MI/DEQ/WB-05/058

MICHIGAN WATER CHEMISTRY MONITORING
Great Lakes Tributaries

2003 Report

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

LIST OF APPENDICES

SECTION 1.0

HIGHLIGHTS

- The Michigan Water Chemistry Monitoring Project (WCMP) was initiated in 1998. This report summarizes results obtained from tributary monitoring efforts undertaken between March and November 2003. Results obtained from tributary monitoring efforts undertaken between February and November 2002 are summarized in the August 2004 report (MI/DEQ/WD-04/049). Additional tributary monitoring reports include MI/DEQ/WD-03/085, covering February through November 2001; MI/DEQ/SWQ-02/092, covering July through November 2000; and MI/DEQ/SWQ-02/025, covering June 1998 through September 1999.

- The WCMP was expanded in 2001 to more fully address the 4 goals identified in the January 1997 report entitled, "A Strategic Environmental Quality Monitoring Program for Michigan's Surface Waters." These goals are:

    1. Assess the current status and condition of individual waters of the state and determine whether standards are being met;
    2. Measure temporal and spatial trends in the quality of Michigan's surface waters;
    3. Provide data to support the Michigan Department of Environmental Quality (MDEQ) water quality programs and evaluate their effectiveness; and
    4. Detect new and emerging water quality problems.

- Samples were collected at 34 stations in 31 tributary watersheds in 2003. Sampling stations were located at or near the mouth of the main stream of each watershed; at a mid-reach location in selected large watersheds; and, for each in-monitoring-year watershed, at a location considered representative of the highest overall water quality in the watershed.

- Nine of 34 stations were sampled intensively (12 times) during periods of high flow and base/low flow, with an emphasis on the former. The remaining 25 stations were sampled non-intensively (4 times) without respect to stream flow conditions.

- Contaminants of interest at all stations included nutrients; conventionals; base/neutral organics; methyl tert butyl ether (MTBE); benzene, toluene, ethylbenzene, and xylene (BTEX); total cyanide (CN); and low level mercury, trace metals, and polychlorinated biphenyls (PCBs). Contaminants designated as water quality indicators for purposes of comprehensive data analysis included total phosphorus, chloride, suspended solids, mercury, chromium, copper, and lead; water quality indicators were sampled at all sampling events at all stations. Spatial trend analysis focused on these water quality indicators, as will future temporal trend analyses.

- In addition to the PCB sampling normally scheduled to take place in 2003 at the Pere Marquette, Boardman, and Flint Rivers, more frequent PCB sampling was carried out in these watersheds at a total of 8 stations. This effort, initiated in 2002, was a continuation of a special study designed to provide data in support of the MDEQ-Water Bureau's (WB's) Total Maximum Daily Load (TMDL) development process. PCB results obtained in 2002 as part of this special study, along with the locations sampled, are presented in Appendix B. The full report on the 2002 results of this special study is available upon request from the MDEQ-WB (MI/DEQ/WB-05/053).

- In 2003, contaminants of interest at selected stations included dioxins and furans at the Tittabawassee, Shiawassee and Saginaw Rivers. WCMP stations were sampled at these rivers in continued support of a separate project designed to provide a baseline characterization of Saginaw Bay watershed sediments. An additional site, located immediately upstream of Dow Chemical – Midland's outfall 031, was sampled at the Tittabawassee River. This site was sampled in support of National Pollutant Discharge Elimination System (NPDES) permit development efforts for the Dow Chemical – Midland NPDES permit.

- Results of sampling conducted in 2001 for perfluorooctyl sulfonates (PFOS) and perfluorooctanoic acid (PFOA) are presented for the first time in this report. PFOS and PFOA represent potential emerging water quality issues and were sampled to provide baseline data on concentrations of these contaminants in surface waters throughout Michigan.

- Data analysis consisted of spatial comparisons, loading rate estimates, and comparisons with Michigan Rule 57 water quality values. Temporal trend analyses will be prepared in future years once a suitably sized dataset becomes available from the WCMP.

- Total PCB concentrations were lowest in the sample collected at the Cheboygan River (0.03 nanograms per liter [ng/L]), and highest in the sample collected at the Lower Kalamazoo River (17 ng/L).

- Among intensively monitored stations, median normalized total Hg was lowest at the Au Sable River (0.38 ng/L), and highest at the Clinton River (7.6 ng/L).

- Among non-intensively monitored stations, median actual total mercury concentrations were lowest at the Cheboygan River (0.63 ng/L), and highest at the Lower St. Joseph River (4.1 ng/L).

- Among intensively monitored stations, median normalized total phosphorus, chloride and suspended solids (TSS) were lowest at the Au Sable River (phosphorus = 0.01 mg/L; chloride = 6 mg/L; TSS < 4 mg/L); and highest at the Clinton River (phosphorus = 0.24 mg/L; chloride = 188 mg/L; TSS = 34 mg/L).

- Among non-intensively monitored stations, median actual total phosphorus was lowest at the Cheboygan River (0.01 mg/L); chloride was lowest at the Manistique, Pine and Sturgeon Rivers (2 mg/L); and TSS was lowest at the Cheboygan and Thunder Bay Rivers (<4.0 mg/L). Median actual total phosphorus was highest at the Upper Grand River (0.12 mg/L); chloride was highest at the Tittabawassee and Huron Rivers (117 mg/L and 114 mg/L, respectively); and TSS was highest at the Cass River (45 mg/L).

- Among minimally impacted sites and downstream, potentially impacted sites, concentrations of all water quality indicators were lower at the River Raisin Headwaters and South Branch Flint River minimally impacted sites in comparison with their respective potentially impacted sites, the River Raisin and Flint River. Concentrations at the East Creek minimally impacted site, however - especially median concentrations - were very similar to the associated Boardman River potentially impacted site for most contaminants.

- With one possible exception, all samples analyzed for total CN met the Michigan Rule 57 water quality value for free CN (5.2 micrograms per liter [ug/L]). The Clinton River's total CN

sample concentration of 6 ug/L may have exceeded the Michigan Rule 57 water quality value for free CN, although a definitive determination cannot be made based on the available data.

- All samples analyzed for base/neutral organics, MTBE, and BTEX met applicable Michigan Rule 57 water quality values.

- All but one sample analyzed for total chromium, copper, and lead met applicable Michigan Rule 57 water quality values. The Clinton River sample, with a copper concentration of 19.8 ug/L, exceeded the Clinton River's copper Rule 57 water quality value of 18 ug/L.

- Of the 34 stations sampled for mercury, 3 (the Au Sable and Cheboygan Rivers, and East Creek) showed no exceedances of the Michigan Rule 57 water quality value for mercury (1.3 ng/L). At 27 of 34 sites, representing a total of 136 samples, total mercury exceeded 1.3 ng/L in at least 50 percent of samples collected. The remaining 4 monitoring stations showed at least one sample in exceedance of the mercury Rule 57 water quality value.

- Total PCB concentrations exceeded the PCB Rule 57 water quality value of 0.026 ng/L at all but one station sampled. The sample collected at the Cheboygan River met the PCB Rule 57 water quality value with a total PCB concentration of 0.026 ng/L.

- Adjusted concentrations of 2,3,7,8-TCDD (dioxin) were zero picograms per liter [pg/L] in 13 of 14 samples analyzed from the Tittabawassee, Saginaw and Shiawassee Rivers. The remaining sample, collected at the WCMP station on the Tittabawassee River, had an adjusted dioxin concentration of 5.3 pg/L, exceeding the Michigan Rule 57 water quality value of 0.0031 pg/L for dioxin. The total 2,3,7,8-TCDD TEC exceeded the Michigan Rule 57 water quality value of 0.0086 pg/L, applicable to total TEC, in all samples collected at WCMP stations, and in 2 of 4 samples collected at the Tittabawassee River immediately upstream of Dow Chemical – Midland's outfall 031. Exceeding samples ranged in concentration from 0.0242 pg/L to 20.4 pg/L total TEC. Total TECs were consistently lowest at the Tittabawassee River immediately upstream of Dow Chemical – Midland's outfall 031.

- A total of 41 PFOS and PFOA results were available for 23 stations. PFOS sample concentrations ranged from <0.5 - 29 ng/L, with a median concentration of 3.1 ng/L. PFOA sample concentrations ranged from 1.2 - 36 ng/L, with a median concentration of 9.5 ng/L.

SECTION 2.0

INTRODUCTION

In June 1998, the MDEQ-WB initiated the WCMP using part of a $500,000 appropriation by the state legislature. This project was a first step towards improving water quality monitoring in Michigan since funding reductions resulted in severely restricted monitoring capabilities. Past limitations in analytical quantification levels further restricted the effectiveness of monitoring activities. Recent technological advances in affordable, low-concentration analytical techniques incorporated into the WCMP have made it possible to assess Michigan's surface waters for bioaccumulative chemicals of concern (BCCs), such as mercury and PCBs, at environmentally relevant levels.

The WCMP is an important component of the statewide surface water quality monitoring activities outlined in the January 1997 report prepared by the MDEQ-WB and the Land and Water Management Division entitled, "A Strategic Environmental Quality Monitoring Program for Michigan's Surface Waters" (Strategy). The WCMP incorporates the goals of the Strategy, which are:

1. Assess the current status and condition of individual waters of the state and determine whether standards are being met;
2. Measure temporal and spatial trends in the quality of Michigan's surface waters;
3. Provide data to support MDEQ water quality programs and evaluate their effectiveness; and
4. Detect new and emerging water quality problems.

As initiated in 1998, the WCMP called for annual water chemistry monitoring at selected Michigan streams tributary to the Great Lakes, and at Great Lakes connecting waters, Saginaw Bay and Grand Traverse Bay. With the November 1998 passage of the Clean Michigan Initiative (CMI) bond proposal, a substantial increase in annual funding became available for statewide surface water quality monitoring beginning in 2000. The study design of the WCMP was subsequently modified and expanded to help ensure implementation of statewide water chemistry monitoring activities capable of more fully realizing the goals set forth in the Strategy.

