.82	11.18	11.15	10.72	11.49	11.95	12.60
EOM	12.33	12.95	13.69	14.37	14.95	14.62	11.20	11.22	10.82	11.27	12.08	12.73

WTR YEAR 1979 MAX 10.50 JUN 27, 1979 MIN 15.25 MAR 1979

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.

LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.

Owner: State Highway Department.

AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordovician age.

WELL CHARACTERISTICS.--Water-table well, diameter 4 in (10 cm), depth 17 ft (5 m), cased.

DATUM.--Altitude of land-surface datum is 800 ft (244 m). Measuring point: Top of 2 in (5 cm) reducing nipple, 1.26 ft (0.38 m) above land-surface datum.

PERIOD OF RECORD.--September 1959 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.47 ft (1.06 m) below land-surface datum, Apr. 12, 1979; lowest measured, 8.62 ft (2.63 m) Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 28	5.39	APR 12	3.47	JUN 28	4.89	JUL 27	5.07	SEP 6	5.59

MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.

LOCATION.--Lat 41°52'06", long 083°41'44", Hydrologic Unit 04100002, on Teal Road 2 mi (3 km) southeast of Petersburg.

Owner: U.S. Geological Survey.

AQUIFER.--Detroit River Group of Devonian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 72 ft (22 m), cased to 53 ft (16 m), open end.

DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--November 1978 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 35.91 ft (10.95 m) below land-surface datum, Apr. 16, 1979; lowest measured, 40.55 ft (12.36 m) Nov. 2, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 2	40.55	DEC 26	39.65	MAR 12	39.48	APR 16	35.91	AUG 9	39.32	AUG 30	39.33
28	40.04	JAN 31	39.76								

GROUND-WATER LEVELS

511

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.

LOCATION.--Lat 41°52'35", long 083°41'50", Hydrologic Unit 04100002, 1.5 mi (2.4 km) southeast of Petersburg on Teal Road.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.2 cm), depth 17 ft (5 m), screened 14 to 17 ft (4 to 5 m).

DATUM.--Altitude of land-surface datum is 675 ft (206 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.

PERIOD OF RECORD.--December 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft (0.91 m) below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft (2.04 m), Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	6.17	DEC 26	6.38	MAR 12	6.54	MAY 16	5.22	JUL 24	5.40	AUG 30	5.87
NOV 28	6.75	JAN 31	6.40	APR 16	5.50	JUN 19	5.29				

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.

LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi (13 km) northeast of Holton on Holton-Duck Lake Road.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.2 cm), depth 31 ft (9 m), screened 28 to 31 ft (8.5 to 9 m).

DATUM.--Altitude of land-surface datum is 595 ft (181 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.

PERIOD OF RECORD.--November 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.16 ft (+0.05 m) above land-surface datum, May 22, 1974; lowest measured, 4.74 ft (1.44 m) below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	0.70	DEC 28	1.46	MAY 22	0.95	JUN 27	2.65	SEP 18	3.26

OAKLAND COUNTY

424133083293201. Local number, 3N 8E 3DBAB.

LOCATION.--Lat 42°41'33", long 083°29'32", Hydrologic Unit 04090005, 3 mi (5 km) east of White Lake at White Lake and Teggedrine Roads.

Owner: Huron Clinton Metropolitan Park Authority.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 163 ft (50 m), screened 143 to 163 ft (44 to 50 m).

DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.

PERIOD OF RECORD.--July 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.20 ft (2.19 m) below land-surface datum, May 7, 1976; lowest, 11.16 ft (3.40 m) Sept. 12, 1978.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.88	10.79	10.55	10.34	10.62	10.58	9.68	9.00	9.42	--	9.84	10.19
10	10.90	10.78	10.60	10.47	10.66	9.92	9.49	9.08	9.34	--	9.94	10.33
15	10.91	10.84	10.58	10.48	10.62	9.85	9.11	9.16	9.48	--	10.12	10.38
20	10.89	10.77	10.60	10.44	10.67	9.82	9.16	9.23	9.63	9.96	10.00	10.41
25	10.81	10.66	10.61	10.56	10.65	9.75	9.19	9.20	--	10.04	10.10	10.56
ECM	10.81	10.68	10.60	10.56	10.59	9.87	9.12	9.30	--	9.98	10.10	10.60
WTR YEAR 1979	MAX	8.97	MAY 3, 1979	MIN	10.91	OCT 8, 1978						

GROUND-WATER LEVELS

OCEANA COUNTY

433133086082601. Local number, 13N 15W 18AAAA.

LOCATION.--Lat 43°31'33", long 086°08'26", Hydrologic Unit 04060101, approximately 6 mi (10 km) southwest of Hesperia.

