AN ASSESSMENT OF NONPOINT-SOURCE DISCHARGES, STREAMFLOW, AND WATER QUALITY IN ONION RIVER, WISCONSIN

By

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CONVERSION TABLE

For readers who prefer to use International System of Units (SI) rather than inch-pound units, conversion factors for terms used in this report are listed below.

Multiply inch-pound unit	By	To obtain SI unit
inch (in.)	25.40	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
pound per square mile (lb/mi^2)	1.751×10^2	kilogram per square kilometer (kg/km^2)
ton per square mile (ton/mi^2)	0.3503	metric ton per square (t/km^2)
cubic foot per second ($(ft^3)/s$)	2.832×10^2	cubic meter per second (m^3/s)
degrees Fahrenheit (°F)	0.555(F-32)	degrees Celsius (°C)

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ABSTRACT

The Onion River in eastern Wisconsin was studied during the 1979 and 1980 water years to define the relationship between water quality and streamflow. Agricultural nonpoint-source discharges in the lower part of the Onion River are suspected of contributing significantly to degradation of water quality.

Two streamflow water-quality monitoring stations were established on the Onion River, one at Hingham upstream of the affected area, and one near Sheboygan Falls downstream of the affected area. Streamflow at Onion River at Hingham ranged from a minimum 7-day mean low flow (Q_7) of 8.7 to a maximum discharge of 600 cubic feet per second; at Onion River near Sheboygan Falls streamflow ranged from a Q_7 of 13 to a maximum discharge of 2,350 cubic feet per second. Based on discharges at the Sheboygan River at Sheboygan, these discharges ranged from about double the low flow that occurs on the average of once every 2 years, to discharges of between 5-and 10-year recurrence intervals. The average discharges at Hingham in the 1979 and 1980 water were 32.2 and 27.6 cubic feet per second, respectively. At Sheboygan Falls, the average discharges in the 1979 and 1980 water years were 94.2 and 55.2 cubic feet per second, respectively. Based on the average discharge at the Sheboygan River at Sheboygan, the 1979 discharge was 60 percent greater than average, and the 1980 discharge was about 5 percent less than average.

Precipitation in the study area for the 1979 water year was 33.1 inches and for the 1980 water year it was 36.8 inches; these amounts are 3.3 inches and 7.0 inches, respectively, more than average.

Suspended-sediment yields and, probably, phosphorus yields were slightly above average for both years because of greater than normal precipitation, and stream discharges that were greater than normal in 1979 and near normal in 1980. Suspended-sediment yields were 79.1 tons per square mile for the 1979 water year and 63.9 tons per square mile for the 1980 water year at Hingham, while downstream of Hingham the yields were 93.5 tons per square mile for the 1979 water year and 84.2 tons per square mile for the 1980 water year. Phosphorus yields were 331 pounds per square mile for the 1979 water year and 317 pounds per square mile for the 1980 water year at Hingham. Downstream of Hingham, the phosphorus yields were 656 pounds per square mile for the 1979 water year and 647 pounds per square mile for the 1980 water year.

A population of bottom-dwelling carp resuspends the bottom sediments during its late spring and early summer active period, possibly causing high concentrations of suspended sediment and phosphorus.

Nutrient yields and loading rates were highest downstream of Hingham. Nonpoint-source contribution of phosphorus amounted to 362 pounds per square mile downstream of Hingham compared to

272 pounds per square mile upstream of Hingham in the 1979 water year.

Part of the high nutrient yields are due to point sources from Belgium Creek, which drains an area of 16.2 square miles. In the 1979 water year, point sources contributed an estimated 16,700 pounds of phosphorus or 45 percent of the total annual load downstream of Hingham, whereas, upstream of Hingham point sources contributed an estimated 2,200 pounds of phosphorus, or 18 percent of the total annual load.

At Hingham during base flow, four of five phosphorus concentrations exceeded levels recommended by the U.S. Environmental Protection Agency; most concentrations during storm runoff exceeded these levels. At Sheboygan Falls, all phosphorus concentrations at base flow and most storm runoff concentrations also exceeded the Environmental Protection Agency criteria.

All samples at both Hingham and Sheboygan Falls contained concentrations of un-ionized ammonia that were less than the U.S. Environmental Protection Agency's criteria (0.02 milligrams per liter), except the March 1980 samples. No samples exceeded the Wisconsin Department of Natural Resources criteria for un-ionized ammonia (0.04 milligrams per liter).

INTRODUCTION

Background

In 1972, Congress mandated, through the Federal Water Pollution Control Act Amendments (FWPCAA)[1] that the surface waters of the United States shall be "fishable and swimmable" by 1983 (U.S. Congress, 1972). To reach this goal, the states must identify and establish programs to improve water quality. It was evident that water-quality goals established by the FWPCAA of 1972 cannot be attained by regulation of only point-source pollution. Indeed, in many areas pollutants discharged from nonpoint sources constitute the major contribution to water-quality degradation (Donigon and Crawford, 1976).

The Wisconsin Department of Natural Resources (DNR) has been designated as the State agency responsible for water-quality protection in Wisconsin (Wisconsin Department of Natural Resources, 1976) and has a primary role in meeting Section 208 requirements. However, to assess nonpoint-source effects on surface-water quality, a data base must first be established. To assist in establishing an adequate data base, the U.S. Geological Survey in cooperation with DNR, began a study in 1977 to define the water quality in relation to streamflow in several areas where surface-water quality has been degraded by nonpoint sources.

Among the river basins studied were the Steiner Branch basin in Lafayette County in southwest Wisconsin and the Elk Creek basin (including Bruce Valley Creek) in Trempealeau County in west-central Wisconsin.

In 1978 the Wisconsin Legislature enacted the Wisconsin Nonpoint Source Water Pollution Abatement Program (Wisconsin Fund). The program works through "priority watersheds" to provide cost sharing and technical assistance to individual property owners, cities, and villages for the control of nonpoint sources of water pollution. To be eligible for cost sharing and technical assistance under the Wisconsin Fund the area must be designated as a priority watershed. The watersheds are selected through a three-step process involving an impartially ranked list of watersheds, regional advisory groups, and the State Nonpoint Coordinating Committee. The first of nine priority watersheds throughout the State to be selected was the Onion River in eastern Wisconsin (Wisconsin Department of Natural Resources, 1981).

This report describes the study done in the Onion River basin in Sheboygan and Ozaukee Counties. Ninety percent of the Onion River basin is in Sheboygan County. The study area is located about 10 mi southwest of Sheboygan (fig. 1). Agricultural nonpoint-source runoff was identified as a major contribution to degraded water quality (Wisconsin Department of Natural Resources, 1979). In DNR's preliminary assessment of the basin in 1978, they found that the waters of the Onion River upstream of Waldo had water quality capable of supporting trout. However, downstream of the Waldo-Hingham area the water quality degraded rapidly. They also found that between Waldo and Gibbsville a large carp population reduced water clarity by resuspending silt and clay deposits.

The nutrient loads in this report reflect the contribution from point and nonpoint sources. Although this report will deal primarily with nonpoint sources, point sources will be discussed brief-

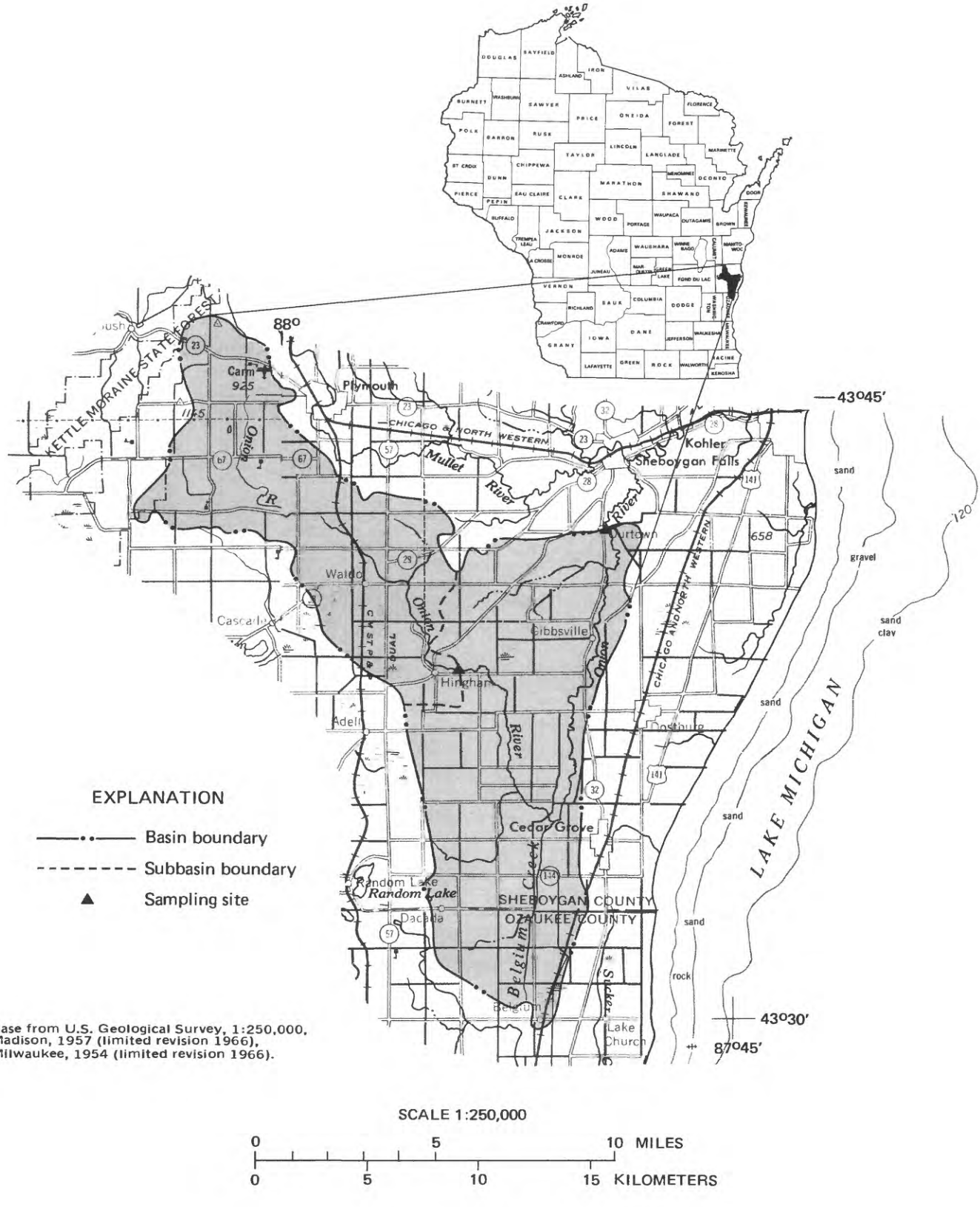


Figure 1. Location of Onion River basin in Wisconsin.

ly. Point sources of pollution are defined as discharges of waste water from discrete, specific sites such as sewage-treatment-plant and industrial-waste outfalls. Nonpoint sources of pollution are diffuse discharge of pollutants that cannot readily be identified as point sources and include storm water and snowmelt runoff from urban and rural land surfaces, livestock operations, and construction activities. Although substandard septic systems are categorized as point sources, because of their minor contribution to the total nutrient load, nonpoint sources, as used in this report, include these septic systems.

An intensive water-quality-monitoring program in the Onion River basin was started by the U.S. Geological Survey in cooperation with the DNR in December 1978 and was continued through September 1980. Two water-quality and stream-discharge monitoring sites (fig. 1) were selected: one at Hingham, upstream of the problem area, and one near Sheboygan Falls, downstream of the problem area. The drainage areas are 37.2 and 94.1 mi^2, respectively.

Purpose and Scope

The purpose of this report is to define the relationship between water quality and nonpoint-source discharges in the Onion River. The scope includes determination of (1) streamflow, (2) the annual loadings of suspended sediment, nitrogen, and phosphorus; (3) water temperature and dissolved-solids concentrations; and (4) miscellaneous water-quality characteristics, including pH, biochemical oxygen demand, periphyton biomass, and concentrations of dissolved oxygen, fecal coliform and fecal streptococci bacteria, alkalinity, chloride, trace metals, and pesticides.

Acknowledgments

The authors would like to thank James S. Baumann, Wisconsin Department of Natural Resources, for his assistance on this project, as well as land owners Rueben Tenhaken and Eugene Kretschmann, who allowed gaging stations to be installed on their property.

PHYSICAL SETTING

Topography and Drainage

The Onion River begins southwest of Plymouth on the eastern edge of the Kettle Moraine State Forest at an altitude of about 1,080 ft. It flows southeastward to near Cedar Grove where it turns abruptly northward to Sheboygan Falls and the Sheboygan River, which flows into Lake Michigan. The Onion River basin is an undulating plain sloping toward Lake Michigan. The valleys and uplands are broad and gently sloping and trend parallel to Lake Michigan. Relief in the headwaters area is generally as much as 200 ft; downstream of Hingham the relief is generally less than 50 ft. Along the western edge of the lower Onion River basin, relief is as great as 150 ft.

Stream-Channel Characteristics

The Onion River from the headwaters to the gaging station at Hingham is 15.4 mi long and has a gradient of 8.8 ft/mi. From Hingham to the gaging station near Sheboygan Falls the river is 19.7 mi long, with a gradient of 5.6 ft/mi. At Hingham the stream is about 50 ft wide and about 1 ft deep; at the Sheboygan Falls gaging station the stream is about 100 ft wide and 1 to 2 ft deep. The river is a series of pools and riffles. The bed material consists of sand, silt, clay, and cobbles with a few boulders. At the Sheboygan Falls station, boulders are common.

Impoundments are located at Hingham and at Waldo. The impoundment at Hingham has a surface area of 38 acres with a maximum depth of 6 ft (Wisconsin Department of Natural Resources, 1972). The impoundment at Waldo has a surface area of 40 acres and a maximum depth of 7 ft.

Climate

The climate is a continental type with four definite seasons (Wisconsin Department of Agriculture, 1961). Winters are cold and snowy, summers have periods that are hot and humid, and spring and fall are at times moderate mixtures of summer and winter. Temperatures and precipitation recorded at Plymouth (fig.1), range from a mean monthly temperature of 19.9°F in January, to 71.0°F in July. The mean annual temperature is 45.8°F. The average annual precipitation is 28.3 in. (1930-59) with

[1] Enacted under Section 208 of Public Law 93-500.

February the driest month (1.41 in.) and June the wettest (3.50 in.). About 53 percent of the average precipitation falls from May through September. Snowfall averages 46.6 in. annually.

Precipitation values in this report are the arithmetic means of the National Weather Service stations at Sheboygan, Plymouth, and West Bend, except as explained in the text. The average annual precipitation for these stations is 29.8 in. for 30 years of record (Environmental Data Service, 1973).

Total precipitation for the 1979 and 1980 water years was 33.1 in. and 36.8 in., which is 3.30 in. more than normal during the 1979 water year and 7.0 in. more than normal during the 1980 water year.

The maximum recorded snow depths at Sheboygan during the study were 28 in. during the 1979 water year and 6 in. during the 1980 water year. The moisture equivalents in the snowpack for the study period were also significantly different. On March 1, 1979, before snowmelt, there was an average moisture equivalent in the snowpack at Green Bay, (60 mi to the north), and Milwaukee (45 mi to the south) of 4.4 in. (U.S. Department of Commerce, 1979). On March 8, 1980, however, the moisture equivalent in the snowpack at these same two stations averaged only 0.3 in. (U.S. Department of Commerce, 1980).

Geology

Surficial deposits in the Onion River basin are glacial drift consisting of clay, sand, gravel, and boulders deposited by the Lake Michigan glacial lobe during the Pleistocene Epoch. These deposits generally are from 20 to 100 ft thick, except in the Kettle Moraine State Forest area where they can be as much as 250 ft thick.

Bedrock underlying the basin is dolomite of Silurian age and is about 250 to 500 ft thick across the basin. The Silurian Dolomite is underlain by the Maquoketa Shale of Ordovician age.

Soils

Soils of the Onion River basin are described by Engel, Roberts, and Steingraeber (1978) for Sheboygan County and by Parker, Kurer, and Steingraeber (1970) for Ozaukee County.

Two major soil associations, the Casco-Fox-Rodman and the Hochheim-Theresa, occur upstream of Waldo. The Casco-Fox-Rodman association is well-drained to excessively drained soils with a subsoil of mainly silty clay loam to sandy clay loam or gravelly sandy loam underlain by stratified gravel and sand outwash. The Hochheim-Theresa association is well-drained soils with a subsoil of mainly clay loam or silty clay loam underlain by gravelly sandy loam glacial till. These soils have a slight or moderate erosion potential.

The Kewaunee-Waymor-Manawa association occurs predominantly in the river basin downstream of Waldo. These soils are well drained to somewhat poorly drained soils with a subsoil of mainly clay loam to clay underlain by loam or silty clay loam glacial till. This soil association has a moderate to severe erosion potential.

Land Use

Agriculture is the principle land use in the Onion River basin (Wisconsin Department of Natural Resources, 1981); dairy farming and cash cropping are the two major uses (table 1). The basin supports about 11,600 animal units[2]; 2,800 animal units are in the basin upstream of Hingham at a density of 75 per square mile and about 8,790 animal units are in the basin downstream of Hingham at a density of 154 per square mile.

Land use in the basin as determined by J. S. Bauman (written commun., Wisconsin Department of Natural Resources, 1981) for the Onion River basin is shown in table 1. The potential exists for greater nonpoint sources of runoff downstream of Hingham because of more cropland and high animal density compared to more woodland and low animal density upstream of Hingham.

METHODS OF STUDY

Gaging stations to measure streamflow, temperature, and specific conductance were installed in December 1978 at Hingham and at Sheboygan Falls. Isco Model 1680[3] automatic water samplers were installed to collect samples during storm runoff for analyses of suspended sediment and nutrient concentrations. A local observer collected weekly suspended-sediment samples during nonstorm periods.

[2] One animal unit equals 1,000 lb live weight.

[3] The use of trade names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

Streamflow characteristics for Onion River at Hingham (04085813) and Sheboygan Falls (04085845) during the study were supplemented with long-term data from the Sheboygan River at Sheboygan gaging station (04086000). The station is 12.7 mi downstream of the gaging station on the Onion River near Sheboygan Falls, and has a drainage area of 418 mi^2.

Precipitation records were obtained from the National Weather Service (U.S. Department of Commerce, 1979, 1980) for stations located at Plymouth, at Sheboygan Falls (fig. 1), and at West Bend (about 25 mi southwest of the basin). Recording rain gages were also located at the gaging stations and were operated only during ice-free periods.

For the collection of nutrient samples, alternate, empty sample bottles in the automatic sampler were pretreated with 1 mL (milliliter) of mercuric chloride to inhibit biological activity and were removed from the automatic sampler as soon as possible and chilled to 4°C. Four samples pretreated with mercuric chloride and four untreated samples were selected to define the temporal concentration curves for suspended sediment and nutrients throughout the stream discharge hydrograph. Those treated with mercuric chloride were analyzed for:

- Nitrite nitrogen
- Nitrite plus nitrate nitrogen
- Ammonia plus organic nitrogen
- Ammonia nitrogen
- Phosphorus
- Phosphorus, orthophosphate

The four untreated samples were filtered and analyzed for:

- Chloride
- Alkalinity
- Dissolved solids, residue on evaporation at 180°

Samples were selected from the remaining bottles for suspended-sediment analyses. All water-quality data were published in the Water Resources Data for Wisconsin, Water Years 1979 and 1980 (U.S. Geological Survey, 1980 and 1981).

Several stream cross-section samples were manually collected concurrently with automatically collected samples that cover a range of stream discharges. This method insured that the automatically collected samples represented the average water quality in the stream cross section. These samples were collected using the equal-width-increment method described by Guy and Norman (1970).

Samples were collected manually at 6-week intervals and the following water-quality characteristics were determined:

- pH
- Concentration of fecal coliform bacteria
- Dissolved-oxygen concentration
- Concentration of fecal streptococci bacteria
- Biochemical oxygen demand--5 day
- Turbidity (1980 water year only)
- Nitrite nitrogen
- Nitrite plus nitrate nitrogen
- Ammonia plus organic nitrogen
- Ammonia nitrogen
- Phosphorus
- Phosphorus, orthophosphate

Dissolved-oxygen concentrations and pH were determined in the field at the time of sampling with a Leeds and Northrup Model 7417 pH meter and Yellow Springs Model 54 dissolved-oxygen meter. Samples for biochemical oxygen demand, fecal coliform, and fecal streptococci bacteria were chilled to 4°C and analyzed later at the U.S. Geological Survey laboratory at Madison. Samples for turbidity and suspended-sediment concentration were also analyzed at the Madison laboratory. Samples for the nitrogen and phosphorus species were treated with 1 mL of mercuric chloride and the chlorophyll *a* and *b* samples were chilled to 4°C and sent to the National Water Quality Laboratory at

Doraville, Ga., for analyses.

STREAMFLOW

Streamflow characteristics for the Onion River stations and Sheboygan River at Sheboygan are summarized in table 2. Daily streamflow data for the Onion River stations for the 1979 and 1980 water years are shown in tables 10 and 11.

Based on the discharges at the Sheboygan River gaging station, discharge for the 1979 water year was about 60 percent above average; the 1980 discharges were about 5 percent below average.

Stream discharge was greater during the 1979 water year than during the 1980 water year. Total precipitation during the 1980 water year was greater than that of 1979, but the 1979 water year had higher winter precipitation. Greater winter precipitation combined with lower evapotranspiration in winter resulted in more runoff and, therefore, greater 1979 water-year stream discharge. This is shown in table 3.

The runoff upstream of Hingham was generally greater than that of the area downstream during most months. However, during the 1979 water year, runoff in the Onion River basin upstream of Hingham was 2.60 in. less than the runoff downstream of Hingham; in the 1980 water year, runoff was 3.50 in. greater. The differences in runoff probably can be attributed to differences in precipitation patterns in the basins and to the differences in ground-water discharge. To illustrate the effects of these two variables, a double-massaccumulation plot of runoff for the two areas is shown in figure 2. The slope of the line indicates a higher runoff rate upstream of Hingham than downstream except during the periods February 28 to April 1, 1979, and during September 1980.

Hydrograph separations, such as those described by Linsley, Kohler, and Paulhus, (1975), made for both stations are shown in figures 3 and 4. Base flow and storm runoff components are summarized in table 4. The separations show that base flow at Onion River at Hingham is a greater percentage of total stream discharge than near Sheboygan Falls. Base flow is discharge that is composed of ground-water runoff.

Streamflow extremes occurred during the 1979 water year; the minimum 7-day mean discharge at both stations occurred in September, 1979. Based on the recorded discharge for the Sheboygan River at Sheboygan, the minimum flows were at the 76 percent flow duration point--about double the average 7-day low flow that occurs on the average of once every 2 years ($Q_{7,2}$). The maximum discharge at the Onion River stations occurred in March 1979, and was caused by melting of the snowpack with a high moisture content. The peak discharge of 6,460 ft^3/s at the Sheboygan River gaging station (March 31, 1979) was between expected peak discharges for recurrence intervals of 5 and 10 years (5,310 ft^3/s and 6,940 ft^3/s), respectively (Conger, 1981). During 1980 the peak discharges in September at the Onion River stations were about one-half the recurrence interval of a mean annual flood.

Holmstrom (1979) found that, during extended drought periods, (which did not occur during the study), there is little ground-water discharge downstream of Hingham (table 5). Table 5 shows that the Onion River loses water between Gibbsville and Sheboygan Falls.

WATER QUALITY

The water in the Onion River at Hingham and at Sheboygan Falls is of the calcium-magnesium bicarbonate type; alkalinity values are typical of those in streams tributary to Lake Michigan in east-central Wisconsin (alkalinity as calcium carbonate ranges from 80 to 360 mg/L (milligrams per liter).

Water quality from numerous springs in the headwaters of the Onion River is capable of maintaining a trout fishery (Wisconsin Department of Natural Resources, 1979). From the headwaters to County Highway N, 0.1 mi upstream from the impoundment at Waldo, the stream is classified as a Class II trout stream--one in which there is some natural reproduction but moderate to heavy fish stocking is required to maintain a good fishery. Stream temperatures are raised at the impoundments at Waldo and Hingham above the maximum temperature allowable to maintain a trout fishery. Downstream of Waldo, the Onion River supports a warm-water fishery.

The poorest water quality (for most uses) in the basin resulting from strong organic pollution and high nutrient levels (Wisconsin Department of Natural Resources, 1979) is in Belgium Creek and in the main stem of the Onion River downstream of

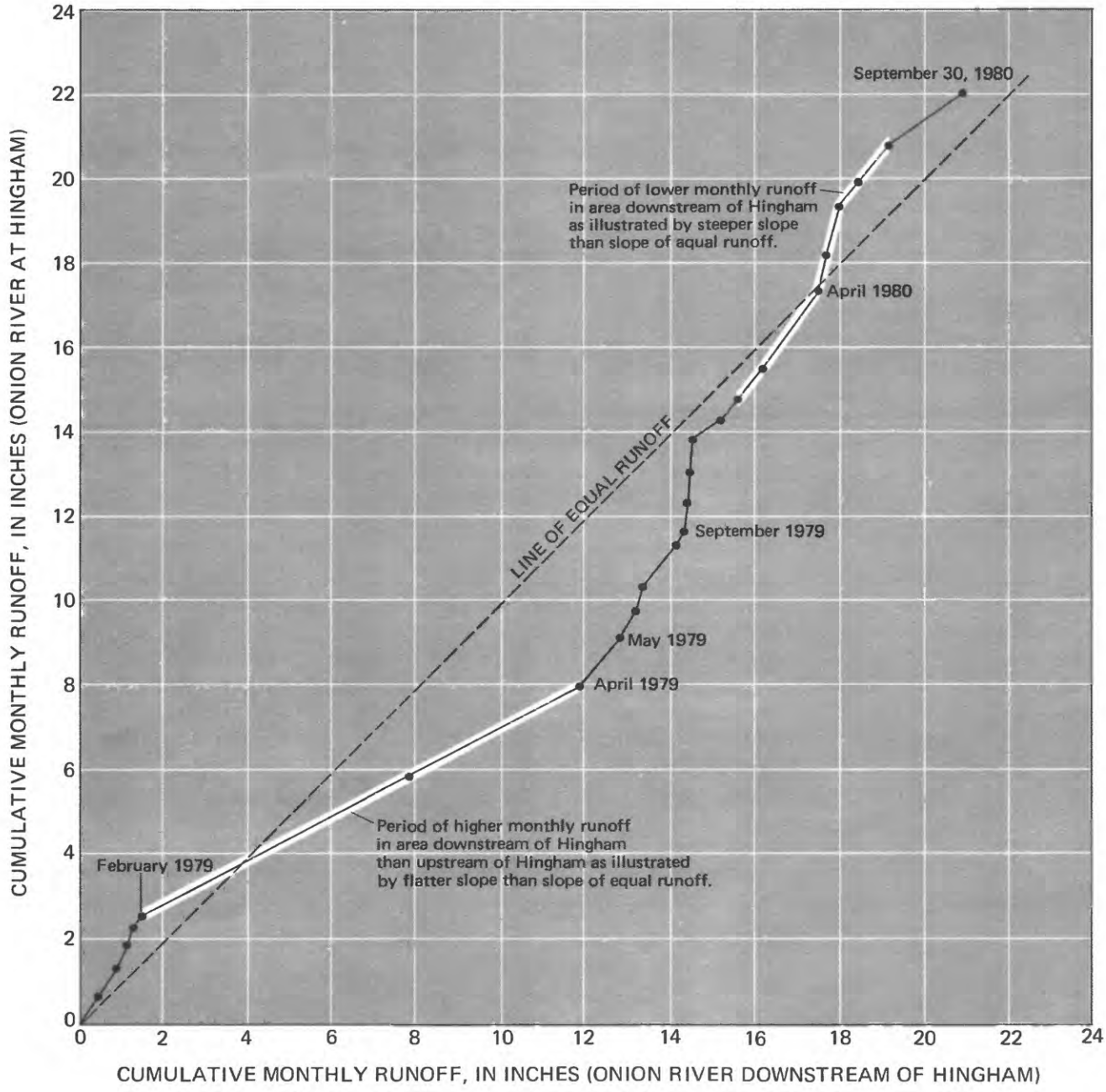
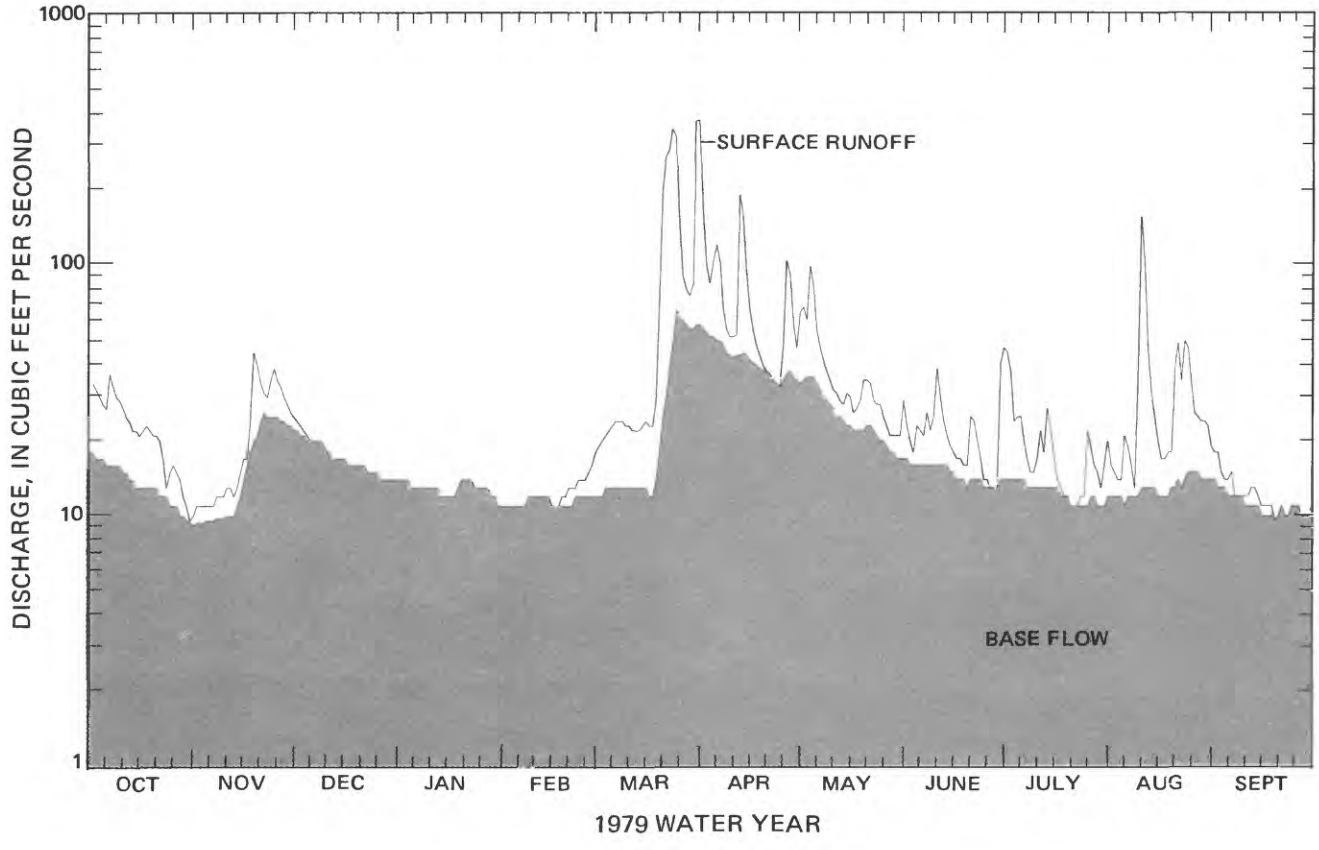


Figure 2. Double mass-accumulation curves for monthly runoff at Onion River at Hingham and Onion River downstream of Hingham.