This report describes the current study design of that portion of the WCMP which targets tributary watersheds, and presents and discusses results from monitoring efforts undertaken March through November 2003 within these watersheds. Details of the complete WCMP study design are presented in Great Lakes and Environmental Assessment Section Procedure 58: Water Quality Monitoring (available upon request from the MDEQ-WB, or at www.michigan.gov).

Results obtained from tributary monitoring efforts undertaken February through November 2002 are summarized in the August 2004 report (MI/DEQ/WD-04/049); results obtained from tributary monitoring efforts undertaken February through November 2001 are summarized in the July 2003 report (MI/DEQ/WD-03/085); results obtained from tributary monitoring efforts undertaken July through November 2000 are summarized in the June 2002 report (MI/DEQ/SWQ-02/092); and results obtained from tributary monitoring efforts undertaken June 1998 through September 1999 are summarized in the February 2002 report (MI/DEQ/SWQ-02/025). Results obtained from monitoring efforts undertaken in 2001-2003 at Saginaw Bay and Grand Traverse Bay are

presented and discussed with previously published results in the March 2003 report entitled, "Water Quality Monitoring of Saginaw Bay and Grand Traverse Bay" (MI/DEQ/WB-05/042). Results obtained from monitoring efforts undertaken in 2003 on Great Lakes connecting waters are presented and discussed with previously published results in the report entitled, "Great Lakes Connecting Channels Data Evaluation and Trend Analysis Report" (MI/DEQ/WB-05/049). These reports are available upon request from the MDEQ-WB, or at www.michigan.gov.

In accordance with one of the key principles of the Strategy, the WCMP was planned and conducted in partnership with several outside organizations. In 2003, these included the United States Geological Survey (USGS); MDEQ-Environmental Science and Services Division-Laboratory Section; MDEQ-Waste and Hazardous Materials Division (WHMD); the Wisconsin State Laboratory of Hygiene (WSLH); Triangle Laboratories, Incorporated; and the Great Lakes Environmental Center. PFOS and PFOA samples collected in 2001 were analyzed by Michigan State University (MSU). The WCMP is coordinated by the MDEQ-WB.

SECTION 3.0

STUDY DESIGN AND METHODS

A total of 34 stations in 31 tributary watersheds were monitored between March and November 2003 as part of the WCMP. This report summarizes all available analytical results from samples collected during this period. It also summarizes PFOS and PFOA results from samples collected in 2001.

3.1 WATERSHED SELECTION, STATION SELECTION AND MONITORING SCHEDULES

When the study design of the WCMP was enhanced in 2000, one primary objective was consistency with existing MDEQ programs and activities to ensure that monitoring would contribute to resource management decisions. This objective led to adapting the WCMP to the 5-year rotating permit basin cycle defined and utilized by the NPDES permitting program. Consistent with this cycle, the WCMP recognizes 45 watershed units. Each watershed unit is based on drainage to 1 of the 4 Great Lakes and is allocated to 1 of 5 monitoring years. Figure 1 shows the watershed units allocated to monitoring year 2, which coincides with 2003. Figures 2 - 5 show the watershed units allocated to monitoring years 3, 4 and 5 and 1, which coincide with 2004, 2005, 2006 and 2007, respectively.

Of the 45 watershed units recognized, 31 were selected for placement of water chemistry monitoring stations within the WCMP. The locations of these 31 monitoring stations were selected based on consideration of a number of criteria, including surrounding land use, availability of historical water quality data, proximity to USGS stream flow gauging stations, accessibility, and avoidance of stream reaches subject to flow reversals (although this objective was not achievable on the Saginaw River). These 31 monitoring stations were categorized as either intensive sites or integrator sites. Integrator sites are further categorized as either intensively or non-intensively monitored; this categorization changes depending upon monitoring year.

Additionally, one minimally impacted site was located within each of the watersheds described above, with the exception of the Muskegon and Kalamazoo River watersheds, each of whose upper and lower reaches share a minimally impacted site. Minimally impacted sites are chosen to provide data on the best water quality that can be expected within each watershed, and are further categorized as non-intensively monitored sites. Watershed selection and monitoring schedules are described below.

3.1.1 Intensive Sites

Of the 31 watersheds selected for placement of monitoring stations, the following 6 were designated for intensive sampling annually irrespective of monitoring year: Au Sable, Clinton, Lower Grand, Lower Kalamazoo, Lower Muskegon, and Saginaw River watersheds (Figure 6). High flow volume and known or expected contamination were important watershed selection criteria in the intensive sites category, as these combined factors are associated with the most significant sources of contaminant loading to the Great Lakes. With the exception of the Saginaw River, watershed selection was also based on stability of the flow regime in the main stream, insofar as stable flows generally yield more precise contaminant loading estimates and

more readily detectable contaminant concentration and loading trends with fewer samples. Monitoring stations were located at or near the mouth of the main stream within each watershed. Table 1 provides detailed station location information.

Intensive sites are sampled 12 times per year on a flow-stratified schedule beginning with the first significant snowmelt or spring rain event and continuing through autumn. Of these 12 samples, approximately 75 percent (%) are to be collected at each site during high flow events and the remaining 25% are to be collected during base/low flow. A high flow event is defined by one or more of the following conditions: stream flow at or above the 20% exceedance flow; an increase in stream flow of approximately 100% above the preceding base flow condition; or an increase in stream flow following a lengthy period of discharge at base flow and considered likely to produce a measurable change in the concentration of sampled constituents. This monitoring schedule was adopted specifically for those contaminants for which loading rate estimates would be calculated, based on its application in the Lake Michigan Mass Balance Project (United States Environmental Protection Agency [USEPA] 1997a); not all contaminants monitored at intensive sites are to be sampled on this schedule (see Section 3.2 of this report for details).

3.1.2 Integrator Sites

The remaining 25 watersheds selected for placement of monitoring stations were designated as integrator sites (Figure 7). Integrator sites represent water quality conditions of major streams and rivers in large, heterogeneous basins. Integrator sites generally were located at or near the mouth of the main stream within each watershed. Four integrator sites represent the upper reaches of the largest watersheds. Specifically, this encompasses mid-reach monitoring stations located on the St. Joseph, Kalamazoo, Grand, and Muskegon Rivers. Table 1 provides detailed station location information.

Integrator sites are sampled intensively on a staggered, 5-year rotation. Once every 5 years (consistent with the NPDES permitting program's basin year cycle), each integrator site will be sampled 12 times on a flow-stratified schedule identical to that adopted for intensive sites. As with intensive sites, this schedule allows for calculation of estimated loading rates for selected contaminants. During the other 4 years in this 5-year cycle, integrator sites are sampled 4 times per year. These sampling events are prearranged within the period between ice breakup and November irrespective of stream flow.

3.1.3 Minimally Impacted Sites

Monitoring year 2 (2003) watersheds included the Boardman, Flint and Raisin River watersheds. The minimally impacted sites selected to represent each of these in-monitoring-year watersheds included East Creek, the South Branch Flint River, and the River Raisin Headwaters, respectively. These sites were believed to represent the best water quality that can be expected within each in-monitoring-year watershed, based on consideration of both water chemistry and biota. Data obtained from minimally impacted sites allow for a comparison of water chemistry data collected at downstream, potentially impacted sites in a watershed, to the minimally impacted site.

Minimally impacted sites are sampled non-intensively on a staggered, 5-year rotation. Once every 5 years (again, consistent with the NPDES permitting program's basin year cycle), each minimally impacted site is to be sampled 4 times per year. As with non-intensively monitored

integrator sites, sampling events are prearranged within the period between ice breakup and November irrespective of stream flow.

3.2 SAMPLE COLLECTION AND CHEMICAL ANALYSES

Sample collection and chemical analyses are discussed below by analyte category. All participating analytical laboratories have quality assurance programs and use peer-reviewed analytical methods.

3.2.1 Nutrients and Conventionals, Cyanide, Base/Neutral Organics, MTBE and BTEX

The nutrient and conventional parameters identified in Table 2 were measured at all stations during each sampling event. Table 2 also provides quantification levels where applicable. Field measurements of dissolved oxygen, temperature, pH, and conductivity were taken during each sampling event using a multi-parameter water quality monitoring device.

Samples for analysis of total CN were added to the WCMP in 2001 to support the Strategy's goal to detect new and emerging water quality problems. Concern over potential CN contamination of Michigan's surface waters developed following information obtained from the Minnesota Pollution Control Agency (Drullinger, 2000). This information indicated that winter and spring runoff from stored piles of road salt may contain ferro cyanide, which is commonly used as an anti-clumping agent and which may under certain conditions convert to a form of CN that is toxic to aquatic life. All total CN results obtained from monitoring efforts undertaken in 2001 were below the Michigan Rule 57 water quality value of 5.2 ug/L. In 2003, monitoring for total CN continued at a rate of one sample per station as a spot-checking measure. Samples were collected during the earliest part of the sampling period when snow melt and/or early spring rains were present. Total CN is included with its analytical quantification level and Michigan Rule 57 water quality value in Table 2.

Samples for analysis of selected base/neutral organics, MTBE and BTEX were added to the WCMP in 1999 to support the Strategy's goal to detect new and emerging water quality problems. Monitoring for these analytes continued in 2003 at a rate of one sample per station during the base/low flow season. This rate was established as a spot-checking measure after more frequent sampling in 1999 yielded very few results above analytical quantification. Base/neutral organics analyzed are identified in Table 3 along with analytical quantification levels and, where available, Michigan Rule 57 water quality values. BTEX and MTBE are listed with analytical quantification levels and Michigan Rule 57 water quality values in Table 4.

In most cases, grab samples were collected from a single point in the flow of the stream at approximately 0.3 – 1.0m depth. A subset of grab samples were collected using the method described for PCBs in Section 3.2.3. Samples were collected and handled in accordance with MDEQ-approved procedures (available upon request), and were analyzed by the MDEQ Environmental Laboratory.