Owner: U.S. Geological Survey.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 79 ft (24 m), screened 69 to 79 ft (21 to 24 m).

DATUM.--Altitude of land-surface datum is 703 ft (214 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.

REMARKS.--Continuous recorder installed, July 10, 1979.

PERIOD OF RECORD.--August 1977 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.10 ft (11.00 m) below land-surface datum, May 25, 1978; lowest measured, 40.37 ft (12.30 m) Apr. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 12	39.65	DEC 29	39.79	MAR 13	40.25	MAY 22	37.20	JUL 31	36.73	SEP 30	37.50
NOV 15	39.60	JAN 29	39.99	APR 24	39.82	JUN 26	36.60	AUG 31	37.10		

OGEMAW COUNTY

442514084164702. Local number, 23N 1E 2BAAA.

LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi (13 km) west of Rose City on south side of Rose City Road.

Owner: Ogemaw County Road Commission.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.8 cm), depth 20 ft (6 m).

DATUM.--Altitude of land-surface datum is 1,265 ft (386 m). Measuring point: Top of casing, 2.30 ft (0.70 m) above land-surface datum.

PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft (2.32 m) below land-surface datum, Apr. 13, 1976; lowest measured, 13.6 ft (4.1 m) December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	11.21	JAN 9	10.14	APR 19	9.69	JUL 26	10.07

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.

LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft (99 m) south of M-64, 1.5 mi (2.4 km) east of Silver City.

Owner: State Corrections Department.

AQUIFER.--Freda Sandstone of Keweenawan age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 100 ft (30 m), cased to 32 ft (10 m).

DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.

PERIOD OF RECORD.--October 1958 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft (2.50 m) below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft (6.65 m) Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 7	13.48	MAR 6	11.47	MAY 23	9.44	SEP 5	16.09

GROUND-WATER LEVELS

513

OTSEGO COUNTY

445920084425801. Local number, 30N 3W 19ABBB.

LOCATION.--Lat 44°59'20", long 084°42'58", Hydrologic Unit 04070007, on Old Alba Road 3 mi (5 km) southwest of Gaylord.

Owner: U.S. Geological Survey.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 87 ft (27 km), screened 72 to 87 ft (22 to 27 km).

DATUM.--Altitude of land-surface datum is 1307 ft (399 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--January 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.69 ft (9.35 m) below land-surface datum, July 24, 1979; lowest measured, 33.75 ft (10.29 m) Mar. 21, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 23	33.32	MAR 21	33.75	JUN 20	38.89	JUL 24	30.69	AUG 23	31.03	SEP 27	31.47
FEB 20	33.56	APR 20	32.69								

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.

LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi (3 km) west and 1 mi (2 km) north of Posen.

Owner: A. Styma.

AQUIFER.--Traverse Group.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 61 ft (19 m).

DATUM.--Altitude of land-surface datum is 815 ft (248 m). Measuring point: Top of casing, 0.5 ft (0.2 m) above land-surface datum.

PERIOD OF RECORD.--December 1959 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.10 ft (1.55 m) below land-surface datum, Mar. 2, 1979; lowest measured, 16.83 ft (5.13 m) Mar. 5, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	10.08	JAN 18	12.77	MAR 2	5.10	JUL 18	9.81

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.

LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi (3 km) south of Roscommon and 0.5 mi (0.8 km) east of highway M-18 on highway M-103.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in (20 cm), depth 14 ft (4 m), open bottom.

DATUM.--Land-surface datum is 1,145.30 ft (349.09 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.

REMARKS.--Federal key well.