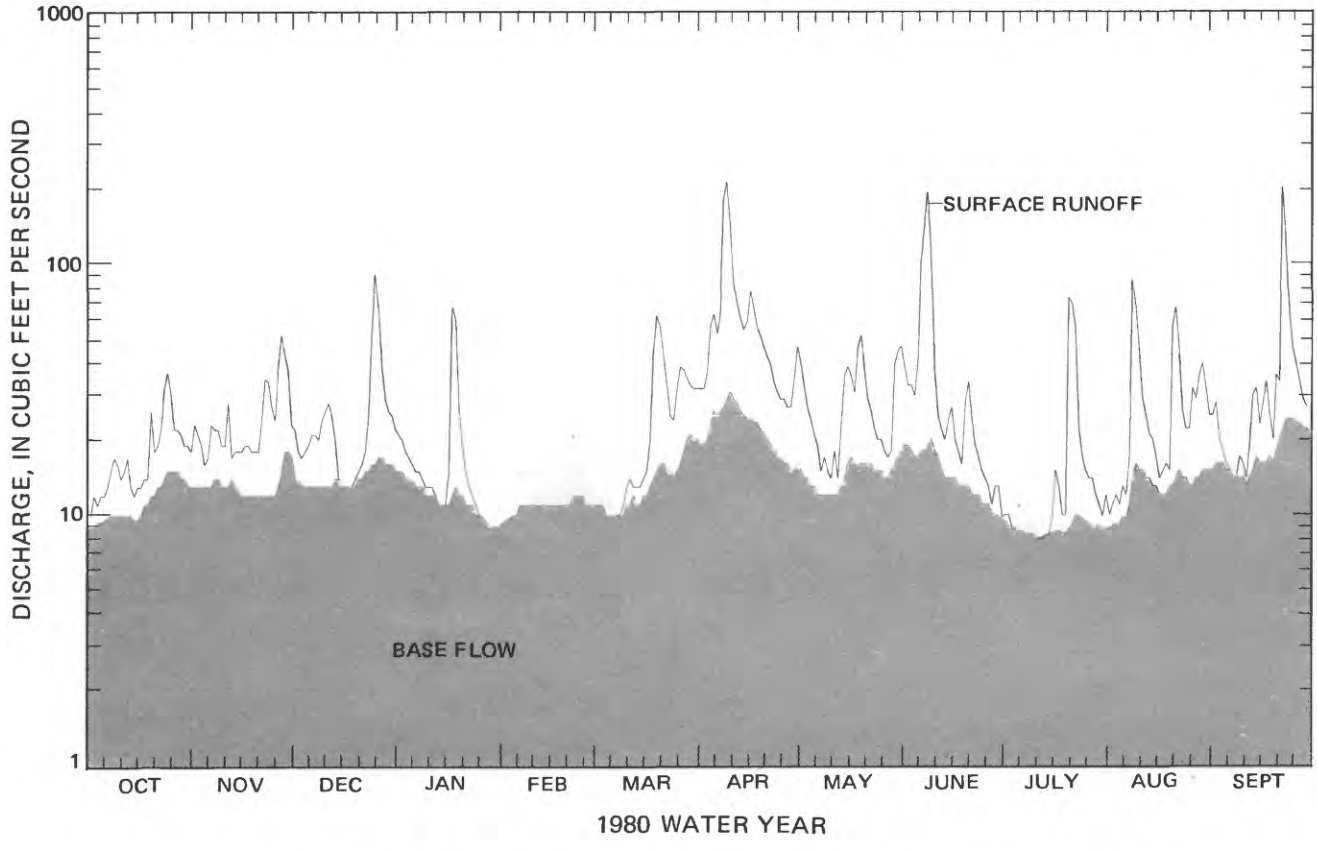
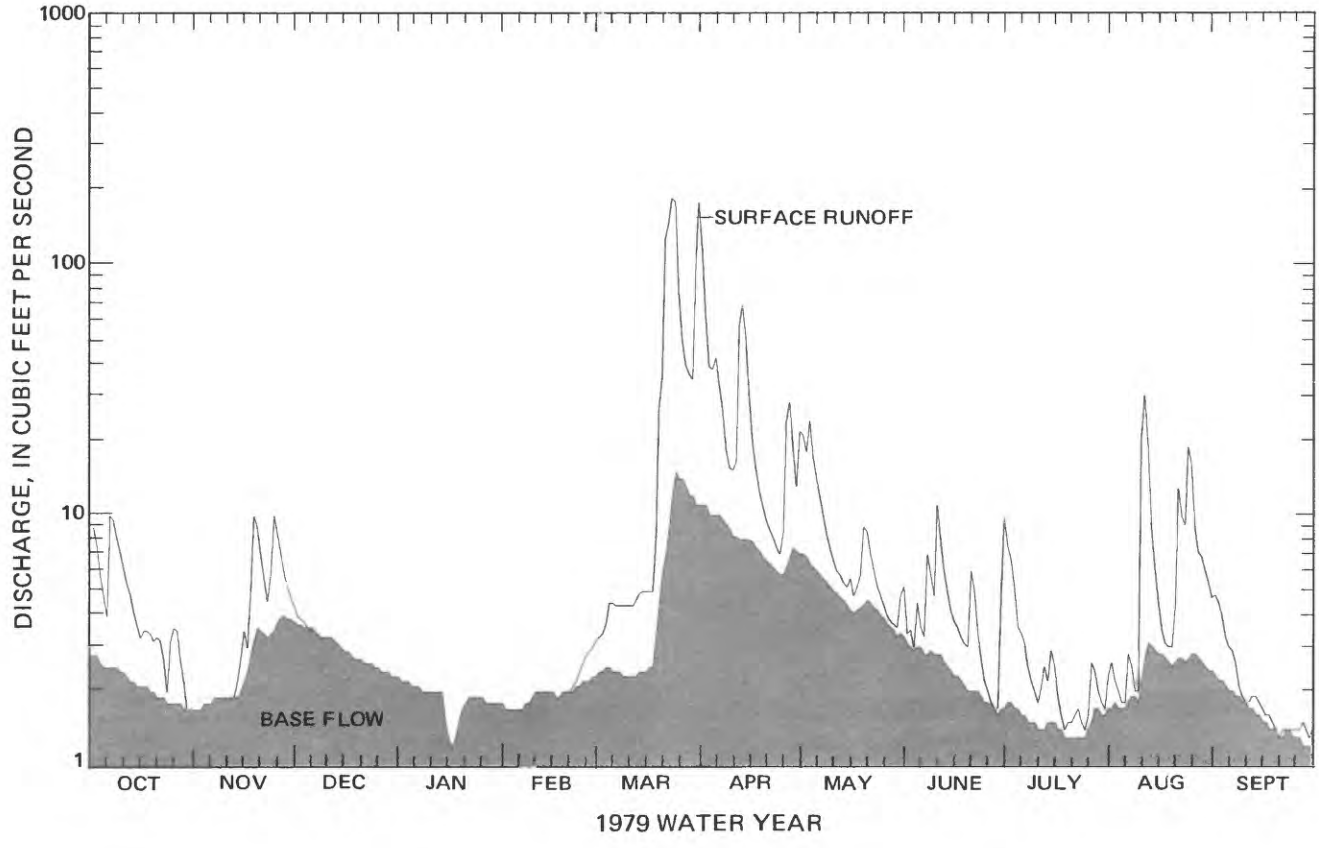


Figure 3. Hydrographs of base flow and surface runoff for Onion River at Hingham, 1979 and 1980 water years.



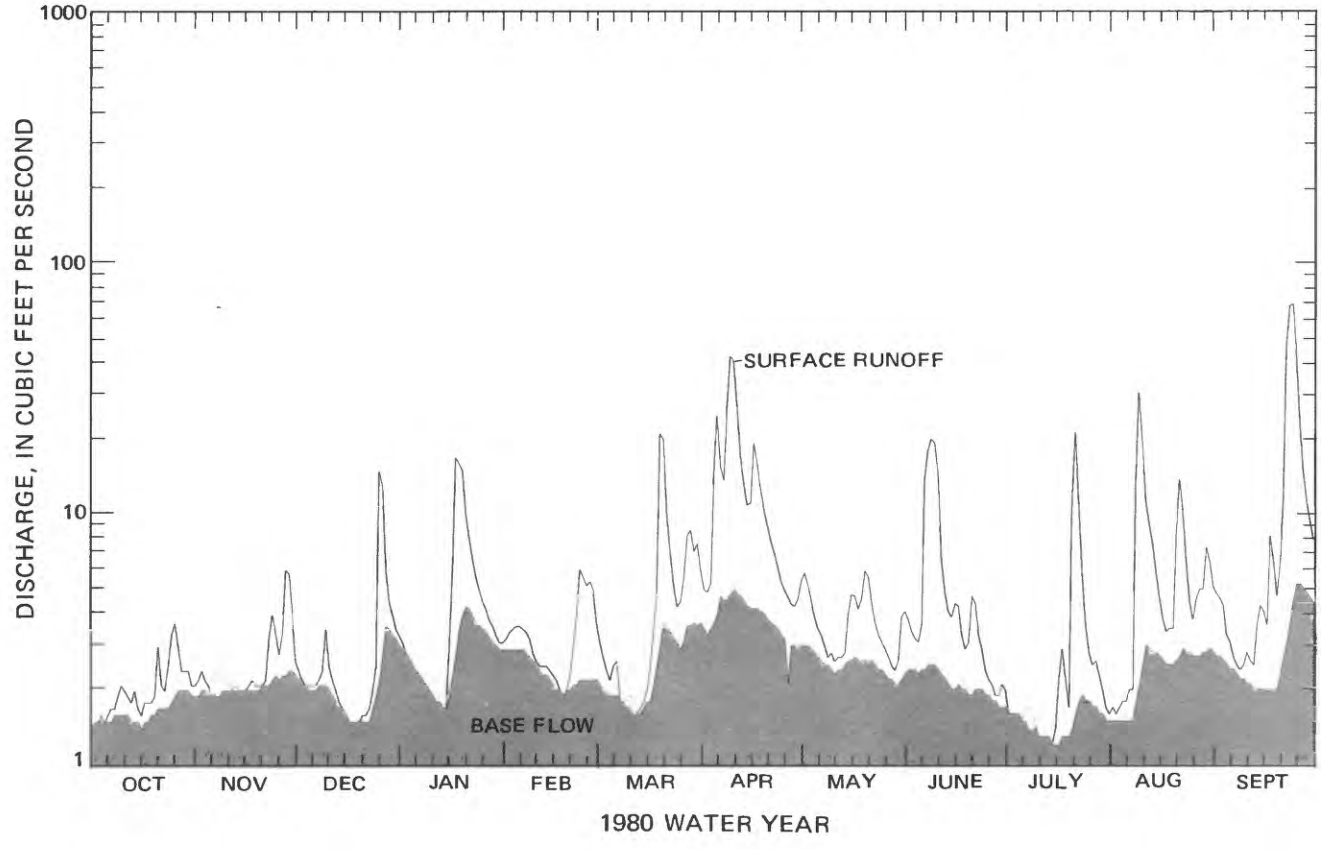


Figure 4. Hydrographs of base flow and surface runoff for Onion River near Sheboygan Falls, 1979 and 1980 water years.

the confluence with this creek.

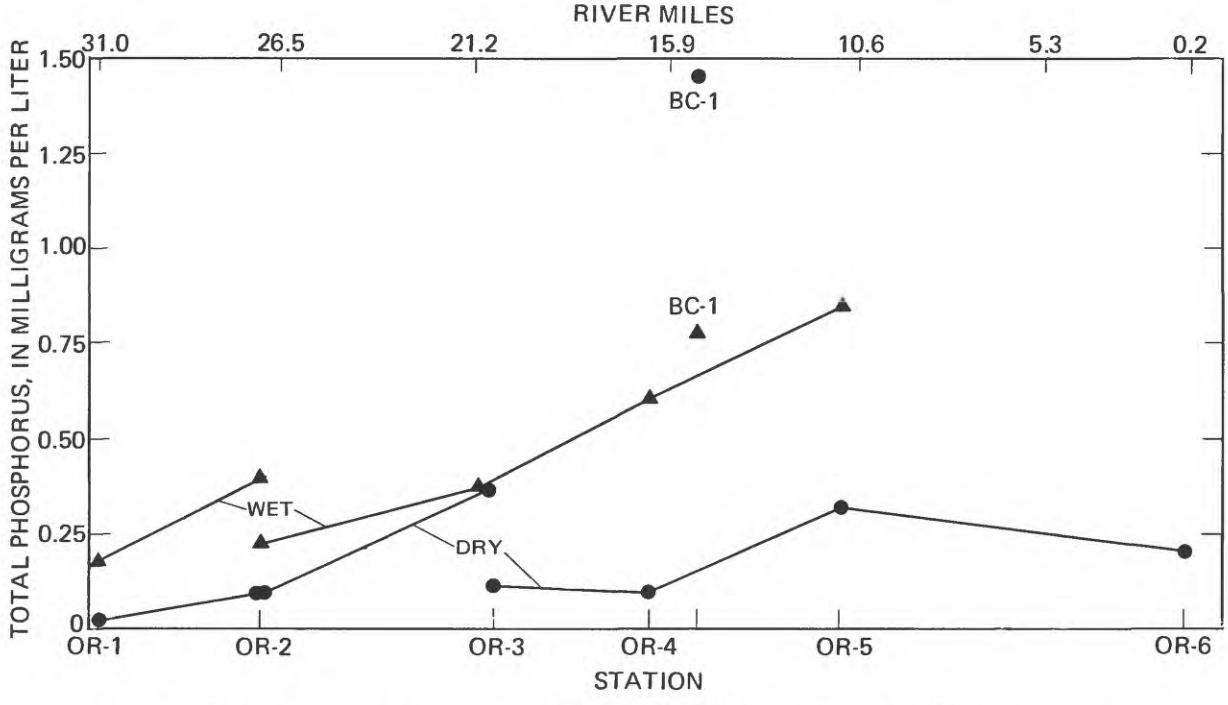
Point sources of pollution include waste-water treatment plants at the villages of Waldo, Hingham, Belgium, and Gibbsville. A vegetable canning company near Belgium discharges into a sewage lagoon that in turn discharges into Belgium Creek. The preserving company discharged wastes intermittently from April 25, to October 30, 1979, and from about June 1 to October 30, 1980 (D. Sauer, Wisconsin Department of Natural Resources, oral commun., January 5, 1982).

In a preliminary assessment of the basin in 1978 the Southeast District of the DNR made dry and wet weather surveys of the Onion River on September 12 and October 30 to determine water-quality trends. They found that phosphorus concentrations during runoff progressively increased in a downstream direction. The results of their data are shown in figure 5.

Complete water-quality data for the Onion River at Hingham and Sheboygan Falls for the 1979 and 1980 water years are given in tables 12 and 13.

Numerous carp were observed at both stations throughout the study. Turbidity changed drastically from very low during winter to exceptionally high during summer when the carp are most active. During 1980 at Sheboygan Falls, turbidity ranged from 5 (March 1) to 80 (June 27) Jackson turbidity units. The Wisconsin Department of Natural Resources (1979), in their preliminary assessment of the basin, also recognized increased turbidity due to carp activity.

Carp are a bottom-dwelling fish species whose activities can cause problems in the aquatic environment. They uproot aquatic vegetation and roil the water while foraging for food (Burns, 1966). The bulk of their vegetation diet consists of filamentous green algae and higher aquatic plants (Dill, 1944; Wales, 1943). Generally inactive at water temperatures below 3.5°C (Sigler, 1958), as the water begins to warm in the spring they move into the shallows to begin spawning. Spawning begins at water temperatures of about 15.5°C, and becomes most active between 18.5° and 20°C (Greeley, 1927; Sigler 1958). When these temperatures are attained spawning occurs both day and night and is accompanied by much commotion and splashing (Burns, 1966).



Note: The Onion River at Sheboygan Falls gaging station is at 3.9 river miles and the Onion River at Hingham gaging station is at 23.6 river miles. The letters and numbers on the abscissa correspond to the DNR sampling stations. "BC-1" refers to a sampling station about 1 mile upstream from the mouth of Belgium Creek. Illustration courtesy of Jeffrey Bode, Southeast District, Wisconsin Department of Natural Resources.

Figure 5. Total phosphorus concentration trends of dry-and wet-weather surveys for the Onion River.

Base-Flow Quality

The chemical quality of the ground-water component of streamflow can be determined from data collected during base-flow periods. The average concentrations of the nitrogen species during base-flow periods were nearly the same in water from the Onion River at Hingham as at Sheboygan Falls. However, the concentrations of orthophosphate and total phosphorus at Sheboygan Falls were about twice those at Hingham (table 6).

Nitrite nitrogen was almost nonexistent in the base-flow water samples. This was not unexpected due to the relatively rapid rate of oxidation of nitrite (NO_2) to nitrate (NO_3) under well-aerated conditions during base-flow periods. At Hingham nitrate nitrogen accounted for an average of 38 percent of the total nitrogen present. Organic nitrogen accounted for 52 percent and ammonia nitrogen, 10 percent. At Sheboygan Falls organic nitrogen accounted for 62 percent of the total nitrogen present, whereas nitrate nitrogen accounted for 31 percent and ammonia nitrogen 7 percent.

Total phosphorus concentrations in water collected from the Onion River at Hingham during base-flow periods ranged from 0.05 to 0.31 mg/L. The median value was 0.17 mg/L. Thirty-five percent of the total phosphorus was orthophosphate phosphorus. At Sheboygan Falls the range was from 0.13 to 0.44 mg/L with a median of 0.40 mg/L. Thirty-seven percent of the total phosphorus was orthophosphate phosphorus.

The concentration of total ammonia nitrogen at Hingham ranged from 0 to 0.31 mg/L with a median of 0.14 mg/L. At Sheboygan Falls concentrations ranged from 0.02 to 0.36 mg/L with a median of 0.11 mg/L.

Chemical and Physical Characteristics

Dissolved Solids

A continuous record of specific conductance was obtained at both stations from April 1979 to September 30, 1980. The daily maximum, minimum, and mean values, and yearly figures are shown in tables 28 and 29. Specific conductance generally is inversely related to stream discharge and directly related to dissolved-solids concentration. At the Onion River at Hingham, the relation between specific conductance and dissolved solids was

$$0.557 \times \text{specific conductance } (\mu\text{mho/cm}) = \text{dissolved solids (mg/L)}.$$

At Onion River near Sheboygan Falls, the relation was

$$0.651 \times \text{specific conductance } (\mu\text{mho/cm}) = \text{dissolved solids (mg/L)}.$$

Dissolved solids loads for the study are shown below.

Water Temperatures

A continuous record of water temperatures was obtained at both stations during the study. The daily maximum, minimum, and mean values are shown in tables 14 and 15.

Biochemical Oxygen Demand

Values for 5-day biochemical oxygen demand (BOD) indicate moderate levels of oxidizable organic material in the stream a both Hingham and Sheboygan Falls. The 5-day BOD values at Hing-

Total dissolved solids

Water year	Upstream of Hingham		Downstream of Hingham	
	Tons	Tons per square mile per day	Tons	Tons per square mile per day
1979 (May through September)	3,170	0.56	4,500	0.52
1980	8,610	.63	14,000	.67

ham ranged from 1.1 to 6.3 mg/L; at Sheboygan Falls the 5-day BOD values ranged from 2.2 to 8.7 mg/L.

Autotrophic Index

Ratios of periphyton biomass to chlorophyll, known as the autotrophic index, indicated low levels of available organic loading at Hingham and high levels at Sheboygan Falls. At Hingham the ratios ranged from 47 to 155; the range at Sheboygan Falls was from 149 to 70,500. The autotrophic index is computed by dividing ash-free dry weight (g/m^2) of the periphyton sample by its chlorophyll *a* content (g/m^2). Values greater than 100 indicate some organic contamination; values range into the thousands for organically contaminated streams.

Indicator Bacteria

Wisconsin water-quality standards for recreational waters for fecal coliform bacteria are the same as those of the U.S. Environmental Protection Agency, 1977: "The geometric mean of not less than 5 samples within a 30-day period shall not exceed 200 per 100 mL nor shall more than 10% of total samples during any 30-day period exceed 400 per 100 mL."

Concentrations of fecal coliform and fecal streptococci bacteria indicate fecal contamination and the possible presence of pathogenic organisms. At Hingham the values for concentrations of fecal coliform bacteria ranged from 4 to 830 colonies per 100 mL of sample with a median of 113; those for fecal streptococci bacteria ranged from 11 to 3,300 colonies per 100 mL with a median of 57.

Concentrations of fecal coliform bacteria at Sheboygan Falls ranged from 25 to 13,000 colonies per 100 mL, with a median of 170; those for fecal streptococci bacteria ranged from 12 to 2,600 colonies per 100 mL with a median of 200.

Other

The concentrations of pesticides, polychlorinated biphenyls, and polychlorinated naphthalenes at Hingham in an unfiltered water sample collected June 28, 1979, and a sample of bed material collected August 15, 1980, were less than the detection limit.

Concentrations of pesticides in unfiltered water and bed-material samples at Sheboygan Falls were less than the detection limit. The concentration of polychlorinated biphenyls (PCB) was 1 $\mu g/kg$ in a bed-material sample collected on August 15, 1980.

RELATION OF SUSPENDED SEDIMENT AND NUTRIENTS TO STREAMFLOW

Suspended-sediment and nutrient loads, computed by streamflow and concentration-integration techniques described by Porterfield (1972) are given in tables 16-29. The loads for constituents in the individual runoff events are shown in table 7. At Hingham, runoff from five storms during the 1979 water year was sampled for selected chemical constituents; at Sheboygan Falls runoff from six storms was sampled. In the 1980 water year runoff from seven storms was sampled at each station.

Annual yields of suspended sediment and nutrients (various forms of nitrogen and phosphorus) were greater in the 1979 water year than in the 1980 water year. To assess the impact of the drainage area on suspended sediment and nutrient yields downstream of Hingham, the discharges and loads at Hingham were subtracted from those at Sheboygan Falls; the results are shown in table 8. The 2-year average suspended-sediment yield for Hingham was 72 $tons/mi^2$; for the basin downstream from Hingham it was 89 $tons/mi^2$. The effect of the impoundments at Hingham and Waldo on suspended-sediment and nutrient loads is unknown. Because the stream discharge in 1979 was 60 percent above average and near normal in 1980, and precipitation for those years was 3.3 in. and 7.0 in. more than normal, respectively, the sediment and nutrient loads may be greater than the long-term average for the Onion River. The suspended-sediment yields for the Onion River stations are greater than the long-term average of 62 ton/mi^2 for Sheboygan River at Sheboygan reported by Hindall (1975).

An initial comparison of suspended-sediment and nutrient yields at Hingham and Sheboygan Falls may be misleading. During the 1979 water year runoff at Sheboygan Falls was 13.33 in. and at Hingham, 11.75 in. The greater runoff at Sheboygan Falls would result in higher loads if the concentrations for the same constituents at both stations were equal. During the 1980 water year, the runoff at Sheboygan Falls was 6.58 in.; runoff at Hingham was 10.10 in. If all constituent concentrations at both stations were equal, a lower load would result

at Sheboygan Falls. The use of double-mass-accumulation curves helps eliminate bias due to runoff by providing a comparison of loadings and seasonal changes in loadings between the stations. The double mass-accumulation curves (figs. 6-10) are constructed by plotting the cumulative monthly constituent yield against cumulative inches of runoff.

The slopes of the double mass-accumulation curves for suspended sediment (fig. 6) show a slight difference between the two stations; during the 1979 water year the load at Hingham was slightly more than that downstream. During the 1980 water year the load at Hingham was less.

Loading rates downstream of Hingham were higher than those upstream of Hingham for all nutrients. A significant proportion of this may be attributed to point-source pollution from Belgium Creek. The Wisconsin Department of Natural Resources (1981) estimated that during the 1979 water year the phosphorus contribution to the Onion River from point sources on Belgium Creek (including a vegetable canning company that usually discharges on a seasonal basis from May to September) amounted to 16,000 lb; other point sources contributed 700 lb. Based on a phosphorus load of 37,300 lb downstream of Hingham, the contribution of phosphorus from these point sources represents 45 percent of the total load. Upstream of Hingham, point-source contributions of phosphorus were estimated to be 2,200 lb or 18 percent of the total load. Nonpoint contribution of phosphorus amounted to 362 lb/mi^2 downstream of Hingham, compared to 272 lb/mi^2 upstream of Hingham. The double mass-accumulation curves for the area downstream of the Hingham station (figs. 9 and 10) show greater fluctuations than the curves (figs. 6-8) for the area upstream of Hingham. This may be due to point-source contributions from Belgium Creek.

In general, the curves (figs. 8 and 10) for nitrite plus nitrate nitrogen and ammonia nitrogen tend to flatten out during the growing season, possibly reflecting the utilization of the nutrients by aquatic plants. The shapes of the curves for phosphorus and orthophosphate (figs. 7 and 9) and organic nitrogen (figs. 8 and 10) closely follow the shapes of the suspended-sediment curves illustrating the association of the nutrients with suspended sediment.

The loading rates of dissolved solids, in tons per square mile, from Onion River at Hingham and the Onion River downstream of Hingham appear similar. However, the area above Hingham had more runoff than the area downstream, producing a disproportionate load at Hingham. A plot of double mass-accumulation curves (fig. 11), however, again illustrates a higher loading rate of dissolved solids downstream of Hingham.

Water-Quality Criteria

Concentration standards for nutrients, trace metals, and pesticides have been established by the U.S. Environmental Protection Agency (1977) and the Wisconsin Department of Natural Resources for the protection of freshwater aquatic life. Ammonia nitrogen concentrations at both Hingham and Sheboygan Falls did not exceed the DNR criterion of 0.04 mg/L of un-ionized ammonia (NH_3-N) (Schuettpelz and Harpt, Wisconsin Department of Natural Resources, written commun., 1980); only the March 1980 samples reached the U.S. Environmental Protection Agency's criterion of 0.02 mg/L. Concentrations of un-ionized ammonia can be determined from analyses of ammonia nitrogen ($NH_3 + NH_4^+$) if the pH and water temperature of the samples are known. However, the resulting concentrations may be low due to possible loss of gaseous ammonia from the sample before analysis.

The U.S. Environmental Protection Agency (1977) has suggested that to prevent biological nuisance growths the following concentrations of total phosphorus should not be exceeded:

0.1 mg/L for streams not discharging into lakes or impoundments,

0.05 mg/L in any stream at the point where it enters a lake or reservoir,

0.025 mg/L within a lake or reservoir.

At Hingham during base flow, four of five samples analyzed exceeded the EPA criterion; at Sheboygan Falls all base-flow samples exceeded the criterion. During storm runoff most samples at both stations exceeded the criterion.

At both stations, concentrations of trace metals (tables 12 and 13) from the water-column samples, June 28, 1979, and from bed-material samples August 15, 1980, were below the EPA criterion where established.

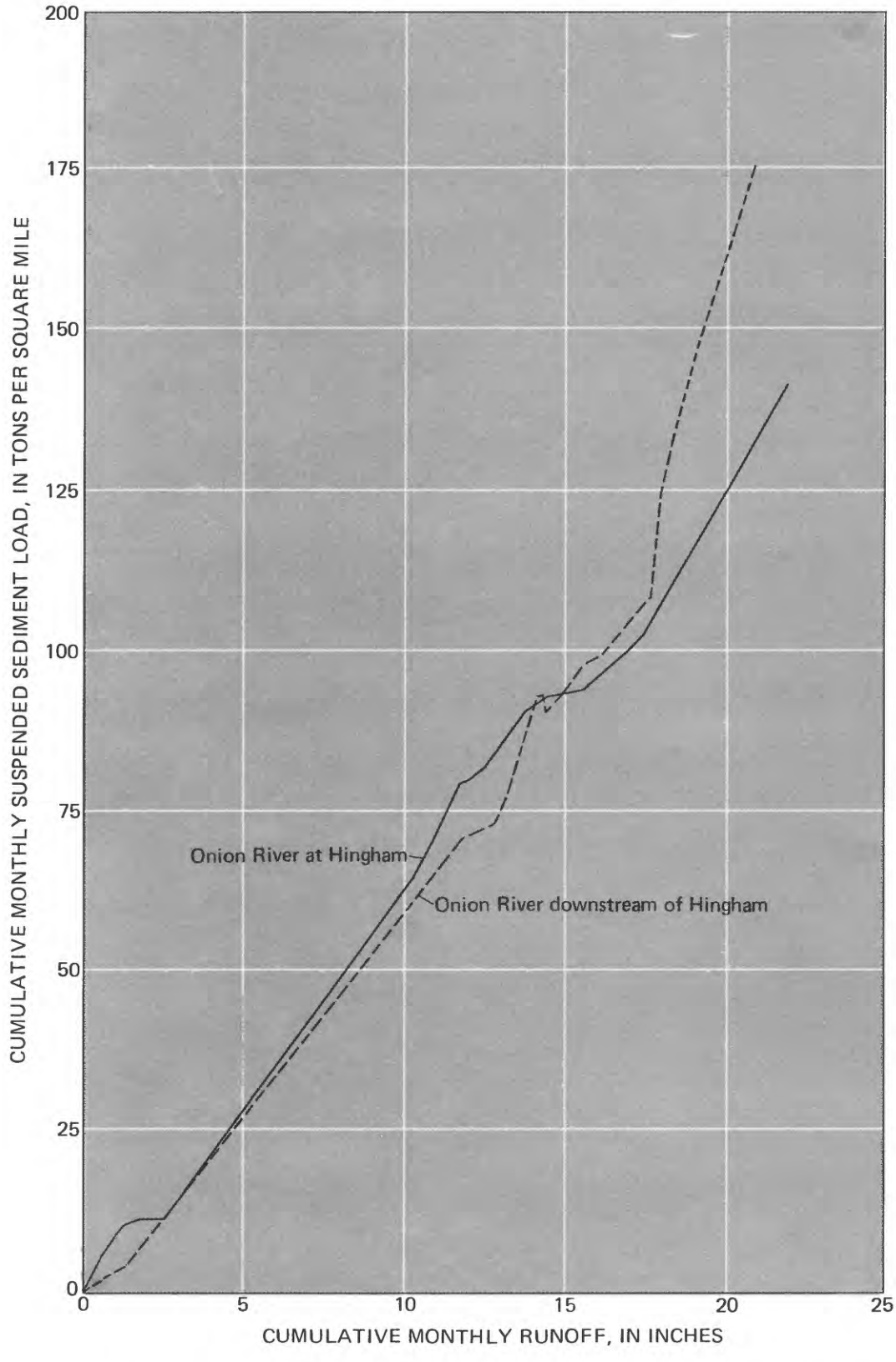


Figure 6. Double mass-accumulation curves of suspended sediment as a function of monthly runoff for Onion River at Hingham and Onion River downstream of Hingham.

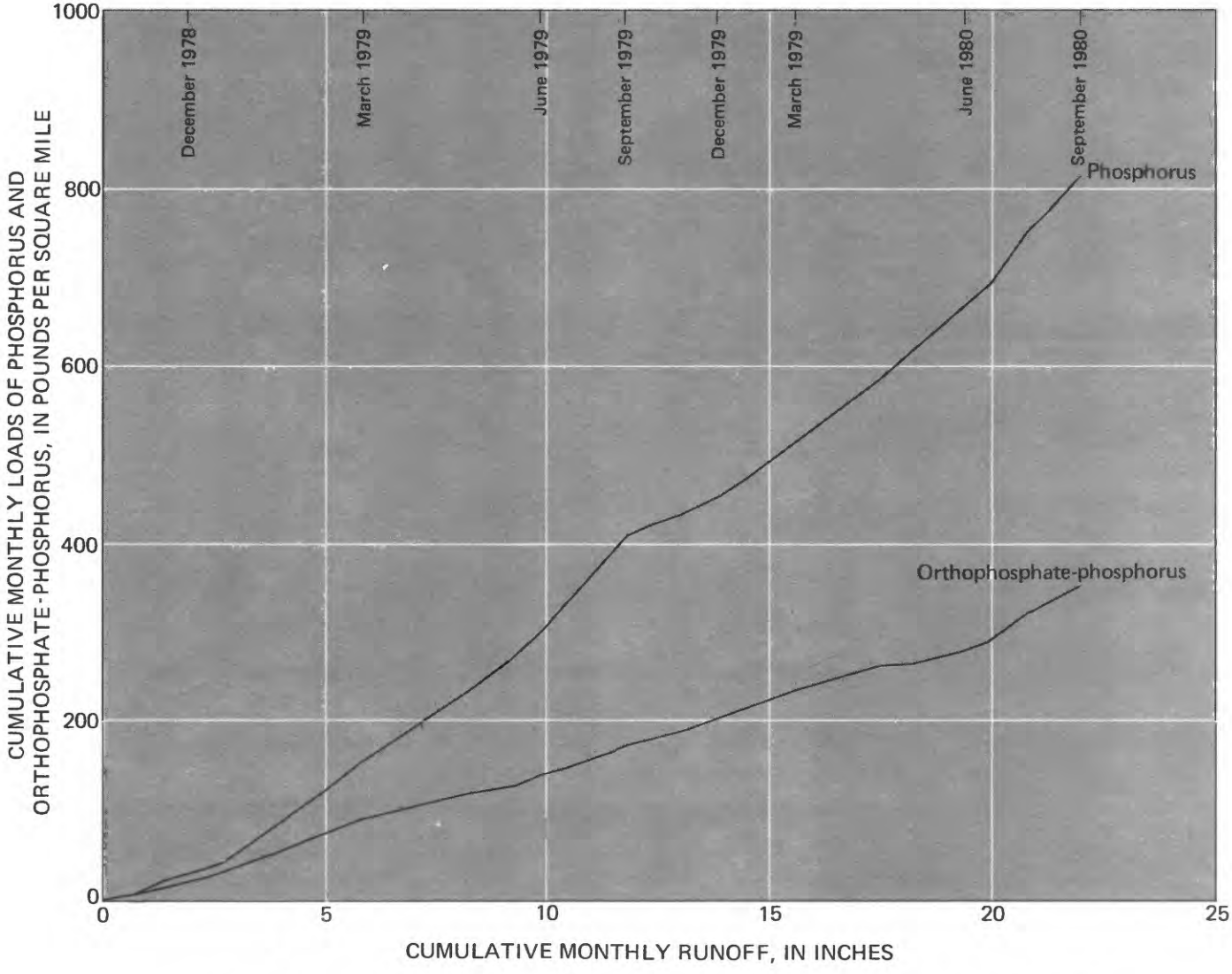


Figure 7. Double mass-accumulation curves of phosphorus and orthophosphate-phosphorus as a function of monthly runoff for Onion River at Hingham.

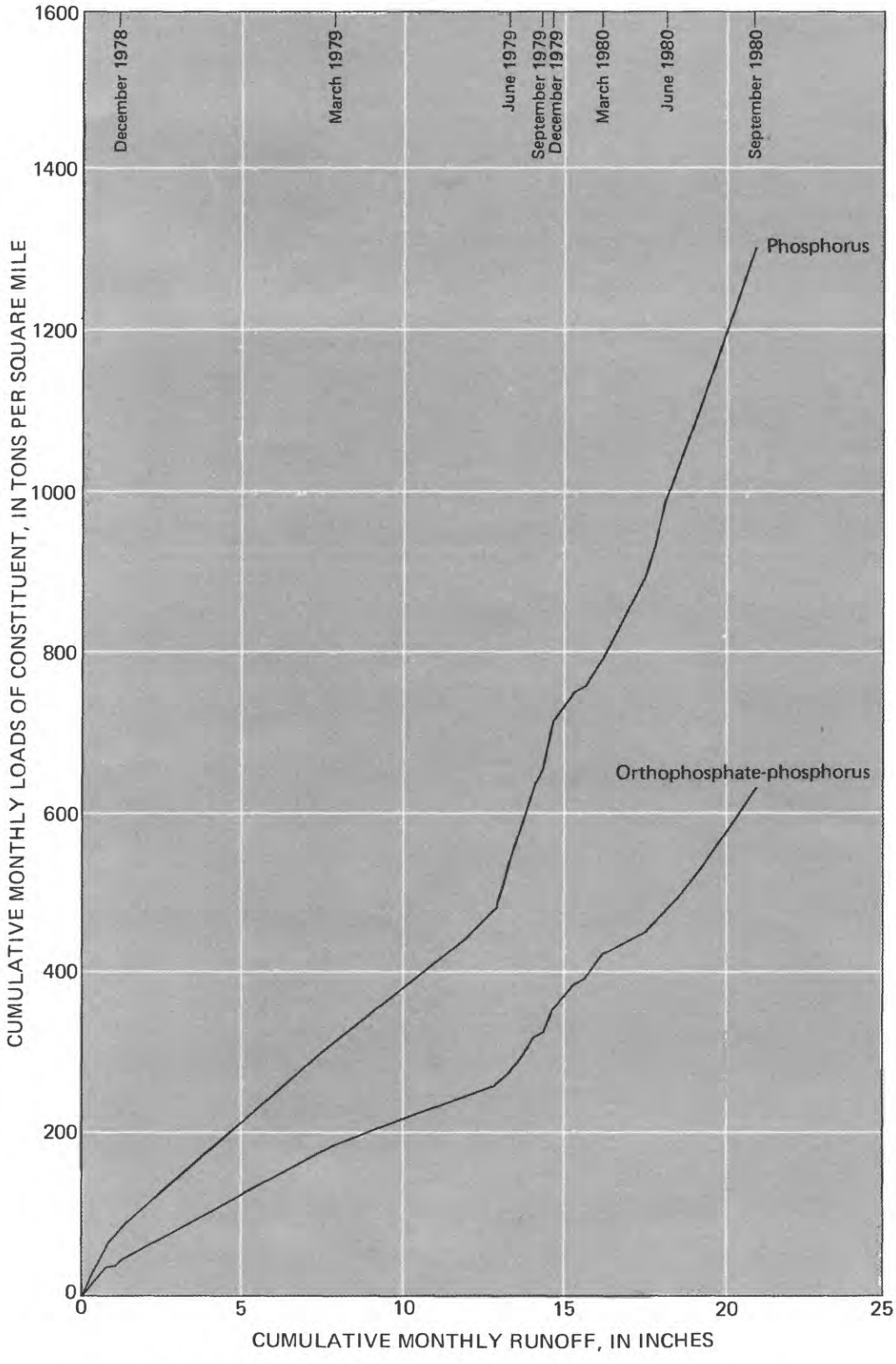


Figure 8. Double mass-accumulation curves of phosphorus and orthophosphate-phosphorus as a function of monthly runoff for Onion River downstream of Hingham.