3.2.2 Mercury and Trace Metals

Samples for total mercury (Hg) and trace metals were collected at all stations during each sampling event, and were analyzed by the WSLH. All metals analyzed are shown in Table 5 with analytical detection and quantification levels. Sample collection and handling was carried out in accordance with USEPA Method 1669, "Sampling Ambient Water for Trace Metals at

EPA Water Quality Criteria Levels" (USEPA 1996a). Samples were collected from a single point in the flow of the stream at approximately 0.3 – 1.0m depth.

Total Hg samples were analyzed by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, consistent with USEPA Method 1631 (USEPA 2001a). Samples were analyzed for the trace metals cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), and zinc (Zn) by Inductively Coupled Plasma – Mass Spectrometry (ICP-MS), consistent with USEPA Method 1638 (USEPA 1996b).

3.2.3 Polychlorinated Biphenyls

In 2003, the study design of the WCMP called for total PCB sampling at all monitoring stations at a rate of at least one sample per station annually. This allows for statewide spot checks of this contaminant, and it enables limited spatial comparisons and comparisons with Michigan Rule 57 water quality values. Table 6 shows all PCB congeners analyzed, along with their analytical detection and quantification levels.

PCB samples were collected in accordance with the sample collection and handling protocol described in the "Lake Michigan Mass Balance Study Methods Compendium, Volume 1: Sample Collection Techniques" (USEPA 1997a). A 160L sample volume was obtained by drawing water from 2 depths (at 0.2 and 0.8 of the total stream depth) at each of 3 points in a transect (at 0.25, 0.5 and 0.75 of the stream channel width). The WSLH performed the chemical analyses in accordance with the analytical protocol described in the "Lake Michigan Mass Balance Study Methods Compendium, Volume 2: Organic and Mercury Sample Analysis Techniques" (USEPA 1997b), with the exception that dissolved and particulate fractions were combined.

3.2.4 Dioxins and Furans

Tittabawassee River monitoring for dioxins and furans was incorporated into the WCMP in 2001 as part of a cooperative effort between the MDEQ-WB and the MDEQ-WHMD in support of a project to provide a baseline characterization of Saginaw Bay watershed sediments. Water chemistry data obtained from this cooperative effort will serve both to complement and supplement other data obtained from the WCMP on BCCs, as well as data on sediment, fish tissue, and flood plain soils obtained through other components of the overall Saginaw Bay watershed project. Data will then be used to develop a more complete understanding of the distribution of dioxins and furans within the Saginaw Bay watershed.

In 2003, one dioxin/furan sample, replicate and blank were collected at the WCMP station on the Tittabawassee River during each of 4 sampling events, and one sample was collected at the Saginaw and Shiawassee Rivers during one sampling event. These samples were collected from a single point in the flow of the stream at approximately 0.3 – 1.0m depth. Also in 2003, additional samples were collected at the Tittabawassee River in support of NPDES permit development for Dow Chemical – Midland. These samples were collected immediately upstream of Dow Chemical – Midland's outfall 031 from a left bank, right bank and midstream position within the flow of the stream at approximately 0.3 – 1.0m depth. The sample collection and handling protocol used were those specified by MDEQ-WHMD (available upon request from the MDEQ-WB). Analyses were performed by Triangle Laboratories, Incorporated, in accordance with USEPA Method 1613B (USEPA 1994).

3.2.5 PFOS and PFOA

In 2001, a statewide study of PFOS and PFOA was undertaken in partnership with MSU, the results of which did not become available to the MDEQ until late in 2004. PFOS is the breakdown product of perfluorooctanesulfonyl fluoride, which was once widely used in surfactants and surface protectors in carpets, leather, paper, and packaging products. PFOA is an essential processing aid in the manufacture of fluoropolymers. Fluoropolymers impart valuable properties, including fire resistance and oil, stain, grease, and water repellency. Growing concern over the environmental persistence, bioaccumulation, potential health effects, and global distribution of these chemicals led to initiation of the study.

Samples were collected from a single point in the flow of the stream at approximately 0.3 – 1.0m depth in accordance with the sample collection and handling protocol specified by MSU. Samples were analyzed by MSU using the method described by Hansen et al (2002). A total of 28 WCMP tributary monitoring stations were sampled a minimum of 3 times (first run, mid-summer and fall) between February and November 2001; however, due to the need to further develop the analytical method during the course of the study, some samples were expended before method development was completed, and final results were not obtained for them.

3.3 SUMMARY STATISTICS

Summary statistics presented in this report include measures of central tendency, spatial comparisons, loading rate estimates, and comparisons with Michigan Rule 57 water quality values.

A final category of summary statistic, that of temporal trend analysis, is discussed; however, due to the still relatively early stage of the WCMP, temporal trend analyses are not yet merited. Detecting temporal trends in stream water quality is not a simple task. Relatively large changes in contaminant concentrations caused by both short- and long-term changes in stream discharge can easily obscure contaminant trends (Harned et al. 1981). For spatial comparisons presented in this report, the effects of stream discharge were controlled for using Locally Weighted Scatterplot Smoothing (LOWESS) where sample size permitted (Helsel 1991). Temporal trend analyses presented in future WCMP reports will also be prepared using data normalized to stream discharge. Temporal trend analyses will be attempted for stations meeting the following criteria: 1) station has accumulated at least 5 years of data, and 2) these data were obtained during sampling periods considered adequately representative of stream discharge in the years in which sample collection took place.

3.3.1 Handling of Coded and Censored Data

Coded data, censored data, and data below analytical quantification or detection levels, and the handling of these in the development of summary statistics, are discussed by analyte category, below. Table 7 provides a comprehensive list of laboratory result remark codes relevant to WCMP data, along with their definitions.

3.3.1.1 Nutrients and Conventionals, Cyanide, Base/Neutral Organics, MTBE and BTEX

In many cases, the MDEQ Environmental Laboratory censors (i.e., does not report) observed concentrations below analytical quantification. In such cases, the laboratory reports only ND.

It is impossible to calculate the true mean of a data set containing censored data. In such cases, mean concentrations were calculated using half the quantification level in place of censored values. Calculated means were then footnoted to indicate that estimated values had been used. Estimated values were likewise used in spatial comparisons and calculations of estimated contaminant loading rates developed for this report. Results coded with a T or W were used, unmodified, in all calculations.

Occasionally, due to travel distances and day or time of sample collection, field staff were unable to deliver samples to the laboratory in time to meet the recommended maximum holding times before analysis for certain analytes; the analytical results for such samples are coded H by the laboratory. Results coded H are considered sufficiently reliable for use in the development of all summary statistics prepared for the WCMP (MDEQ 1999a).

3.3.1.2 Mercury and Trace Metals

Total Hg and trace metal concentrations below analytical quantification or detection levels were reported and were used in all calculations, as were all coded results. Sample results below the WSLH's daily instrument calibration blank were reported as zero by the WSLH, and these zero values were used in all calculations.

3.3.1.3 Polychlorinated Biphenyls

Total PCB concentrations were estimated by summing the concentrations of the individual and coeluting congeners identified in Table 6. Congener concentrations below analytical quantification or detection levels were reported and were used in calculating total PCB. Congener concentrations not detected above noise were reported as zero by the WSLH, and zero values were used for the purpose of calculating total concentrations. If the concentrations of all congeners in a sample were reported as zero, then total PCB was reported as zero. In samples where the presence of uncontrollable interference made analysis impossible, the WSLH reported NAI in place of a result. Such congeners were assigned a concentration equal to zero for the purpose of calculating total PCB concentrations. If all congeners in a given sample were coded NAI, then total PCB for that sample was reported as NAI, and that sample was not counted in developing summary statistics. In some cases, sample dilution was necessary to bring analyte concentration ranges within the instrument calibration range. Occasionally as a result of dilution, congeners already present in low concentrations could not be detected after dilution. In such cases, the WSLH reported NDD in place of a result. Such congeners were assigned a concentration equal to zero for the purpose of calculating total concentrations.

3.3.1.4 Dioxins and Furans

In addition to presenting actual and adjusted congener concentrations, dioxin and furan results are presented in toxicity equivalence concentrations (TECs), which represent a measure of their toxicity. Congener-specific TECs were calculated by multiplying the adjusted congener concentration by the toxicity equivalency factor (TEF) and the bioaccumulation equivalency factor (BEF), in accordance with the Michigan Part 8 Rules (MAC 1997). TEFs and BEFs are shown in Table 13. Adjusted congener concentrations used in the calculation of TECs were obtained as follows: observed results below analytical detection (coded ND) were assigned a concentration equal to zero; and congener concentrations at or above analytical detection, including B and/or J coded results, were adjusted by subtracting from them the concentration of

congener in the corresponding blank (if the concentration in the blank was also at or above analytical detection).

3.3.1.5 PFOS and PFOA

Observed PFOS and PFOA concentrations below analytical quantification were reported as less than the quantification level (0.5 ng/L). Mean concentrations were calculated using half the quantification level in place of censored values.

3.3.2 Measures of Central Tendency

Where possible, arithmetic mean and median concentrations were calculated for each analyte at each monitoring station.

3.3.3 Spatial Comparisons

Graphs were developed showing concentrations of total phosphorus, chloride, suspended solids (TSS), Hg, trace metals, and PCB measured at each monitoring location. Comparisons were made among stations sampled at the same frequency (i.e., intensively or non-intensively), and between minimally impacted sites and associated downstream, potentially impacted sites. Where necessary to render differences among data groups more readily discernible, data were logarithmically transformed.

The current implementation of the WCMP does not include a randomized sampling component. The use of water quality information yielded by the WCMP is therefore restricted to sites that have actually been sampled; this information cannot be extrapolated to unsampled sites. Consequently, the WCMP is limited in its ability to provide information that helps the MDEQ-WB formulate conclusions concerning water quality throughout the state. The MDEQ-WB is in the process of developing a randomized sampling design component for the WCMP, the implementation of which is planned for 2005.

3.3.4 Loading Rate Estimates

Loading rate estimates were calculated for all water quality indicators from intensively monitored sites. Calculations were performed using the Stratified Beale Ratio Estimator described by Richards (1994).