PERIOD OF RECORD.--December 1934 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft (0.70 m) below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft (1.90 m) Dec. 6-11, 1949

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	4.39	4.55	4.78	4.96	5.10	4.90	3.42	3.16	3.62	3.90	4.56	4.49
10	4.32	4.62	4.82	4.98	5.13	4.81	3.32	3.10	3.69	4.00	4.10	4.58
15	4.34	4.67	4.84	5.00	5.17	4.76	3.24	3.19	3.79	4.08	4.07	4.67
20	4.36	4.71	4.86	5.02	5.17	4.69	3.22	3.30	3.87	4.22	4.18	4.77
25	4.41	4.73	4.90	5.04	5.18	4.17	3.28	3.37	3.69	4.34	4.29	4.84
EOM	4.48	4.75	4.94	5.07	5.19	3.74	3.19	3.52	3.86	4.48	4.38	4.82
WTR YEAR 1979	MAX	3.10	MAY 8, 1979	MIN	5.21	FEB 3, 1979						

GROUND-WATER LEVELS

SANTILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.

LOCATION.--Lat 43°34'39", long 082°52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi (5 km) east and .75 mi (1.21 km) north of Argyle.

Owner: U.S. Geological Survey.

AQUIFER.--Marshall Formation of Mississippian age.

WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in (15 cm), depth 130 ft (40 m), cased with plastic pipe to 48 ft (15 m), open bottom.

DATUM.--Altitude of land-surface datum is 805 ft (245 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--October 15, 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.66 ft (5.38 m) below land-surface datum, Apr. 6, 1978; lowest 22.52 ft (6.86 m) Sep. 30, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.01	22.06	21.86	21.28	21.47	20.72	19.17	18.43	19.35	19.83	20.91	21.83
10	22.03	22.10	21.85	21.35	21.51	20.18	19.09	18.55	19.51	19.96	21.06	22.00
15	22.06	22.13	21.84	21.43	21.49	20.02	18.70	18.79	19.75	20.19	21.27	22.11
20	22.07	22.10	21.80	21.35	21.51	19.63	18.86	18.96	20.01	20.42	21.39	22.23
25	--	21.95	21.80	21.46	21.57	19.65	18.97	19.10	20.18	20.62	21.59	22.39
BOM	--	21.94	21.77	21.44	21.51	19.28	18.68	19.13	20.21	20.84	21.69	22.52

WTR YEAR 1979 MAX 18.34 MAY 7, 1979 MIN 22.52 SEP 30, 1979

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.

LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge.

Owner: U.S. Fish and Wildlife Service.

AQUIFER.--Limestones of Upper Ordovician age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in (10 cm), depth 151 ft (46 m), cased to 65 ft (20 m).

DATUM.--Altitude of land-surface datum is 710 ft (216 m). Measuring point: Top of casing, 3.60 ft (1.10 m) below land-surface datum.

PERIOD OF RECORD.--June 1952 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft (1.41 m) below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft (1.98 m) Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	5.41	5.31	5.21	5.06	5.02	4.84	5.22	5.28	5.34	5.30	5.38
10	5.25	5.40	5.31	5.19	5.09	4.92	4.75	5.23	5.30	5.35	5.38	5.44
15	5.35	5.47	5.32	5.20	5.08	4.91	4.93	5.31	5.33	5.43	5.38	5.42
20	5.38	5.43	5.24	5.07	5.08	4.97	4.86	5.23	5.23	5.45	5.36	5.34
25	5.40	5.33	5.25	5.05	5.01	4.97	5.10	5.20	5.23	5.49	5.40	5.37
BOM	5.42	5.34	5.20	5.07	5.03	4.89	5.23	5.29	5.25	5.34	5.40	5.42

WTR YEAR 1979 MAX 4.70 APR 11, 1979 MIN 5.49 JUL 24, 1979

VAN BUREN COUNTY

421435085591001. Local number, 3S 14W 6BAAD.

LOCATION.--Lat 42°14'35", long 085°59'10", Hydrologic Unit 04050001, 5 mi (8 km) northwest of Paw Paw at the southwest corner of 45th and 48th Streets.

Owner: Rex Martin.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 1½ in (3.8 cm), depth 59 ft (18 m), screened 56 to 59 ft (17 to 18 m).

DATUM.--Altitude of land-surface datum is 740 ft (226 m). Measuring point: Top of casing, 0.5 ft (.2 m) above land-surface datum.

PERIOD OF RECORD.--May 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 37.22 ft (11.34 m) below land-surface datum, May 30, 1974; lowest measured, 43.28 ft (13.19 m) Nov. 20, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	39.90	JAN 3	39.75	MAR 14	38.68	MAY 22	37.53	JUL 31	38.38	SEP 5	38.74
NOV 28	39.45	FEB 8	39.74	APR 18	37.44	JUN 26	38.05				

GROUND-WATER LEVELS

515

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.

LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.

Owner: Ypsilanti Township.

AQUIFER: Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 80 ft (24 m), screened 77 to 80 ft (23 to 24 m).

DATUM.--Land-surface datum is 665.65 ft (202.86 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 3.00 ft (0.91 m) above land-surface datum.

REMARKS.--Water level affected by nearby pumping.

PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft (1.76 m) below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft (6.91 m) Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	16.07	16.24	14.95	14.65	14.84	--	13.70	13.75	12.67	12.96	13.30	12.64
10	15.43	16.40	14.92	14.58	14.83	--	13.55	--	13.30	12.65	13.07	12.71
15	14.97	16.56	14.70	14.63	14.67	--	13.02	--	13.33	13.11	13.32	12.66
20	15.01	16.41	14.60	14.43	--	--	13.24	12.63	--	13.18	13.05	12.62
25	15.71	--	14.67	14.58	--	--	13.45	12.59	--	13.28	12.77	12.67
EOM	16.16	15.31	14.61	14.68	--	13.79	13.65	12.66	13.55	13.50	12.74	12.67
WTR YEAR 1979	MAX	12.51	MAY 26, 1979	MIN	16.90	OCT 1, 1978						

TEMPERATURE OF GROUND WATER

Temperatures of ground water are measured as part of a state-wide water resource investigation in cooperation with Michigan Department of Natural Resources. The purpose of these measurements is to determine the natural ground-water temperature of selected points throughout the State. These data, when combined with existing theory, can be used to estimate ground-water temperatures at moderate depth at any point in the State. Measurements of temperature were made by means of "lazy" thermometers (Heath, 1964), which remain in the well except when being read.

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH

DATE	WATER TEMPER- ATURE (°C)	DATE	WATER TEMPER- ATURE (°C)	DATE	WATER TEMPER- ATURE (°C)
ALGER COUNTY, 45N 19W 25BDCD1 (LAT 46°16'08", LONG 86°37'38") DEPTH 66 ft (20 m)					
NOV 21, 1978	9.0	MAR 1, 1979	7.5	JUN 7 . . .	6.5
CLINTON COUNTY, 6N 2W 16DDAD1 (LAT 42°54'10", LONG 84°32'35") DEPTH 23 ft (7 m)					
OCT 24, 1978	11.5	FEB 22 . . .	9.0	JUN 20 . . .	9.0
NOV 27 . . .	11.5	MAR 22 . . .	9.0	JUL 26 . . .	10.0
DEC 21 . . .	11.5	APR 23 . . .	8.5	AUG 20 . . .	11.0
JAN 22, 1979	10.5	MAY 21 . . .	8.5	SEP 20 . . .	11.5
DICKINSON COUNTY, 43N 28W 32ADAB1 (LAT 46°04'59", LONG 87°49'37") DEPTH 31 ft (9 m)					
FEB 7, 1979	7.5	AUG 15 . . .	6.5	SEP 18 . . .	7.0
MAR 23 . . .	7.0				
HILLSDALE COUNTY, 7S 2W 10BDDD1 (LAT 41°52'36", LONG 84°31'37") DEPTH 20 ft (6 m)					
OCT 31, 1978	10.0	FEB 6 . . .	10.0	MAY 24 . . .	8.5
NOV 28 . . .	11.0	MAR 15 . . .	9.5	JUL 7 . . .	8.5
JAN 10, 1979	10.5	APR 16 . . .	9.0	SEP 4 . . .	9.0
INGHAM COUNTY, 3N 1E 7DDCA1 (LAT 42°39'34", LONG 84°21'49") DEPTH 41 ft (12 m)					
NOV 1, 1978	11.0	MAR 13 . . .	10.5	JUL 19 . . .	10.0
DEC 4 . . .	11.0	APR 19 . . .	10.0	AUG 9 . . .	10.0
JAN 9, 1979	11.0	MAY 16 . . .	10.0	SEP 25 . . .	10.5
FEB 14 . . .	9.0	JUN 21 . . .	10.0		
LENAWEE COUNTY, 5S 1E 12DDBD1 (LAT 42°02'46", LONG 84°15'06") DEPTH 39 ft (12 m)					
OCT 16, 1978	9.5	MAR 28, 1979	10.0	JUN 29 . . .	9.5
NOV 27 . . .	9.5	APR 5 . . .	9.5	JUL 26 . . .	9.5
DEC 28 . . .	9.5	MAY 17 . . .	9.0	AUG 30 . . .	9.5
MENOMINEE COUNTY, 37N 26W 19DADA1 (LAT 45°35'00", LONG 87°33'15") DEPTH 17 ft (5 m)					
DEC 28, 1978	8.5	JUN 28 . . .	7.5	SEP 6 . . .	10.5
APR 12, 1979	5.5	JUL 27 . . .	8.5		