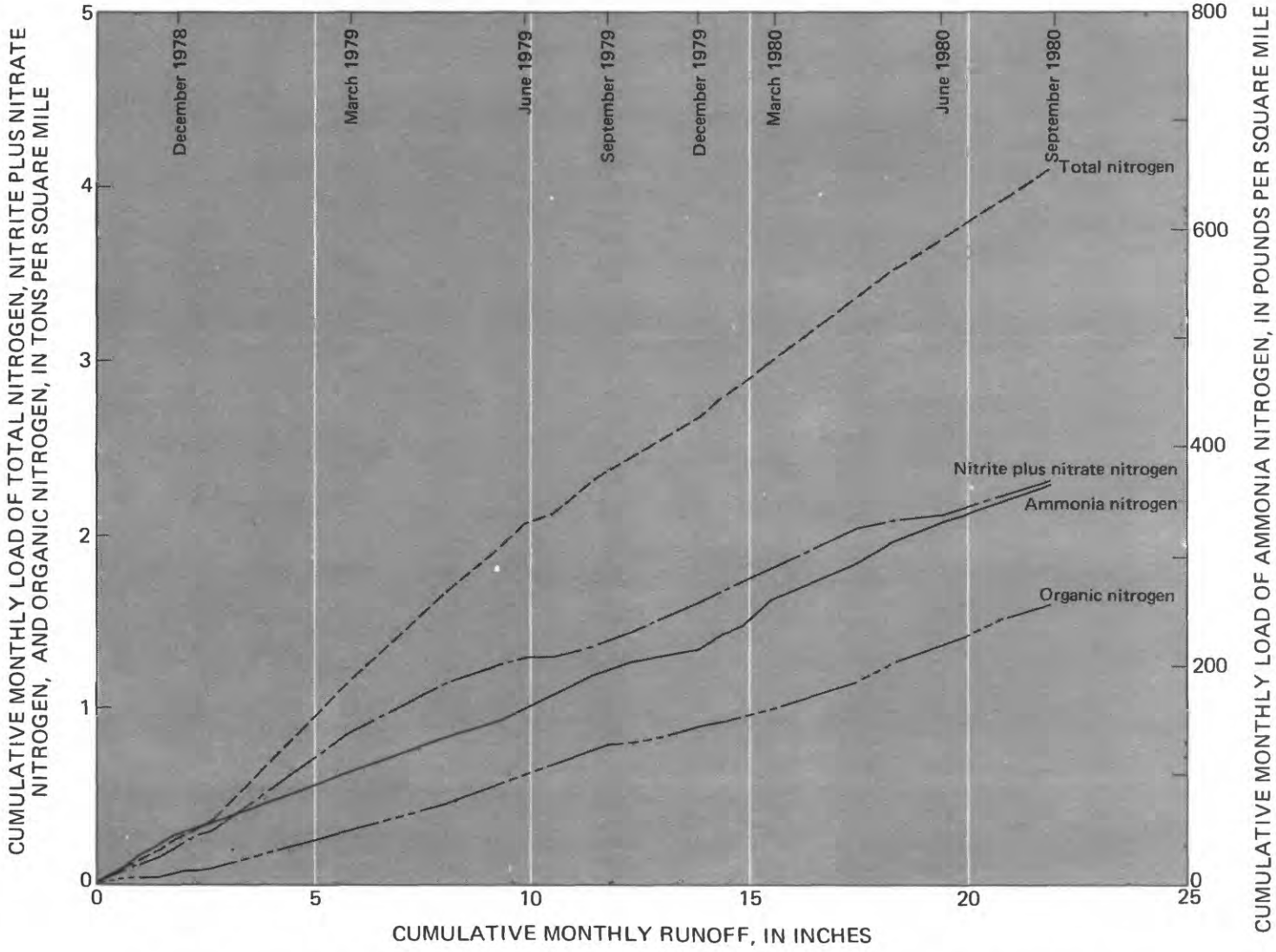


Figure 9. Double mass-accumulation curves of nitrogen, ammonia nitrogen, nitrite plus nitrate nitrogen and organic nitrogen as a function of monthly runoff for Onion River at Hingham.

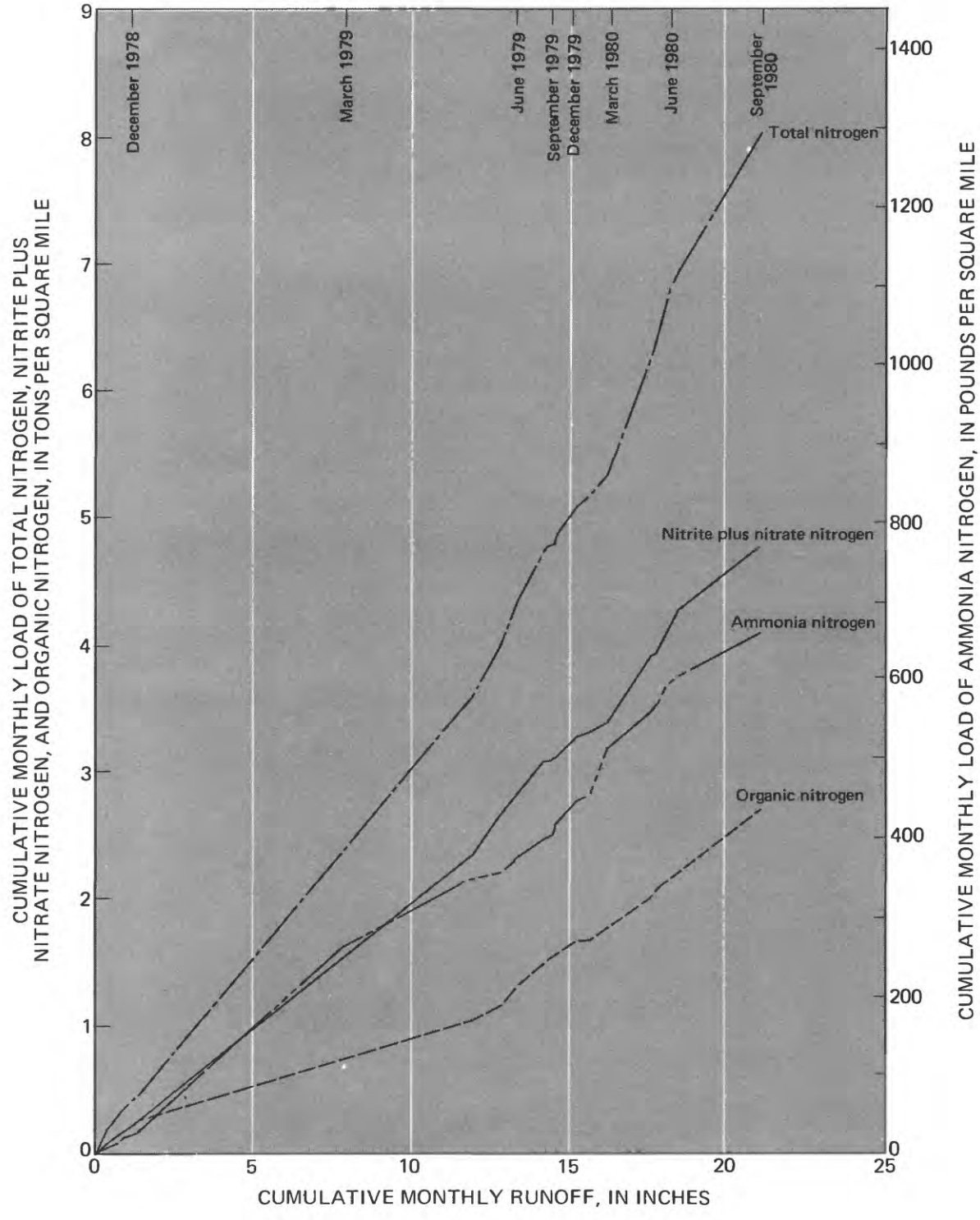


Figure 10. Double mass-accumulation curves of total nitrogen, ammonia nitrogen, nitrite plus nitrate nitrogen, and organic nitrogen as a function of monthly runoff for Onion River downstream of Hingham.

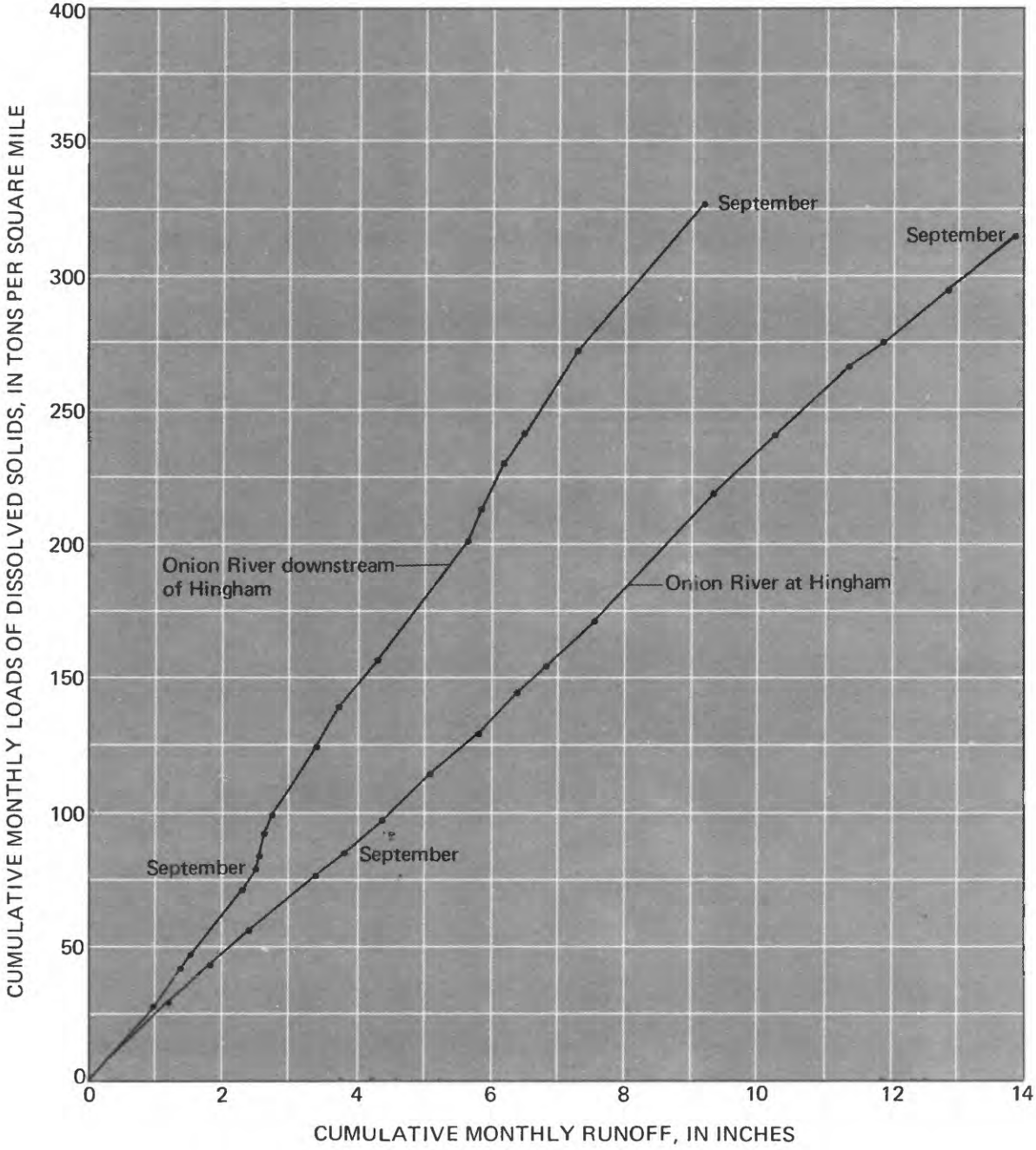


Figure 11. Double mass-accumulation curves of dissolved solids as a function of monthly runoff for Onion River downstream of Hingham.

Seasonal and Annual Fluctuations

Seasonal and annual fluctuations in nutrients and sediments were apparent throughout the study. High ammonia concentrations in March 1980 (tables 12 and 13) contrast sharply with the low concentrations in March 1979. The high concentrations in 1980 may be attributed to runoff from manure spread on frozen ground. Snow depths of less than 6 in. in the 1979-80 winter allowed farmers access to the fields to spread manure. During the 1978-79 winter, deep snow (31 in. recorded on January 24 at Sheboygan) may have prevented manure spreading during most of the winter.

Unusually large seasonal fluctuations in concentrations of suspended sediment and total phosphorus during low flow also were noted. The close relationships of phosphorus with suspended sediment have been demonstrated in the Steiner Branch basin (Field and Lidwin, 1982) as well as in other basins (Ward and Eckardt, 1979; McElroy and others, 1976; Verhoff and others, 1979). Some phosphorus sorbs to the soil particles and is transported "piggy-back" with suspended sediments.

To illustrate the seasonal changes in concentrations of suspended-sediment and total phosphorus, average monthly low-flow concentrations are shown in figure 12. The seasonal changes in the concentration for Steiner Branch also are shown for comparison. There is considerable scatter among the data points, and the solid and dashed lines that were drawn are subject to subjective interpretation. However, the purpose of these lines is not to depict absolute values but rather to illustrate the seasonal fluctuations in suspended sediment and phosphorus concentrations in the Onion River. Suspended-sediment concentrations may increase slightly seasonally as shown on the Steiner Branch plot with the phosphorus-concentration curve following the sediment concentration curve. However, the concentrations during summer on Onion River at Hingham and Sheboygan Falls are considerably higher than the authors found in any of the other nonpoint-source studies. The higher phosphorus concentrations in summer at Sheboygan Falls may be attributed in part to point sources from Belgium Creek during the canning season, but there are no point sources of contamination above Hingham to cause the high concentrations at that station during summer.

The low points in the suspended sediment and total phosphorus concentration curves coincide with the inactive period of carp because of cold water temperatures. The high point of the curve corresponds to the spawning period when carp are most active. As previously discussed, carp begin spawning at about 15.5°C and become most active between 18.5° and 20°C. In the spring, these water temperatures were attained at both stations near the end of May and in early June (tables 30 and 31). Therefore, the data suggest that the high concentrations of suspended sediment and total phosphorus during late spring and early summer may be due to carp activity.

Nutrient concentrations during storm runoff at Sheboygan Falls were less than expected, despite the degraded quality of water in the river. The maximum concentrations during storm runoff for suspended sediment, and maximum and median concentrations for total phosphorus, total organic nitrogen, and ammonia nitrogen were generally lower in the Onion River than at Steiner Branch and Bruce Valley Creek; low-flow concentrations were greater (table 9).

Trout require good stream-water quality. Steiner Branch and Bruce Valley Creek can support a trout population (Wisconsin Department of Natural Resources, 1980). In comparison to these streams, storm-runoff concentrations of nutrients and sediments do not seem to be the major factor contributing to the degraded water quality of the Onion River.

SUMMARY

The U.S. Geological Survey, in cooperation with the Wisconsin Department of Natural Resources, investigated the water quality of the Onion River basin in east-central Wisconsin during the 1979 and 1980 water years. Dairy farming and cash cropping are the major agricultural activities in the basin. Nonpoint-source pollution in the lower part of the Onion River was suspected of contributing significantly to degraded water quality. Two streamflow water-quality-monitoring stations were established on the Onion River; one at Hingham upstream of the problem area and one near Sheboygan Falls downstream from the problem area.

The data-collection program began in December 1978 and ended in September 1980. Its scope included determination of (1) streamflow; (2) the suspended-sediment, nitrogen, and phosphorus loads; (3) water temperature and dissolved solids; and (4) miscellaneous water-quality constituents including dissolved oxygen, pH, biochemical oxy-

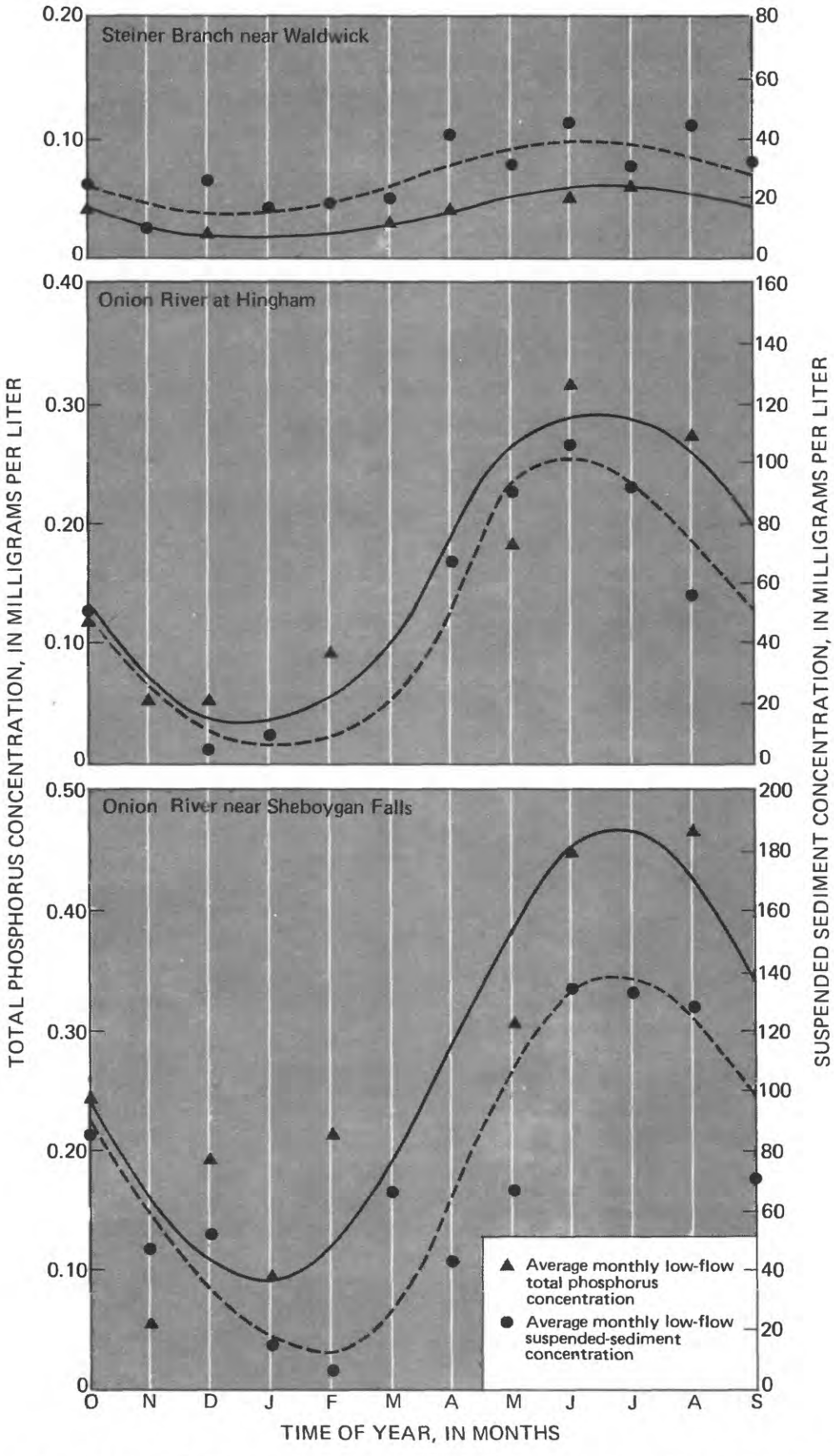


Figure 12. Average monthly suspended-sediment and total phosphorus concentrations during low-flow in the Onion River and Steiner Branch.

gen demand, fecal coliform and fecal streptococci bacteria, periphyton biomass, pesticides, trace metals, alkalinity, and chloride.

Streamflow at Onion River at Hingham ranged from a minimum 7-day mean flow of 8.7 to a maximum discharge of 600 ft^3/s; at Onion River near Sheboygan Falls the range was from a minimum 7-day mean flow of 13 to a maximum discharge of 2,350 ft^3/s. Based on discharges at the Sheboygan River at Sheboygan these discharges ranged from about double the low flow that occurs on the average of once every 2 years to discharges of between a 5-year and a 10-year flood frequency. The average discharge at Hingham in the 1979 water year was 32.2 ft^3/s and in the 1980 water year it was 27.6 ft^3/s. At Sheboygan Falls the average discharge in the 1979 water year was 94.2 ft^3/s and in the 1980 water year it was 55.2 ft^3/s. Based on the average discharge at the Sheboygan River at Sheboygan, the 1979 water year was 60 percent greater than average and the 1980 water year was about 5 percent less than average.

Precipitation for the 1979 water year was 33.1 in. and for the 1980 water year it was 36.8 in.; these amounts are 3.3 in. and 7.0 in., respectively, above average.

Suspended-sediment yields were greatest at the Sheboygan Falls station but comparison of the double-mass-accumulation curves show loading rates to be about the same for both stations. Suspended-sediment yields were 79.1 ton/mi^2 for the 1979 water year and 63.9 ton/mi^2 for the 1980 water year at Hingham, whereas the yields were 93.5 ton/mi^2 in the 1979 water year and 84.2 ton/mi^2 in the 1980 water year downstream of Hingham. Carp resuspend bottom sediments and nutrients causing unusually high concentrations during the summer of both 1979 and 1980.

All nutrient loads were greater in the 1979 water year than in the 1980 water year. The area downstream of Hingham produced higher nutrient yields than the basin upstream of Hingham. In addition, double-mass-accumulation curves indicated highest loading rates downstream of Hingham. These higher loading rates may be due to the impact of point sources on Belgium Creek. The data on point-source loading are rather limited, however, and warrant further investigation. Phosphorus yields were 331 lb/mi^2 for the 1979 water year and 317 lb/mi^2 for the 1980 water year at Hingham; downstream of Hingham the yields were 656 lb/mi^2 for the 1979 water year and 647 lb/mi^2 for the 1980 water year. During the 1979 water year downstream of Hingham, 45 percent of the total phosphorus load was attributed to point sources of contamination. Ammonia concentrations at both stations did not exceed the DNR criterion of 0.04 mg/L of un-ionized ammonia (NH_3-N). Most phosphorus concentrations during base flow and surface runoff exceeded the U.S. EPA criterion of 0.10 mg/L for prevention of biological nusiance growths.

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Table 1. Percentage of land use in the Onion River basin

[Data, in percentage of total area, from J. S. Bauman (Wisconsin Department of Natural Resources, written commun., 1982)]

Use	Upstream of Hingham dam	Downstream of Hingham dam
Cropland	71	89
Pasture	1	1
Woodland	22	6
Wetlands	4	3
Urban	1	1
Other	1	0

Table 2. Summary of streamflow characteristics for Onion River at Hingham, Onion River near Sheboygan Falls, and Sheboygan River at Sheboygan, 1979 and 1980 water years

Streamflow characteristic	Onion River at Hingham		Onion River near Sheboygan Falls		Sheboygan River at Sheboygan	
	1979	1980	1979	1980	1979	1980
Total discharge, in cubic feet per second-days[1]	11,747	10,097	33,717	20,193	141,421	83,986
Mean discharge, in cubic feet per second.	32.2	27.6	92.4	55.2	387	229
Mean discharge, in cubic feet per second per square mile.	0.87	0.74	0.98	0.59	0.93	0.55
Runoff, in inches	11.75	10.10	13.33	7.98	12.59	7.47
Minimum 7-day mean low-flow, in cubic feet per second.	11	8.7	14	13	47	52
Maximum recorded peak discharge, in cubic feet per second.	600	407	2,350	774	6,460	2,540

[1] The sum of the daily mean discharges for the entire water year.

Table 3. Precipitation and runoff for Onion River near Sheboygan Falls for selected periods

	1979 water year			1980 water year		
	Nov.-April	May-Sept.	Total	Nov.-April	May-Sept.	Total
Precipitation (inches).	16.2	17.0	33.2	10.1	26.7	36.8
Runoff (inches)	9.79	3.54	13.3	3.89	4.09	7.98

Table 4. Base flow and storm runoff for Onion River at Hingham and Onion River at Sheboygan Falls, 1979 and 1980 water years

Water year	Onion River at Hingham			Onion River near Sheboygan Falls		
	Base flow (ft^3/s)	Surface runoff (ft^3/s)	Surface runoff as a percentage of base flow	Base flow (ft^3/s)	Surface runoff (ft^3/s)	Surface runoff as a percentage of base flow
1979	6,620	5,130	56	11,600	22,100	34
1980	5,020	5,070	50	8,750	11,400	43

Table 5. Comparison of base-flow discharges at Hingham, Gibbsville, and Sheboygan Falls

[Adapted from Holmstrom, 1979. ----, no measurements made.]

Date of measurement	Hingham	Gibbsville	Sheboygan Falls
Drainage area, mi^2	36.2	82.0	94.1
July 11, 1973	8.35	----	----
July 12, 1973	----	11.3	8.45
Aug. 12, 1975	5.62	----	----
Aug. 13, 1975	----	12.2	5.58
Aug. 10, 1976	9.06	10.6	9.15
July 12, 1977	8.51	8.38	8.64

Table 6. Concentrations of nutrients in base-flow samples from the Onion River at Hingham and Sheboygan Falls

[Data in milligrams per liter]

	Nitrite nitrogen		Nitrite plus nitrate nitrogen		Ammonia nitrogen		Organic nitrogen		Total nitrogen		Total phosphorus		Orthophosphate phosphorus	
1979														
June 28	0.05	0.01	0.59	0.09	0.20	0.23	1.5	2.4	2.3	2.6	0.31	0.44	0.11	0.15
August 8	.01	.03	.17	.43	.14	.11	.78	.88	1.1	1.4	.19	.40	.06	.15
December 14	.01	<.01	1.6	1.2	.05	.08	.54	.51	2.2	1.8	.05	.13	.05	.09
1980														
May 8	.02	.02	.41	.03	.31	.36	1.5	1.7	2.2	2.1	.17	.40	.02	.03
October 7	.01	[1] ---	1.4	1.5	<.01	.02	.67	1.1	2.1	2.6	.12	.24	.06	.12
Mean	.02	.02	.83	.65	.14	.16	1.0	1.3	2.0	2.1	.17	.32	.06	.11

[1] ---, no sample collected.

Table 7. Constituent loads and percentage of annual load for storms sampled

Dates of storms	Total nitrogen		Nitrite plus nitrate nitrogen		Organic nitrogen	
	Load (lb)	Percentage of annual load	Load (lb)	Percentage of annual load	Load (lb)	Percentage of annual load
			Onion River at Hingham			
1979						
March 19-24	31,900	18.1	23,600	22.4	7,640	12.7
March 30 to April 1	17,100	9.7	10,300	9.8	6,360	10.6
June 28 to July 1	2,220	1.3	1,020	1.0	1,100	1.8
August 8-12	5,160	2.9	1,780	1.7	3,080	5.1
August 20-22	1,620	.9	662	.6	1,050	1.7
1980						
January 17-24	4,950	3.8	2,200	3.2	2,290	3.8
March 17-18	1,450	1.1	530	.8	675	1.1
April 8-10	10,400	8.0	6,730	9.9	3,330	5.6
June 5-12	8,590	6.6	3,330	4.9	5,060	8.5
July 20-22	2,700	2.1	1,060	1.6	1,440	2.4
August 8-11	3,170	2.4	1,470	2.2	1,700	2.9
September 22-25	6,940	5.3	3,110	4.6	3,560	6.0
			Onion River near Sheboygan Falls			
1979						
March 19-24	166,000	22.9	116,000	25.3	41,500	17.8
March 30 to April 1	73,500	10.2	46,900	10.2	22,300	9.6
June 28 to July 1	9,970	1.4	6,200	1.4	3,690	1.6
August 8-12	22,800	3.2	12,000	2.6	10,300	4.4
August 20-22	7,870	1.1	3,820	.8	3,680	1.6
August 25	4,610	.6	2,220	.5	2,100	.9
1980						
January 16-19	15,900	3.2	11,000	4.2	9,340	4.8
March 18-21	14,300	2.8	5,330	2.0	6,190	3.2
April 5-10	76,600	15.2	57,900	21.9	18,500	9.5
June 5-12	43,800	8.7	25,700	9.7	14,500	7.5
July 20-22	21,100	4.2	12,400	4.7	7,360	3.8
August 8-11	24,500	4.9	13,100	4.9	9,740	5.0
September 17-30	89,500	17.7	53,300	20.2	36,200	18.6

Table 7. Constituent loads and percentage of annual load for storms sampled--Continued

Ammonia nitrogen		Total phosphorus		Orthophosphate phosphorus		Suspended sediment	
Load (lb)	Percentage of annual load	Load (lb)	Percentage of annual load	Load (lb)	Percentage of annual load	Load (ton)	Percentage of annual load
			Onion River at Hingham				
951	12.8	1,430	11.7	879	16.7	182	6.2
678	9.2	1,540	12.5	637	12.1	483	16.4
116	1.6	239	1.9	84	1.6	79.2	2.7
301	4.1	717	5.8	314	6.0	176	6.0
82	1.1	213	1.7	78	1.5	29.9	1.0
278	4.5	485	4.1	193	3.7	24.9	1.0
244	3.9	164	1.4	117	2.2	5.6	.2
339	5.5	767	6.5	234	4.5	176	7.4
374	6.0	955	8.1	291	5.6	234	9.8
96	1.5	393	3.3	148	2.8	96.0	4.0
292	4.7	532	4.5	457	8.7	95.9	4.0
254	4.1	1,010	8.6	432	8.3	251	10.6
			Onion River near Sheboygan Falls				
8,490	28.2	8,520	17.2	5,340	22.3	1,300	15.8
4,110	13.7	5,600	11.3	2,780	11.6	1,710	20.7
244	.8	728	1.5	255	1.1	140	1.7
607	2.0	2,570	5.2	1,030	4.3	581	7.0
181	.6	858	1.7	299	1.2	133	1.6
120	.4	490	1.0	188	.8	72	.9
1,060	5.2	2,280	4.7	1,220	5.5	145	2.0
2,890	14.0	1,570	3.2	1,120	5.0	53.2	.7
1,380	6.7	3,600	7.4	1,200	5.4	587	8.2
939	4.5	3,260	6.7	1,090	4.9	917	12.8
426	2.1	1,870	3.9	696	3.1	511	7.1
794	3.8	2,660	5.5	1,600	7.2	517	7.2
2,260	10.9	11,600	23.9	6,110	27.3	1,970	27.5

Table 8. Loads and yields of chemical constituents in the Onion River basin, 1979 and 1980 water years

Constituent	Onion River near Hingham (Drainage area = 37.2 mi^2)			Onion River near Sheboygan Falls (Drainage area = 94.1 mi^2)			Onion River downstream from Hingham (Drainage area = 56.9 mi^2)		
	Pounds	Pounds per square mile	Pounds per square mile per day	Pounds	Pounds per square mila	Pounds per square mile per day	Pounds	Pounds per square mile	Pounds per square mile per day
				1979 water year					
Total nitrogen	176,000	4,740	13.0	723,000	7,680	21.0	546,000	9,600	26.3
Organic nitrogen	60,100	1,620	4.43	233,000	2,470	6.78	173,000	3,040	8.32
Ammonia nitrogau	7,400	199	.54	30,100	320	.88	22,700	399	1.09
Nitrite nitrate	106,000	2,840	7.79	458,000	4,860	13.3	352,000	6,180	16.9
Phosphorus	12,300	331	.91	49,600	528	1.45	37,300	656	1.80
Orthophosphate phosphorus	5,280	142	.39	24,000	254	.70	18,700	329	.91
Total suspended-sadiment yields in tonnage equivalents.	2,940 tons	79.1 ton/mi^2	.22 (ton/mi^2)/d	8,260 tons	87.8 ton/mi^2	.24 (ton/mi^2)/d	5,320 tons	93.5 ton/mi^2	.26 (ton/mi^2)/d
1980 watar year									
Total nitrogen	131,000	3,520	9.63	505,000	5,360	14.7	373,000	6,560	18.0
Organic nitrogen	59,500	1,600	4.37	194,000	2,060	5.63	135,000	2,360	6.46
Ammonia nitrogen	6,190	166	.45	20,600	219	.60	14,400	254	.69
Nitrite nitrate	68,100	1,830	5.00	265,000	2,810	7.68	197,000	3,450	9.44
Phosphorus	11,800	317	.87	48,700	517	1.41	36,800	647	1.77
Orthophosphate phosphorus	5,220	140	.38	22,400	238	.65	17,100	301	.82
Total suspendad-sadiment yields in tonnage aquivalents.	2,380 tons	63.9 ton/mi^2	.18 (ton/mi^2)/d	7,170 tons	76.2 ton/mi^2	.21 (ton/mi^2)/d	4,800 tons	84.2 ton/mi^2	.23 (ton/mi^2)/d

Table 9. Suspended-sediment and nutrient concentrations during low-flow and storm-runoff periods in the Onion River, Steiner Branch, and Bruce Valley Creek

[Concentrations are in milligrams per liter]