3.3.5 Comparisons with Michigan Rule 57 Water Quality Values

Data obtained for all designated water quality indicators, as well as data obtained for total CN, base/neutral organics, MTBE, BTEX, PCBs, dioxins and furans, were compared with applicable Rule 57 water quality values. These values were developed in accordance with the Michigan Part 4 Rules (MAC 1999).

For Hg, the applicable Rule 57 water quality value is the wildlife value (WV); and for Cr, Cu, and Pb, the applicable Rule 57 water quality value is the final chronic value (FCV). The FCV for Cr, Cu, and Pb is hardness dependent and was calculated for each tributary watershed using tributary-specific hardness data. Ambient Cr, Cu, and Pb concentrations are for total metal, whereas the FCVs for these trace metals are expressed as dissolved metal; therefore, a direct comparison between ambient total Cr, Cu, and Pb concentrations and their Rule 57 water

quality values cannot be made. This is not an important consideration when the ambient total metal concentration meets the applicable Rule 57 water quality value; however, when it exceeds this value, the available data cannot show whether the ambient concentration of dissolved metal exceeds the Rule 57 water quality value. Additional, more sophisticated monitoring would be necessary to resolve an ambiguity of this nature, and caution must be exercised when drawing conclusions from the available data.

For CN, MTBE, and BTEX, the applicable Rule 57 water quality value is the FCV. Ambient CN concentrations are expressed as total CN, whereas the FCV for this contaminant is expressed as free CN; therefore, a direct comparison between ambient total CN concentrations and the Rule 57 water quality value cannot be made. This is not an important consideration when the ambient total CN concentration meets the Rule 57 water quality value; however, when it exceeds this value, the available data cannot show whether the ambient concentration of free CN exceeds the Rule 57 water quality value.

For base/neutral organics, the applicable Rule 57 water quality value differs among the 28 of 50 chemicals in this category for which these values have been developed (see Section 4.4.2 for further details). Base/neutral organics and (where available) their Rule 57 water quality values are shown in Table 3.

For total PCB, the applicable Rule 57 water quality value is the human cancer value (HCV).

For dioxins and furans, the concentration of 2,3,7,8-TCDD is compared with the WV, while the total TEC, (obtained by adding together all congener-specific TECs including that of 2,3,7,8-TCDD), is compared with the HCV.

3.3.6 Temporal Trend Analyses

Measurement of temporal trends is one of the key goals of the WCMP; however, temporal trend analyses are not yet merited at this relatively early stage of the WCMP (see Section 3.3 for further discussion of this issue). The WCMP will evaluate temporal trends in annual loading rates of all designated water quality indicators (i.e., total phosphorus, chloride, suspended solids, Hg, Cr, Cu, and Pb).

SECTION 4.0

RESULTS, SUMMARY STATISTICS AND DISCUSSION

Field staff collected a total of 208 water samples between March and November 2003. Table 8 lists all fixed WCMP monitoring stations along with year(s) sampled since the WCMP was initiated in 1998.

4.1 MEASURES OF CENTRAL TENDENCY

Analytical results and measures of central tendency are presented for all analytes in Appendix A.

4.2 SPATIAL COMPARISONS

Concentrations of designated water quality indicators were compared among monitoring stations sampled at the same frequency (i.e., intensively or non-intensively), and between minimally impacted sites and associated downstream, potentially impacted sites. A comparison of mean total phosphorus, chloride and TSS concentrations among all intensive and integrator sites is also provided (see Figures 33, 34 and 35, respectively). Concentrations of PCB were compared among all stations. Where censored values were present in a data set, estimated values were used in their place. Among designated water quality indicators sampled in 2003, censored values were present only in data sets for TSS (Quantification Level (QL) = 4 mg/L).

4.2.1 Spatial Comparisons Among Intensively Monitored Sites

Monitoring for total phosphorus, chloride, TSS, Hg, Cr, Cu, and Pb took place at 9 intensively monitored sites, including intensive sites and intensively monitored integrator sites (Table 1). These sites were ranked lowest to highest according to median normalized contaminant concentration, and the resulting graphs (Figures 8 - 14) are discussed below.

4.2.1.1 Phosphorus, Chloride and Suspended Solids

Among intensively monitored stations, median normalized total phosphorus, chloride and TSS were lowest at the Au Sable River (phosphorus = 0.01 mg/L; chloride = 6 mg/L; TSS < 4 mg/L); and highest at the Clinton River (phosphorus = 0.24 mg/L; chloride = 188 mg/L; TSS = 34 mg/L). In comparison, historic (1967-1968) background water quality stream data published by the Michigan Department of Natural Resources (MDNR) (1970) show statewide median total chloride and TSS concentrations of 8 mg/L and 11 mg/L, respectively. Similar data for total phosphorus were not published in that MDNR report. However, the USEPA published more recent (1990-2000) stream data representing reference conditions in Michigan, and an estimated median concentration of 0.061 mg/L total phosphorus was derived from those data (USEPA 2001b; 2000a; 2000b).

4.2.1.2 Mercury and Trace Metals

Among intensively monitored stations, median normalized total Hg, Cr, Cu and Pb were lowest at the Au Sable River (Hg = 0.38 ng/L; Cr = 0 ug/L; Cu = 0.22 ug/L; Pb = 0.04 ug/L); and highest at the Clinton River (Hg = 7.6 ng/L; Cr = 2.2 ug/L; Cu = 4.8 ug/L; Pb = 3 ug/L).

4.2.2 Spatial Comparisons Among Non-Intensively Monitored Sites

Monitoring for total phosphorus, chloride, TSS, Hg, Cr, Cu, and Pb took place at 25 non-intensively monitored sites including minimally impacted sites (Table 1). These sites were ranked lowest to highest according to median actual contaminant concentration, and the resulting graphs (Figures 15 - 21) are discussed below.

4.2.2.1 Phosphorus, Chloride and Suspended Solids

Among non-intensively monitored sites, phosphorus was lowest at the Cheboygan River (0.01 mg/L); chloride was lowest at the Manistique, Pine and Sturgeon Rivers (2 mg/L); and TSS was lowest at the Cheboygan and Thunder Bay Rivers (<4.0 mg/L). Median total phosphorus was highest at the Upper Grand River (0.12 mg/L); chloride was highest at the Tittabawassee and Huron Rivers (117 mg/L and 114 mg/L, respectively); and TSS was highest at the Cass River (45 mg/L). In comparison, historic (1967-1968) background water quality stream data show statewide median total chloride and TSS concentrations of 8 mg/L and 11 mg/L, respectively (MDNR 1970), while more recent (1990-2000) background water quality stream data show a statewide estimated median total phosphorus concentration of 0.061 mg/L (USEPA 2001b; 2000a; 2000b).

4.2.2.2 Mercury and Trace Metals

Among non-intensively monitored sites, the Cheboygan River ranked lowest in Hg (0.63 ng/L) and Pb (0.041 ug/L); the River Raisin Headwaters ranked lowest in Cr (0.0085 ug/L); and East Creek ranked lowest in Cu (0.26 ug/L). Median total Hg was highest at the Lower St. Joseph River (4.1 ng/L); Cr was highest at the Cass River (1.09 ug/L); and Cu and Pb were highest at the River Rouge (2.5 ug/L and 1.5 ug/L, respectively).

4.2.3 Spatial Comparisons Between Minimally Impacted and Potentially Impacted Sites

Comparisons between minimally impacted sites and associated downstream, potentially impacted sites are presented in Figures 23- 29 for concentrations of water quality indicators measured at each location in 2003. Data sets obtained at minimally impacted sites were not large enough to support normalization to stream discharge; therefore, comparisons were made using actual contaminant concentrations. The diagram shown in Figure 22 gives an explanation of the features of a typical box plot and provides a means of interpreting the box plot graphs presented in Figures 23 – 29.

Concentrations of all water quality indicators were lower at the River Raisin Headwaters and South Branch Flint River minimally impacted sites, in comparison with their respective potentially impacted sites, the River Raisin and Flint River. In contrast, concentrations at the East Creek minimally impacted site (especially median concentrations) were very similar to the associated Boardman River potentially impacted site for most contaminants. Given the

generally low contaminant concentrations found at the Boardman River site, however, this outcome is not surprising.

4.2.4 Polychlorinated Biphenyls

Total PCB was sampled at least once at all stations monitored in 2003. The graph presented in Figure 30 shows all stations ranked lowest to highest according to total PCB concentration; mean concentration was used for those stations at which more than one result was available. The lowest concentration of total PCB was found in the sample collected at the Cheboygan River (0.03 ng/L), and the highest concentration was found in the sample collected at the Lower Kalamazoo River (17 ng/L).

In 2003, more frequent PCB sampling was carried out at the Pere Marquette, Boardman and Flint River WCMP monitoring stations, and at other locations throughout the Pere Marquette River watershed. This effort, initiated in 2002, was a continuation of a special study designed to provide data in support of the MDEQ-WB's TMDL development process. PCB results obtained in 2002 as part of this special study, along with the locations sampled, are presented in Appendix B. The full report on the 2002 results of this special study is available upon request from the MDEQ-WB (MI/DEQ/WB-05/053).

4.2.5 PFOS and PFOA

PFOS and PFOA results obtained from sampling that took place in 2001 are summarized in Figure 31 and Figure 32, respectively. Stations are ranked from lowest to highest concentration; mean concentration was used for those stations at which more than one result was available. The Lower Muskegon River ranked lowest in PFOS concentration with a mean of 0.81 ng/L, and the Lower Kalamazoo River ranked highest with a sample concentration of 24 ng/L. The Au Sable River ranked lowest in PFOA concentration with a sample concentration of 1.2 ng/L, and the Lower Kalamazoo River ranked highest with a sample concentration of 36 ng/L. Individual sample results are shown in Table 14. The MDEQ-WB is evaluating the significance of these results to determine what follow-up measures may be warranted.

4.3 LOADING RATE ESTIMATES

Loading rate estimates were calculated for stations in the intensive and intensively monitored integrator site categories for all designated water quality indicators; results are shown in Tables 9 and 10. Also shown are actual mean contaminant concentrations, mean stream flows based on flow measurements taken during the sampling period, and the 95% confidence intervals associated with the loading rate estimates. For each contaminant, stations are shown in the tables ranked from highest to lowest estimated loading rate. Hydrographs of stream flow discharge are also provided for each station for which contaminant loading rates were estimated (Figures 36 - 44).