TEMPERATURE OF GROUND WATER

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TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH--CONTINUED

DATE	WATER TEMPER- ATURE (°C)	DATE	WATER TEMPER- ATURE (°C)	DATE	WATER TEMPER- ATURE (°C)
MONROE COUNTY, 7S 6E 15ADBB1 (LAT 41°52'35", LONG 83°41'40") DEPTH 17 ft (5 m)					
OCT 17, 1978	11.5	MAR 12 . . .	9.5	JUN 19 . . .	8.5
NOV 28 . . .	11.5	APR 16 . . .	8.5	JUL 24 . . .	9.5
DEC 26 . . .	11.5	MAY 16 . . .	8.5	AUG 30 . . .	10.5
JAN 31, 1979	10.5				

OAKLAND COUNTY, 5N 8E 8ACAC1 (LAT 42°51'16", LONG 83°32'15") DEPTH 42 ft (13 m)					
OCT 16, 1978	8.5	FEB 27 . . .	9.0	JUN 14 . . .	9.0
NOV 13 . . .	9.0	APR 2 . . .	8.0	JUL 11 . . .	9.0
DEC 14 . . .	8.0	MAY 10 . . .	9.0	SEP 4 . . .	9.0
JAN 30, 1979	9.0				

ONTONAGON COUNTY, 46N 38W 30ADDD1 (LAT 46°21'18", LONG 89°05'43") DEPTH 50 ft (15 m)					
OCT 4, 1978	7.5	MAR 5, 1979	7.0	JUN 19 . . .	7.0
NOV 8 . . .	7.0	APR 17 . . .	7.0	JUL 26 . . .	6.5
DEC 11 . . .	7.0	MAY 15 . . .	6.5	SEP 4 . . .	7.5

ROSCOMMON COUNTY, 24N 2W 20BABAI (LAT 44°27'22", LONG 84°35'07") DEPTH 12 ft (4 m)					
OCT 20, 1978	9.5	FEB 21 . . .	5.5	JUL 26 . . .	9.0
NOV 20 . . .	8.5	MAR 19 . . .	5.5	SEP 20 . . .	10.0
DEC 18 . . .	7.5	APR 19 . . .	5.0		
JAN 22, 1979	6.0	MAY 17 . . .	6.0		

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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
<i>Length</i>		
inches (in)	2.54×10^1	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^0	kilometers (km)
<i>Area</i>		
acres	4.047×10^3	square meters (m ²)
	4.047×10^{-1}	square hectometers (hm ²)
	4.047×10^{-3}	square kilometers (km ²)
square miles (mi ²)	2.590×10^0	square kilometers (km ²)
<i>Volume</i>		
gallons (gal)	3.785×10^0	liters (L)
	3.785×10^0	cubic decimeters (dm ³)
	3.785×10^{-3}	cubic meters (m ³)
million gallons	3.785×10^3	cubic meters (m ³)
	3.785×10^{-3}	cubic hectometers (hm ³)
cubic feet (ft ³)	2.832×10^1	cubic decimeters (dm ³)
	2.832×10^{-2}	cubic meters (m ³)
cfs-days	2.447×10^3	cubic meters (m ³)
	2.447×10^{-3}	cubic hectometers (hm ³)
acre-feet (acre-ft)	1.233×10^3	cubic meters (m ³)
	1.233×10^{-3}	cubic hectometers (hm ³)
	1.233×10^{-6}	cubic kilometers (km ³)
<i>Flow</i>		
cubic feet per second (ft ³ /s)	2.832×10^1	liters per second (L/s)
	2.832×10^1	cubic decimeters per second (dm ³ /s)
	2.832×10^{-2}	cubic meters per second (m ³ /s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm ³ /s)
	6.309×10^{-5}	cubic meters per second (m ³ /s)
million gallons per day	4.381×10^1	cubic decimeters per second (dm ³ /s)
	4.381×10^{-2}	cubic meters per second (m ³ /s)
<i>Mass</i>		
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