Station name	Drainaga area (mi^2)	Suspended sediment		Total phosphorus			
		Low flow	Storm runoff	Low flow		Storm runoff	
		(Range)	(Range)	(Ranga)	(Median)	(Ranga)	(Median)
Onion River at Hingham.	37.2	1-152	10-2,470	0.05-0.40	0.15	0.14-0.99	0.37
Onion River near Shaboygan Falls.	94.1	1-225	10- 970	.09- .60	.32	.16-1.3	.58
Steiner Branch near Waldwick.	5.9	3- 78	10-6,430	.02- .06	.04	.16-4.3	.88
Bruce Valley Creek near Pleasantville.	10.1	3- 36	10-2,690	.09- .44	.30	.13-7.2	1.95

		Total organic nitrogen				Total ammonia nitrogen			
		Low flow		Storm runoff		Low flow		Storm runoff	
		(Range)	(Median)	(Ranga)	(Median)	(Range)	(Median)	(Range)	(Median)
Onion River at Hingham	37.2	0.35-2.1	0.78	0.63-3.2	1.4	0 -0.31	0.12	0.02-1.4	0.13
Onion Rivar near Sheboygan Falls	94.1	.30-3.0	1.1	.88-4.5	2.3	0.2- .36	.13	.07-1.4	.30
Steiner Branch near Waldwick	5.9	0 - .82	.35	.66-21	3.6	.01- .04	.03	.14-2.7	.52
Bruce Valley Creek near Pleasantvilla	10.1	.32- .50	.42	.20-13	3.4	.05- .12	.10	.04-4.2	.27

Table 10. Stream discharges for Onion River at Hingham, 1979 and 1980 water years

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	11	24	14	11	19	165	68	23	45	16	18
2	32	11	23	14	11	20	100	61	20	38	15	18
3	30	11	22	14	11	21	85	99	18	24	14	15
4	28	11	21	13	11	22	104	82	23	25	14	14
5	27	11	20	13	11	23	120	55	22	25	21	14
6	37	11	20	13	11	24	102	47	21	20	19	15
7	33	12	20	13	11	24	67	42	26	17	16	12
8	30	12	20	13	12	24	56	38	22	15	13	12
9	29	12	19	13	12	23	52	35	25	15	34	12
10	27	13	18	13	12	23	52	32	39	17	156	12
11	25	13	18	13	12	22	53	31	30	22	98	12
12	24	12	17	13	12	22	191	29	24	18	45	13
13	22	13	17	12	12	22	157	28	21	27	31	13
14	22	15	17	12	12	23	94	31	19	22	25	12
15	21	17	17	12	11	24	67	30	18	17	20	11
16	22	17	16	12	11	23	55	26	17	14	17	11
17	23	25	16	12	11	23	48	27	17	13	17	11
18	22	45	16	13	12	29	44	29	16	12	18	11
19	21	40	16	14	12	72	40	35	16	12	18	9.6
20	21	34	16	14	13	200	38	35	25	12	39	10
21	20	31	16	14	13	270	37	34	24	12	49	11
22	17	30	15	14	13	286	35	29	20	11	35	10
23	13	35	15	13	14	350	34	28	17	12	50	10
24	15	39	15	13	14	326	33	28	14	12	47	11
25	16	35	15	13	14	146	48	25	14	22	34	11
26	15	33	14	13	15	90	104	23	13	19	26	11
27	14	30	14	13	16	80	91	21	13	16	25	10
28	12	28	14	12	18	76	58	21	13	15	24	10
29	11	26	14	12	---	84	47	21	41	13	24	10
30	9.6	25	14	11	---	376	65	21	47	16	23	11
31	10	---	14	11	---	379	---	29	---	20	19	---
TOTAL	682.6	658	533	399	348	3146	2242	1140	658	578	1002	360.6
MEAN	22.0	21.9	17.2	12.9	12.4	101	74.7	36.8	21.9	18.6	32.3	12.0
MAX	37	45	24	14	18	379	191	99	47	45	156	18
MIN	9.6	11	14	11	11	19	33	21	13	11	13	9.6
CFSM	.59	.59	.46	.35	.33	2.72	2.01	.99	.59	.50	.87	.32
IN.	.68	.66	.53	.40	.35	3.15	2.24	1.14	.66	.58	1.00	.36

WTR YR 1979 TOTAL 11747.2 MEAN 32.2 MAX 379 MIN 9.6 CFSM .87 IN 11.75

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	23	22	21	11	12	32	41	39	10	10	25
2	12	21	18	20	12	12	32	33	33	10	11	28
3	11	19	17	18	12	12	37	27	33	8.9	12	20
4	12	16	18	17	13	12	57	24	30	8.6	11	18
5	12	17	19	16	14	11	63	21	42	11	13	16
6	13	23	21	15	14	11	53	19	98	10	12	15
7	15	22	21	15	15	10	64	15	139	9.7	17	15
8	17	22	20	14	15	10	181	17	196	9.6	86	14
9	16	19	24	13	14	11	213	15	117	9.6	67	17
10	14	19	26	13	14	13	145	14	38	8.6	45	16
11	15	28	28	13	14	14	85	18	25	8.1	29	14
12	17	17	25	12	15	13	70	14	22	8.1	25	19
13	13	18	20	12	15	13	61	23	20	8.3	21	30
14	12	18	14	11	15	13	55	36	24	8.3	20	32
15	13	18	14	11	15	14	59	39	27	10	17	23
16	13	19	13	15	14	15	78	36	20	15	14	28
17	14	19	13	68	14	20	66	31	18	13	15	34
18	14	18	13	60	13	45	56	46	16	10	16	25
19	26	18	14	26	14	62	52	52	28	9.9	15	20
20	18	18	15	19	16	56	47	38	34	73	56	36
21	19	24	16	15	17	43	43	29	24	69	67	34
22	22	35	18	13	21	33	40	26	19	56	46	201
23	32	34	25	12	19	25	34	22	17	22	26	126
24	37	27	54	11	17	24	31	20	15	17	22	64
25	30	24	91	10	15	32	29	20	14	15	22	46
26	22	38	66	9.8	14	39	29	18	13	14	32	40
27	22	52	39	9.4	14	38	27	17	11	14	29	34
28	21	44	29	9.1	13	35	27	18	13	12	36	29
29	19	38	26	9.0	22	33	35	40	13	11	40	27
30	19	23	25	9.0	---	32	47	45	9.8	9.9	32	26
31	18	---	22	10	---	32	---	47	---	12	25	---
TOTAL	548	731	786	526.3	431	745	1848	861	1147.8	511.6	889	1072
MEAN	17.7	24.4	25.4	17.0	14.9	24.0	61.6	27.8	38.3	16.5	28.7	35.7
MAX	37	52	91	68	22	62	213	52	196	73	86	201
MIN	10	16	13	9.0	11	10	27	14	9.8	8.1	10	14
CFSM	.48	.66	.68	.46	.40	.65	1.66	.75	1.03	.44	.77	.96
IN.	.55	.73	.79	.53	.43	.74	1.85	.86	1.15	.51	.89	1.07

CAL YR 1979 TOTAL 11938.6 MEAN 32.7 MAX 379 MIN 9.6 CFSM .88 IN 11.94
WTR YR 1980 TOTAL 10096.7 MEAN 27.6 MAX 213 MIN 8.1 CFSM .74 IN 10.10

Table 11. Stream discharges for Onion River near Sheboygan Falls, 1979 and 1980 water years

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	18	40	22	17	33	1180	210	34	75	26	48
2	76	19	39	22	17	34	628	180	35	66	22	45
3	58	19	38	22	17	37	396	240	30	51	20	40
4	48	19	36	21	17	45	387	170	45	36	18	33
5	40	19	36	21	17	45	430	140	36	34	18	30
6	100	19	35	21	17	44	336	120	33	31	28	29
7	96	19	34	20	18	44	265	100	70	25	25	26
8	82	19	33	20	18	44	185	84	58	22	20	21
9	72	19	33	20	19	44	156	74	48	20	20	19
10	62	19	33	20	20	44	153	66	110	18	200	18
11	54	19	33	20	20	44	164	60	80	21	302	18
12	49	19	32	20	20	46	575	58	60	25	186	19
13	42	22	31	20	20	49	698	54	50	22	88	19
14	37	27	30	15	20	50	517	52	42	29	61	18
15	33	35	29	13	20	50	305	56	38	25	45	17
16	35	30	29	12	19	50	195	48	36	19	35	16
17	35	50	28	13	19	50	153	52	33	16	31	16
18	34	100	27	15	20	80	126	58	31	14	30	15
19	32	90	27	17	20	270	109	90	30	15	30	14
20	33	70	27	18	20	360	96	86	60	15	44	13
21	32	56	26	19	21	1270	88	70	50	16	128	14
22	27	46	26	19	22	1460	82	60	34	17	98	14
23	20	60	26	19	24	1840	75	52	27	15	91	14
24	32	100	25	19	26	1780	70	48	22	14	187	14
25	36	84	25	19	28	774	85	44	20	16	158	14
26	35	70	24	18	29	500	235	40	18	26	89	14
27	27	58	24	18	30	400	284	38	17	24	71	15
28	22	52	24	18	32	370	188	37	17	20	68	14
29	17	47	23	18	---	354	131	36	46	18	60	13
30	17	44	23	18	---	956	218	48	98	17	54	14
31	18	---	23	18	---	1770	---	52	---	23	47	---
TOTAL	1391	1268	919	575	587	12937	8510	2523	1308	785	2300	614
MEAN	44.9	42.3	29.6	18.5	21.0	417	284	81.4	43.6	25.3	74.2	20.5
MAX	100	100	40	22	32	1840	1180	240	110	75	302	48
MIN	17	18	23	12	17	33	70	36	17	14	18	13
CFSM	.48	.45	.32	.20	.22	4.43	3.02	.87	.46	.27	.79	.22
IN.	.55	.50	.36	.23	.23	5.11	3.36	1.00	.52	.31	.91	.24

WTR YR 1979 TOTAL 33717 MEAN 92.4 MAX 1840 MIN 12 CFSM .98 IN 13.33

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	22	24	31	32	31	50	58	38	16	17	48
2	15	24	22	28	34	27	49	52	34	16	16	46
3	16	22	21	27	35	24	53	45	32	16	17	43
4	15	21	21	25	36	22	146	39	31	16	18	33
5	16	19	21	24	36	25	247	35	36	15	18	31
6	17	20	21	23	35	26	155	33	137	17	20	27
7	17	25	22	22	34	18	137	30	179	17	20	25
8	19	25	24	21	32	18	267	27	199	16	130	24
9	21	23	35	20	28	19	428	28	193	14	306	25
10	20	21	25	19	26	19	411	26	144	14	188	28
11	19	20	22	18	25	18	272	27	65	14	111	26
12	18	21	20	18	25	16	171	27	49	13	90	25
13	20	20	18	17	25	17	134	28	41	13	75	36
14	17	20	17	17	24	18	109	40	39	12	58	43
15	16	20	16	30	23	20	111	48	44	14	46	41
16	18	21	15	60	22	25	193	47	43	22	38	36
17	18	22	15	170	20	35	159	42	33	29	34	81
18	18	21	15	160	19	50	125	46	29	22	35	65
19	19	21	15	150	20	210	104	59	31	17	35	47
20	30	21	16	100	23	200	90	56	47	111	85	64
21	21	22	16	80	30	100	78	44	44	212	137	116
22	20	32	17	66	40	70	70	37	33	110	100	464
23	25	40	20	56	60	52	62	33	29	57	63	675
24	33	34	25	50	56	43	54	31	24	36	44	686
25	37	28	150	45	52	45	50	29	22	28	38	427
26	30	34	130	42	54	56	47	27	21	25	46	227
27	24	60	60	38	50	82	44	25	19	26	50	145
28	24	58	45	36	37	86	43	24	19	23	50	111
29	24	40	40	33	86	71	46	26	21	20	73	92
30	21	26	35	31	---	76	54	39	20	17	64	77
31	21	---	33	31	---	59	---	41	---	16	51	---
TOTAL	644	803	976	1488	1019	1578	3959	1149	1696	994	2073	3814
MEAN	20.8	26.8	31.5	48.0	35.1	50.9	132	37.1	56.5	32.1	66.9	127
MAX	37	60	150	170	86	210	428	59	199	212	306	686
MIN	15	19	15	17	19	16	43	24	19	12	16	24
CFSM	.22	.29	.34	.51	.37	.54	1.40	.39	.60	.34	.71	1.35
IN.	.25	.32	.39	.59	.40	.62	1.57	.45	.67	.39	.82	1.51

CAL YR 1979 TOTAL 32562 MEAN 89.2 MAX 1840 MIN 12 CFSM .95 IN 12.87
WTR YR 1980 TOTAL 20193 MEAN 55.2 MAX 686 MIN 12 CFSM .59 IN 7.98

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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)
DEC , 1978								
06...	1525	20	320	24	408	.55	22	1.90
FEB , 1979								
28...	1230	18	320	20	399	.54	19	1.18
MAR								
20...	1345	200	--	--	--	--	--	2.87
20...	1515	200	153	20	247	.34	133	--
23...	0545	322	144	17	230	.31	200	--
23...	0745	324	--	--	--	--	--	2.97
23...	1900	387	126	17	203	.28	212	--
24...	0230	428	--	--	--	--	--	3.07
30...	0230	162	--	--	--	--	--	2.57
30...	0330	189	171	20	278	.38	142	--
30...	1345	428	--	--	--	--	--	2.27
30...	1615	578	99	13	168	.23	262	--
30...	2345	526	--	--	--	--	--	1.87
31...	0215	495	99	11	159	.22	213	--
APR								
01...	0815	182	126	14	193	.26	95	--
01...	1045	170	--	--	--	--	--	2.08
MAY								
25...	1015	25	290	20	395	.54	27	1.27
JUN								
28...	0930	13	280	18	365	.50	13	.540
29...	0615	44	--	--	--	--	--	.780
29...	0900	52	144	16	257	.35	36	--
29...	1015	52	--	--	--	--	--	1.41
29...	1300	52	189	14	293	.40	41	--
29...	2015	45	--	--	--	--	--	1.11
30...	0615	49	--	--	--	--	--	1.61
30...	0900	49	171	23	312	.42	41	--
30...	1500	45	--	--	--	--	--	1.31
30...	1900	44	--	--	--	--	--	1.32
JUL								
01...	0915	44	--	--	--	--	--	1.33
01...	1300	46	194	15	284	.39	35	--
AUG								
08...	1445	13	230	16	301	.41	11	.160

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)
DEC , 1978								
06...	--	1.90	--	--	--	--	.060	--
FEB , 1979								
28...	.020	1.20	.120	.35	.47	1.7	.090	.070
MAR								
20...	.030	2.90	.170	1.0	1.1	4.1	.190	.120
20...	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--
23...	.030	3.00	.100	.80	.90	3.9	.160	.110
23...	--	--	--	--	--	--	--	--
24...	.030	3.10	.090	1.0	1.1	4.2	.200	.110
30...	.030	2.60	.100	1.1	1.1	3.8	.170	.060
30...	--	--	--	--	--	--	--	--
30...	.030	2.30	.150	2.2	2.3	4.6	.470	.150
30...	--	--	--	--	--	--	--	--
30...	.030	1.90	.150	1.3	1.4	3.3	.370	.150
31...	--	--	--	--	--	--	--	--
APR								
01...	--	--	--	--	--	--	--	--
01...	.020	2.10	.120	.71	.83	2.9	.140	.100
MAY								
25...	.030	1.30	.090	1.1	1.1	2.5	.210	.050
JUN								
28...	.050	.590	.200	1.5	1.7	2.3	.310	.110
29...	.080	.860	.250	3.2	3.4	4.3	.610	.140
29...	--	--	--	--	--	--	--	--
29...	.090	1.50	.150	1.8	1.9	3.4	.380	.140
29...	--	--	--	--	--	--	--	--
29...	.090	1.20	.120	1.4	1.5	2.7	.270	.100
30...	.090	1.70	.140	1.1	1.3	3.0	.270	.120
30...	--	--	--	--	--	--	--	--
30...	.090	1.40	.150	1.1	1.3	2.7	.230	.100
30...	.080	1.40	.120	1.1	1.1	2.6	.220	.090
JUL								
01...	.070	1.40	.140	1.3	1.4	2.8	.270	.100
01...	--	--	--	--	--	--	--	--
AUG								
08...	.010	.170	.140	.78	.92	1.1	.190	.060

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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)
AUG , 1979								
09...	2215	133	--	--	--	--	--	.470
09...	2315	204	162	14	242	.33	133	--
10...	0015	255	--	--	--	--	--	.540
10...	0115	285	189	13	245	.33	189	--
10...	0315	264	126	11	188	.26	134	--
10...	0415	209	--	--	--	--	--	1.03
10...	0815	117	--	--	--	--	--	1.26
10...	1915	137	--	--	--	--	--	1.23
12...	1045	44	171	14	262	.36	31	--
12...	1115	43	--	--	--	--	--	.670
20...	0845	43	--	--	--	--	--	.000
20...	0930	46	243	23	329	.45	41	--
20...	1230	52	--	--	--	--	--	1.29
20...	1330	52	261	23	337	.46	47	--
20...	2330	48	261	20	335	.46	43	--
21...	0030	48	--	--	--	--	--	1.29
21...	1130	52	243	21	318	.43	45	--

DATE	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, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
AUG , 1979								
09...	.050	.520	.210	3.2	3.4	3.9	.720	.190
09...	--	--	--	--	--	--	--	--
10...	.050	.590	.210	1.9	2.1	2.7	.510	.160
10...	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--
10...	.070	1.10	.140	2.4	2.5	3.6	.850	.220
10...	.140	1.40	.230	2.5	2.7	4.1	.810	.390
10...	.070	1.30	.160	1.1	1.4	2.7	.320	.130
12...	--	--	--	--	--	--	--	--
12...	.050	.720	.120	1.4	1.5	2.2	.320	.160
20...	<.010	<.100	.050	2.6	2.6	2.6	.530	.050
20...	--	--	--	--	--	--	--	--
20...	.010	1.30	.120	1.4	1.5	2.8	.340	.170
20...	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--
21...	.010	1.30	.100	1.3	1.4	2.7	.290	.140
21...	--	--	--	--	--	--	--	--

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)
DEC , 1978							
05...	1620	20	8.0	13.2	--	--	--
06...	1915	20	--	--	430	230	3.9
JAN , 1979							
17...	0930	12	7.6	--	--	--	--
17...	1230	12	7.0	--	--	--	--
17...	1700	12	--	--	180	39	1.1
FEB							
27...	1600	18	8.1	11.4	--	--	--
28...	1230	18	--	--	110	57	3.7
MAR							
23...	1330	333	--	--	210	3300	2.2
MAY							
25...	1015	25	--	10.2	--	--	3.8
25...	1600	26	--	--	46	57	--
JUN							
28...	0930	13	8.3	6.3	--	--	5.5
28...	1700	13	--	--	250	310	--
AUG							
08...	1445	13	8.3	--	--	--	--
08...	1800	13	--	--	180	180	4.4
SEP							
14...	1015	12	8.1	--	--	--	--
14...	1355	13	--	7.5	--	--	4.0
14...	1600	13	--	--	E390	73	--

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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, NITRITE TOTAL (MG/L AS N)
NOV , 1979									
16...	0830	19	290	18	362	.49	19	1.49	.010
DEC									
14...	1100	14	290	21	360	.49	14	1.60	.000
JAN , 1980									
17...	0815	E68	--	--	--	--	--	1.85	.050
17...	0915	E68	148	20	258	.35	--	--	--
17...	1415	E68	--	--	--	--	--	1.75	.050
17...	1515	E68	126	19	237	.32	--	--	--
17...	2015	E68	--	--	--	--	--	1.45	.050
17...	2115	E68	122	18	232	.32	--	--	--
24...	1100	11	--	--	--	--	--	2.97	.030
24...	1130	11	306	25	400	.54	12	--	--
MAR									
17...	0945	E24	126	23	218	.30	--	--	--
17...	1045	E27	--	--	--	--	--	1.35	.050
17...	2145	E40	75	21	162	.22	--	--	--
17...	2245	E50	--	--	--	--	--	1.35	.050
18...	0345	E70	82	22	185	.25	--	--	--
18...	0445	E70	--	--	--	--	--	1.36	.040
18...	0845	57	108	15	167	.23	26	1.66	.040
27...	1200	39	230	21	325	.44	34	1.67	.030
APR									
08...	0730	143	180	21	294	.40	114	--	--
08...	0830	191	--	--	--	--	--	1.86	.040
08...	0930	333	189	21	301	.41	271	--	--
08...	1030	348	--	--	--	--	--	2.16	.040
08...	1130	348	171	20	296	.40	278	--	--
08...	1430	253	--	--	--	--	--	2.35	.050
08...	2000	112	--	--	--	--	--	2.25	.050
08...	2030	140	162	20	300	.41	113	--	--
08...	2130	174	--	--	--	--	--	2.25	.050
09...	0130	218	--	--	--	--	--	2.15	.050
09...	1930	195	--	--	--	--	--	2.45	.050
10...	1130	148	--	--	--	--	--	2.35	.050
MAY									
08...	1010	16	300	22	--	--	--	.390	.020

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	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, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
NOV , 1979								
16...	1.50	.060	.44	.50	2.0	.050	--	.060
DEC								
14...	1.60	.050	.54	.59	2.2	.050	--	.050
JAN , 1980								
17...	1.90	.080	2.2	2.3	4.2	.460	.230	--
17...	--	--	--	--	--	--	--	--
17...	1.80	.210	2.7	2.9	4.7	.510	.320	--
17...	--	--	--	--	--	--	--	--
17...	1.50	.230	2.1	2.3	3.8	.500	.320	--
17...	--	--	--	--	--	--	--	--
24...	3.00	.350	1.4	1.7	4.7	.210	.170	--
24...	--	--	--	--	--	--	--	--
MAR								
17...	--	--	--	--	--	--	--	--
17...	1.40	1.10	2.5	3.6	5.0	.580	--	.380
17...	--	--	--	--	--	--	--	--
17...	1.40	1.40	2.5	3.9	5.3	.630	--	.490
18...	--	--	--	--	--	--	--	--
18...	1.40	1.10	2.5	3.6	5.0	.590	--	.440
18...	1.70	.330	1.5	1.8	3.5	.400	--	.300
27...	1.70	.160	.58	.74	2.4	.140	--	.060
APR								
08...	--	--	--	--	--	--	--	--
08...	1.90	.130	2.3	2.4	4.3	.490	--	.130
08...	--	--	--	--	--	--	--	--
08...	2.20	.130	1.3	1.4	3.6	.360	--	.110
08...	--	--	--	--	--	--	--	--
08...	2.40	.140	1.1	1.1	3.6	.410	--	.100
08...	2.30	.140	1.3	1.4	3.7	.290	--	.090
08...	--	--	--	--	--	--	--	--
08...	2.30	.140	1.3	1.4	3.7	.500	--	.090
09...	2.20	.130	1.3	1.4	3.6	.250	--	.080
09...	2.50	.090	1.1	1.1	3.7	.200	--	.070
10...	2.40	.120	.88	1.0	3.4	.160	--	.060
MAY								
08...	.410	.310	1.5	1.8	2.2	.170	--	.020

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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, NITRITE TOTAL (MG/L AS N)
JUN , 1980									
05...	2300	60	--	--	--	--	--	.560	.040
05...	2400	60	243	15	--	--	--	--	--
06...	0500	95	--	--	--	--	--	.820	.050
06...	1700	99	--	--	--	--	--	1.25	.050
07...	1300	164	225	14	--	--	--	--	--
07...	1400	166	--	--	--	--	--	1.03	.070
08...	0400	166	--	--	--	--	--	1.05	.050
08...	1100	225	207	14	--	--	--	--	--
08...	1200	232	--	--	--	--	--	.810	.050
09...	1600	84	--	--	--	--	--	.750	.050
10...	0500	46	171	9.9	--	--	--	--	--
10...	0600	46	--	--	--	--	--	.810	.020
12...	1315	22	220	29	--	--	--	11.9	.140
JUL									
17...	1100	14	230	22	322	.44	12	--	--
20...	0700	65	171	14	259	.35	45	--	--
20...	0800	87	--	--	--	--	--	.760	.070
20...	1000	143	--	--	--	--	--	.450	.060
20...	1100	146	207	13	274	.37	108	--	--
20...	1500	84	153	13	223	.30	51	--	--
20...	1800	71	--	--	--	--	--	1.44	.060
22...	0700	60	--	--	--	--	--	.920	.080
22...	0800	45	171	14	271	.37	33	--	--
AUG									
08...	2000	69	--	--	--	--	--	1.08	.120
08...	2045	67	126	13	190	.26	34	--	--
09...	1530	66	--	--	--	--	--	1.12	.080
09...	1615	66	189	15	266	.36	47	--	--
15...	1010	17	310	23	414	.56	19	1.15	.050
SEP									
22...	0430	163	117	12	176	.24	77	--	--
22...	0730	389	--	--	--	--	--	1.42	.080
22...	0830	407	108	11	174	.24	191	1.28	.120
22...	1330	199	--	--	--	--	--	1.22	.280
22...	1430	175	198	27	298	.41	141	--	--
22...	2130	153	--	--	--	--	--	1.46	.040
23...	1530	111	--	--	--	--	--	1.17	.030

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
JUN , 1980								
05...	.600	.020	1.5	1.5	2.1	.240	--	.040
05...	--	--	--	--	--	--	--	--
06...	.870	.070	1.7	1.8	2.7	.380	--	.110
06...	1.30	.070	1.1	1.1	2.5	.220	--	.060
07...	--	--	--	--	--	--	--	--
07...	1.10	.130	1.3	1.4	2.5	.220	--	.050
08...	1.10	.100	1.3	1.4	2.5	.240	--	.090
08...	--	--	--	--	--	--	--	--
08...	.860	.110	1.3	1.4	2.3	.280	--	.090
09...	.800	.090	1.3	1.4	2.2	.280	--	.120
10...	--	--	--	--	--	--	--	--
10...	.830	.090	1.3	1.4	2.2	.230	--	.080
12...	12.0	.140	2.1	2.2	14	.400	--	.180
JUL								
17...	--	--	--	--	--	.000	--	--
20...	--	--	--	--	--	--	--	--
20...	.830	.140	3.1	3.2	4.0	.900	--	.180
20...	.510	.120	1.8	1.9	2.4	.380	--	.120
20...	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--
20...	1.50	.070	1.1	1.1	2.7	.420	--	.180
22...	1.00	.110	1.5	1.6	2.6	.320	--	.120
22...	--	--	--	--	--	--	--	--
AUG								
08...	1.20	.290	.91	1.1	2.4	.480	--	.480
08...	--	--	--	--	--	--	--	--
09...	1.20	.230	1.4	1.6	2.8	.400	--	.320
09...	--	--	--	--	--	--	--	--
15...	1.20	.040	1.1	1.1	2.3	.270	--	.140
SEP								
22...	--	--	--	--	--	--	--	--
22...	1.50	.140	1.8	1.9	3.4	.860	--	.330
22...	1.40	.220	3.0	3.2	4.6	.990	--	.440
22...	1.50	.180	2.5	2.7	4.2	.350	--	.010
22...	--	--	--	--	--	--	--	--
22...	1.50	.080	1.1	1.1	2.7	.380	--	.140
23...	1.20	.070	1.1	1.1	2.4	.330	--	.170

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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, NITRITE TOTAL (MG/L AS N)
SEP , 1980									
23...	1630	109	--	--	--	--	--	--	.030
24...	1630	60	--	--	--	--	--	1.07	.030
24...	1730	48	207	17	286	.39	37	--	--
25...	1900	48	--	--	--	--	--	1.07	.030

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
SEP , 1980								
23...	--	.060	--	--	--	--	--	--
24...	1.10	.050	1.1	1.1	2.3	.230	--	.140
24...	--	--	--	--	--	--	--	--
25...	1.10	.080	.63	.71	1.8	.190	--	.120

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (MG/L AS SIO2)	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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)
NOV , 1979										
15...	1030	17	8.4	4.5	--	13.0	105	--	--	--
16...	1245	19	--	--	--	--	--	70	40	4.7
DEC										
13...	1600	20	8.3	3.0	--	13.6	105	--	--	--
14...	1600	14	--	--	--	--	--	120	K11	2.4
JAN , 1980										
24...	1100	11	7.5	.5	--	10.1	73	--	--	1.9
24...	1730	11	--	--	--	--	--	K4	25	--
26...	1510	11	--	--	5	--	--	--	--	--
FEB										
02...	1510	12	--	--	14	--	--	--	--	--
28...	0750	13	6.9	--	--	--	--	--	--	--
28...	0855	13	--	--	--	6.0	--	--	--	5.4
28...	1345	13	--	--	--	--	--	97	120	--
MAR										
26...	1520	28	--	--	15	--	--	--	--	--
27...	1630	38	--	--	--	--	--	73	470	3.5
MAY										
07...	1145	15	--	12.5	--	11.1	109	--	--	--
08...	1010	16	8.2	11.0	--	--	--	--	--	6.3
08...	1430	17	--	--	--	--	--	K15	48	--
12...	1740	14	--	--	38	--	--	--	--	--
JUN										
12...	1315	22	8.1	22.0	--	8.0	95	--	--	3.2
12...	1630	21	--	--	--	--	--	200	95	--
27...	1930	10	--	--	25	--	--	--	--	--
JUL										
12...	1845	8.3	--	--	30	--	--	--	--	--
16...	1540	--	--	27.5	--	--	95	--	--	--
17...	1610	13	--	--	--	--	--	830	270	6.0
AUG										
02...	1600	11	--	--	30	--	--	--	--	--
14...	1430	20	8.1	24.0	--	8.1	100	--	--	--
15...	1010	17	--	22.0	--	--	--	--	--	5.4
15...	1330	17	--	--	--	--	--	550	48	--

Table 12. Water and bed-material analyses from Onion River at Hingham, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	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)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)
DEC , 1979									
25...	1500	92	--	.60	--	--	--	--	--
JUL									
17...	1100	14	--	--	9.92	14.6	35.5	5.13	132
22...	1325	37	13	2.8	--	--	--	--	--
AUG									
15...	1010	17	--	--	10.6	13.0	15.1	1.54	159

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ARSENIC TOTAL IN BOT-TOM MA-TERIAL (UG/G AS AS)	CADMIUM RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CD)	CHRO-MIUM, RECOV. FM BOT-TOM MA-TERIAL (UG/G)	COPPER, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CU)	LEAD, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS PB)	MERCURY RECOV. FM BOT-TOMCMA-TERIAL (UG/L AS HG)	NICKEL, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS NI)	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN)
AUG , 1980										
15...	1010	17	0	<10	<10	<10	10	.00	10	9

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	PCB, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ALDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	CHLOR-DANE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDD, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDT, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DI-AZINON, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DI-ELDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ENDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)
AUG , 1980											
15...	1010	17	.00	.0	.00	.0	.0	.0	.0	.0	.0

DATE	ETHION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	HEPTA-CHLOR, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	HEPTA-CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	MALA-THION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	METH-OXY-CHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARA-THION, TOT. IN BOTTOM MATL. (UG/KG)	METHYL TRI-THION, TOT. IN BOTTOM MATL. (UG/KG)	PARA-THION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	TOXA-PHENE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	TRI-THION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)
AUG , 1980											
15...	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00	.0

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SEDI-MENT, SUS-PENDED (MG/L)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .125 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM
JUN , 1980											
05...	1325	60	2470	52	71	86	96	98	100	--	--
JUL											
22...	1300	37	115	59	80	90	96	98	98	99	100

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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)
DEC , 1978								
06...	1505	34	360	48	534	.73	49	2.40
FEB								
28...	1145	32	320	31	446	.61	39	1.28
MAR								
20...	1030	360	--	--	--	--	--	3.33
20...	1200	360	123	21	233	.32	226	--
23...	0845	1660	82	16	182	.25	816	--
23...	1045	1780	--	--	--	--	--	3.06
24...	0430	2200	213	32	353	.48	2100	--
24...	0700	2010	--	--	--	--	--	2.79
30...	0045	442	--	--	--	--	--	3.35
30...	0300	498	139	21	251	.34	337	--
31...	0830	1850	77	11	147	.20	734	--
31...	1100	1940	--	--	--	--	--	1.87
31...	2100	1710	80	11	147	.20	679	--
31...	2330	1630	--	--	--	--	--	2.07
APR								
02...	2030	517	115	15	198	.27	276	--
02...	2300	483	--	--	--	--	--	2.78
MAY								
25...	0945	45	290	30	451	.61	55	1.08
JUN								
28...	1130	16	280	25	380	.52	16	.080
29...	1830	70	--	--	--	--	--	3.54
29...	2000	74	220	25	376	.51	75	--
30...	0330	113	--	--	--	--	--	6.37
30...	0500	113	209	25	418	.57	128	--
30...	1230	96	--	--	--	--	--	7.32
30...	1400	92	209	31	438	.60	109	--
JUL								
01...	1230	71	--	--	--	--	--	4.40
01...	1400	71	253	25	411	.56	79	--
AUG								
08...	1430	20	240	29	376	.51	20	.400
10...	0345	69	187	23	312	.42	58	--
10...	0645	97	--	--	--	--	--	2.42
10...	2315	314	--	--	--	--	--	3.75
11...	0045	320	143	17	274	.37	237	--

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
DEC , 1978								
06...	--	2.40	--	--	--	--	.240	--
FEB								
28...	.020	1.30	.250	.30	.55	1.9	.210	.190
MAR								
20...	.070	3.40	.250	1.4	1.6	5.0	.250	.170
20...	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--
23...	.040	3.10	.180	1.0	1.1	4.3	.230	.130
24...	--	--	--	--	--	--	--	--
24...	.110	2.90	.280	1.0	1.3	4.2	.210	.140
30...	.050	3.40	.220	.88	1.1	4.5	.160	.090
30...	--	--	--	--	--	--	--	--
31...	--	--	--	--	--	--	--	--
31...	.030	1.90	.200	1.1	1.4	3.3	.340	.150
31...	--	--	--	--	--	--	--	--
31...	.030	2.10	.200	.90	1.1	3.2	.270	.150
APR								
02...	--	--	--	--	--	--	--	--
02...	.020	2.80	.130	.97	1.1	3.9	.160	.100
MAY								
25...	.020	1.10	.060	1.5	1.6	2.7	.190	.040
JUN								
28...	.010	.090	.230	2.4	2.6	2.7	.440	.150
29...	.060	3.60	.120	3.8	3.9	7.5	.660	.200
29...	--	--	--	--	--	--	--	--
30...	.130	6.50	.220	3.2	3.4	9.9	.620	.230
30...	--	--	--	--	--	--	--	--
30...	.180	7.50	.220	3.3	3.5	11	.650	.240
30...	--	--	--	--	--	--	--	--
JUL								
01...	.200	4.60	.180	2.6	2.8	7.4	.500	.180
01...	--	--	--	--	--	--	--	--
AUG								
08...	.030	.430	.110	.88	.99	1.4	.400	.150
10...	--	--	--	--	--	--	--	--
10...	.080	2.50	.220	3.1	3.3	5.8	.740	.310
10...	.150	3.90	.130	3.2	3.3	7.2	.810	.310
11...	--	--	--	--	--	--	--	--