4.3.1 Phosphorus, Chloride and Suspended Solids

Loading rate estimates for total phosphorus, chloride and TSS are presented in Table 9. Among stations for which contaminant loading rates were estimated, the least significant contributor of total phosphorus, chloride and TSS loadings to the Great Lakes was the Boardman River (2 metric tons per year [mt/year], 1,500 mt/year, and 750 mt/year, respectively); the most significant contributor of total phosphorus and TSS loadings to the Great

Lakes was the Lower Grand River (340 mt/year and 101,000 mt/year, respectively); and the most significant contributor of total chloride loadings to the Great Lakes was the Saginaw River (209,000 mt/year).

4.3.2 Mercury and Trace Metals

Loading rate estimates for total Hg and trace metal water quality indicators are presented in Table 10. Among stations for which contaminant loading rates were estimated, the least significant contributors of total Hg were the Au Sable and Boardman Rivers (0.37 kilograms per year [kg/year]); the least significant contributor of total Cu and Pb was the Boardman River (51 kg/year and 37 kg/year, respectively); and the least significant contributor of total Cr was the Au Sable River (4 kg/year). The most significant contributor of total Hg, Cr, Cu and Pb was the Lower Grand River (15 kg/year, 3,500 kg/year, 7,700 kg/year, and 5,400 kg/year, respectively).

4.4 COMPARISONS WITH MICHIGAN RULE 57 WATER QUALITY VALUES

Analyte concentrations were compared with their applicable Rule 57 water quality value. Exceedance rate is represented by the number of individual samples in exceedance of the applicable Rule 57 water quality value / the total number of analyses completed for that contaminant at each monitoring station.

4.4.1 Cyanide

All but one sample analyzed for total CN were below analytical quantification (5.0 ug/L). The Michigan Rule 57 water quality value based on free CN is 5.2 ug/L. Therefore, all samples below analytical quantification met the Michigan Rule 57 water quality value for CN. The sample collected March 17, 2003 at the Clinton River had a total CN concentration of 6 ug/L and may have exceeded the Michigan Rule 57 water quality value for free CN, although a definitive determination cannot be made based on these results.

4.4.2 Base/Neutral Organics, MTBE and BTEX

Table 3 identifies the base/neutral organics analyzed, along with their analytical quantification levels. Group 3 of Table 3 identifies the base/neutral organics for which no Rule 57 water quality values have been developed; all sample analyses for contaminants in this group showed concentrations below analytical quantification. Group 2 of Table 3 shows the base/neutral organics for which Rule 57 water quality values have been developed, but whose quantification levels are above these Rule 57 water quality values. All sample analyses for contaminants in this group showed concentrations below analytical quantification; however, a definitive comparison against Rule 57 water quality values cannot be made for these contaminants. Group 1 of Table 3 shows the base/neutral organics for which Rule 57 water quality values have been developed and whose quantification levels are below these Rule 57 water quality values. All sample analyses for contaminants in this group showed concentrations below analytical quantification; thus, all contaminants in this group met their Rule 57 water quality values.

Table 4 lists MTBE and BTEX with their quantification levels and Rule 57 water quality values. All MTBE samples collected in 2003 were below analytical quantification (QL = 5.0 ug/L), and were therefore well below the MTBE Rule 57 water quality value (FCV = 730 ug/L). BTEX contaminants in all but 2 samples (the Cheboygan River and River Raisin) were below analytical quantification (QL range: 1.0 – 2.0 ug/L), and were therefore also well below applicable Rule 57

water quality values (Rule 57 water quality value range: 18 – 200 ug/L). The sample collected at the Cheboygan River contained 1.4 ug/L toluene, and the sample collected at the River Raisin contained 2.1 ug/L toluene; both were well below the toluene Rule 57 water quality value. Concentrations of benzene, ethylbenzene and xylene in these samples were below analytical quantification.

4.4.3 Mercury and Trace Metals

Hg, Cr, Cu, and Pb concentrations are compared with applicable Rule 57 water quality values in Table 11. Also shown in this table are the mean and range of concentrations, and the exceedance rate for each contaminant. A comparison of the occurrence of mercury Rule 57 water quality value exceedances among integrator and intensive sites is also provided (Figure 45).

All but one sample analyzed for total Cr, Cu and Pb met applicable Michigan Rule 57 water quality values. The Clinton River sample collected on May 1, 2003 exceeded the Clinton River's copper Rule 57 water quality value of 18 ug/L with a copper concentration of 19.8 ug/L. All samples collected for total Hg at 3 of 34 monitoring stations met the Hg Rule 57 water quality value of 1.3 ng/L; specifically, the Au Sable and Cheboygan Rivers, and East Creek. At 27 of 34 sites, representing a total of 136 samples, total mercury exceeded 1.3 ng/L in at least 50 percent of samples collected. The remaining 4 monitoring stations showed at least one sample in exceedance of the mercury Rule 57 water quality value.

4.4.4 Polychlorinated Biphenyls

Total PCB concentrations measured at each monitoring station are shown in Table 12. Concentrations exceeded the PCB Rule 57 water quality value of 0.026 ng/L at all but one station sampled. The sample collected at the Cheboygan River met the PCB Rule 57 water quality value with a total PCB concentration of 0.026 ng/L.

4.4.5 Dioxins and Furans

Dioxin and furan concentrations are compared with applicable Rule 57 water quality values in Table 13. Adjusted concentrations of 2,3,7,8-TCDD (dioxin) were zero pg/L in 13 of 14 samples analyzed from the Tittabawassee, Saginaw and Shiawassee Rivers. The remaining sample, collected at the WCMP station on the Tittabawassee River, had an adjusted dioxin concentration of 5.3 pg/L, exceeding the Michigan Rule 57 water quality value of 0.0031 pg/L for dioxin. The total 2,3,7,8-TCDD TEC exceeded the Michigan Rule 57 water quality value of 0.0086 pg/L, applicable to total TEC, in all samples collected at WCMP stations, and in 2 of 4 samples collected at the Tittabawassee River immediately upstream of Dow Chemical – Midland's outfall 031. Exceeding samples ranged in concentration from 0.0242 pg/L to 20.4 pg/L total TEC. Total TECs were consistently lowest at the Tittabawassee River immediately upstream of Dow Chemical – Midland's outfall 031.

Prepared by: Christine Aiello, Environmental Quality Analyst
Surface Water Assessment Section
Water Bureau
Michigan Department of Environmental Quality
June 8, 2005

SECTION 5.0

REFERENCES

Aiello, C. 2004. Michigan Water Chemistry Monitoring Great Lakes Tributaries 2002 Report. MDEQ-WB Report #MI/DEQ/WD-04/049.

Aiello, C. 2003. Michigan Water Chemistry Monitoring 2001 Report. MDEQ-WB Report #MI/DEQ/WD-03/085.

Aiello, C. 2002. Michigan Water Chemistry Trend Monitoring 2000 Report. MDEQ-WB Report #MI/DEQ/SWQ-02/092.

Aiello, C. and J. Smith. 2002. Michigan Water Chemistry Trend Monitoring 1998-1999 Report. MDEQ-WD Report #MI/DEQ/SWQ-02/025.

Drullinger, David. "Cyanide in road salt." E-mail to William Creal. July 21, 2000.

Fogarty, L. R. 2004. PCB Concentrations in Pere Marquette River and Muskegon River Watersheds, 2002. USGS Open-File Report 2004-1088. MDEQ-WB Report #MI/DEQ/WB-05/053.

Great Lakes Environmental Center. 2005. Water Quality Monitoring of Saginaw and Grand Traverse Bays. Report prepared for the Michigan Department of Environmental Quality in partial fulfillment of Contract #071B1001643. MDEQ-WB Report #MI/DEQ/WB-05/042.

Great Lakes Environmental Center and Limno-Tech, Incorporated. 2005. Great Lakes Connecting Channels Data Evaluation and Trend Analysis Report. Report prepared for the Michigan Department of Environmental Quality in partial fulfillment of Contract #071B1001643. MDEQ-WB Report #MI/DEQ/WB-05/049.

Hansen, K. J., H. O. Johnson, J. S. Eldridge, J. L. Butenhoff, and L. A. Dick. 2002. Quantitative Characterization of Trace Levels of PFOS and PFOA in the Tennessee River. Environmental Science and Technology. Vol. 36, 8:1681-1685.

Harned, D. A., C. C. Daniel III and J. K. Crawford. 1981. Methods of Discharge Compensation as an Aid to the Evaluation of Water Quality Trends. Water Res. Research. Vol. 12, 5:1389-1400.

Helsel, D. R. 1991. National Water Summary 1990-91 – Stream Water Quality: Hydrology. Statistical Analysis of Water-Quality Data. U. S. Geological Survey Water-Supply Paper 2400. pp. 93-100.

Livingstone, D. A. 1963. Chemical composition of Rivers and Lakes, Chapter G. Data of Geochemistry. 6th ed. Prof. Pap. U.S.G.S. 440-G., 64 pp.

Michigan Administrative Code (MAC). 1999. Part 4. Water Quality Standards. R 323.1041 – 323.1117. June 8, 2004 <http://www.michigan.gov/orr>.

Michigan Administrative Code (MAC). 1997. Part 8. Water Quality-Based Effluent Limit Development for Toxic Substances. R 323.1201 – 323.1221. June 8, 2004 <http://www.michigan.gov/orr>.

Michigan Department of Environmental Quality (MDEQ). 1999a. Kjeldahl Nitrogen and Total Phosphorus Hold Time Study (KN TP HT Study.xls).

Michigan Department of Natural Resources (MDNR). 1970. A Survey of Background Water Quality in Michigan Streams. Report #025650. 47 pp.

Richards, R. P. 1994. Tributary Loading Estimates for Selected Herbicides in Lake Erie Tributaries of Michigan and Ohio. Final Report to the USEPA Great Lakes National Program Office in Partial Fulfillment of Grant #GL995453-01. Heidelberg College.