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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)
AUG , 1979								
11...	1400	305	--	--	--	--	--	3.43
11...	1830	284	187	21	345	.47	265	--
12...	0800	203	--	--	--	--	--	2.50
12...	0930	200	187	21	337	.46	182	--
20...	1830	63	308	35	469	.64	80	--
20...	2000	70	--	--	--	--	--	1.79
21...	0630	137	209	36	463	.63	171	--
22...	0030	116	--	--	--	--	--	2.99
22...	1830	86	--	--	--	--	--	2.30
22...	2000	85	308	34	473	.64	109	--
25...	1515	135	264	29	439	.60	160	--
25...	1645	129	--	--	--	--	--	2.83
29...	0815	62	--	--	--	--	--	1.76
29...	0945	61	319	34	476	.65	78	--

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
AUG , 1979								
11...	.170	3.60	.140	2.8	2.9	6.5	.590	.240
11...	--	--	--	--	--	--	--	--
12...	.100	2.60	.180	2.2	2.4	5.0	.510	.240
12...	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--
20...	.010	1.80	.130	2.4	2.5	4.3	.620	.200
21...	--	--	--	--	--	--	--	--
22...	.010	3.00	.130	2.5	2.6	5.6	.480	.180
22...	<.010	2.30	.100	2.4	2.5	4.8	.470	.150
22...	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--
25...	.070	2.90	.090	2.4	2.5	5.4	.500	.240
29...	.040	1.80	.080	2.0	2.1	3.9	.420	.150
29...	--	--	--	--	--	--	--	--

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	PH (STAND-ARD UNITS)	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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)
DEC , 1978								
05...	1735	36	7.9	--	--	--	--	--
06...	1030	35	--	12.0	--	--	--	--
06...	1915	34	--	--	--	70	62	4.2
JAN , 1979								
16...	0945	11	7.9	--	--	--	--	--
17...	1105	13	7.9	3.0	--	--	--	--
17...	1720	13	--	--	--	25	20	--
FEB								
26...	0930	29	--	4.0	--	--	--	--
28...	1145	32	7.4	4.0	29	170	240	2.2
MAR								
23...	1330	1750	--	--	--	120	3100	3.4
APR								
10...	--	153	8.1	12.0	--	--	--	--
MAY								
25...	0930	46	--	11.0	--	--	--	5.4
25...	1510	42	--	--	--	59	49	--
JUN								
28...	1130	16	8.6	9.2	107	--	--	4.1
28...	1630	16	--	--	--	250	84	--
AUG								
08...	1430	20	8.0	--	--	--	--	--
08...	1815	19	--	--	--	180	200	--
SEP								
14...	0900	18	8.8	--	--	--	--	--
14...	1500	18	--	10.3	--	--	--	--
14...	1600	18	--	--	--	K870	200	8.1

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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, NITRITE TOTAL (MG/L AS N)
NOV , 1979									
16...	0755	21	330	76	520	.71	29	1.28	.020
DEC									
14...	1000	3.9	320	30	421	.57	4.4	1.20	.000
JAN , 1980									
16...	2345	E150	--	--	--	--	--	3.13	.070
17...	0115	E140	155	40	322	.44	--	--	--
17...	1000	E150	--	--	--	--	--	.460	.010
17...	1430	E190	139	23	261	.36	--	--	--
18...	0230	E170	141	35	289	.39	--	--	--
18...	0700	E160	--	--	--	--	--	4.21	.090
19...	1730	E150	--	--	--	--	--	4.03	.070
19...	1900	E120	175	27	305	.41	--	--	--
24...	1315	E50	302	41	487	.66	--	2.28	.020
MAR									
18...	1230	E62	--	--	--	--	--	2.02	.080
18...	1400	E58	132	35	278	.38	--	--	--
19...	0200	E241	--	--	--	--	--	1.64	.060
19...	1230	E273	110	28	238	.32	--	--	--
19...	1400	E249	--	--	--	--	--	1.64	.060
20...	0330	E221	110	26	245	.33	--	--	--
20...	2300	E147	121	26	248	.34	--	--	--
21...	0030	E123	--	--	--	--	--	1.74	.060
27...	1100	90	220	27	348	.47	85	1.58	.020
APR									
05...	0215	257	--	--	--	--	--	3.21	.090
05...	0815	270	--	--	--	--	--	7.20	.100
05...	1715	236	--	--	--	--	--	7.49	.110
08...	1115	238	209	39	477	.65	307	--	--
08...	1245	268	--	--	--	--	--	6.81	.090
09...	0215	387	176	32	429	.58	448	--	--
09...	0345	394	--	--	--	--	--	6.52	.080
09...	1845	455	187	33	447	.61	549	--	--
09...	2015	455	--	--	--	--	--	7.21	.090
10...	0815	429	--	--	--	--	--	6.52	.080
10...	1000	422	187	32	433	.59	493	--	--
MAY									
08...	0915	27	290	32	--	--	--	.010	.020

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	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, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
NOV , 1979								
16...	1.30	.150	.82	.97	2.3	.460	--	.360
DEC								
14...	1.20	.080	.51	.59	1.8	.130	--	.090
JAN , 1980								
16...	3.20	.440	3.6	4.0	7.2	1.10	.420	--
17...	--	--	--	--	--	--	--	--
17...	.470	.000	4.5	4.5	5.0	1.00	.030	--
17...	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--
18...	4.30	.300	.00	.30	4.6	.720	.440	--
19...	4.10	.470	2.3	2.8	6.9	.520	.470	--
19...	--	--	--	--	--	--	--	--
24...	2.30	.150	.70	.85	3.2	.090	.080	--
MAR								
18...	2.10	1.40	2.6	4.0	6.1	.740	--	.540
18...	--	--	--	--	--	--	--	--
19...	1.70	1.10	1.1	2.3	4.0	.610	--	.420
19...	--	--	--	--	--	--	--	--
19...	1.70	1.20	2.3	3.5	5.2	.640	--	.420
20...	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--
21...	1.80	.700	2.1	2.8	4.6	.450	--	.300
27...	1.60	.220	.57	.79	2.4	.220	--	.160
APR								
05...	3.30	.110	3.0	3.1	6.4	.520	--	.150
05...	7.30	.310	1.9	2.2	9.5	.730	--	.220
05...	7.60	.190	2.1	2.3	9.9	.400	--	.150
08...	--	--	--	--	--	--	--	--
08...	6.90	.170	1.9	2.1	9.0	.370	--	.140
09...	--	--	--	--	--	--	--	--
09...	6.60	.150	2.5	2.6	9.2	.590	--	.170
09...	--	--	--	--	--	--	--	--
09...	7.30	.140	2.3	2.4	9.7	.410	--	.130
10...	6.60	.110	2.1	2.2	8.8	.300	--	.110
10...	--	--	--	--	--	--	--	--
MAY								
08...	.030	.360	1.7	2.1	2.1	.400	--	.030

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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, NITRITE TOTAL (MG/L AS N)
JUN , 1980									
05...	2345	54	--	--	--	--	--	1.93	.070
06...	0045	60	275	29	--	--	--	--	--
06...	0945	127	--	--	--	--	--	8.64	.260
06...	1245	141	--	--	--	--	--	2.39	.110
06...	2145	188	209	31	--	--	--	--	--
06...	2315	108	--	--	--	--	--	8.38	.220
07...	0515	167	--	--	--	--	--	.740	.220
08...	0515	211	242	33	--	--	--	--	--
08...	0645	211	--	--	--	--	--	9.31	.190
09...	0345	180	--	--	--	--	--	4.57	.130
09...	1545	200	--	--	--	--	--	2.79	.110
10...	1115	151	220	22	--	--	--	--	--
10...	1245	136	--	--	--	--	--	9.52	.280
12...	1230	50	210	21	--	--	--	1.20	.100
JUL									
17...	1030	30	66	9.0	280	.38	23	.700	.030
20...	0930	73	--	--	--	--	--	4.49	.110
20...	1100	86	198	24	350	.48	81	--	--
21...	0030	249	--	--	--	--	--	6.58	.220
21...	0500	254	165	23	333	.45	228	--	--
21...	1230	219	--	--	--	--	--	5.31	.190
21...	1700	180	187	26	361	.49	175	--	--
22...	1100	112	--	--	--	--	--	4.16	.140
22...	1230	108	242	26	405	.55	118	--	--
AUG									
08...	1015	85	--	--	--	--	--	2.09	.110
08...	1145	104	198	25	298	.41	84	--	--
09...	0700	313	--	--	--	--	--	3.07	.130
09...	0830	320	165	21	301	.41	260	--	--
10...	0230	241	220	29	394	.54	256	--	--
10...	1000	188	--	--	--	--	--	3.93	.170
11...	1445	105	264	31	429	.58	122	--	--
11...	1615	102	--	--	--	--	--	3.06	.140
15...	0900	41	320	48	511	.70	57	.410	.030
29...	1015	79	--	--	--	--	--	.590	.100

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
JUN , 1980								
05...	2.00	.100	2.4	2.5	4.5	.550	--	.190
06...	--	--	--	--	--	--	--	--
06...	8.90	.220	4.2	4.4	13	.940	--	.280
06...	2.50	.120	2.7	2.8	5.3	.580	--	.240
06...	--	--	--	--	--	--	--	--
06...	8.60	.210	3.0	3.2	12	.630	--	.220
07...	.960	.210	3.1	3.3	4.3	.570	--	.220
08...	--	--	--	--	--	--	--	--
08...	9.50	.180	3.0	3.2	13	.630	--	.210
09...	4.70	.120	2.8	2.9	7.6	.550	--	.180
09...	2.90	.130	3.1	3.2	6.1	.590	--	.210
10...	--	--	--	--	--	--	--	--
10...	9.80	.220	3.5	3.7	14	.850	--	.240
12...	1.30	.160	1.4	1.6	2.9	.270	--	.110
JUL								
17...	.730	.020	2.2	2.2	2.9	.610	--	.160
20...	4.60	.240	3.4	3.6	8.2	.890	--	.360
20...	--	--	--	--	--	--	--	--
21...	6.80	.220	3.8	4.0	11	1.10	--	.350
21...	--	--	--	--	--	--	--	--
21...	5.50	.170	2.7	2.9	8.4	.620	--	.250
21...	--	--	--	--	--	--	--	--
22...	4.30	.140	2.8	2.9	7.2	.580	--	.200
22...	--	--	--	--	--	--	--	--
AUG								
08...	2.20	.320	2.9	3.2	5.4	.910	--	.550
08...	--	--	--	--	--	--	--	--
09...	3.20	.230	2.7	2.9	6.1	.730	--	.470
09...	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--
10...	4.10	.150	2.3	2.4	6.5	.550	--	.340
11...	--	--	--	--	--	--	--	--
11...	3.20	.150	2.2	2.3	5.5	.530	--	.290
15...	.440	.090	1.7	1.8	2.2	.390	--	.180
29...	.690	.030	1.8	1.8	2.5	.600	--	.290

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ALKA-LINITY FIELD (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C 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, NITRITE TOTAL (MG/L AS N)
SEP , 1980									
17...	1015	89	--	--	--	--	--	2.80	.100
17...	1315	101	--	--	--	--	--	2.51	.090
18...	0415	74	--	--	--	--	--	2.89	.110
20...	1915	93	--	--	--	--	--	2.21	.090
21...	0115	127	--	--	--	--	--	.900	1.00
21...	0245	130	308	57	520	.71	183	--	--
22...	0215	98	--	--	--	--	--	3.29	.210
22...	0645	246	220	34	386	.53	256	--	--
22...	0815	329	--	--	--	--	--	2.98	.120
22...	2345	555	--	--	--	--	--	2.91	.090
23...	2215	764	143	15	255	.35	526	--	--
23...	2345	769	--	--	--	--	--	2.69	.110
24...	1445	671	--	--	--	--	--	2.77	.130
26...	1330	139	--	--	--	--	--	2.99	.110
28...	0730	117	--	--	--	--	--	4.00	.100
29...	1630	89	--	--	--	--	--	3.18	.120
30...	1330	75	297	39	503	.68	102	--	--
30...	1500	75	--	--	--	--	--	3.06	.140

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)
SEP , 1980								
17...	2.90	.180	1.9	2.1	5.0	.630	--	.340
17...	2.60	.190	1.8	2.0	4.6	.590	--	.300
18...	3.00	.000	2.4	2.4	5.4	.510	--	.180
20...	2.30	.070	2.4	2.5	4.8	.610	--	.360
21...	1.90	.360	4.0	4.4	6.3	1.30	--	.900
21...	--	--	--	--	--	--	--	--
22...	3.50	.170	1.7	1.9	5.4	.440	--	.230
22...	--	--	--	--	--	--	--	--
22...	3.10	.140	4.1	4.2	7.3	1.10	--	.320
22...	3.00	.140	2.3	2.4	5.4	.910	--	.470
23...	--	--	--	--	--	--	--	--
23...	2.80	.120	1.6	1.7	4.5	.660	--	.400
24...	2.90	.120	1.8	1.9	4.8	.590	--	.370
26...	3.10	.110	1.4	1.5	4.6	.410	--	.260
28...	4.10	.130	1.9	2.0	6.1	.410	--	.220
29...	3.30	.090	1.9	2.0	5.3	.360	--	.180
30...	--	--	--	--	--	--	--	--
30...	3.20	.110	1.7	1.8	5.0	.370	--	.190

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (MG/L AS SIO2)	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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)
NOV , 1979										
15...	1350	20	8.6	3.5	--	15.0	118	--	--	--
16...	1230	15	--	--	--	--	--	K12	K20	4.9
DEC										
14...	1000	3.9	--	.5	--	12.6	91	--	--	2.3
14...	1600	E10	--	--	--	--	--	41	K12	--
14...	1630	E12	8.4	--	--	--	--	--	--	--
JAN , 1980										
24...	1230	E50	7.4	.5	--	7.0	51	--	--	2.2
24...	1730	E50	--	--	--	--	--	110	91	--
26...	1530	E42	--	--	25	--	--	--	--	--
FEB										
02...	1530	E34	--	--	15	--	--	--	--	--
28...	0755	E37	7.9	1.5	--	5.9	44	--	--	6.8
28...	1345	E37	--	--	--	--	--	420	820	--
MAR										
01...	1610	E31	--	--	4	--	--	--	--	--
27...	1100	90	6.5	.5	--	19.1	139	--	--	3.0
27...	1630	86	--	--	--	--	--	130	470	--
MAY										
07...	1455	27	--	11.0	--	15.6	149	--	--	--
08...	0915	27	8.3	9.5	--	--	--	--	--	8.7
08...	1430	27	--	--	--	--	--	58	79	--
12...	1750	26	--	--	40	--	--	--	--	--
JUN										
12...	1145	51	8.0	20.0	--	6.7	77	--	--	4.3
12...	1630	44	--	--	--	--	--	1700	230	--
27...	1950	18	--	--	80	--	--	--	--	--
JUL										
12...	1920	13	--	--	40	--	--	--	--	--
17...	0845	31	8.0	23.5	--	6.6	80	--	--	8.4
17...	1540	27	--	--	--	--	--	1800	1600	--
AUG , 1980										
14...	1110	48	--	--	50	--	--	--	--	--
14...	1155	48	7.8	21.5	--	7.5	88	--	--	--
15...	1400	39	--	--	--	--	--	K13000	2600	7.9

Table 13. Water and bed-material analyses from Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	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)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)
DEC , 1979									
25...	1530	E150	--	4.0	--	--	--	--	--
JUL , 1980									
17...	0900	31	--	--	6.46	7.87	.020	.000	70500
22...	1600	101	12	2.3	--	--	--	--	--
AUG									
15...	0900	41	--	--	3.39	3.86	.160	.000	2940

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	ARSENIC TOTAL IN BOT-TOM MA-TERIAL (UG/G AS AS)	CADMIUM RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CD)	CHRO-MIUM, RECOV. FM BOT-TOM MA-TERIAL (UG/G)	COPPER, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CU)	LEAD, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS PB)	MERCURY RECOV. FM BOT-TOMCMA-TERIAL (UG/L AS HG)	NICKEL, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS NI)	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN)
AUG , 1980										
15...	0900	41	0	<10	<10	<10	50	.00	10	40

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	PCB, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ALDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	CHLOR-DANE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDD, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDT, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DI-AZINON, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DI-ELDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ENDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)
AUG , 1980											
15...	0900	41	1	.0	.00	.0	.0	.0	.0	.0	.0

DATE	ETHION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	HEPTA-CHLOR, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	HEPTA-CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	MALA-THION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	METH-OXY-CHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARA-THION, TOT. IN BOTTOM MATL. (UG/KG)	METHYL TRI-THION, TOT. IN BOTTOM MATL. (UG/KG)	PARA-THION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	TOXA-PHENE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	TRI-THION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)
AUG , 1980											
15...	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00	.0

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SEDI-MENT, SUS-PENDED (MG/L)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .125 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM
JUL , 1980											
22...	1440	104	284	47	65	80	93	98	98	99	100

Table 14. Water temperatures for Onion River at Hingham, 1979 and 1980 water years

TEMPERATURE, WATER (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							---	---	---	8.0	5.5	7.0
2							---	---	---	8.0	7.5	8.0
3							---	---	---	11.5	7.5	9.5
4							---	---	---	12.5	9.5	11.0
5							---	---	---	11.0	9.5	10.0
6							---	---	---	12.0	9.0	10.5
7							---	---	---	17.0	10.5	14.5
8							---	---	---	21.0	16.5	19.0
9							---	---	---	22.0	18.0	20.0
10							---	---	---	22.5	17.0	20.0
11							---	---	---	21.0	17.0	20.0
12							---	---	---	18.0	15.0	16.0
13							---	---	---	16.5	13.5	14.5
14							---	---	---	18.5	13.0	15.5
15							---	---	---	19.5	14.0	16.5
16							---	---	---	19.5	14.5	16.5
17							---	---	---	19.0	14.5	16.5
18							---	---	---	21.5	16.0	18.5
19							---	---	---	20.0	18.0	18.5
20							---	---	---	21.0	16.5	18.5
21							---	---	---	19.0	15.0	17.0
22							---	---	---	17.0	15.0	16.0
23							---	---	---	15.0	12.5	14.0
24							---	---	---	17.0	11.5	13.5
25							18.0	14.5	15.5	18.5	12.0	15.0
26							14.5	12.0	13.0	19.0	13.0	16.0
27							11.5	9.0	10.0	19.0	15.0	16.5
28							11.0	7.5	9.0	20.5	15.0	17.5
29							9.0	6.5	8.0	21.5	16.0	18.5
30							6.5	5.5	6.0	18.5	16.5	18.0
31							---	---	---	19.5	15.5	17.5
MONTH							18.0	5.5	10.5	22.5	5.5	15.5

TEMPERATURE, WATER (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	23.0	18.0	20.0	24.0	20.5	22.5	24.0	22.0	23.0	25.0	22.5	23.5
2	24.0	18.0	21.0	24.5	21.0	22.5	27.0	21.0	23.5	25.5	22.5	24.0
3	25.0	18.5	21.5	24.5	21.5	23.0	29.0	22.5	25.5	23.5	21.0	22.5
4	22.5	20.0	21.0	24.5	20.5	22.5	26.0	24.5	25.0	23.0	19.5	21.0
5	23.5	18.5	21.0	25.0	19.5	21.5	26.5	23.0	24.5	25.0	19.5	21.5
6	21.5	18.5	20.0	25.5	20.0	22.5	26.0	22.5	24.0	24.5	21.0	22.5
7	23.5	19.5	21.0	24.5	20.5	22.5	28.5	23.5	26.0	21.0	17.0	19.0
8	24.0	21.0	22.5	25.0	21.0	23.0	26.5	22.0	25.5	20.5	15.5	17.0
9	22.0	20.5	21.0	26.5	21.5	24.0	24.5	23.0	23.5	20.5	16.0	18.0
10	21.0	17.5	20.0	27.5	23.0	24.5	23.0	20.5	21.5	18.5	16.5	18.0
11	21.5	16.5	19.0	28.0	23.5	25.5	21.5	18.5	20.0	18.5	16.5	17.5
12	21.5	18.0	19.5	28.5	24.5	26.0	21.5	19.0	20.5	22.5	17.0	19.5
13	22.5	18.0	20.5	28.5	25.5	26.5	20.5	19.5	20.0	22.0	19.0	20.0
14	24.5	19.5	22.0	30.0	25.5	27.5	21.0	17.0	19.0	19.0	16.0	17.5
15	27.0	21.5	24.5	30.0	25.0	27.0	25.5	16.5	19.5	19.0	14.0	16.5
16	27.0	23.0	25.0	28.0	23.5	25.5	20.5	17.5	19.0	21.0	15.0	17.5
17	26.0	21.5	23.0	26.5	22.5	24.0	20.0	18.0	19.0	21.0	15.5	18.0
18	23.5	20.0	21.5	28.0	21.0	24.0	21.5	19.0	20.0	20.5	16.5	18.0
19	23.5	18.5	21.0	27.5	22.0	24.5	21.0	19.5	20.5	19.0	14.5	16.5
20	25.0	19.0	21.5	26.5	22.5	24.0	20.5	19.5	20.0	20.0	14.5	17.0
21	25.0	21.0	23.0	27.5	22.0	24.5	21.5	18.5	20.5	19.5	15.5	17.0
22	22.5	19.0	21.0	27.5	23.0	25.0	22.0	20.5	21.0	18.5	14.0	16.0
23	21.5	17.0	19.0	29.5	24.0	26.0	23.0	20.5	21.5	18.5	14.0	16.0
24	22.5	17.0	19.5	27.5	24.5	25.5	21.5	20.0	21.0	17.0	15.0	16.0
25	23.5	17.0	20.0	25.5	24.0	25.0	23.0	18.5	21.0	19.0	14.5	16.5
26	24.5	18.0	21.0	27.0	23.0	24.5	21.5	19.5	20.5	20.5	15.0	17.5
27	24.5	20.5	22.0	27.5	23.0	25.0	22.0	20.0	21.0	21.5	16.5	18.5
28	25.0	20.0	22.0	28.0	24.0	25.5	22.0	20.5	21.0	21.5	17.0	19.0
29	22.5	19.0	21.5	28.0	23.0	25.0	22.0	20.5	21.0	19.5	18.0	18.5
30	24.0	20.0	22.0	27.0	23.5	25.0	24.5	21.0	22.0	21.0	17.0	18.5
31	---	---	---	26.0	23.5	24.5	25.0	21.0	23.0	---	---	---
MONTH	27.0	16.5	21.5	30.0	19.5	24.5	29.0	16.5	21.5	25.5	14.0	18.5
YEAR	30.0	5.5	20.0									

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 14. Water temperatures for Onion River at Hingham, 1979 and 1980 water years--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	20.0	15.5	17.5	11.0	7.5	9.5	2.0	1.0	1.5	2.0	1.5	2.0
2	16.5	14.5	15.5	8.0	6.0	7.0	2.5	.5	1.5	2.0	1.5	1.5
3	15.0	13.0	14.0	6.5	4.0	5.5	2.5	1.0	2.0	2.0	1.0	1.5
4	13.5	11.0	12.5	6.0	3.5	4.5	3.0	1.5	2.5	2.5	1.0	1.5
5	13.0	10.5	11.5	6.5	5.0	5.5	3.5	2.5	2.5	2.5	1.0	1.5
6	12.5	10.5	11.5	6.0	4.5	5.5	3.5	2.0	2.5	1.5	.5	1.0
7	12.0	9.5	10.5	5.0	3.0	4.0	3.5	1.5	2.5	.5	.5	.5
8	11.0	10.0	10.5	4.5	2.5	3.5	2.5	1.0	2.0	.5	.5	.5
9	10.0	8.0	9.0	3.5	1.5	2.5	3.5	2.0	2.5	.5	.5	.5
10	10.0	7.5	8.5	2.5	.0	1.5	4.0	2.0	3.0	1.0	.5	.5
11	9.5	8.5	9.0	2.5	.5	1.5	4.0	2.5	3.0	1.0	.5	.5
12	8.5	5.5	7.5	4.0	2.0	3.0	3.0	2.0	2.5	.5	.5	.5
13	7.5	4.5	6.0	5.0	3.0	3.5	3.0	1.0	2.0	1.0	.5	1.0
14	7.5	4.5	6.0	5.5	3.0	4.0	3.0	.5	1.5	2.5	.5	1.5
15	9.5	5.5	7.5	5.0	3.5	4.5	4.0	2.0	2.5	2.0	1.5	2.0
16	10.5	8.0	9.0	6.0	3.0	4.5	2.5	.0	1.0	2.0	1.0	1.5
17	10.5	9.0	10.0	6.5	4.0	5.0	.5	.0	.5	1.0	1.0	1.0
18	10.5	9.0	10.0	8.5	4.5	6.5	2.5	.5	1.5	1.0	.5	1.0
19	13.0	10.5	12.0	9.5	7.5	8.5	2.5	1.0	1.5	1.0	.5	.5
20	18.0	12.5	15.0	9.0	7.5	8.5	3.0	2.0	2.0	1.5	.5	1.0
21	19.5	16.0	18.0	8.0	7.5	7.5	2.5	1.5	2.0	2.0	.5	1.5
22	18.0	16.5	17.0	7.5	7.0	7.5	2.0	2.0	2.0	2.0	.5	1.0
23	15.5	8.0	11.5	7.0	5.0	6.0	2.0	2.0	2.0	.5	.5	.5
24	8.0	6.5	7.5	5.5	3.5	4.5	2.0	1.5	2.0	1.0	.5	1.0
25	6.5	4.5	5.5	5.0	3.5	4.0	1.5	1.0	1.5	1.5	.5	1.0
26	7.0	3.5	5.5	4.5	3.5	4.0	1.0	1.0	1.0	1.0	.5	.5
27	7.5	6.0	6.5	3.5	2.5	3.0	1.5	.5	1.0	1.0	.5	.5
28	9.5	6.0	7.5	2.5	.5	1.5	2.0	.5	1.5	1.0	.5	.5
29	9.5	7.0	8.0	2.0	.5	1.0	2.5	1.0	1.5	1.0	.5	.5
30	10.0	7.5	8.5	1.5	.5	1.0	3.0	1.0	1.5	1.0	.5	.5
31	11.5	8.5	10.0	---	---	---	3.0	1.0	2.0	1.0	.5	.5
MONTH	20.0	3.5	10.5	11.0	.0	4.5	4.0	.0	2.0	2.5	.5	1.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	.5	.5	.5	.0	.5	6.0	2.0	4.0	16.5	10.5	13.0
2	1.0	.5	.5	1.0	.0	.5	7.5	3.0	5.0	20.0	13.5	16.5
3	1.0	.5	.5	1.0	.0	.5	4.5	2.0	3.5	22.5	15.0	18.0
4	1.0	.5	.5	2.5	.5	1.0	4.5	1.5	3.0	22.5	16.0	19.0
5	1.0	.5	1.0	2.5	.0	.5	6.0	3.5	5.0	22.0	16.5	18.5
6	1.0	.5	1.0	.5	.0	.0	6.5	5.5	6.0	19.0	13.5	16.0
7	1.0	.5	.5	.5	.0	.5	6.5	5.5	6.0	13.5	9.5	11.5
8	1.0	.5	1.0	2.0	.0	.5	7.5	5.0	6.0	10.5	8.5	9.5
9	1.0	.5	.5	1.5	.0	.5	6.0	3.0	4.5	12.5	7.5	9.5
10	1.0	.5	.5	2.5	.0	1.0	5.0	2.5	4.0	12.0	9.0	10.0
11	1.0	.5	.5	.5	.0	.0	7.0	3.5	5.5	16.0	9.5	12.5
12	.5	.5	.5	1.0	.0	.5	6.5	5.0	6.0	18.0	11.5	14.0
13	---	---	---	1.0	.0	.5	6.5	4.5	5.5	14.0	11.0	12.5
14	---	---	---	2.0	.0	.5	4.5	1.0	2.5	13.5	10.0	11.5
15	---	---	---	2.0	.0	.5	4.5	.5	3.0	16.5	10.5	13.0
16	---	---	---	2.5	.5	1.0	6.5	2.5	5.0	15.0	12.0	13.5
17	---	---	---	.5	.0	.5	7.5	5.5	6.0	13.5	12.0	12.5
18	---	---	---	2.0	.0	.5	12.0	6.5	9.0	12.5	12.0	12.0
19	---	---	---	2.0	.5	1.0	14.5	10.0	12.0	15.5	11.5	14.0
20	---	---	---	1.5	.5	1.0	16.5	12.0	14.0	20.0	15.0	18.0
21	---	---	---	2.5	.5	1.0	17.5	13.5	15.5	23.5	17.0	20.0
22	---	---	---	2.5	.0	1.0	20.5	14.5	17.5	24.5	18.5	21.0
23	---	---	---	.5	.0	.5	17.5	13.0	15.5	24.0	19.0	21.5
24	---	---	---	1.0	.0	.5	12.5	8.0	10.0	25.0	20.5	22.5
25	---	---	---	1.5	.0	.5	10.0	7.5	8.5	25.5	20.5	22.5
26	---	---	---	3.5	.0	1.0	10.5	7.5	8.5	23.5	18.5	20.5
27	1.5	.0	.5	1.5	.5	1.0	11.5	8.5	9.5	24.5	17.5	20.5
28	2.0	.0	.5	1.5	.5	1.0	9.0	8.0	8.5	24.0	19.0	20.5
29	.5	.0	1.0	3.0	1.0	1.5	9.5	8.0	8.5	22.5	20.0	21.0
30	---	---	---	3.5	1.0	2.0	11.5	9.0	10.0	23.0	19.5	21.0
31	---	---	---	5.0	1.5	3.0	---	---	---	23.0	18.5	20.5
MONTH	2.0	.0	.5	5.0	.0	1.0	20.5	.5	7.5	25.5	7.5	16.5

Table 14. Water temperatures for Onion River at Hingham, 1979 and 1980 water years--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.0	17.0	18.0	25.5	19.0	22.0	27.5	23.0	25.0	22.0	20.5	21.5
2	21.0	17.0	18.0	25.5	20.5	22.5	25.0	23.0	24.0	23.0	20.0	21.5
3	22.5	17.0	19.5	27.5	20.0	23.5	26.0	22.0	24.0	23.5	20.0	21.5
4	21.5	18.5	20.0	23.0	22.5	23.0	25.0	22.5	23.5	23.5	20.5	22.0
5	18.5	16.0	17.5	---	---	---	26.5	22.0	24.0	23.5	19.0	21.0
6	19.5	16.5	18.0	---	---	---	26.5	22.5	24.0	24.0	19.5	21.5
7	21.0	17.5	19.5	---	---	---	24.0	22.5	23.0	23.5	20.0	22.0
8	18.5	15.5	17.0	---	---	---	24.0	21.0	22.5	25.0	21.0	23.0
9	17.5	14.5	15.5	---	---	---	23.0	22.0	22.5	24.0	20.5	22.5
10	18.0	14.0	16.0	---	---	---	22.0	20.5	21.5	22.5	18.5	20.5
11	21.0	14.5	17.5	---	---	---	22.0	20.5	21.0	19.5	17.5	18.5
12	22.5	17.0	19.5	---	---	---	24.5	19.0	21.0	18.5	17.5	18.0
13	24.5	19.0	21.5	---	---	---	22.0	20.0	21.0	22.0	18.0	20.0
14	26.0	21.0	23.0	---	---	---	24.5	20.5	22.5	20.5	17.0	19.0
15	23.0	16.5	20.0	---	---	---	24.0	21.0	22.5	17.0	16.0	16.5
16	21.0	15.5	17.5	30.0	25.5	27.0	21.5	19.0	20.5	16.5	14.5	15.5
17	23.0	16.0	19.0	28.0	23.5	25.5	19.0	18.0	18.5	16.5	13.0	14.5
18	20.5	17.5	19.0	26.0	23.5	24.5	24.0	18.0	20.5	16.5	14.0	15.0
19	17.5	15.5	16.5	29.0	23.5	25.5	25.5	20.5	23.0	17.0	14.0	15.5
20	20.5	14.5	18.0	26.0	23.0	24.5	25.0	22.5	24.0	19.5	16.5	17.5
21	24.0	18.0	20.5	24.5	24.0	24.0	25.5	23.0	24.0	19.0	17.5	18.5
22	25.0	20.0	22.0	24.5	22.5	23.5	26.0	22.5	24.0	17.5	15.5	16.5
23	25.5	21.0	23.0	24.5	21.5	23.0	24.5	22.0	23.0	15.5	13.5	14.5
24	26.5	22.0	24.0	25.0	21.0	23.0	24.5	21.5	23.0	15.0	12.5	14.0
25	29.5	23.0	26.0	24.0	22.0	22.5	23.0	21.5	22.0	15.0	13.0	13.5
26	30.0	25.0	27.0	22.0	19.0	20.5	23.5	21.0	22.5	13.0	12.5	12.5
27	25.0	22.0	23.5	24.0	18.0	21.0	23.5	20.5	22.0	---	---	---
28	26.0	20.5	23.5	26.5	19.5	22.5	21.0	20.0	20.5	---	---	---
29	23.5	20.5	22.0	27.0	22.0	24.0	22.5	20.5	21.5	---	---	---
30	25.0	19.0	21.0	23.5	22.0	22.5	23.0	21.0	22.0	---	---	---
31	---	---	---	26.5	21.5	23.5	21.5	21.0	21.0	---	---	---
MONTH	30.0	14.0	20.0	30.0	18.0	23.5	27.5	18.0	22.5	25.0	12.5	18.5
YEAR	30.0	.0	10.5									

Table 15. Water temperatures for Onion River near Sheboygan Falls, 1979 and 1980 water years