U. S. Environmental Protection Agency (USEPA). 2001a. Method 1631: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry. EPA 821/R-01-024.

U. S. Environmental Protection Agency (USEPA). 2001b. Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion VIII. EPA 822-B-01-015.

U. S. Environmental Protection Agency (USEPA). 2000a. Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion VII. EPA 822-B-00-018.

U. S. Environmental Protection Agency (USEPA). 2000b. Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion VI. EPA 822-B-00-017.

U. S. Environmental Protection Agency (USEPA). 1997a. USGS Field Operation Plan: Tributary Monitoring. Lake Michigan Mass Balance Study Methods Compendium, Vol. 1: Sample Collection Techniques. EPA 905/R-97-012a.

U. S. Environmental Protection Agency (USEPA). 1997b. PCBs and Pesticides in Surface Water by XAD-2 Resin Extraction. Lake Michigan Mass Balance Study Methods Compendium, Vol. 2: Organic and Mercury Sample Analysis Techniques. EPA 905/R-97-012b.

U. S. Environmental Protection Agency (USEPA). 1996a. Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. EPA 821/R-96-011.

U. S. Environmental Protection Agency (USEPA). 1996b. Method 1638: Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry. EPA 821/R-96-005.

U. S. Environmental Protection Agency (USEPA). 1994. Method 1613B: Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS.

Table 1. WCMP tributary station location information.

Station	Location	County	STORET ID#	Latitude Longitude
Intensive Sites				
Au Sable	Rea Rd. below Foote Dam, Oscoda Twp.	Iosco	350061	44.43611 °N, - 83.43417 °W
Clinton	Shadyside Pk., Gratiot Ave., city of Mt. Clemens	Macomb	500233	42.58417 °N, - 82.88278 °W
Grand (Lower)	Riverside Pk., vic. of Ottawa Ctr., Robinson Twp.	Ottawa	700123	43.02667 °N, - 86.03389 °W
Kalamazoo (Lower)	57th St., vic. New Richmond, Manlius Twp.	Allegan	030077	42.65111 °N, - 86.10611 °W
Muskegon (Lower)	Maple Island Rd., Cedar Creek Twp. Sec. 25	Muskegon	610273	43.31778 °N, - 86.03889 °W
Saginaw	Main St., City of Essexville	Bay	090177	43.61751 °N, - 83.84278 °W
Integrator Sites - Year 2003 Intensively Monitored				
Boardman	Beitner Rd., Garfield Twp., Sec. 3	Grand Traverse	280014	44.67528 °N, - 85.63070 °W
Flint	M-13, Spaulding Twp.	Saginaw	730285	43.30857 °N, - 83.95328 °W
Raisin	ERA Dock, city of Monroe	Monroe	580046	41.90056 °N, - 83.35444 °W
Integrator Sites - Year 2003 Non-Intensively Monitored				
Black	Water St. boat launch DS of RR bridge	St. Clair	740385	42.97356 °N, - 82.42029 °W
Cass	M-13 bridge, Spaulding Twp., Sec. 12	Saginaw	730024	43.36500 °N, - 83.95473 °W
Cheboygan	Lincoln Ave., city of Cheboygan	Cheboygan	160073	45.63334 °N, - 84.48195 °W
Escanaba	0.35mi US of Soo Line RR Bridge	Delta	210102	45.80028 °N, - 87.09583 °W
Grand (Upper)	M-66 bridge, Ionia Twp. Sec. 30	Ionia	340025	42.97195 °N, - 85.07000 °W
Huron	2000' DS of Rockwood WWTP, Berlin Twp.	Monroe	580364	42.04528 °N, - 83.21417 °W
Kalamazoo (Upper)	G Ave., city of Augusta	Kalamazoo	390057	42.33528 °N, - 85.34528 °W
Manistee	M-55 bridge, Manistee Twp., Sec. 31	Manistee	510088	44.26430 °N, - 86.29538 °W
Manistique	Vic.old RR bridge N.of old US-2, city of Manistique	Schoolcraft	770073	45.96889 °N, - 86.24611 °W
Menominee	26th St. bridge, city of Menominee	Menominee	550038	45.10625 °N, - 87.63556 °W
Muskegon (Upper)	Hersey Rd., Hersey Twp.	Osceola	670008	43.84722 °N, - 85.43231 °W
Ontonagon	RR bridge, Ontonagon, Sec 25	Ontonagon	660038	46.86751 °N, - 89.31695 °W
Pere Marquette	Main St., city of Scottville, Custer/Amber Twp.	Mason	530027	43.94444 °N, - 86.28000 °W
Pine	M-134 bridge, St. Ignace Twp. Sec. 10	Mackinac	490006	46.05117 °N, - 84.65681 °W
Rouge	W. Jefferson Ave. Bridge	Wayne	820070	42.28056 °N, - 83.12889 °W
Shiawassee	Fergus Rd., St. Charles Twp.	Saginaw	730023	43.25472 °N, - 84.10556 °W
St. Joseph (Lower)	River Pk. off Zollar Dr.	Berrien	110628	42.06333 °N, - 86.44889 °W
St. Joseph (Upper)	Rt. 12 bridge, city of Mottville	St. Joseph	750273	41.80003 °N, - 85.75694 °W
Sturgeon	Co Rd. 499, Nahma Twp., Sec. 20	Delta	210032	45.83417 °N, - 86.66862 °W
Tahquamenon	State Campground on U.S.123	Chippewa	170141	46.55583 °N, - 85.03889 °W
Thunder Bay	Bagley St., Alpena Twp.	Alpena	040123	45.06694 °N, - 83.47194 °W
Tittabawassee	Central Rd., Spaulding Twp.	Saginaw	730025	43.39278 °N, - 84.01111 °W
Minimally Impacted Sites - Year 2003 (Non-Intensively Monitored)				
East Creek[1]	Mayfield Rd. upstream of bridge, Paradise Twp.	Grand Traverse	280318	44.62746 °N, - 85.50444 °W
South Branch Flint[2]	Greenwood Road, Lapeer Twp.	Lapeer	440173	43.01549 °N, - 83.25982 °W
Raisin (Headwaters)[3]	Pierce Rd., Norvell Twp.	Jackson	380393	42.15583 °N, - 84.14361 °W

[1] Boardman River watershed

[2] Flint River watershed

[3] Raisin River watershed

Table 2. Nutrients, conventionals and cyanide analyzed for the WCMP, and their analytical quantification levels. All units are mg/L unless otherwise indicated.

Analyte	Quantification Level
Alkalinity (as CaCO3)	20
Ammonia	0.010
Carbon, Total Organic	0.5
Chloride	1
Conductance*	---
Cyanide@	0.005
Hardness	5
Nitrate (Calculated)	0.010
Nitrite	0.002
Nitrogen, Kjeldahl	0.10
Oxygen, Dissolved*	---
pH*	---
Phosphate, Ortho	0.003
Phosphorus, Total	0.005
Potassium	0.1
Sodium	1
Solids, Total Dissolved (Calculated)	20
Solids, Total Suspended	4
Sulfate	2
Temperature*	---
Turbidity	1 NTU

* = Field measured parameter; may additionally be measured in the laboratory.
@ = Michigan Rule 57 water quality value = 0.0052 mg/L.
NTU = Nephelometric Turbidity Units.

Table 3. Base/neutral organics analyzed for the WCMP, and their analytical quantification levels and Michigan Rule 57 water quality values.

Analyte	Quantification Level (ug/L)	R. 57 Water Quality Value (ug/L)
Group 1: Quantification Level Below R. 57 Water Quality Value		
1,2,4-Trichlorobenzene	2.0	FCV = 30
1,2-Dichlorobenzene	1.0	FCV = 13
1,3-Dichlorobenzene	1.0	FCV = 28
1,4-Dichlorobenzene	1.0	FCV = 16
Acenaphthylene	1.0	FCV = 7.2*
Acenapthene	1.0	FCV = 38
Anthracene	1.0	FCV = 2.8*
Bis(2-chloroethyl)ether	1.0	HCV = 15
Bis(2-chloroisopropyl)ether	1.0	HCV = 290*
Bis(2-ethylhexyl)phthalate	2.0	HCV = 32
Butyl benzyl phthalate	1.0	FCV = 67
Chrysene	1.0	HCV = 1.5*
Diethyl phthalate	1.0	FCV = 110
Di-n-butyl phthalate	1.0	FCV = 9.7
Fluoranthene	1.0	FCV = 1.6
Fluorene	1.0	FCV = 12
Hexachloroethane	1.0	HCV = 6.7
Isophorone	1.0	FCV = 1300
Naphthalene	1.0	FCV = 13
Nitrobenzene	2.0	HCV = 180
Phenanthrene	1.0	FCV = 2.4
Pyrene	1.0	FCV = 2.5*
Group 2: Quantification Level Above R. 57 Water Quality Value		
2-Methylnaphthalene	5.0	FCV = 4.8*
Carbazole	10	FCV = 4
Dibenzofuran	5.0	FCV = 4
Hexachlorobenzene	2.0	WV = 0.0003
Hexachlorobutadiene	2.0	WV = 0.053
Hexachlorocyclopentadiene	10	FCV = 0.07*
Group 3: No R. 57 Water Quality Value Currently Developed		
2,4-Dinitrotoluene	5.0	
2,6-Dinitrotoluene	5.0	
2-Chloronaphthalene	2.0	
2-Nitroaniline	20	
3-Nitroaniline	20	
4-Bromophenyl phenylether	2.0	
4-Chlorophenyl phenylether	1.0	
4-Nitroaniline	20	
Azobenzene	2.0	
Benzo(a)anthracene	1.0	
Benzo(a)pyrene	2.0	
Benzo(b)fluoranthene	2.0	
Benzo(g,h,i)perylene	2.0	
Benzo(k)fluoranthene	2.0	
Bis(2-chloroethoxy)methane	2.0	
Dibenz(a,h)anthracene	2.0	
Dimethyl phthalate	2.0	
Di-n-octyl phthalate	2.0	
Indeno(1,2,3-cd)pyrene	2.0	
N-Nitrosodimethylamine	5.0	
N-Nitrosodi-n-propylamine	2.0	
N-Nitrosodiphenylamine	2.0	

FCV = Final Chronic Value.
HCV = Human Cancer Value (Non-Drinking Water).
HNV = Human Non-Cancer Value (Non-Drinking Water).
WV = Wildlife Value.
* = Value shown is an estimate based on available data.