TEMPERATURE, WATER (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							---	---	---	9.0	5.5	7.5
2							---	---	---	8.5	8.0	8.0
3							---	---	---	12.0	8.0	10.0
4							---	---	---	12.5	10.0	11.0
5							---	---	---	10.5	9.5	9.5
6							---	---	---	13.5	9.0	11.0
7							---	---	---	18.0	10.5	14.5
8							---	---	---	21.5	15.0	18.0
9							---	---	---	21.0	17.0	18.5
10							---	---	---	23.0	15.5	19.0
11							---	---	---	20.5	17.0	19.5
12							---	---	---	17.0	14.0	15.5
13							---	---	---	15.5	12.0	13.5
14							---	---	---	18.5	12.5	15.5
15							---	---	---	20.0	14.0	17.0
16							---	---	---	20.5	14.0	17.0
17							---	---	---	19.0	14.0	16.5
18							---	---	---	22.0	15.0	18.5
19							---	---	---	19.5	16.5	18.0
20							---	---	---	21.0	15.0	18.0
21							---	---	---	20.0	14.5	17.5
22							---	---	---	17.0	14.0	15.5
23							---	---	---	15.0	12.5	14.0
24							---	---	---	18.5	11.5	14.5
25							17.0	12.5	14.5	20.0	12.0	16.0
26							13.5	10.5	12.0	20.0	13.0	16.5
27							10.5	8.5	9.5	18.0	15.0	16.5
28							11.0	7.5	9.0	22.0	14.0	18.0
29							9.0	6.5	8.5	23.0	15.5	19.5
30							6.5	5.5	6.0	19.0	16.5	17.5
31							---	---	---	21.5	14.5	18.0
MONTH							17.0	5.5	10.0	23.0	5.5	15.5

TEMPERATURE, WATER (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	24.0	17.0	20.5	24.0	19.0	21.5	23.5	21.0	22.0	25.5	22.0	23.5
2	25.0	18.0	21.5	25.0	19.0	22.0	27.0	19.5	23.5	26.5	22.0	24.0
3	25.5	18.0	22.0	25.0	20.5	22.5	30.0	22.5	26.0	24.0	21.0	22.5
4	23.0	19.5	21.0	24.0	19.0	21.5	25.5	23.5	25.0	24.0	18.0	21.0
5	24.5	17.5	21.0	24.0	17.0	21.0	27.0	22.0	24.0	25.0	18.5	22.0
6	21.0	17.0	19.0	25.5	18.0	22.0	26.5	21.0	23.5	25.5	20.5	22.5
7	23.0	17.5	20.5	24.5	19.0	22.0	29.5	22.5	26.0	21.0	17.0	18.5
8	22.5	19.5	21.0	25.5	19.5	22.5	26.0	23.5	25.0	20.0	14.5	17.0
9	21.0	18.5	19.5	27.0	20.0	23.5	23.5	21.5	22.5	20.5	15.0	18.0
10	20.0	16.5	18.5	28.5	22.0	24.5	22.0	20.5	21.5	18.5	16.5	18.0
11	22.0	15.5	18.5	29.5	22.5	25.5	21.5	19.5	20.5	18.5	16.0	17.0
12	23.0	17.0	20.0	29.5	23.0	26.0	22.0	19.0	20.5	22.5	15.5	19.0
13	23.5	16.5	20.0	29.5	24.0	26.0	21.0	19.5	20.0	21.0	18.0	19.5
14	25.0	18.5	21.5	29.0	24.0	26.5	22.0	17.0	19.5	18.5	15.0	16.5
15	28.0	20.0	24.0	30.0	23.5	26.5	22.5	16.0	19.0	19.5	13.0	16.0
16	28.0	23.0	25.0	27.5	22.0	24.5	21.0	16.0	19.0	21.5	14.5	17.5
17	25.5	21.5	23.5	26.5	20.5	23.0	19.5	17.5	18.5	21.5	15.0	18.0
18	23.0	18.0	20.5	26.5	19.0	23.0	22.5	18.5	20.5	21.5	15.5	18.0
19	24.0	16.5	20.5	28.0	20.5	24.0	21.5	20.5	21.0	19.5	13.0	16.0
20	24.0	17.5	20.5	26.0	21.0	23.5	20.5	19.5	20.0	20.5	13.5	17.0
21	25.0	19.5	22.5	27.5	21.5	24.5	22.5	18.5	20.0	19.5	15.0	17.0
22	22.0	17.5	20.5	29.5	23.0	25.5	22.5	20.0	21.0	19.0	12.5	15.5
23	21.5	15.0	18.0	30.0	23.5	26.5	23.0	20.5	21.5	19.0	12.5	15.5
24	23.0	15.0	19.0	27.5	24.0	25.5	21.5	20.0	20.5	16.0	13.5	15.0
25	23.5	15.0	19.5	24.5	22.5	24.0	22.0	18.5	20.0	19.5	12.5	16.0
26	25.0	16.5	21.0	27.5	21.0	24.0	21.0	19.0	20.0	21.0	14.0	17.5
27	24.0	19.5	21.5	27.0	21.5	24.5	22.5	19.0	20.5	21.5	15.5	18.0
28	25.0	18.0	21.5	29.0	23.0	25.5	23.0	20.0	21.0	21.5	15.5	18.5
29	21.5	18.5	20.0	29.0	21.5	25.0	24.5	20.0	22.0	18.5	16.5	17.5
30	23.5	17.5	20.5	28.0	22.5	25.0	25.5	21.0	23.0	21.0	15.5	18.0
31	---	---	---	25.5	22.5	23.5	25.5	21.0	23.5	---	---	---
MONTH	28.0	15.0	21.0	30.0	17.0	24.0	30.0	16.0	21.5	26.5	12.5	18.5
YEAR	30.0	5.5	19.5									

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 15. Water temperatures for Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	1.0	1.0	1.0	1.0	1.0	7.5	1.0	4.5	17.5	10.5	13.5
2	1.0	1.0	1.0	1.0	1.0	1.0	10.5	5.0	7.5	20.5	12.5	16.0
3	1.0	1.0	1.0	1.0	1.0	1.0	7.5	4.0	5.5	21.5	13.5	17.5
4	1.0	1.0	1.0	1.0	1.0	1.0	6.0	1.5	4.0	23.0	15.5	19.0
5	1.0	1.0	1.0	1.0	1.0	1.0	7.0	4.5	6.0	22.5	16.5	19.0
6	1.0	1.0	1.0	1.0	1.0	1.0	7.5	6.0	6.5	19.5	14.0	16.0
7	1.0	1.0	1.0	1.0	1.0	1.0	6.5	5.5	6.0	14.0	9.5	10.5
8	1.0	1.0	1.0	1.0	1.0	1.0	6.5	5.5	6.0	10.5	8.0	9.0
9	1.0	1.0	1.0	1.0	1.0	1.0	6.5	4.5	6.0	13.5	6.5	10.0
10	1.0	1.0	1.0	1.0	1.0	1.0	5.0	4.0	4.5	11.5	8.5	10.5
11	1.0	1.0	1.0	1.0	1.0	1.0	6.5	4.5	5.5	17.5	9.0	13.0
12	1.0	1.0	1.0	1.0	1.0	1.0	6.5	5.0	6.0	19.0	11.0	15.0
13	1.0	1.0	1.0	1.0	1.0	1.0	6.0	4.0	5.0	15.0	10.0	12.0
14	1.0	1.0	1.0	1.0	1.0	1.0	4.0	1.0	2.5	13.0	9.0	11.0
15	1.0	1.0	1.0	1.0	1.0	1.0	5.0	.5	3.0	17.0	10.0	13.5
16	1.0	1.0	1.0	1.0	1.0	1.0	6.0	3.0	4.5	16.0	11.5	14.0
17	1.0	1.0	1.0	1.0	1.0	1.0	7.0	4.5	5.5	13.0	11.5	12.0
18	1.0	1.0	1.0	1.0	1.0	1.0	11.5	6.0	8.5	12.5	11.0	12.0
19	1.0	1.0	1.0	1.0	1.0	1.0	14.0	9.0	11.5	19.5	11.0	15.0
20	1.0	1.0	1.0	1.0	1.0	1.0	16.0	10.5	13.0	22.5	14.5	18.5
21	1.0	1.0	1.0	1.0	1.0	1.0	17.0	11.5	14.0	24.0	16.5	20.5
22	1.0	1.0	1.0	1.0	1.0	1.0	20.0	12.0	16.0	25.5	18.0	22.0
23	1.0	1.0	1.0	1.0	1.0	1.0	17.0	12.5	14.5	25.0	18.0	22.0
24	1.0	1.0	1.0	1.0	1.0	1.0	12.5	7.5	9.0	25.5	19.5	22.5
25	1.0	1.0	1.0	1.0	1.0	1.0	9.5	6.5	7.5	25.0	19.5	21.5
26	1.0	1.0	1.0	1.0	.5	1.0	10.5	6.5	8.5	24.0	16.0	20.0
27	1.0	1.0	1.0	.5	.5	.5	12.0	8.5	9.5	24.5	16.5	20.5
28	1.0	1.0	1.0	.5	.5	.5	8.5	7.5	8.0	23.0	18.0	20.5
29	1.0	1.0	1.0	1.0	.5	.5	10.0	7.5	8.5	22.0	18.0	19.5
30	---	---	---	1.0	.5	.5	12.5	8.5	10.5	22.5	17.5	20.0
31	---	---	---	4.0	.5	1.5	---	---	---	24.5	18.0	21.0
MONTH	1.0	1.0	1.0	4.0	.5	1.0	20.0	.5	7.5	25.5	6.5	16.5

Table 15. Water temperatures for Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.5	16.5	18.0	26.0	18.5	22.0	29.0	21.5	25.0	22.0	19.5	20.5
2	22.0	15.5	18.5	26.5	19.5	23.0	25.0	21.5	23.0	23.5	19.5	21.5
3	24.5	16.5	20.5	27.5	19.0	23.5	28.0	20.5	24.0	23.5	18.5	21.0
4	23.0	17.5	20.5	29.0	22.0	25.0	25.0	21.5	23.0	23.5	19.5	21.5
5	19.5	15.0	16.5	27.0	22.0	24.0	28.5	21.5	24.5	23.5	17.5	20.5
6	18.5	15.5	17.0	26.0	19.0	22.5	26.5	22.0	24.0	24.0	18.0	21.0
7	19.5	16.5	18.0	26.5	20.5	23.5	24.0	21.5	22.5	23.5	19.0	21.5
8	19.0	16.5	17.5	28.5	22.0	25.0	23.5	20.5	22.0	25.0	19.5	22.5
9	18.0	16.0	17.0	28.5	21.5	24.5	22.0	21.0	21.5	23.5	19.5	22.0
10	18.0	14.5	16.0	31.5	21.5	26.0	21.0	20.0	20.5	21.5	16.5	19.0
11	21.5	13.5	17.5	28.5	24.0	26.0	21.0	19.5	20.0	19.0	16.0	17.5
12	18.5	16.5	17.5	27.5	23.0	24.5	23.0	18.0	20.5	18.0	16.5	17.0
13	24.5	18.5	21.5	30.5	22.0	25.5	21.5	19.0	20.5	22.0	17.0	19.5
14	27.5	20.5	23.5	27.0	23.0	25.0	23.5	19.0	21.5	20.0	16.5	18.5
15	22.5	16.0	18.5	28.5	24.0	26.0	24.0	19.5	21.5	17.0	15.5	16.5
16	21.5	13.5	17.5	29.5	23.0	26.0	20.5	18.5	19.5	16.0	14.0	15.0
17	24.0	15.0	19.5	29.0	23.0	25.5	18.5	17.5	18.0	15.5	12.5	14.0
18	20.5	16.5	19.0	25.5	22.0	23.5	24.5	17.0	21.0	16.5	13.0	14.5
19	18.0	14.5	16.0	31.0	22.0	26.0	26.5	20.0	23.0	17.0	13.0	15.0
20	22.0	13.5	18.0	25.0	21.5	23.0	23.5	21.5	22.5	19.5	16.0	17.5
21	24.5	18.0	21.0	23.5	22.5	23.0	25.0	22.0	23.0	18.5	16.5	17.5
22	26.0	20.0	23.0	24.0	21.5	22.5	24.5	21.0	23.0	16.5	15.0	15.5
23	27.5	21.0	24.0	25.5	20.5	22.5	25.0	20.0	22.5	15.0	13.5	14.0
24	28.5	21.5	25.0	26.0	20.0	23.0	24.0	20.0	22.0	14.0	13.0	13.5
25	30.0	22.5	26.0	24.0	21.0	22.0	22.0	20.0	21.0	14.0	13.0	13.5
26	31.0	24.0	27.0	21.5	17.5	19.5	24.5	19.5	22.0	13.5	12.0	12.5
27	24.0	21.0	22.0	24.0	17.0	20.5	22.0	19.5	21.0	14.5	12.0	13.0
28	27.5	19.5	23.5	26.0	17.5	22.0	21.0	19.0	20.0	14.0	12.5	13.0
29	23.5	21.0	22.5	28.0	21.5	24.5	22.5	19.5	21.0	16.5	12.5	14.5
30	25.0	18.5	21.5	23.0	20.5	22.0	23.0	20.5	21.5	16.5	14.0	15.5
31	---	---	---	26.5	20.5	23.5	21.0	20.0	20.5	---	---	---
MONTH	31.0	13.5	20.0	31.5	17.0	23.5	29.0	17.0	22.0	25.0	12.0	17.5
YEAR	31.5	.5	10.5									

Table 16. Suspended-sediement loads for Onion River at Hingham, 1979 and 1980 water years

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	3.0	7.0	.11	.06	.51	8.9	11	6.6	15	5.6	8.0
2	10	3.0	6.0	.11	.06	1.1	4.0	9.1	5.4	12	4.7	7.6
3	9.0	3.0	5.0	.11	.06	2.4	3.7	28	4.8	6.9	4.0	6.4
4	8.0	3.0	4.0	.11	.06	4.5	19	21	6.6	8.5	3.8	5.6
5	8.0	3.0	4.0	.11	.06	4.3	45	11	6.2	10	11	5.4
6	12	3.0	3.6	.11	.06	3.6	36	6.9	5.8	7.3	6.0	5.3
7	10	3.0	3.0	.14	.06	3.0	21	6.1	7.8	6.0	3.9	4.4
8	9.0	3.0	2.5	.18	.03	2.4	15	6.2	6.5	4.2	2.8	4.0
9	9.0	3.0	2.1	.21	.03	1.9	4.7	6.2	7.4	2.9	34	3.9
10	8.0	3.0	1.6	.25	.03	1.6	1.4	6.1	20	3.3	112	3.9
11	8.0	3.0	1.4	.32	.03	1.6	2.7	6.7	10	4.7	18	3.4
12	7.0	3.0	1.1	.42	.03	6.2	193	6.7	7.0	2.9	9.2	3.7
13	6.0	3.0	.92	.49	.03	7.0	49	7.4	5.8	5.4	6.9	3.7
14	6.0	4.0	.78	.62	.03	7.1	17	8.8	5.1	4.9	6.2	3.2
15	6.0	5.0	.64	.78	.03	7.3	7.5	9.3	4.8	4.1	4.8	3.2
16	6.0	5.0	.52	1.0	.03	6.8	6.0	8.3	4.4	3.8	4.1	3.4
17	6.0	8.0	.43	1.2	.03	6.6	5.7	7.7	4.4	3.7	4.4	3.5
18	6.0	15	.35	1.1	.03	8.2	5.6	9.1	4.1	4.0	4.7	3.6
19	6.0	13	.30	.87	.03	18	5.6	17	4.1	4.0	4.8	3.0
20	6.0	11	.26	.68	.04	29	5.7	14	7.4	4.0	12	3.2
21	6.0	10	.22	.53	.04	23	6.1	11	7.0	3.6	10	3.2
22	5.0	9.0	.16	.42	.04	17	6.0	8.1	5.4	3.2	7.9	2.9
23	3.0	11	.16	.28	.04	46	4.4	6.5	4.1	3.2	20	2.9
24	4.0	12	.12	.21	.04	49	3.0	5.5	3.5	3.9	17	2.9
25	4.0	11	.12	.18	.04	18	9.1	4.4	3.7	8.4	8.0	2.9
26	4.0	10	.11	.14	.04	9.2	23	4.1	3.7	6.6	5.7	2.6
27	4.0	9.0	.11	.11	.09	7.6	18	4.1	3.9	4.8	5.6	2.3
28	3.0	8.0	.11	.06	.19	6.6	10	4.4	4.2	4.4	5.4	2.3
29	3.0	8.0	.11	.06	---	8.1	7.9	4.7	48	3.8	5.7	2.2
30	2.0	8.0	.11	.06	---	388	12	4.8	12	5.7	7.1	2.2
31	2.0	---	.11	.06	---	86	---	9.4	---	7.4	8.0	---
TOTAL	197.0	196.0	46.94	11.03	1.34	781.61	556.0	273.6	229.7	172.6	363.3	114.8

WTR YR 1979 TOTAL 2943.92

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	5.8	1.5	1.4	.95	.19	.52	9.3	13	1.8	1.5	4.9
2	2.7	5.0	.64	1.2	1.1	.16	.52	6.7	11	1.8	1.6	5.6
3	2.4	4.3	.48	1.1	.91	.13	1.8	4.9	9.8	1.8	1.7	3.9
4	2.4	3.4	.59	.97	.81	.13	17	3.8	8.5	1.9	1.5	3.8
5	2.3	3.4	.69	.86	.72	.09	10	3.9	51	2.6	1.8	3.3
6	2.4	4.2	.85	.81	.60	.09	1.8	5.0	34	2.3	1.6	3.2
7	2.6	3.9	1.0	.81	.53	.05	5.9	5.4	42	2.1	2.3	3.1
8	2.6	3.4	1.0	.76	.45	.05	122	6.6	56	1.9	55	2.7
9	2.4	2.7	5.0	.67	.34	.06	44	5.9	30	1.8	23	3.1
10	2.0	2.2	6.0	.67	.30	.10	9.6	5.6	8.5	1.5	11	2.8
11	2.0	3.0	8.0	.67	.30	.15	3.9	6.8	5.6	1.3	6.9	2.5
12	2.0	1.5	4.0	.62	.28	.18	3.4	5.3	6.4	1.2	6.4	3.4
13	1.5	1.4	.70	.62	.24	.21	2.9	11	5.5	1.4	5.7	7.4
14	1.2	1.2	.45	.56	.24	.28	2.6	18	7.9	1.8	5.6	7.6
15	1.4	1.3	.46	.56	.20	.38	4.1	18	8.7	2.8	5.2	4.1
16	1.4	1.2	.38	3.6	.19	1.8	6.6	15	4.8	5.1	4.7	6.2
17	1.5	1.2	.42	14	.19	2.9	4.6	12	3.5	4.2	4.9	8.2
18	1.6	1.1	.46	4.7	.18	2.7	5.1	21	2.4	2.8	5.1	4.7
19	3.0	1.1	.53	1.9	.23	1.7	6.0	27	7.2	2.4	5.0	3.1
20	2.1	1.1	.63	1.3	.26	1.0	7.0	20	8.4	57	25	9.2
21	2.2	9.3	.72	.97	.28	.92	8.0	14	4.4	27	20	6.4
22	2.5	14	.90	.77	.40	.72	9.6	12	3.1	12	9.7	203
23	12	14	2.1	.68	.41	.54	10	9.7	2.6	5.6	8.3	32
24	13	11	22	.59	.37	.58	8.8	8.8	2.2	3.8	7.4	10
25	6.2	9.4	47	.62	.32	3.7	7.2	8.4	2.0	3.1	7.1	6.3
26	1.9	25	22	.66	.34	5.4	6.2	6.9	1.7	2.7	9.8	5.9
27	1.9	43	8.6	.69	.34	2.5	5.0	4.7	1.3	2.4	8.4	5.0
28	1.8	24	4.0	.69	.32	1.2	4.6	4.3	1.7	2.0	26	4.3
29	1.8	14	2.4	.70	.32	.61	7.5	12	1.9	1.8	11	4.0
30	1.7	3.1	1.9	.73	---	.52	12	13	1.5	1.6	6.2	3.9
31	1.6	---	1.6	.84	---	.52	---	15	---	1.8	4.9	---
TOTAL	88.6	219.2	147.00	45.72	12.12	29.56	338.24	320.0	346.6	163.3	294.3	373.6

WTR YR 1980 TOTAL 2378.24

Table 17. Suspended-sediment loads for Onion River near Sheboygan Falls, 1979 and 1980 water years

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	2.0	6.0	.77	.05	.27	189	59	6.9	39	7.2	13
2	18	2.0	5.0	.65	.09	.37	63	19	7.2	36	4.6	11
3	12	2.0	4.0	.83	.14	.70	28	19	3.3	24	2.9	8.6
4	8.0	2.0	3.0	.96	.14	1.1	27	13	7.5	15	2.3	6.7
5	6.0	2.0	4.0	1.1	.23	1.3	33	11	5.2	12	2.5	5.7
6	27	2.0	2.6	1.4	.32	1.4	24	8.7	4.6	10	10	5.1
7	25	2.0	2.2	1.6	.44	1.7	11	8.1	14	7.1	10	4.2
8	20	2.0	1.9	1.6	.58	1.8	4.5	7.7	13	5.8	7.0	3.1
9	16	2.0	1.7	1.6	.51	2.0	4.1	7.6	8.0	5.1	7.0	3.0
10	13	2.0	1.5	1.5	.43	2.3	5.2	7.8	60	4.6	258	2.9
11	10	2.0	1.7	1.5	.32	2.5	6.8	8.1	38	5.6	229	3.1
12	9.0	2.0	2.0	1.4	.27	2.9	769	8.9	25	6.5	80	3.4
13	7.0	3.0	2.4	1.4	.22	3.3	382	9.3	19	5.0	34	3.4
14	6.0	4.0	2.8	1.0	.16	3.6	145	10	14	8.8	20	3.3
15	5.0	5.0	3.4	.84	.11	3.9	47	13	13	6.4	13	2.4
16	6.0	4.0	4.2	.68	.10	4.2	26	10	11	4.5	8.6	1.7
17	6.0	10	4.9	.14	.05	4.6	20	12	10	3.5	8.2	1.2
18	5.0	27	4.6	.12	.05	7.8	16	14	9.0	2.9	7.9	.66
19	5.0	23	4.2	.09	.05	29	14	20	8.5	2.9	7.1	.34
20	5.0	16	3.9	.10	.05	56	12	16	25	2.8	20	.16
21	5.0	11	3.4	.10	.06	239	11	13	19	3.0	72	.09
22	4.0	8.0	3.1	.05	.06	327	9.9	11	11	2.9	41	.10
23	2.0	12	2.8	.05	.07	463	8.2	9.3	7.2	2.7	41	.13
24	5.0	27	2.5	.05	.07	189	6.9	8.5	6.5	2.4	110	.18
25	6.0	21	2.3	.05	.08	70	9.8	7.6	6.0	3.7	72	.25
26	5.0	16	1.9	.05	.08	50	82	7.1	5.8	10	33	.36
27	4.0	12	1.6	.05	.16	37	61	6.9	5.7	8.6	24	.50
28	3.0	10	1.4	.05	.17	25	29	6.8	5.5	6.2	28	.65
29	2.0	8.0	1.2	.05	---	19	15	6.9	29	4.7	21	.87
30	2.0	7.0	1.1	.05	---	732	98	9.0	66	3.8	17	1.3
31	2.0	---	.93	.05	---	787	---	10	---	6.3	15	---
TOTAL	272.0	248.0	88.23	19.88	5.06	3068.74	2157.4	378.3	463.9	261.8	1213.3	87.39

WTR YR 1979 TOTAL 8264.00

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	2.6	7.2	1.8	9.7	.20	5.3	11	13	6.1	5.8	12
2	1.5	2.5	6.1	1.8	12	.20	5.2	11	12	6.0	5.5	12
3	1.7	1.9	5.7	1.9	10	.30	5.7	10	12	6.2	5.9	11
4	1.6	1.5	5.6	2.0	8.7	.30	35	9.0	11	6.1	6.1	8.9
5	1.8	1.2	5.5	2.1	7.2	.50	115	8.6	17	5.9	6.1	8.3
6	1.9	.99	5.4	2.0	5.8	.60	19	8.0	167	6.2	6.8	7.4
7	1.9	1.0	5.6	2.0	4.6	.60	13	7.8	210	5.7	6.7	6.3
8	1.9	.84	6.0	1.9	3.5	.80	143	7.6	195	4.7	140	5.3
9	2.0	.78	8.4	1.8	2.6	.80	211	8.0	141	3.9	213	4.9
10	1.8	.75	5.7	1.8	2.0	.80	86	8.0	108	3.7	104	4.9
11	1.6	.77	4.9	1.7	1.7	.70	36	8.5	48	3.6	60	3.9
12	1.4	.85	4.3	1.7	1.4	.60	25	8.9	31	3.4	39	3.4
13	1.4	.86	3.7	1.7	1.2	.60	18	11	24	3.2	36	4.3
14	1.2	.94	3.3	1.7	1.0	.60	13	22	22	3.1	20	5.1
15	1.1	.96	2.9	1.8	.90	.60	12	23	23	8.3	11	4.9
16	1.3	1.7	2.5	11	.80	1.0	20	17	22	15	7.5	4.3
17	1.3	3.7	2.3	63	.80	5.1	17	12	16	15	6.1	24
18	1.3	3.8	2.1	30	.80	7.9	16	12	13	7.9	6.3	20
19	1.4	3.1	1.9	11	.90	28	15	22	14	5.0	6.4	13
20	4.8	2.5	1.9	4.7	1.9	14	15	21	31	180	67	17
21	2.7	2.3	1.8	4.2	2.5	3.3	15	13	24	232	49	32
22	2.2	2.7	1.7	5.1	3.2	1.9	15	10	16	99	38	843
23	2.5	2.8	2.2	6.7	4.4	1.4	15	8.9	13	48	24	472
24	3.1	2.1	5.2	6.6	2.7	1.2	12	8.0	11	24	16	256
25	3.2	2.3	73	6.1	1.5	1.2	9.5	7.0	9.4	16	13	133
26	2.4	5.3	29	5.9	1.0	1.5	7.5	6.4	8.4	13	16	61
27	2.0	25	7.5	6.0	.80	2.2	6.1	6.2	6.9	11	17	37
28	2.1	23	3.6	6.4	.40	4.6	6.2	6.3	6.9	9.7	14	26
29	2.3	14	2.1	6.8	.30	7.1	7.2	6.3	7.6	7.8	18	19
30	2.2	8.6	1.7	7.2	---	8.4	9.5	10	7.4	6.7	16	18
31	2.4	---	1.8	8.2	---	6.5	---	13	---	5.8	13	---
TOTAL	61.5	121.34	220.6	216.6	94.30	103.50	928.2	341.5	1240.6	772.0	993.2	2077.9

WTR YR 1980 TOTAL 7171.24

Table 18. Total organic nitrogen load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL ORGANIC NITROGEN, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	20	64	38	24	36	664	470	170	320	78	76
2	110	20	62	38	24	38	390	420	150	260	72	76
3	98	20	60	38	24	40	320	670	130	140	66	55
4	88	20	56	35	24	42	410	560	170	150	66	48
5	84	20	54	35	24	44	480	390	160	150	110	48
6	140	20	54	35	24	45	400	330	160	110	100	55
7	110	22	54	35	24	45	240	300	190	86	78	36
8	98	22	54	35	26	45	190	270	160	72	57	36
9	92	22	50	35	26	44	180	250	180	72	444	36
10	84	26	48	35	26	44	180	230	280	86	1530	36
11	74	26	48	35	26	42	180	220	220	120	705	36
12	70	22	46	35	26	42	1320	210	180	92	348	42
13	60	26	46	32	26	42	1040	200	160	160	231	42
14	60	33	46	32	26	44	560	220	140	120	183	36
15	56	40	46	32	26	45	370	220	130	86	137	31
16	60	40	42	32	24	44	290	190	130	66	116	31
17	64	74	42	32	24	44	250	200	130	58	114	31
18	52	190	42	35	26	269	220	210	120	52	113	31
19	56	150	42	38	26	512	200	250	120	52	109	24
20	56	120	42	38	28	1110	190	250	180	52	307	26
21	52	100	42	38	28	1350	180	250	180	52	480	31
22	40	98	40	38	28	1320	170	210	150	46	260	26
23	26	130	40	35	30	1630	160	200	130	52	500	26
24	34	150	40	35	30	1720	160	200	110	52	450	31
25	36	130	40	35	30	740	250	148	110	120	250	31
26	34	110	38	35	32	438	700	140	100	100	150	31
27	30	98	38	35	35	374	620	130	100	78	140	26
28	22	88	38	32	39	372	400	130	107	72	130	26
29	20	78	38	32	---	397	330	130	391	58	130	26
30	16	74	38	30	---	3640	450	130	285	78	120	31
31	18	---	38	30	---	2060	---	210	---	110	84	---
MAX	140	190	64	38	39	3640	1320	670	391	320	1530	76
MIN	16	20	38	30	24	36	160	130	100	46	57	24

WTR YR 1979 MAX 3640 MIN 16

TOTAL	1960	1989	1428	1075	756	16658	11494	7938	4923	3122	7658	1117

TOTAL LOAD FOR YEAR: 60118 POUNDS

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	71	66	62	48	26	98	330	310	110	50	93
2	26	62	49	57	58	26	98	270	270	110	56	109
3	23	53	45	49	58	26	120	230	270	100	62	68
4	26	41	49	45	63	26	220	210	250	100	56	100
5	30	45	53	41	68	24	250	180	449	120	68	88
6	30	71	62	37	60	24	200	170	715	110	62	81
7	37	66	62	37	65	22	261	140	950	110	94	81
8	45	66	57	33	65	22	1260	138	1380	110	738	75
9	41	53	76	30	60	24	1360	140	819	110	480	94
10	33	53	85	30	60	28	708	130	286	100	300	88
11	37	95	95	30	53	30	520	160	222	97	180	75
12	45	45	80	26	57	28	440	130	242	97	150	63
13	30	49	57	26	57	28	380	200	221	99	120	120
14	26	49	40	23	57	28	350	290	230	99	110	130
15	30	49	33	23	57	30	370	310	260	110	98	82
16	30	45	30	85	45	32	570	290	200	160	75	110
17	33	53	30	796	45	244	490	260	180	140	81	140
18	33	49	30	654	42	431	430	360	170	110	88	93
19	85	49	33	262	45	322	400	400	260	110	81	68
20	49	49	37	177	60	277	370	310	310	627	390	160
21	53	76	41	128	73	200	340	240	230	474	480	140
22	66	134	49	102	110	144	320	220	190	343	310	2250
23	120	130	80	90	92	101	280	190	180	130	160	746
24	140	90	260	79	73	89	260	180	160	94	130	372
25	100	76	570	65	57	115	240	180	150	81	130	187
26	66	150	350	58	45	132	240	160	140	75	200	180
27	66	240	160	51	45	120	230	150	120	75	180	140
28	62	190	100	49	35	111	230	160	140	62	230	110
29	53	150	85	49	---	100	290	320	140	56	260	100
30	53	71	80	49	---	98	370	360	110	50	200	98
31	49	---	66	43	---	98	---	370	---	62	150	---
MAX	140	240	570	796	---	431	1360	400	1380	627	738	2250
MIN	23	41	30	23	---	22	98	130	110	50	50	63

TOTAL	1542	2420	2910	3286	1653	3006	11696	7178	9554	4231	5769	6241

TOTAL LOAD FOR YEAR: 59486 POUNDS

Table 19. Total nitrogen load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL NITROGEN, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	420	110	270	130	100	170	2590	1130	320	673	160	190
2	390	110	260	130	100	180	1770	990	270	470	140	190
3	360	110	250	130	100	190	1460	1750	240	260	130	150
4	330	110	230	120	100	200	1850	1400	320	280	130	140
5	310	110	220	120	100	210	2190	880	300	280	220	140
6	460	110	220	120	100	220	1810	730	280	200	190	150
7	400	120	220	120	100	220	1110	640	370	170	1200	120
8	360	120	220	120	110	220	900	570	300	140	81	120
9	340	120	210	120	110	210	820	520	350	140	463	120
10	310	130	190	120	110	210	820	470	590	170	2720	120
11	290	130	190	120	110	200	840	450	430	230	1340	120
12	270	120	180	120	110	200	3780	420	330	180	559	130
13	240	130	180	110	110	200	3000	400	280	300	363	130
14	240	150	180	110	110	210	1650	450	250	230	290	120
15	230	180	180	110	100	220	1110	430	240	170	217	110
16	240	180	170	110	100	210	880	370	220	130	186	110
17	260	290	170	110	100	210	750	380	220	120	184	110
18	240	580	170	120	110	289	680	420	210	110	183	110
19	230	500	170	130	110	1120	606	520	210	110	178	90
20	230	420	170	130	120	4170	570	520	350	110	541	94
21	220	370	170	130	120	5820	550	500	330	110	650	110
22	180	360	150	130	120	6050	520	420	270	96	430	94
23	130	430	150	120	130	7470	501	400	220	110	660	94
24	150	440	150	120	130	7250	480	400	180	110	610	110
25	170	430	150	120	130	3200	750	337	180	230	420	110
26	150	400	140	120	140	1940	1850	320	160	190	300	110
27	140	360	140	120	150	1700	1590	280	160	160	290	94
28	120	330	140	110	165	1730	940	280	164	140	270	94
29	110	300	140	110	---	1730	730	280	685	120	270	94
30	90	290	140	100	---	8110	1070	280	703	160	260	110
31	94	---	140	100	---	6390	---	420	---	210	210	---
MEAN	249	251	183	119	114	1950	1272	560	304	197	447	119
WTR YR 1979	MEAN	483	MAX	8110	MIN	81						
TOTAL	7704	7540	5660	3680	3195	60449	38167	17357	9132	6109	13845	3584