Table 4. BTEX and MTBE, and their analytical quantification levels and Michigan Rule 57 water quality values.

Analyte	Quantification Level (ug/L)	R. 57 Water Quality Value (ug/L)
Benzene	1.0	FCV = 200
Toluene	1.0	FCV = 140
Ethylbenzene	1.0	FCV = 18
m- & p-Xylene	2.0	FCV = 35*
o-Xylene	1.0	
Methyl tert butyl ether	5.0	FCV = 730

* = Value applies to total xylene. (Total xylene = m- & p-xylene + o-xylene).

Table 5. Mercury and trace metals analyzed for the WCMP, and their analytical detection and quantification levels. All units are ug/L unless otherwise specified.

Analyte	Detection Level	Quantification Level	Units
Hg	0.14	0.45	ng/L
Cd	0.011	0.037	ug/L
Cr	0.057	0.19	ug/L
Cu	0.03	0.1	ug/L
Pb	0.0041	0.014	ug/L
Ni	0.093	0.31	ug/L
Zn	0.13	0.43	ug/L

Table 6. PCB congeners analyzed for the WCMP, and the analytical detection and quantification levels for a 160 liter sample.

Congener #	Detection Level (ng/L)	Quantification Level (ng/L)	Congener #	Detection Level (ng/L)	Quantification Level (ng/L)
3	0.22	0.72	97	0.0030	0.010
4/10	0.025	0.083	87	0.0050	0.017
7/9	0.0055	0.018	85	0.0055	0.018
6	0.011	0.037	136	0.015	0.050
8/5	0.024	0.080	77/110	0.011	0.037
19	0.0035	0.012	82	0.0035	0.012
18	0.0070	0.023	151	0.0050	0.017
15/17	0.015	0.050	135/144	0.0065	0.022
24/27	0.0035	0.012	123/149	0.0050	0.017
16/32	0.011	0.037	118	0.0080	0.027
26	0.0070	0.023	146	0.0055	0.018
25	0.0060	0.020	132/153/105	0.010	0.033
28/31	0.020	0.070	141	0.0040	0.013
33	0.0075	0.025	137/176	0.0065	0.022
53	0.0040	0.013	163/138	0.011	0.037
51	0.0035	0.012	158	0.0075	0.025
22	0.011	0.037	178	0.0070	0.023
45	0.0045	0.015	187/182	0.0050	0.017
46	0.0045	0.015	183	0.0055	0.018
52	0.0075	0.025	128	0.0045	0.015
49	0.0050	0.017	167	0.0060	0.020
47/48	0.0090	0.030	185	0.0035	0.012
44	0.0065	0.022	174	0.0055	0.018
37/42	0.010	0.033	177	0.0060	0.020
41/71/64	0.010	0.033	202/171	0.0040	0.013
40	0.0050	0.017	172	0.0075	0.025
63	0.012	0.040	180	0.0065	0.022
74	0.0065	0.022	193	0.0075	0.025
70/76	0.012	0.040	199	0.0045	0.015
66	0.012	0.040	170/190	0.0055	0.018
95	0.0060	0.020	198	0.0075	0.025
91	0.0055	0.018	201	0.0090	0.030
56/60	0.0080	0.027	203/196	0.014	0.047
92/84	0.012	0.040	208/195	0.0040	0.013
89	0.0030	0.010	207	0.0035	0.012
101	0.0055	0.018	194	0.0055	0.018
99	0.0040	0.013	206	0.0035	0.012
83	0.0045	0.015			

Note: Coelution is signified by the "/ " notation. Coeluting congeners cannot be separated analytically using analytical methods employed by the WCMP.

Table 7. Summary of laboratory result remark codes and their definitions.

Analyte Category	Code	Definition
Nutrients and Conventionals	A	Value reported is the mean of two or more determinations.
	D	Analyte value quantified from a dilution(s); quantification level raised.
	H	Recommended laboratory holding time was exceeded.
	I	Dilution required due to matrix interference; quantification level raised.
	J	Analyte was positively identified. Value is an estimate.
	ND	Observed result was below the quantification level.
	P	Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
	T	Reported value is less than the quantification level.
	W	Reported value is less than the method detection level.
Base/Neutral Organics, MTBE, BTEX, and Cyanide	ND	Observed result was below the quantification level.
Mercury and Trace Metals	BSQC	Batch spike exceeded quality control criteria.
	CCB	Continuing calibration blank exceeded level of detection.
	CCV	Continuing calibration standard exceeded quality control criteria.
	ELOD	Matrix problem; elevated level of detection reported.
	HT	Recommended laboratory holding time was exceeded before analysis.
	ICB	Initial calibration blank exceeded level of detection.
	ISQC	Internal standard exceeded quality control criteria.
	LCQC	Laboratory control exceeded quality control criteria.
	MBQC	Method blank exceeded level of detection.
	MS	Matrix spike exceeded quality control criteria.
	MSD	Matrix spike duplicate exceeded quality control criteria.
PCBs	EST	Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
	FBK	Analyte had measurable value above established QC limit when blank was analyzed using same equipment and analytical method.
	FMS	Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
	NAI	Not analyzed due to uncontrollable interference.
	NDD	Not detected due to dilution.
Dioxins and Furans	B	Analyte was detected in the laboratory method blank as well as in an associated field sample.
	J	Indicates a concentration based on an analyte to internal standard ratio which is below the calibration curve. Concentrations outside the calibration curve are estimates only.
	ND	Concentration below the detection level shown.

Table 8. WCMP tributary station sampling history.

Station	STORET ID	1998	1999	2000	2001	2002	2003
Intensive and Integrator Sites							
Au Sable	350061	X		X	X	X	X
Black	740385			X	X	X	X
Boardman	280014				X	X	X
Cass	730024			X	X	X	X
Cheboygan	160073			X	X	X	X
Clinton	500233	X		X	X	X	X
Escanaba	210102		X	X	X	X	X
Flint	730285			X	X	X	X
Grand (Lower)	700123		X	X	X	X	X
Grand (Upper)	340025			X	X	X	X
Huron	580364	X		X	X	X	X
Kalamazoo (Lower)	030077		X	X	X	X	X
Kalamazoo (Upper)	390057			X	X	X	X
Manistee	510088			X	X	X	X
Manistique	770073		X	X	X	X	X
Menominee	550038			X	X	X	X
Muskegon (Lower)	610273		X	X	X	X	X
Muskegon (Upper)	670008			X	X	X	X
Ontonagon	660038			X	X	X	X
Pere Marquette	530027		X	X	X	X	X
Pine	490006			X	X	X	X
Raisin	580046	X		X	X	X	X
Rouge	820070	X		X	X	X	X
Saginaw	090177	X			X	X	X
Shiawassee	730023	X		X	X	X	X
St. Joseph (Lower)	110628		X	X	X	X	X
St. Joseph (Upper)	750273			X	X	X	X
Sturgeon	210032			X	X	X	X
Tahquamenon	170141		X	X	X	X	X
Thunder Bay	040123	X		X	X	X	X
Tittabawassee	730025	X		X	X	X	X
Monitoring Year 5 Minimally Impacted Sites							
Bigelow Creek	630291				X		
Evergreen Creek	790157				X		
Grand (Headwaters)	380083				X		
Pokagon Creek	140126				X		
Tioga River	070070				X		
Monitoring Year 1 Minimally Impacted Sites							
Huron (Headwaters)	470521					X	
Paint River	360124					X	
Perry Creek	680056					X	
W. Br. Tittabawassee	260068					X	
Monitoring Year 2 Minimally Impacted Sites							
East Creek	280318						X
S. Br. Flint	440173						X
Raisin (Headwaters)	380393						X

Table 9. 2003 loading rate estimates for total chloride, phosphorus and suspended solids.

Parameter	Station	Loading Rate+	95% C.I.	Mean Concentration+	Mean Flow +*
Tot Chloride		metric tons/year	(+/-)	mg/L	cfs
	Saginaw River	209,195	22%	113.00	2,610
	Grand River (Lower)	130,079	14%	60.08	2,730
	Clinton River	76,691	16%	172.25	508
	Kalamazoo River (Lower)	62,190	7%	47.17	1,560
	Flint River	49,364	33%	110.42	568
	Muskegon River (Lower)	28,168	3%	21.33	1,920
	River Raisin	25,935	12%	46.42	649
	Au Sable River	6,230	1%	5.92	1,160
	Boardman River	1,463	6%	8.33	198
Tot Phosphorus		metric tons/year	(+/-)	mg/L	cfs
	Grand River (Lower)	345	27%	0.14	2,730
	Saginaw River	227	10%	0.11	2,610
	Kalamazoo River (Lower)	151	24%	0.10	1,560
	Clinton River	118	42%	0.23	508
	Flint River	108	87%	0.20	568
	River Raisin	107	46%	0.11	649
	Muskegon River (Lower)	49	48%	0.03	1,920
	Au Sable River	11	18%	0.01	1,160
	Boardman River	2	24%	0.01	198
TSS		metric tons/year	(+/-)	mg/L	cfs
	Grand River (Lower)	101,442	35%	34.50	2,730
	Saginaw River	47,411	20%	21.08	2,610
	Clinton River	44,306	57%	61.67	508
	Flint River	36,046	92%	56.50	568
	Muskegon River (Lower)	33,514	61%	18.91	1,920
	Kalamazoo River (Lower)	33,002	18%	24.67	1,560
	River Raisin	30,630	50%	28.33	649
	Au Sable River	2,081	1%	2.00	1,160
	Boardman River	751	37%	5.43	198

+ = Calculated values; not rounded to appropriate number of significant figures.
* = Estimates of mean flow are based on measurements taken within the period sampled.
C.I. = Confidence interval of loading rate estimate. True loading rate = estimated loading rate +/- (estimated loading rate x confidence interval).