TOTAL LOAD FOR YEAR: 176422 POUNDS

TOTAL NITROGEN, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	97	260	240	230	240	130	390	510	480	110	110	310
2	120	230	190	220	260	130	390	400	400	110	120	350
3	110	210	180	190	260	130	460	330	400	100	140	240
4	120	170	190	180	280	130	730	290	360	96	120	210
5	120	180	210	170	300	120	810	250	560	120	150	190
6	130	260	230	160	230	120	670	220	1320	110	140	170
7	160	240	230	160	240	110	928	170	1810	110	200	198
8	180	240	220	140	240	110	3540	202	2480	110	1280	160
9	170	210	270	130	230	120	4190	170	1400	110	954	200
10	140	210	300	130	230	140	2710	160	460	96	578	190
11	160	330	330	130	150	150	1110	210	300	90	356	160
12	180	180	280	120	160	140	900	160	260	90	315	200
13	130	190	220	120	160	140	780	280	240	93	264	340
14	120	190	166	110	160	140	700	440	290	93	245	360
15	130	190	140	110	160	150	750	480	330	110	211	260
16	130	205	130	230	150	160	1010	440	240	170	160	310
17	140	210	130	1500	150	540	850	380	210	150	170	400
18	140	190	130	1260	140	910	710	580	190	110	190	280
19	300	190	140	560	150	672	660	660	340	110	170	220
20	190	190	160	420	170	630	590	470	420	1110	760	410
21	210	270	170	338	180	493	540	350	290	983	920	390
22	240	420	190	300	230	388	500	310	220	603	610	4035
23	380	410	280	290	200	297	420	260	200	270	320	1640
24	450	310	710	280	180	286	380	240	174	200	270	784
25	350	270	1320	250	160	399	350	240	160	170	270	485
26	240	470	900	240	150	499	350	210	150	160	406	460
27	240	680	480	230	150	493	330	200	130	160	360	390
28	230	560	340	230	140	460	330	210	150	240	460	330
29	210	470	300	210	140	400	430	500	150	120	520	300
30	210	260	280	210	---	390	590	560	110	110	410	290
31	190	---	240	240	---	390	---	580	---	140	310	---
MEAN	191	280	300	293	193	302	903	337	474	205	371	475
WTR YR 1980	MEAN	359	MAX	4190	MIN	90						
TOTAL	5917	7985	9296	9088	5590	9367	27098	10462	14224	6354	11489	14268

TOTAL LOAD FOR YEAR: 131138 POUNDS

Table 20. Total nitrite plus nitrate nitrogen load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL NITRITE PLUS NITRATE, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	310	100	220	130	85	120	1820	560	130	329	39	98
2	290	100	210	130	85	130	940	480	110	250	35	98
3	280	100	200	130	85	140	760	930	94	74	32	81
4	260	100	190	120	85	140	990	720	130	78	32	75
5	250	100	180	120	85	150	1200	420	120	78	60	75
6	340	100	205	120	85	160	960	340	120	55	51	81
7	300	110	200	120	85	160	550	290	150	43	39	64
8	280	110	200	120	92	160	430	260	120	35	28	64
9	270	110	190	120	92	150	390	230	150	35	74	64
10	250	120	180	120	92	150	390	200	270	43	958	64
11	230	120	180	110	84	140	400	200	190	64	540	64
12	220	110	170	110	84	140	2240	180	140	47	183	69
13	200	120	170	100	84	140	1720	170	120	88	101	69
14	200	140	170	100	84	150	860	200	100	64	71	64
15	190	160	170	100	77	160	550	190	94	43	46	58
16	200	160	160	100	77	150	420	150	88	32	35	58
17	210	230	160	100	77	150	350	160	88	28	30	58
18	200	410	160	110	84	190	310	180	81	23	26	58
19	190	370	160	120	84	780	280	230	81	23	22	50
20	190	310	160	120	91	3050	260	230	150	23	172	52
21	180	280	160	110	84	4280	250	220	140	23	290	58
22	160	280	140	110	84	4540	230	180	110	22	200	52
23	120	320	140	100	91	5650	220	170	88	23	290	52
24	140	360	140	100	91	5340	210	170	68	23	270	58
25	150	320	140	100	91	2330	350	175	68	64	190	58
26	140	300	140	100	97	1400	990	130	61	51	140	58
27	130	280	140	100	100	1210	830	110	61	39	140	70
28	110	260	140	97	117	1110	450	110	42	35	130	70
29	100	240	140	97	---	1200	340	110	266	28	130	70
30	88	230	140	89	---	4520	530	110	379	39	130	80
31	92	---	140	89	---	3980	---	180	---	55	100	---
MEAN	202	202	168	109	88	1357	674	258	127	60	148	66

WTR YR 1979 MEAN 290 MAX 5650 MIN 22

TOTAL	6270	6050	5195	3392	2452	42070	20220	7825	3809	1857	4584	1990

TOTAL LOAD FOR YEAR: 105714 POUNDS

TOTAL NITRITE PLUS NITRATE, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	78	170	160	160	91	100	300	200	140	22	22	160
2	93	160	140	150	100	100	300	140	110	22	25	180
3	86	140	130	140	100	100	350	98	110	19	28	130
4	93	120	140	130	110	100	570	80	98	18	25	120
5	93	130	140	120	120	91	640	64	109	25	31	100
6	100	170	160	110	120	91	530	54	571	22	25	97
7	110	160	160	110	130	82	584	36	848	21	110	132
8	130	160	150	110	130	82	2120	38	978	21	556	90
9	120	140	180	100	120	91	2710	38	514	21	437	110
10	110	140	190	100	120	110	1900	35	172	18	293	100
11	110	210	210	100	120	120	680	50	76	16	186	90
12	130	130	190	93	130	110	490	35	64	16	164	120
13	100	140	150	93	130	110	390	68	56	17	138	200
14	93	140	120	86	130	110	320	120	72	17	128	210
15	100	140	110	86	130	120	360	140	85	22	110	150
16	100	154	100	140	120	130	580	120	56	38	90	180
17	110	140	100	640	120	150	440	100	49	31	97	220
18	110	140	100	490	110	380	340	180	42	22	100	160
19	190	140	110	220	120	565	300	210	89	22	97	130
20	140	140	110	180	140	518	250	140	120	369	370	240
21	140	180	120	163	150	397	210	94	72	459	450	220
22	170	260	140	160	190	306	190	81	53	235	300	1570
23	240	250	190	170	170	229	140	64	45	64	170	873
24	270	200	390	180	150	216	120	56	38	45	140	387
25	220	180	630	120	130	295	110	56	35	38	140	276
26	160	280	470	80	120	361	110	50	31	35	210	260
27	160	370	280	76	120	350	98	45	25	35	190	220
28	160	320	210	74	110	326	98	49	31	28	240	190
29	140	280	190	73	110	310	150	140	31	25	260	180
30	140	170	190	73	---	300	250	170	21	22	210	170
31	140	---	160	82	---	300	---	180	---	28	160	---
MEAN	133	182	188	149	126	215	521	95	158	58	177	242

WTR YR 1980 MEAN 186 MAX 2710 MIN 16

TOTAL	4136	5454	5820	4609	3641	6650	15630	2931	4741	1796	5502	7265

TOTAL LOAD FOR YEAR: 68175 POUNDS

Table 21. Total ammonia nitrogen load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL AMMONIA NITROGEN, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	8	17	10	8	13	107	36	16	33	11	8
2	22	8	16	10	8	14	54	32	14	28	10	8
3	21	8	15	10	8	15	46	54	12	17	9	6
4	19	8	15	9	8	15	57	44	16	18	9	6
5	19	8	14	9	8	16	67	28	16	18	14	6
6	25	8	14	9	8	17	56	24	14	14	13	6
7	22	9	14	9	8	17	35	21	18	12	11	5
8	21	9	14	9	9	17	29	19	15	10	9	5
9	20	9	13	9	9	16	26	17	18	10	34	5
10	19	9	13	9	9	16	26	16	28	12	152	5
11	17	9	13	9	9	15	27	15	21	15	76	5
12	17	9	12	9	9	15	110	14	17	12	30	6
13	15	9	12	9	9	15	89	13	14	19	20	6
14	15	11	12	9	9	16	51	15	13	15	16	5
15	15	12	12	9	8	17	35	14	12	12	12	5
16	15	12	11	9	8	16	28	12	12	9	11	5
17	16	17	11	9	8	16	24	13	12	9	11	5
18	15	30	11	9	9	20	22	14	11	8	12	5
19	15	27	11	10	9	60	20	17	11	8	12	4
20	15	23	11	10	9	180	19	17	18	8	22	4
21	14	21	11	10	9	210	18	17	17	8	35	5
22	12	21	11	10	9	180	17	14	14	7	25	4
23	9	24	11	9	10	177	17	14	12	8	36	4
24	11	27	11	9	10	144	16	14	9	8	34	5
25	11	24	11	9	10	65	24	12	9	15	24	5
26	11	23	10	9	11	40	57	11	9	13	16	5
27	10	21	10	9	11	40	49	10	9	11	16	4
28	9	19	10	9	12	36	30	10	14	10	15	4
29	8	18	10	9	---	40	24	10	34	9	15	4
30	7	17	10	8	---	283	34	10	35	11	14	5
31	7	---	10	8	---	288	---	20	---	14	8	---
MAX	25	30	17	10	12	288	110	54	35	33	152	8.0
MIN	7.0	8.0	10	8.0	8.0	13	16	10	9.0	7.0	8.0	4.0
WTR YR 1979	MAX 288		MIN 4.0									
TOTAL	475	458	376	284	252	2029	1214	577	470	401	732	155

TOTAL LOAD FOR YEAR: 7403 POUNDS

TOTAL AMMONIA NITROGEN, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3	8	7	7	12	6	24	29	28	7	5	6
2	3	7	6	6	13	6	24	24	24	7	6	7
3	3	6	5	6	13	6	27	20	24	7	6	4
4	3	5	6	5	14	6	40	19	22	6	6	4
5	3	5	6	5	15	6	44	17	32	8	7	3
6	4	8	7	4	11	6	38	15	36	7	6	3
7	4	7	7	4	12	5	35	13	85	7	14	3
8	5	7	6	4	12	5	130	28	110	7	140	3
9	5	6	8	4	11	6	120	13	60	7	88	4
10	4	6	9	4	11	7	89	12	20	6	44	3
11	4	10	10	4	11	8	52	15	15	6	20	3
12	5	5	8	3	12	7	44	12	16	6	13	4
13	4	6	6	3	12	7	40	18	15	6	8	8
14	3	6	4	3	12	7	36	26	15	6	6	9
15	4	6	4	3	12	8	39	28	17	7	4	6
16	4	6	4	5	8	8	48	26	13	10	3	7
17	4	6	4	56	8	84	42	23	12	9	3	10
18	4	6	4	78	7	160	37	32	11	7	3	6
19	9	6	4	35	8	100	35	35	18	7	3	4
20	6	6	4	28	9	85	32	27	21	39	20	10
21	6	8	5	23	9	60	30	22	15	32	25	10
22	7	13	6	16	28	43	28	20	13	25	15	170
23	11	12	8	21	20	30	25	17	11	12	6	48
24	14	9	22	21	14	26	23	16	10	9	5	18
25	11	8	43	16	8	33	22	16	10	8	5	18
26	7	14	29	16	8	37	22	15	9	8	9	12
27	7	21	15	15	8	33	20	14	8	8	8	10
28	7	17	10	15	7	30	20	15	9	6	10	8
29	6	14	9	15	7	25	25	28	9	6	12	8
30	6	8	8	15	---	24	32	31	7	5	9	6
31	6	---	7	16	---	24	---	32	---	6	6	---
MAX	14	21	43	78	28	160	130	35	110	39	140	170
MIN	3.0	5.0	4.0	3.0	7.0	5.0	20	12	7.0	5.0	3.0	3.0
WTR YR 1980	MAX 170		MIN 3.0									
TOTAL	172	252	281	456	332	898	1223	658	695	297	515	415

TOTAL LOAD FOR YEAR: 6194 POUNDS

Table 22. Total phosphorus load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL PHOSPHORUS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	3	12	5	5	9	134	68	24	64	25	28
2	21	3	12	5	5	10	99	61	21	64	23	28
3	19	3	11	5	5	10	85	98	19	39	22	25
4	17	3	10	5	5	11	103	82	24	40	22	22
5	16	3	9	5	5	11	118	56	23	40	33	22
6	28	3	6	5	5	12	101	48	22	32	30	23
7	23	4	6	5	5	12	67	43	42	26	25	18
8	19	4	6	5	5	12	56	39	35	23	14	18
9	18	4	6	5	5	11	53	36	40	23	102	18
10	16	4	6	5	5	11	53	33	65	26	432	18
11	14	4	6	5	6	11	54	32	49	35	99	18
12	12	4	6	5	6	11	186	30	39	28	70	20
13	11	4	6	5	6	11	154	29	33	44	53	20
14	11	5	6	4	6	11	94	32	30	35	43	18
15	10	7	6	4	5	12	67	31	28	26	33	16
16	11	7	5	4	5	11	56	27	26	21	29	16
17	12	14	5	4	5	11	49	28	26	20	29	16
18	11	40	5	5	6	16	45	30	25	18	30	16
19	10	32	5	5	6	80	41	36	25	18	29	14
20	10	23	5	5	6	210	39	36	40	18	71	15
21	9	20	5	6	6	240	38	35	39	18	84	15
22	7	19	5	6	6	228	36	30	32	16	58	14
23	4	25	5	6	7	330	35	29	26	18	86	13
24	5	31	5	6	7	347	34	29	22	18	80	12
25	6	25	5	6	7	147	49	28	22	35	56	11
26	5	23	4	6	7	86	103	24	20	30	42	10
27	5	19	4	6	7	74	91	22	20	25	40	9
28	3	17	4	5	8	66	58	22	22	23	39	8
29	3	14	4	5	---	83	48	22	90	20	39	7
30	2	14	4	5	---	930	65	22	63	25	37	6
31	2	---	4	5	---	477	---	30	---	33	30	---
MEAN	11	12	6	5	5	113	73	37	33	29	58	16
WTR YR 1979	MEAN	33	MAX	930	MIN	2						
TOTAL	364	381	188	158	162	3501	2211	1168	992	891	1805	494

TOTAL LOAD FOR YEAR: 12315 POUNDS

TOTAL PHOSPHORUS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4	10	10	9	9	6	28	48	48	10	11	43
2	6	9	6	8	10	6	28	38	40	10	12	50
3	5	7	6	6	10	6	34	32	40	9	13	32
4	6	5	6	6	11	6	57	27	36	9	12	28
5	6	6	7	5	11	6	64	23	60	11	14	24
6	7	10	9	4	11	6	52	21	144	10	13	22
7	8	10	9	4	12	5	60	16	187	10	18	22
8	10	10	8	4	12	5	380	16	283	10	233	20
9	9	7	11	3	11	6	256	16	175	10	152	26
10	8	7	13	3	11	7	131	15	52	9	92	24
11	8	15	15	3	11	8	93	20	29	8	55	20
12	10	6	12	3	12	7	73	15	25	8	45	12
13	7	6	8	3	12	7	62	26	23	8	35	25
14	6	6	4	2	12	7	55	44	28	8	31	28
15	7	6	4	2	12	8	60	48	32	10	25	16
16	7	6	3	16	11	16	84	44	23	16	20	23
17	8	6	3	170	11	54	68	37	20	14	22	31
18	8	6	3	150	11	110	56	58	18	10	24	19
19	21	6	4	58	11	95	51	67	33	10	22	13
20	11	6	4	36	17	80	45	47	41	181	130	34
21	12	11	5	25	18	56	41	34	28	137	160	31
22	16	23	6	18	28	40	37	30	21	75	97	643
23	29	22	12	16	20	27	30	25	19	36	45	231
24	37	14	54	12	18	23	27	23	16	28	36	87
25	26	11	146	10	16	29	25	23	15	20	36	50
26	16	27	79	10	11	33	25	20	14	19	60	41
27	16	50	29	10	11	29	23	19	11	15	53	31
28	15	36	16	10	10	27	23	20	14	13	70	24
29	12	27	13	10	10	40	31	50	14	12	81	21
30	12	10	12	10	---	29	45	57	10	11	60	20
31	11	---	10	11	---	29	---	60	---	13	43	---
MEAN	11	12	17	20	12	26	68	32	50	24	55	56
WTR YR 1980	MEAN	32	MAX	643	MIN	2						
TOTAL	352	381	527	637	370	813	2044	1019	1499	750	1720	1691

TOTAL LOAD FOR YEAR: 11803 POUNDS

Table 23. Total orthophosphate phosphorus load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL ORTHOPHOSPHORUS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	3	11	5	3	8	92	22	5	24	6	8
2	17	3	10	5	3	8	38	19	4	22	6	8
3	15	3	10	5	3	9	30	37	3	12	5	6
4	14	3	9	4	3	10	40	29	5	12	5	5
5	13	3	8	4	3	10	49	16	4	12	9	5
6	21	3	8	4	3	11	39	13	4	9	8	6
7	18	4	8	4	3	11	22	11	12	7	6	4
8	15	4	8	4	4	11	17	10	10	6	4	4
9	14	4	8	4	4	10	15	9	12	6	24	4
10	13	4	7	4	4	10	15	8	23	7	174	4
11	12	4	7	4	4	10	16	7	16	10	74	4
12	11	4	6	4	4	10	94	7	12	8	38	5
13	10	4	6	4	4	10	72	6	9	14	22	5
14	10	5	6	4	4	10	35	7	8	10	15	4
15	9	6	6	4	3	11	22	7	8	7	10	4
16	10	6	6	4	3	10	16	6	7	5	7	4
17	10	12	6	4	3	10	13	6	7	5	6	4
18	10	28	6	4	4	9	12	7	6	4	5	4
19	9	23	6	5	4	36	10	9	6	4	4	3
20	9	18	6	5	4	120	10	9	12	4	26	3
21	8	16	6	5	4	170	9	8	12	4	32	4
22	6	15	5	5	4	171	9	7	9	4	20	3
23	4	19	5	4	5	204	8	6	7	4	33	3
24	5	23	5	4	5	178	8	6	5	4	30	4
25	6	19	5	4	5	65	13	5	5	10	19	4
26	5	18	5	4	5	32	40	5	5	8	13	4
27	5	15	5	4	6	22	33	4	5	6	12	3
28	4	14	5	4	7	18	18	4	5	6	12	3
29	3	12	5	4	---	21	13	4	25	5	12	3
30	3	12	5	3	---	270	21	4	30	6	11	4
31	3	---	5	3	---	275	---	7	---	9	8	---
MAX	21	28	11	5.0	7.0	275	94	37	30	24	174	8.0
MIN	3.0	3.0	5.0	3.0	3.0	8.0	8.0	4.0	3.0	4.0	4.0	3.0
WTR YR 1979	MAX 275		MIN 3.0									
TOTAL	310	307	204	129	111	1760	829	305	281	254	656	129

TOTAL LOAD FOR YEAR: 5275 POUNDS

TOTAL ORTHOPHOSPHORUS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3	10	9	9	6	6	10	8	8	3	3	16
2	4	9	7	8	6	6	10	6	6	3	3	20
3	3	7	6	7	6	6	11	4	6	2	4	11
4	4	6	7	6	7	6	19	4	5	2	3	9
5	4	6	7	6	8	6	22	3	6	3	4	8
6	4	10	9	5	8	4	18	2	39	3	4	7
7	5	9	9	5	8	3	22	2	43	3	13	7
8	6	9	8	5	8	3	101	2	97	3	226	6
9	6	7	11	4	8	4	85	2	69	3	138	8
10	5	7	12	4	8	4	48	2	19	2	63	8
11	5	13	13	4	8	4	31	2	10	2	30	6
12	6	6	11	4	8	4	24	2	8	2	24	10
13	4	7	8	4	8	4	21	3	8	2	19	21
14	4	7	4	3	8	4	18	7	10	2	16	24
15	4	7	5	3	8	4	20	8	11	3	13	14
16	4	6	4	11	8	5	28	7	8	5	10	19
17	5	7	4	51	8	38	23	5	6	4	10	26
18	5	7	4	46	7	79	19	10	6	3	10	16
19	12	7	5	20	8	41	17	12	12	3	8	11
20	7	7	5	15	9	30	15	7	16	66	60	29
21	7	11	6	11	9	21	14	5	10	55	78	26
22	9	19	7	11	19	15	12	4	7	27	43	243
23	16	18	11	22	14	11	10	3	6	8	17	107
24	20	13	36	17	14	9	9	3	5	6	13	51
25	15	11	80	9	12	12	8	3	5	5	13	31
26	9	21	39	8	11	14	8	2	4	5	24	22
27	9	34	22	8	11	12	8	2	3	5	21	18
28	9	26	14	7	11	11	8	2	4	4	29	16
29	7	21	12	7	11	10	6	8	4	3	34	13
30	7	10	11	7	---	10	10	10	3	3	24	13
31	7	---	9	5	---	10	---	10	---	4	16	---
MAX	20	34	80	51	19	79	101	12	97	66	226	243
MIN	3.0	6.0	4.0	3.0	6.0	3.0	6.0	2.0	3.0	2.0	3.0	6.0
WTR YR 1980	MAX 243		MIN 2.0									
TOTAL	215	338	395	332	265	396	655	150	444	244	973	816

TOTAL LOAD FOR YEAR: 5223 POUNDS

Table 24. Total organic nitrogen load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL ORGANIC NITROGEN, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1080	86	300	48	28	53	6250	2230	250	985	160	380
2	830	94	290	48	28	55	3330	1850	260	794	120	340
3	540	94	280	48	28	80	2320	2620	210	730	110	290
4	400	94	260	45	28	97	2270	1730	630	500	92	220
5	300	94	260	45	28	97	2510	1370	500	470	92	190
6	1280	94	240	45	28	95	1980	1140	450	420	170	180
7	1200	94	230	43	29	95	1580	910	1030	330	150	160
8	940	94	220	43	29	95	1120	740	840	290	97	120
9	760	94	220	43	31	95	960	640	680	260	130	100
10	600	94	220	43	32	95	940	550	1690	230	3340	92
11	480	94	220	43	32	95	1000	490	1190	280	4590	92
12	420	94	210	43	32	99	3310	470	870	330	2120	100
13	330	120	200	43	32	110	3980	440	710	290	778	100
14	270	160	190	32	32	110	2990	420	590	390	497	92
15	220	240	180	28	32	110	1810	460	530	330	348	85
16	240	190	180	26	31	110	1180	380	500	250	246	78
17	240	430	170	28	31	110	940	420	450	200	202	78
18	230	1280	160	32	32	170	780	470	420	180	182	71
19	210	1080	160	37	32	810	680	800	410	190	168	64
20	220	730	160	39	32	2470	600	760	870	190	448	58
21	210	510	150	41	34	8660	550	600	710	200	1930	64
22	160	380	150	41	36	9110	520	490	470	220	1300	64
23	100	570	150	41	39	10700	480	420	360	190	950	64
24	210	1280	140	41	42	9780	440	380	290	180	2680	64
25	260	970	140	41	45	3560	540	356	260	200	2100	64
26	240	730	140	39	47	2110	1410	300	230	160	920	64
27	160	540	140	39	49	1610	1690	280	220	140	660	71
28	120	460	140	39	52	1430	1140	280	211	110	620	64
29	79	390	130	39	---	1430	810	270	817	92	520	58
30	79	350	130	39	---	5280	2330	380	1680	85	450	64
31	86	---	130	39	---	10800	---	420	---	130	370	---
MAX	1280	1280	300	48	52	10800	6250	2620	1690	985	4590	380
MIN	79	86	130	26	28	53	440	270	210	85	92	58

WTR YR 1979 MAX 10800 MIN 26

TOTAL	12494	11530	5890	1198	951	69521	50480	23066	18328	9346	26540	3531

TOTAL LOAD FOR YEAR: 232835 POUNDS

TOTAL ORGANIC NITROGEN, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	118	140	200	86	67	370	630	370	120	140	500
2	66	140	120	170	92	58	360	550	320	120	130	470
3	73	120	110	160	94	52	400	460	290	120	140	440
4	66	110	110	140	97	48	1500	380	280	120	150	320
5	73	94	110	140	97	54	2940	330	379	110	150	290
6	80	100	110	130	94	56	1520	300	1450	130	170	250
7	80	140	120	120	92	39	1170	270	2590	130	172	230
8	94	140	140	110	86	39	2840	248	3160	120	1930	220
9	110	130	240	100	76	41	5400	250	3140	100	4280	230
10	100	92	140	94	70	41	4650	220	2580	100	2260	260
11	94	86	120	87	68	39	3030	240	803	100	1270	240
12	87	92	54	87	68	34	1710	240	397	92	943	230
13	100	86	49	80	68	37	1260	250	400	92	721	350
14	80	86	47	80	65	39	980	390	380	83	499	440
15	73	86	43	190	62	43	1000	550	440	100	370	410
16	87	92	41	640	59	54	1990	480	430	201	380	334
17	87	96	41	3800	54	390	1560	420	300	355	330	841
18	87	92	41	2900	51	510	1160	470	260	222	340	817
19	94	92	41	2000	54	2300	920	640	280	159	340	547
20	190	92	43	1000	62	2350	770	600	480	2240	990	838
21	110	95	43	650	97	1030	650	440	440	3470	1750	1820
22	100	210	47	420	150	580	570	350	300	1650	1200	8430
23	140	290	55	270	260	350	490	300	260	813	690	6920
24	220	230	70	200	210	310	410	280	200	350	450	6360
25	260	170	1800	160	170	330	370	260	180	260	380	3730
26	190	230	1600	140	170	430	350	240	170	230	470	1780
27	140	550	550	120	160	256	220	210	150	240	520	1280
28	140	520	350	120	100	300	310	200	150	200	484	1130
29	140	290	290	110	71	580	470	220	170	170	820	938
30	110	150	240	100	---	620	580	380	160	140	700	728
31	110	---	220	100	---	460	---	400	---	130	540	---
MAX	260	550	1800	3800	260	2350	5400	640	3160	3470	4280	8430
MIN	66	86	41	80	51	34	220	200	150	83	130	220

WTR YR 1980 MAX 8430 MIN 34

TOTAL	3447	4819	7125	14618	2883	11537	39950	11198	20909	12467	23709	41373

TOTAL LOAD FOR YEAR: 194035 POUNDS

Table 25. Total nitrogen load, in pounds per day, for Onion River at Hingham, 1979 and 1980 water years

TOTAL NITROGEN, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2400	200	680	240	180	360	21300	7940	470	2870	350	850
2	1850	210	650	240	180	370	12600	6250	490	1920	270	770
3	1210	210	630	240	180	400	8220	9780	380	1560	240	650
4	900	210	580	230	180	490	8030	5720	720	860	200	490
5	680	210	580	230	180	490	8960	4230	510	780	200	430
6	2830	210	550	230	180	480	6930	3330	450	670	390	410
7	2660	210	530	220	190	480	5410	2500	2670	460	330	350
8	2080	210	500	220	190	480	3720	1910	1940	370	154	250
9	1700	210	500	220	200	480	3120	1570	1410	320	217	220
10	1340	210	500	220	220	480	3050	1310	5740	270	6950	200
11	1080	210	500	220	220	480	3280	1130	3350	350	10600	200
12	930	210	480	220	220	500	12120	1070	2050	460	4910	220
13	730	270	460	220	220	530	14840	960	1510	370	1840	220
14	600	370	430	160	220	540	10850	900	1120	600	1190	200
15	500	550	410	140	220	540	6260	1020	950	460	843	190
16	550	430	410	130	200	540	3930	800	860	290	603	170
17	550	960	390	140	200	540	3050	900	740	220	500	170
18	530	2830	370	160	220	1800	2500	1070	670	170	456	160
19	480	2400	370	180	220	4510	2150	2130	630	200	428	140
20	500	1620	370	190	220	9380	1880	1980	2050	200	898	130
21	480	1150	350	200	230	32900	1720	1440	1510	220	4250	140
22	370	840	350	200	240	35900	1600	1130	780	240	2720	140
23	230	1280	350	200	260	43000	1450	900	530	200	2560	140
24	480	2830	330	200	280	39800	1350	800	370	170	5350	140
25	580	2160	330	200	300	16500	1660	641	320	220	4610	140
26	550	1620	310	190	310	12200	4780	600	270	350	2400	140
27	370	1210	310	190	320	7940	5820	560	240	310	1760	160
28	270	1000	310	190	310	7110	3780	530	238	240	1580	140
29	180	870	290	190	---	7620	2600	510	1560	200	1260	130
30	180	790	290	190	---	20400	8420	800	5300	190	1000	140
31	200	---	290	190	---	31800	---	900	---	280	820	---
MEAN	903	856	432	200	225	9001	5846	2107	1328	517	1932	261
WTR YR 1979	MEAN	1980	MAX	43000		MIN	130					
TOTAL	27990	25690	13400	6190	6290	279040	175380	65311	39828	16020	59879	7830

TOTAL LOAD FOR YEAR: 722848 POUNDS

TOTAL NITROGEN, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	260	300	450	490	470	590	1110	700	160	180	710
2	150	300	260	380	540	390	570	940	580	160	160	670
3	160	260	250	360	560	330	830	750	520	160	180	600
4	150	250	250	320	580	290	3790	600	500	160	200	400
5	160	210	250	300	580	350	11800	510	558	150	200	360
6	180	230	250	280	560	370	6660	470	6340	180	240	290
7	180	320	260	260	540	220	4860	400	6540	180	223	260
8	210	320	300	250	490	220	12600	306	11600	160	4380	240
9	250	280	540	230	410	240	21800	360	7380	130	10300	260
10	230	250	320	210	370	240	18900	320	8250	130	6430	310
11	210	230	260	190	350	220	10800	340	2300	130	3390	280
12	190	250	230	190	350	180	5840	340	866	120	2120	260
13	230	230	190	180	350	200	4020	360	631	120	1340	680
14	180	230	165	180	330	220	2930	760	730	100	771	880
15	160	230	160	313	310	250	3010	1030	890	130	485	820
16	190	261	150	1660	290	350	7030	990	860	270	408	522
17	190	260	150	4860	250	660	5220	820	550	433	364	2040
18	190	250	150	4280	240	1400	3610	960	440	280	373	1820
19	210	250	150	5140	250	5480	2720	1450	500	205	382	1150
20	430	250	160	3300	310	5140	2180	1330	990	6440	1730	1610
21	250	260	160	2230	450	2320	1750	890	890	10300	3630	3610
22	230	470	180	1560	670	1490	1480	670	550	4350	2230	15500
23	320	670	230	1100	1190	998	1230	550	440	2080	1090	17700
24	500	520	320	880	1080	470	1000	500	320	640	622	17000
25	590	380	5160	745	970	500	890	440	280	420	495	10800
26	430	520	4140	720	1030	802	800	390	260	350	667	5720
27	300	1250	1250	630	920	1071	730	350	220	370	759	4160
28	300	1190	800	580	600	1118	700	320	220	300	673	3560
29	300	670	670	510	470	950	790	370	260	240	1370	2690
30	250	340	540	470	---	1050	1000	730	240	180	1150	2120
31	250	---	500	470	---	750	---	790	---	160	800	---
MEAN	249	380	603	1072	536	927	4671	650	1847	942	1527	3234
WTR YR 1980	MEAN	1379	MAX	21800		MIN	100					
TOTAL	7720	11391	18695	33228	15530	28739	140130	20146	55405	29188	47352	97022

TOTAL LOAD FOR YEAR: 504546 POUNDS

Table 26. Total nitrite plus nitrate nitrogen load, in pounds per day, for Onion River near Sheboygan Falls, 1979 and 1980 water years

TOTAL NITRITE PLUS NITRATE, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1370	110	520	250	180	230	14000	7200	160	1939	60	460
2	1050	120	500	250	180	240	8744	5220	170	1087	35	420
3	690	120	490	250	180	260	5330	9510	120	530	26	350
4	510	120	470	240	180	320	4190	4630	290	170	18	270
5	380	120	470	240	180	320	5820	3090	180	140	18	240
6	1620	120	454	230	150	310	4470	2240	150	100	110	220
7	1520	120	440	220	160	310	3470	1530	1470	52	88	190
8	1190	120	430	220	160	310	2370	1060	690	35	47	140
9	970	120	430	220	160	310	1970	820	430	26	74	120
10	760	120	430	220	170	310	1930	640	6320	18	3410	120
11	620	120	410	220	170	310	2080	530	2260	30	5840	120
12	530	120	400	220	170	320	7930	490	890	52	2590	120
13	420	150	380	220	160	340	9750	420	490	35	754	120
14	340	210	370	150	160	350	7080	390	280	85	327	120
15	280	310	360	130	160	350	4030	460	200	52	214	110
16	310	240	360	120	150	350	2500	330	170	22	152	99
17	310	550	350	130	150	350	1930	390	130	12	124	99
18	300	1620	340	150	150	970	1570	490	100	8	112	90
19	270	1370	320	170	150	3540	1350	1230	95	10	104	82
20	280	930	320	180	150	6320	1180	1120	890	16	321	74
21	270	650	310	190	160	22700	1080	730	490	12	2140	82
22	210	480	310	180	170	25300	990	530	140	15	1360	82
23	130	730	310	180	180	30500	900	390	67	10	1110	82
24	270	1620	300	180	180	27400	840	330	34	8	3010	82
25	320	1230	300	180	200	11000	1030	261	26	12	2220	82
26	310	930	270	170	200	6650	3050	230	18	60	1070	82
27	210	690	270	170	210	4960	3740	200	8	46	780	90
28	150	580	270	170	224	4290	2410	190	8	26	740	82
29	100	500	260	170	---	4470	1640	180	622	18	518	74
30	100	450	260	160	---	13700	7780	330	3630	15	540	82
31	110	---	260	160	---	19200	---	390	---	40	440	---
MEAN	513	489	367	192	171	6009	3838	1469	684	151	915	146

WTR YR 1979 MEAN 1254 MAX 30500 MIN 8

TOTAL	15903	14670	11377	5952	4788	186279	115140	45539	20520	4681	28365	4380

TOTAL LOAD FOR YEAR: 457759 POUNDS

TOTAL NITRITE PLUS NITRATE, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	90	150	170	250	260	300	370	49	220	24	28	170
2	90	170	150	220	280	260	350	35	160	24	24	150
3	99	150	140	200	280	230	400	22	140	24	28	130
4	90	140	140	180	290	210	2060	14	130	24	37	70
5	99	120	140	170	290	240	8500	10	74	21	33	60
6	110	130	140	160	280	240	5300	9	3830	28	43	44
7	110	180	150	150	280	160	3980	6	2550	28	43	37
8	120	180	170	140	260	160	9570	4	7760	24	1674	34
9	140	160	290	130	230	170	16100	5	4060	17	5482	37
10	130	140	180	120	210	170	14400	4	5600	17	3952	48
11	120	130	150	120	200	160	8080	5	1380	17	1983	40
12	120	140	130	120	200	140	1340	5	407	14	986	37
13	130	130	120	110	200	150	630	5	278	14	469	160
14	110	130	110	110	190	160	340	250	230	12	202	230
15	99	130	99	240	190	170	360	400	320	17	99	210
16	120	147	90	755	170	220	1940	370	300	54	96	160
17	120	150	90	3310	150	480	1070	280	150	119	75	1110
18	120	140	90	3640	140	530	510	350	110	55	80	992
19	120	140	90	3340	150	1940	290	670	130	40	80	592
20	240	140	99	2030	170	1900	190	580	370	3210	613	735
21	140	150	99	1440	230	960	120	320	320	6620	1840	1560
22	130	260	110	1050	320	660	86	200	150	2580	890	7520
23	183	350	130	780	810	480	60	150	110	580	310	10500
24	270	280	180	640	700	280	39	130	68	190	140	10600
25	320	220	2220	420	590	300	31	110	54	100	96	6890
26	240	280	1820	450	640	490	25	92	48	75	150	3820
27	170	620	620	370	570	709	21	75	37	83	180	2800
28	170	590	420	330	400	950	19	68	37	61	197	2360
29	170	350	350	280	340	700	24	83	48	43	430	1700
30	140	190	290	270	---	750	39	230	43	25	320	1350
31	140	---	270	270	---	500	---	260	---	24	190	---
MEAN	144	206	298	703	311	476	2541	155	970	457	670	1805

WTR YR 1980 MEAN 723 MAX 16100 MIN 4

TOTAL	4464	6180	9238	21793	9019	14756	76230	4805	29100	14167	20770	54150

TOTAL LOAD FOR YEAR: 264672 POUNDS

Table 27. Total ammonia nitrogen load, in pounds per day, for Onion River near Sheboygan Falls, 1979 and 1980 water years

TOTAL AMMONIA NITROGEN, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	12	27	18	14	44	1140	130	11	72	17	33
2	53	12	26	18	14	46	494	100	11	62	14	31
3	40	12	26	18	14	50	300	150	9	53	13	27
4	33	12	24	17	14	61	290	95	16	39	11	22
5	27	12	24	17	14	61	330	73	12	37	11	20
6	71	12	23	17	14	59	240	60	10	34	18	19
7	68	12	23	16	14	59	170	47	70	28	16	17
8	58	12	22	16	14	59	110	37	60	25	12	14
9	50	12	22	16	15	59	85	31	50	23	12	12
10	43	12	22	16	16	59	83	27	100	21	178	11
11	37	12	22	16	16	59	91	24	79	24	233	11
12	34	12	21	16	16	62	490	22	61	28	172	12
13	28	14	21	16	16	66	640	20	52	25	78	12
14	25	18	20	12	16	68	420	19	45	32	51	11
15	22	23	19	10	16	68	210	21	41	28	36	11
16	23	20	19	10	15	68	110	17	39	22	26	10
17	23	34	18	10	15	68	83	19	36	19	21	10
18	23	71	18	12	16	120	64	22	34	17	20	9
19	21	64	18	14	16	370	52	40	33	18	18	9
20	22	49	18	14	16	480	44	38	61	18	31	8
21	21	38	17	15	17	1540	39	29	52	19	91	9
22	18	31	17	15	18	1580	36	24	37	20	59	9
23	13	41	17	15	19	1990	32	19	30	18	67	9
24	21	71	16	15	28	2530	29	17	25	17	150	9
25	24	59	16	15	30	982	38	15	23	19	120	9
26	23	49	16	14	31	550	150	14	21	17	66	9
27	18	40	16	14	32	380	190	13	20	16	51	9
28	14	36	16	14	43	300	110	12	20	13	49	9
29	11	32	15	14	---	291	67	12	40	11	26	8
30	11	30	15	14	---	1080	130	17	112	11	38	9
31	12	---	15	14	---	1890	---	19	---	15	32	---
MAX	71	71	27	18	43	2530	1140	150	112	72	233	33
MIN	11	12	15	10	14	44	29	12	9.0	11	11	8.0

WTR YR 1979 MAX 2530 MIN 8.0

TOTAL	951	864	608	458	519	15099	6267	1183	1210	801	1737	389

TOTAL LOAD FOR YEAR: 30086 POUNDS

TOTAL AMMONIA NITROGEN, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	14	16	20	26	25	60	69	50	26	3	18
2	10	16	14	18	28	22	60	63	46	26	3	17
3	10	14	14	18	28	19	60	57	44	26	3	15
4	10	14	14	16	29	18	108	51	43	26	3	9
5	10	12	14	16	29	20	274	47	50	25	3	8
6	11	13	14	15	28	21	154	45	122	27	4	7
7	11	16	14	14	28	14	131	42	194	27	4	6
8	12	16	16	14	26	14	238	52	175	26	191	5
9	14	15	23	13	23	15	333	40	137	23	354	6
10	13	14	16	12	21	15	252	37	152	23	159	7
11	12	13	1⅞	12	20	14	220	38	66	23	90	6
12	12	14	13	12	20	13	160	38	43	22	63	6
13	13	13	12	11	20	14	130	40	53	22	45	11
14	11	13	7	11	19	14	110	52	51	21	28	15
15	10	13	10	20	19	16	110	59	56	23	20	14
16	12	17	10	84	18	20	170	58	55	5	12	11
17	12	14	10	350	16	45	150	54	45	4	10	79
18	12	14	10	280	15	320	120	58	41	4	10	31
19	12	14	10	350	16	1280	110	70	43	7	10	18
20	20	14	10	210	25	936	96	67	58	133	50	30
21	14	14	10	130	30	350	86	56	56	209	120	168
22	13	21	11	88	45	210	79	49	45	84	66	356
23	16	27	13	57	80	130	72	45	41	25	29	470
24	22	23	16	44	75	110	65	43	35	11	16	443
25	25	18	110	36	65	90	61	41	33	7	12	267
26	20	23	92	34	70	80	58	38	32	6	17	137
27	16	41	41	31	65	99	56	36	30	6	20	94
28	16	40	30	29	40	85	55	35	30	5	9	73
29	16	27	27	27	35	80	58	37	32	4	38	48
30	14	17	23	25	---	85	65	51	31	3	30	44
31	14	---	22	25	---	70	---	53	---	3	20	---
MAX	25	41	110	350	80	1280	333	70	194	209	354	470
MIN	10	12	7.0	11	15	13	55	35	30	3.0	3.0	5.0

WTR YR 1980 MAX 1280 MIN 3.0

TOTAL	423	534	656	2022	959	4244	3701	1521	1889	882	1442	2419

TOTAL LOAD FOR YEAR: 20692 POUNDS

Table 28. Total phosphorus load, in pounds per day, for Onion River near Sheboygan Falls, 1979 and 1980 water years

TOTAL PHOSPHORUS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	200	16	55	21	14	41	1510	390	31	206	65	120
2	150	17	53	21	14	43	610	320	33	200	53	110
3	99	17	51	21	14	49	450	470	26	150	47	98
4	74	17	47	20	14	67	440	290	46	96	41	79
5	50	17	47	20	14	67	490	220	34	89	41	70
6	240	17	45	20	14	64	370	180	30	80	71	68
7	220	17	43	18	16	64	290	140	220	62	57	60
8	170	17	41	18	16	64	200	110	170	53	44	47
9	140	17	41	18	17	64	170	92	140	47	48	41
10	110	17	41	18	18	64	160	79	370	41	886	39
11	89	17	41	18	18	64	180	69	350	50	1050	39
12	76	17	39	18	18	69	660	66	180	62	541	41
13	60	21	37	18	18	76	810	60	140	53	234	41
14	49	30	35	12	18	79	590	56	120	74	156	39
15	41	45	33	9	18	79	340	63	100	62	114	36
16	45	35	33	8	17	79	210	50	96	44	85	34
17	45	79	31	9	17	79	160	57	86	36	73	34
18	43	240	30	12	18	80	130	66	80	30	69	31
19	39	200	30	14	18	290	110	120	77	33	66	29
20	41	130	30	16	18	490	100	110	180	33	132	27
21	39	94	28	17	19	1680	91	85	140	36	474	29
22	30	69	28	17	21	1860	84	69	89	39	252	29
23	18	100	28	17	25	2240	77	56	68	33	260	29
24	39	240	26	17	28	1960	71	51	53	30	590	29
25	47	180	26	17	31	799	88	45	47	36	490	29
26	45	130	25	16	33	480	260	39	41	65	250	29
27	30	99	25	16	35	360	310	37	39	59	190	31
28	21	84	25	16	36	320	200	35	39	47	180	29
29	14	71	23	16	---	296	140	34	151	41	123	27
30	14	64	23	16	---	1160	410	51	332	39	140	29
31	16	---	23	16	---	2930	---	56	---	56	120	---
MEAN	74	70	34	16	19	518	324	115	117	63	224	45
WTR YR 1979	MEAN	136	MAX	2930	MIN	8						
TOTAL	2294	2114	1083	510	557	16057	9711	3566	3508	1982	6942	1373

TOTAL LOAD FOR YEAR: 49697 POUNDS

TOTAL PHOSPHORUS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	49	22	33	17	17	50	110	100	38	41	110
2	31	54	19	28	18	15	40	94	92	38	38	100
3	34	49	17	26	19	13	50	81	86	38	41	96
4	31	47	17	23	19	12	295	69	82	38	44	69
5	34	41	17	22	19	14	727	62	88	35	44	64
6	36	44	17	20	19	14	206	58	492	41	49	54
7	36	57	19	19	18	10	162	53	572	41	49	49
8	41	57	22	17	17	10	711	58	649	38	612	46
9	47	52	40	16	15	10	1130	49	616	32	1160	49
10	44	47	23	15	14	10	659	45	591	32	571	56
11	41	44	19	13	14	10	550	47	176	32	320	52
12	39	47	16	13	14	9	340	47	77	30	233	49
13	44	44	13	12	14	9	260	28	110	30	174	77
14	36	44	12	12	13	10	210	110	110	27	117	96
15	34	44	9	100	12	11	210	140	120	32	86	91
16	39	52	10	350	12	14	382	130	120	59	76	99
17	39	49	10	880	11	130	310	120	89	99	71	253
18	39	47	10	600	10	170	240	130	76	59	76	174
19	41	47	10	450	11	680	200	180	82	41	81	110
20	70	47	11	230	12	490	170	170	130	663	290	213
21	47	49	11	120	24	230	150	120	120	867	314	545
22	44	35	12	70	32	100	130	100	89	344	236	2650
23	57	50	16	40	65	60	110	88	76	170	160	2800
24	79	38	23	27	45	40	98	82	61	98	99	2240
25	90	27	447	24	42	40	91	76	55	73	82	1170
26	70	38	353	23	44	70	85	70	52	64	100	520
27	54	98	98	21	40	98	79	64	46	67	120	320
28	54	93	61	19	30	100	77	61	46	58	161	242
29	54	50	50	18	27	80	83	67	52	49	190	183
30	47	25	40	17	---	90	98	110	49	41	160	154
31	47	---	37	17	---	60	---	110	---	38	120	---
MEAN	46	48	47	106	22	84	263	88	170	107	191	424
WTR YR 1980	MEAN	133	MAX	2800	MIN	9						
TOTAL	1430	1465	1481	3275	647	2626	7903	2729	5104	3312	5915	12731

TOTAL LOAD FOR YEAR: 48618 POUNDS

Table 29. Total orthophosphate phosphorus load, in pounds per day, for Onion River near Sheboygan Falls, 1979 and 1980 water years

TOTAL ORTHOPHOSPHORUS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	110	14	32	12	14	34	854	140	9	73	23	47
2	86	15	21	12	14	35	371	110	10	53	19	44
3	61	15	21	12	14	38	190	170	8	51	17	38
4	48	15	12	11	14	46	190	100	14	34	15	30
5	38	15	12	11	14	46	210	75	10	31	15	27
6	120	15	11	11	14	45	150	59	9	28	25	26
7	120	15	11	11	15	45	110	45	74	22	22	23
8	95	15	11	11	15	45	69	35	59	19	17	18
9	80	15	11	11	15	45	55	29	47	17	19	16
10	66	15	11	11	16	45	54	24	130	15	330	15
11	56	15	11	11	16	45	59	21	87	18	425	15
12	49	15	10	11	16	47	320	20	62	22	240	16
13	40	18	10	11	16	50	410	18	50	19	107	16
14	34	23	10	8	16	51	270	17	40	26	69	15
15	30	32	9	7	16	51	140	19	36	22	49	14
16	32	26	9	6	15	51	74	15	34	16	35	13
17	32	51	9	7	15	51	54	17	30	13	29	13
18	31	120	9	8	16	23	41	20	28	11	27	12
19	28	110	9	9	16	180	34	39	27	12	25	11
20	30	77	9	10	16	320	29	36	62	12	46	10
21	28	58	8	10	22	1070	26	27	50	13	167	11
22	23	45	8	10	23	1120	23	21	31	14	86	11
23	16	64	8	10	25	1330	21	17	24	12	100	11
24	28	120	8	10	27	1320	19	15	19	11	240	11
25	33	98	8	10	29	533	24	10	17	13	188	11
26	32	77	8	10	30	320	95	12	15	23	99	11
27	23	61	8	10	31	240	120	11	14	21	76	12
28	18	53	8	10	33	200	71	10	13	17	72	11
29	13	47	8	10	---	179	44	10	47	15	45	10
30	13	41	8	10	---	570	140	15	122	14	55	11
31	14	---	8	10	---	1360	---	17	---	20	46	---
MAX	120	120	32	12	33	1360	854	170	130	73	425	47
MIN	13	14	8.0	6.0	14	23	19	10	8.0	11	15	10
TOTAL	1427	1300	336	311	523	9535	4267	1174	1178	687	2728	529

WTR YR 1979 MAX 1360 MIN 6.0

TOTAL LOAD FOR YEAR: 23995 POUNDS

TOTAL ORTHOPHOSPHORUS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	18	20	27	17	17	48	19	20	5	10	48
2	11	20	18	24	18	15	48	16	17	5	9	45
3	12	18	17	23	19	13	52	13	15	5	10	41
4	11	17	17	21	19	12	105	10	14	5	11	27
5	12	15	17	20	19	14	228	9	14	5	11	25
6	13	16	17	19	19	14	105	8	176	6	13	20
7	13	54	18	18	18	10	80	7	210	6	11	18
8	15	54	20	17	17	10	206	4	217	5	344	17
9	17	45	31	16	15	10	341	6	209	4	731	18
10	16	41	21	15	14	10	243	6	177	4	350	21
11	15	39	18	14	14	10	203	6	59	4	179	19
12	14	41	16	14	14	9	100	6	30	4	123	18
13	16	39	14	13	14	9	69	6	22	4	88	22
14	13	39	8	13	13	10	50	21	21	3	56	28
15	12	39	12	24	12	11	51	28	25	4	39	26
16	14	41	11	75	12	27	120	27	24	14	34	22
17	14	43	11	390	11	44	89	23	16	24	29	116
18	14	41	11	380	10	124	62	26	13	15	30	63
19	15	41	11	380	11	466	47	39	14	10	30	41
20	26	41	12	220	12	370	37	36	27	261	110	111
21	17	43	12	130	24	155	30	25	25	315	230	344
22	16	28	13	70	32	100	25	19	16	120	140	924
23	21	37	16	45	65	66	21	16	13	62	72	1570
24	29	30	21	22	61	40	17	14	10	31	42	1390
25	33	24	190	19	42	42	15	13	8	21	34	735
26	26	30	160	18	44	54	14	12	8	18	45	327
27	20	61	61	16	40	71	12	10	7	19	51	186
28	20	59	43	16	30	95	12	10	7	16	51	129
29	20	37	37	14	27	75	13	11	8	13	90	93
30	17	22	31	13	---	80	17	21	7	10	74	78
31	17	---	29	13	---	58	---	22	---	10	53	---
MAX	33	61	190	390	65	466	341	39	217	315	731	1570
MIN	11	15	8.0	13	10	9.0	12	4.0	7.0	3.0	9.0	17
TOTAL	520	1073	933	2099	663	2041	2460	489	1429	1028	3100	6522

WTR YR 1980 MAX 1570 MIN 3.0

TOTAL LOAD FOR YEAR: 22357 POUNDS

Table 30. Specific conductance for Onion River at Hingham, 1979 and 1980 water years

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							---	---	---	614	609	613
2							---	---	---	610	606	608
3							---	---	---	613	600	609
4							---	---	---	603	592	596
5							---	---	---	602	591	596
6							---	---	---	620	598	610
7							---	---	---	634	614	625
8							---	---	---	641	632	637
9							---	---	---	644	633	639
10							---	---	---	645	636	641
11							---	---	---	645	637	642
12							---	---	---	642	638	640
13							---	---	---	640	627	634
14							---	---	---	630	624	626
15							---	---	---	631	614	623
16							---	---	---	628	615	622
17							---	---	---	622	597	611
18							---	---	---	616	596	607
19							---	---	---	615	602	607
20							---	---	---	629	613	620
21							---	---	---	634	625	630
22							---	---	---	637	628	632
23							---	---	---	638	631	633
24							---	---	---	700	579	624
25							624	480	616	659	634	648
26							627	571	604	664	643	654
27							606	575	585	667	654	662
28							596	576	586	669	657	663
29							606	595	599	662	641	656
30							611	593	603	649	624	640
31							---	---	---	652	636	643
MONTH							627	480	599	700	579	629

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	648	638	643	492	477	486	584	563	578	600	584	592
2	647	635	640	522	486	507	580	565	575	594	576	587
3	646	628	636	524	513	520	567	478	531	589	578	583
4	646	636	643	522	513	518	509	496	504	591	575	586
5	648	639	642	538	526	531	510	474	501	588	567	577
6	647	632	641	542	528	536	507	499	502	575	555	564
7	637	616	629	528	489	510	507	498	501	566	558	562
8	624	583	603	488	475	484	648	468	509	567	554	561
9	609	591	603	493	473	482	535	404	507	561	550	557
10	606	553	596	497	473	489	489	249	374	553	544	549
11	613	589	604	509	479	491	419	385	395	565	549	560
12	610	594	602	492	481	487	469	422	448	580	565	571
13	601	593	598	511	485	496	521	467	496	623	539	580
14	611	598	602	535	511	523	574	506	542	591	580	587
15	610	600	606	541	532	537	597	439	594	595	583	589
16	625	594	607	549	536	543	609	581	596	595	589	592
17	649	585	605	556	545	550	616	588	600	599	587	595
18	590	579	586	555	503	538	630	605	618	597	585	590
19	581	560	570	553	494	535	635	625	629	585	577	582
20	567	548	559	546	525	533	623	543	601	586	575	581
21	549	536	544	537	507	522	584	536	566	584	570	576
22	542	522	531	522	515	520	572	454	549	576	555	570
23	537	522	531	524	517	520	547	500	533	569	553	561
24	543	534	539	530	506	523	556	524	541	554	525	538
25	563	538	551	521	508	515	592	562	579	530	499	516
26	573	555	563	532	512	522	593	590	592	502	476	492
27	594	548	567	551	529	544	591	585	589	492	471	482
28	584	559	575	559	546	554	595	586	590	482	469	477
29	569	387	509	577	557	567	594	587	591	478	468	473
30	495	471	483	581	537	567	599	569	582	481	471	475
31	---	---	---	574	559	564	595	579	587	---	---	---
MONTH	649	387	587	581	473	523	648	249	545	623	468	557
YEAR	700	249	569									

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 30. Specific conductance for Onion River at Hingham, 1979 and 1980 water years–Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	484	469	476	575	562	568	681	651	665	652	646	651
2	493	480	487	562	552	559	700	677	692	653	643	648
3	493	489	491	563	550	557	711	700	705	654	647	650
4	500	490	494	563	558	561	715	696	710	657	651	655
5	510	497	503	569	561	565	704	670	686	661	652	657
6	514	508	511	567	554	558	677	645	657	662	653	659
7	517	511	514	559	554	555	651	633	640	684	663	674
8	520	509	515	555	548	554	636	620	627	677	661	668
9	522	520	521	558	553	554	633	617	625	712	661	687
10	527	521	523	558	553	554	633	620	628	717	694	702
11	521	517	519	569	552	560	623	614	618	718	660	686
12	526	509	518	583	570	575	623	606	615	673	651	661
13	520	514	518	586	568	578	626	590	608	677	655	669
14	527	518	523	573	565	568	622	600	613	685	625	648
15	532	519	525	642	563	610	632	610	618	632	620	625
16	530	524	527	639	620	628	645	633	637	624	448	542
17	529	524	528	627	595	605	655	624	644	458	385	420
18	536	527	532	608	592	600	691	653	666	422	387	400
19	543	530	538	614	600	606	707	672	687	485	425	454
20	574	537	549	611	600	606	673	652	659	546	479	511
21	556	551	555	608	590	600	659	646	651	600	545	576
22	551	542	548	614	595	602	647	613	631	628	598	619
23	544	529	532	620	598	613	614	580	597	648	610	633
24	538	528	533	627	614	619	586	537	566	660	588	625
25	543	539	541	639	620	627	549	521	540	612	578	600
26	544	533	539	633	611	626	535	513	523	600	563	581
27	551	542	547	639	627	633	575	533	552	633	591	611
28	560	545	554	630	603	615	608	573	592	629	617	622
29	581	555	572	623	603	610	631	609	623	636	609	622
30	582	574	578	654	623	644	641	629	636	646	627	636
31	582	553	574	---	---	---	651	642	646	649	638	646
MONTH	582	469	529	654	548	590	715	513	631	718	385	614

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	645	629	635	670	625	642	570	542	559	690	683	686
2	648	625	633	670	616	647	569	537	554	698	678	688
3	643	608	624	662	619	643	566	523	546	705	690	695
4	615	593	606	635	604	621	571	545	561	706	694	701
5	634	603	613	619	515	579	576	548	565	710	692	701
6	625	602	614	607	510	566	580	549	566	702	691	698
7	605	586	596	641	569	590	596	566	582	705	666	688
8	596	571	582	628	478	562	608	489	563	689	667	677
9	577	552	566	625	478	558	572	543	555	684	630	657
10	580	561	569	619	504	567	593	549	569	645	613	631
11	589	577	584	597	510	555	618	596	607	631	579	608
12	589	555	581	613	559	582	646	622	633	598	570	586
13	---	---	---	628	572	593	657	644	652	585	559	573
14	---	---	---	659	604	618	664	651	659	602	576	586
15	---	---	---	625	597	613	662	646	655	624	594	611
16	---	---	---	607	419	559	666	655	660	644	616	630
17	---	---	---	469	297	370	670	662	666	646	627	638
18	---	---	---	334	301	321	682	663	671	642	631	638
19	---	---	---	373	327	357	693	677	686	660	641	650
20	---	---	---	385	361	372	697	688	691	666	651	658
21	---	---	---	404	363	390	698	686	692	671	655	659
22	---	---	---	445	395	420	705	693	698	670	656	659
23	---	---	---	482	439	457	706	694	699	661	647	652
24	---	---	---	515	480	491	698	692	693	654	638	646
25	---	---	---	528	474	503	696	690	692	643	625	636
26	---	---	---	625	474	611	697	691	693	627	608	620
27	594	574	585	620	580	594	698	689	694	620	601	607
28	622	572	598	581	530	552	690	687	688	606	587	597
29	635	588	615	562	534	549	688	683	684	595	580	588
30	---	---	---	579	555	570	689	681	683	586	564	575
31	---	---	---	573	541	564	---	---	---	575	552	563
MONTH	648	552	600	670	297	536	706	489	637	710	552	639

Table 30. Specific conductance for Onion River at Hingham, 1979 and 1980 water years--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	574	545	553	469	453	458	433	420	427	587	578	583
2	621	552	587	457	446	451	441	430	436	592	552	583
3	642	620	629	466	444	453	440	434	437	596	590	593
4	628	598	612	453	449	450	444	429	440	597	585	594
5	628	587	614	---	---	---	454	428	442	602	565	585
6	614	586	595	---	---	---	482	458	472	575	563	569
7	598	565	583	---	---	---	476	448	459	583	565	574
8	558	480	532	---	---	---	458	333	391	597	581	589
9	479	466	471	---	---	---	513	387	475	601	583	593
10	528	481	502	---	---	---	506	488	494	594	581	586
11	554	499	525	---	---	---	518	497	502	592	576	583
12	603	494	560	---	---	---	559	517	535	590	561	576
13	583	555	571	---	---	---	585	560	575	570	568	569
14	604	565	585	---	---	---	612	589	600	572	564	567
15	593	577	583	---	---	---	625	602	615	565	563	564
16	584	568	575	559	524	534	630	611	618	572	551	564
17	567	533	554	511	496	505	627	616	621	568	547	556
18	539	508	523	510	494	501	621	534	592	586	554	568
19	508	490	501	493	485	489	572	519	550	606	588	597
20	529	495	506	484	321	392	555	414	503	605	592	598
21	528	492	515	432	355	405	503	406	462	591	579	584
22	516	495	508	415	395	405	510	497	503	592	311	436
23	533	505	519	446	414	428	522	504	510	465	441	454
24	526	498	509	464	437	452	542	513	524	523	467	492
25	514	493	506	492	462	477	549	525	541	553	511	529
26	525	499	511	507	490	501	560	542	554	560	554	557
27	498	490	495	517	500	510	568	558	563	---	---	---
28	495	479	488	534	510	521	560	532	550	---	---	---
29	485	474	478	530	444	495	558	515	536	---	---	---
30	479	457	469	464	441	452	569	553	563	---	---	---
31	---	---	---	468	417	445	579	570	575	---	---	---
MONTH	642	457	539	559	321	466	630	333	518	606	311	563
YEAR	718	297	574									

Table 31. Specific conductance for Onion River near Sheboygan Falls, 1979 and 1980 water years

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							---	---	---	606	550	577
2							---	---	---	608	599	605
3							---	---	---	604	577	587
4							---	---	---	590	575	583
5							---	---	---	608	586	594
6							---	---	---	625	606	615
7							---	---	---	630	611	619
8							---	---	---	635	601	622
9							---	---	---	637	575	617
10							---	---	---	630	542	595
11							---	---	---	607	562	587
12							---	---	---	606	543	582
13							---	---	---	592	544	570
14							---	---	---	567	477	531
15							---	---	---	531	455	496
16							---	---	---	497	456	477
17							---	---	---	504	483	494
18							---	---	---	505	475	497
19							---	---	---	521	470	495
20							---	---	---	555	503	528
21							---	---	---	540	491	517
22							---	---	---	531	505	523
23							---	---	---	549	527	543
24							---	---	---	651	532	578
25							641	625	636	659	621	642
26							624	500	571	648	606	629
27							562	510	540	645	622	633
28							582	561	568	665	607	640
29							608	584	594	654	574	620
30							592	546	570	636	606	625
31							---	---	---	636	585	613
MONTH							641	500	580	665	455	575

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	633	582	608	572	545	552	555	542	549	713	701	705
2	620	598	610	553	540	549	601	562	588	745	711	725
3	627	599	616	542	524	534	601	554	582	763	748	757
4	628	618	625	571	531	549	551	525	540	773	757	766
5	628	607	619	570	552	558	554	522	534	795	771	780
6	629	614	621	570	552	557	535	508	517	806	785	795
7	634	602	619	551	533	543	609	537	568	841	813	832
8	615	593	605	543	475	517	610	558	587	849	758	813
9	622	600	612	513	477	497	551	447	518	760	737	743
10	626	601	612	537	498	526	464	390	426	739	728	732
11	620	605	613	534	526	532	466	397	432	730	703	717
12	627	618	623	531	513	525	486	468	474	705	656	686
13	649	628	639	526	512	520	525	490	508	712	631	667
14	650	642	648	519	493	506	545	527	535	692	680	685
15	654	643	650	497	488	492	563	542	553	697	681	690
16	651	630	644	505	492	499	580	558	568	698	683	691
17	644	634	639	505	487	499	588	582	585	718	703	711
18	637	594	620	500	481	490	612	591	601	708	681	698
19	646	592	618	504	476	489	670	614	637	687	664	678
20	623	598	609	508	495	501	703	676	689	665	614	650
21	636	599	617	517	493	506	705	616	632	618	587	607
22	656	634	645	552	518	541	624	615	619	610	582	595
23	660	645	654	586	549	561	635	595	624	602	576	590
24	657	645	652	585	557	572	588	489	537	607	575	595
25	646	586	622	591	557	578	563	494	530	617	596	606
26	587	560	576	603	572	593	592	568	581	597	556	584
27	606	578	596	581	567	574	610	594	603	581	555	568
28	608	572	595	587	567	575	627	612	618	628	569	596
29	589	512	557	569	553	564	636	623	629	746	632	691
30	592	527	559	558	537	546	685	631	648	779	747	762
31	---	---	---	552	529	542	703	691	696	---	---	---
MONTH	660	512	617	603	475	535	705	390	571	849	555	691
YEAR	849	390	597									

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 31. Specific conductance for Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	776	737	756	798	706	741	717	702	709	709	690	700
2	738	715	730	830	803	820	732	720	728	707	699	702
3	716	701	711	812	785	804	746	735	743	734	703	717
4	702	691	697	802	775	787	761	741	750	730	715	723
5	692	669	683	819	807	813	744	698	719	742	722	729
6	670	650	662	821	808	812	705	653	687	742	734	739
7	658	648	653	810	779	791	690	649	677	804	730	762
8	650	631	642	807	780	795	715	655	690	861	805	831
9	654	632	644	785	762	771	744	710	725	873	853	863
10	655	643	648	806	775	790	759	689	724	895	825	875
11	650	644	647	818	807	813	704	664	685	817	739	765
12	648	648	648	---	---	---	701	651	685	789	747	767
13	650	643	646	---	---	---	707	648	667	821	797	809
14	641	632	637	---	---	---	723	609	678	823	751	784
15	640	630	635	865	830	859	679	648	668	708	682	700
16	647	641	644	841	815	827	691	660	678	681	444	660
17	658	645	650	838	823	827	722	695	707	702	577	611
18	677	659	668	841	810	823	780	726	754	589	563	573
19	683	648	670	818	798	808	790	718	750	588	572	578
20	646	630	637	811	768	788	715	649	676	639	598	619
21	681	641	656	785	754	767	673	653	663	689	650	675
22	694	679	686	822	764	780	655	628	639	718	695	710
23	695	671	680	830	687	726	628	602	614	764	726	747
24	735	672	705	713	682	697	599	538	561	812	775	792
25	705	640	654	689	673	686	590	520	552	814	804	809
26	675	647	659	676	658	667	596	549	575	807	794	799
27	708	676	693	721	679	701	646	607	620	809	794	803
28	736	709	725	697	670	678	663	625	639	815	808	812
29	749	733	739	677	670	672	678	644	662	827	815	822
30	769	750	758	718	680	702	705	667	687	833	825	828
31	751	701	721	---	---	---	721	683	699	832	821	825
MONTH	776	630	677	865	658	768	790	520	678	895	444	746

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	822	813	817	699	682	690	569	545	562	742	736	738
2	814	810	811	721	699	714	570	557	562	741	728	734
3	815	808	812	733	713	726	569	559	564	736	733	734
4	826	816	823	720	710	717	595	545	570	744	731	737
5	827	814	820	708	699	704	568	517	540	745	736	741
6	811	793	801	696	685	693	591	572	584	743	722	735
7	790	770	780	683	680	681	633	595	620	750	696	735
8	769	749	758	689	678	683	639	562	612	741	682	712
9	748	742	744	690	682	685	572	544	557	741	666	706
10	749	742	745	688	675	682	582	567	572	713	652	684
11	745	735	740	683	672	677	620	586	602	694	649	669
12	734	724	731	684	671	680	651	622	637	669	649	660
13	723	719	722	710	682	693	693	650	665	652	628	640
14	722	716	720	704	690	696	704	692	698	652	633	645
15	717	711	715	687	670	678	731	696	708	697	649	666
16	710	708	709	669	638	659	732	654	688	706	675	695
17	721	706	714	635	549	590	724	706	716	675	649	661
18	727	714	721	570	520	531	750	729	742	672	641	655
19	729	724	727	543	489	512	756	752	755	697	675	685
20	722	711	717	516	494	502	750	746	748	744	687	708
21	710	690	704	523	516	520	747	743	746	756	744	750
22	687	642	666	538	511	523	749	741	745	752	744	746
23	639	606	621	558	535	544	746	736	743	740	733	737
24	602	588	593	580	556	570	738	732	735	744	740	742
25	601	584	591	595	557	582	736	730	734	748	729	742
26	625	602	612	687	512	604	738	735	736	748	729	742
27	646	625	636	616	570	593	745	736	740	755	740	746
28	664	644	652	584	530	558	741	735	738	751	740	746
29	684	662	674	562	525	544	736	730	733	744	715	731
30	---	---	---	533	512	522	744	741	743	718	690	705
31	---	---	---	543	522	533	---	---	---	687	656	668
MONTH	827	584	720	733	489	622	756	517	670	756	628	710

Table 31. Specific conductance for Onion River near Sheboygan Falls, 1979 and 1980 water years--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	674	662	669	724	697	715	577	557	565	808	789	800
2	665	656	661	712	639	682	596	567	587	798	755	779
3	674	656	664	690	590	641	597	581	589	795	733	754
4	671	665	668	627	603	616	590	580	585	855	784	817
5	674	645	659	713	621	684	607	580	595	832	792	817
6	650	632	642	709	682	698	592	573	584	843	801	826
7	677	624	657	774	709	741	647	587	617	853	821	838
8	671	653	661	755	671	695	615	513	561	868	799	824
9	650	540	611	732	706	723	534	487	502	879	831	863
10	621	525	563	756	725	741	611	537	579	846	800	821
11	642	624	632	744	721	734	650	612	627	847	797	822
12	624	616	620	741	679	718	707	654	683	825	794	806
13	714	643	672	675	647	665	727	708	715	844	814	829
14	733	710	722	647	638	643	751	724	737	831	727	774
15	726	707	720	641	602	627	779	752	765	728	704	711
16	726	707	716	602	578	586	787	772	778	711	677	699
17	722	695	709	638	570	585	796	780	789	734	687	709
18	722	707	716	652	605	622	797	774	785	788	723	756
19	711	680	690	628	609	619	786	763	773	793	785	790
20	692	632	672	610	454	512	794	552	694	790	767	777
21	638	596	619	535	453	498	637	555	601	779	722	750
22	613	581	596	585	536	569	650	618	633	768	417	520
23	626	573	597	601	575	589	728	648	684	448	423	436
24	645	607	636	616	602	608	805	756	787	491	451	472
25	654	617	639	611	603	607	814	787	802	551	495	519
26	689	645	676	612	601	605	862	815	836	624	557	594
27	723	685	709	619	605	611	825	773	806	665	627	650
28	739	667	709	647	620	636	782	755	769	696	665	682
29	747	667	711	651	636	646	767	710	743	713	697	706
30	813	724	765	640	610	631	772	741	758	729	710	721
31	---	---	---	611	559	596	807	773	794	---	---	---
MONTH	813	525	666	774	453	640	862	487	688	879	417	729
YEAR	895	417	692									