Table 10. 2003 loading rate estimates for total mercury and trace metal water quality indicators. Calculations are based on actual contaminant concentrations.

Parameter	Station	Loading Rate+	95% C.I.	Mean Concentration+	Mean Flow+*
Chromium		kg/year	(+/-)	ug/L	cfs
	Grand River (Lower)	3,504	31%	1.09	2,730
	Clinton River	2,263	65%	3.35	508
	Saginaw River	1,990	21%	0.93	2,610
	Flint River	1,218	59%	1.92	568
	River Raisin	992	62%	1.06	649
	Kalamazoo River (Lower)	855	18%	0.59	1,560
	Muskegon River (Lower)	256	56%	0.15	1,920
	Boardman River	9	53%	0.05	198
	Au Sable River	4	193%	0.004	1,160
Copper		kg/year	(+/-)	ug/L	cfs
	Grand River (Lower)	7,703	22%	2.67	2,730
	Saginaw River	5,028	10%	2.22	2,610
	Clinton River	3,796	47%	6.40	508
	Flint River	2,432	73%	3.85	568
	Kalamazoo River (Lower)	2,325	13%	1.60	1,560
	River Raisin	2,037	31%	3.20	649
	Muskegon River (Lower)	892	14%	0.63	1,920
	Au Sable River	219	18%	0.23	1,160
	Boardman River	51	19%	0.29	198
Lead		kg/year	(+/-)	ug/L	cfs
	Grand River (Lower)	5,438	44%	1.67	2,730
	Clinton River	3,248	68%	4.73	508
	Saginaw River	2,532	8%	1.12	2,610
	Flint River	2,325	68%	3.39	568
	Kalamazoo River (Lower)	1,994	13%	1.41	1,560
	River Raisin	1,241	57%	1.09	649
	Muskegon River (Lower)	438	47%	0.24	1,920
	Au Sable River	47	19%	0.04	1,160
	Boardman River	37	27%	0.10	198
Mercury		kg/year	(+/-)	ng/L	cfs
	Grand River (Lower)	15	45%	4.70	2,730
	Kalamazoo River (Lower)	9	16%	6.59	1,560
	Saginaw River	7	6%	2.77	2,610
	Clinton River	6	66%	9.25	508
	Flint River	5	57%	6.61	568
	River Raisin	3	52%	3.59	649
	Muskegon River (Lower)	2	33%	1.29	1,920
	Au Sable River	0.37	27%	0.42	1,160
	Boardman River	0.37	27%	1.09	198

+ = Calculated values; may not be rounded to appropriate number of significant figures.

* = Estimates of mean flow are based on measurements taken within the period sampled.

C.I. = Confidence interval of loading rate estimate. True loading rate = estimated loading rate +/- (estimated loading rate x confidence interval).

Table 11. 1 Rule 57 water quality values, mean and range of concentrations, and exceedance rates for mercury and selected trace metal water quality indicators.

STORET ID	Station	Mercury (ng/L)	Chromium (ug/L)	Copper (ug/L)	Lead (ug/L)
350061	**Au Sable River**				
R.57 Water Quality Value@		1.3	100.0	12.0	15.0
Mean Concentration+		0.422	0.004	0.228	0.044
Range of Concentrations		0.1 - 0.82	0 - 0.037	0.142 - 0.429	0.023 - 0.08
Exceedance Rate*		0 / 12	0 / 12	0 / 12	0 / 12
740385	**Black River**				
R.57 Water Quality Value@		1.3	130.0	17.0	23.0
Mean Concentration+		2.070	0.751	2.115	0.704
Range of Concentrations		0.73 - 4.02	0.377 - 1.17	1.31 - 3.19	0.452 - 1.04
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
280014	**Boardman River**				
R.57 Water Quality Value@		1.3	110.0	13.0	17.0
Mean Concentration+		1.092	0.046	0.286	0.098
Range of Concentrations		0.26 - 2.97	0 - 0.167	0.04 - 0.495	0.03 - 0.342
Exceedance Rate*		4 / 12	0 / 12	0 / 12	0 / 12
730024	**Cass River**				
R.57 Water Quality Value@		1.3	190.0	24.0	35.0
Mean Concentration+		2.968	1.070	2.143	0.889
Range of Concentrations		2.29 - 3.51	0.6 - 1.49	1.52 - 2.54	0.689 - 1.22
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
160073	**Cheboygan River**				
R.57 Water Quality Value@		1.3	100.0	13.0	16.0
Mean Concentration+		0.598	0.006	0.472	0.045
Range of Concentrations		0.1 - 1.02	0 - 0.023	0.317 - 0.589	0.029 - 0.068
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
500233	**Clinton River**				
R.57 Water Quality Value@		1.3	140.0	18.0	25.0
Mean Concentration+		9.247	3.347	6.397	4.732
Range of Concentrations		2.42 - 33.63	1.12 - 14.7	2.78 - 19.8	1.38 - 21.1
Exceedance Rate*		12 / 12	0 / 12	1 / 12	0 / 12
280318	**East Creek**				
R.57 Water Quality Value@		1.3	110.0	14.0	18.0
Mean Concentration+		1.033	0.069	0.245	0.081
Range of Concentrations		0.89 - 1.17	0.032 - 0.13	0.132 - 0.327	0.063 - 0.113
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
210102	**Escanaba River**				
R.57 Water Quality Value@		1.3	82.0	9.9	12.0
Mean Concentration+		1.628	0.567	0.778	0.152
Range of Concentrations		0 - 2.82	0.216 - 0.887	0.542 - 1.08	0.127 - 0.178
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 water quality values are expressed as dissolved metal.
+ = Calculated value; may not be rounded to appropriate number of significant figures.
* = Number of samples exceeding Rule 57 water quality value / number of samples analyzed.

Table 11. 2 Rule 57 water quality values, mean and range of concentrations, and exceedance rates for mercury and selected trace metal water quality indicators.

STORET ID	Station	Mercury (ng/L)	Chromium (ug/L)	Copper (ug/L)	Lead (ug/L)
730285	**Flint River**				
R.57 Water Quality Value@		1.3	160.0	20.0	27.0
Mean Concentration+		6.613	1.916	3.850	3.387
Range of Concentrations		2.2 - 29.71	0.732 - 7.58	2.02 - 13.5	0.938 - 16.9
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
700123	**Grand River (Lower)**				
R.57 Water Quality Value@		1.3	160.0	20.0	28.0
Mean Concentration+		4.698	1.089	2.669	1.666
Range of Concentrations		1.23 - 13.05	0.216 - 2.66	1.28 - 5.46	0.444 - 5.36
Exceedance Rate*		11 / 12	0 / 12	0 / 12	0 / 12
340025	**Grand River (Upper)**				
R.57 Water Quality Value@		1.3	170.0	21.0	30.0
Mean Concentration+		3.305	0.503	2.375	0.853
Range of Concentrations		2.26 - 5.6	0.271 - 0.937	1.64 - 3.17	0.426 - 1.6
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
580364	**Huron River**				
R.57 Water Quality Value@		1.3	190.0	24.0	35.0
Mean Concentration+		1.755	0.412	1.545	1.315
Range of Concentrations		1.17 - 2.18	0.325 - 0.508	1.3 - 1.84	1.09 - 1.64
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
030077	**Kalamazoo River (Lower)**				
R.57 Water Quality Value@		1.3	150.0	19.0	26.0
Mean Concentration+		6.590	0.595	1.598	1.415
Range of Concentrations		2.6 - 10.04	0.05 - 0.842	0.857 - 2.3	0.732 - 2.36
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
390057	**Kalamazoo River (Upper)**				
R.57 Water Quality Value@		1.3	170.0	22.0	31.0
Mean Concentration+		5.088	1.195	1.905	1.551
Range of Concentrations		1.74 - 10.72	0.32 - 2.57	1.34 - 2.83	0.567 - 3.17
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
510088	**Manistee River**				
R.57 Water Quality Value@		1.3	110.0	13.0	17.0
Mean Concentration+		1.225	0.257	0.452	0.214
Range of Concentrations		0.92 - 1.61	0.16 - 0.374	0.355 - 0.501	0.121 - 0.284
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
770073	**Manistique River**				
R.57 Water Quality Value@		1.3	65.0	7.9	8.7
Mean Concentration+		1.813	0.203	0.351	0.144
Range of Concentrations		1.14 - 3.33	0.126 - 0.302	0.286 - 0.384	0.119 - 0.173
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 water quality values are expressed as dissolved metal.
+ = Calculated value; may not be rounded to appropriate number of significant figures.
* = Number of samples exceeding Rule 57 water quality value / number of samples analyzed.

Table 11. 3 Rule 57 water quality values, mean and range of concentrations, and exceedance rates for mercury and selected trace metal water quality indicators.

STORET ID	Station	Mercury (ng/L)	Chromium (ug/L)	Copper (ug/L)	Lead (ug/L)
550038	**Menominee River**				
R.57 Water Quality Value@		1.3	82.0	9.9	12.0
Mean Concentration+		2.145	0.235	0.758	0.109
Range of Concentrations		0 - 4.47	0.049 - 0.373	0.489 - 0.886	0.051 - 0.151
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
610273	**Muskegon River (Lower)**				
R.57 Water Quality Value@		1.3	120.0	15.0	19.0
Mean Concentration+		1.291	0.152	0.632	0.240
Range of Concentrations		0.45 - 2.46	0 - 0.466	0.366 - 0.905	0.09 - 0.7
Exceedance Rate*		4 / 12	0 / 12	0 / 12	0 / 12
670008	**Muskegon River (Upper)**				
R.57 Water Quality Value@		1.3	110.0	14.0	18.0
Mean Concentration+		1.943	0.231	0.579	0.214
Range of Concentrations		1.34 - 2.78	0.152 - 0.309	0.417 - 0.795	0.126 - 0.295
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
660038	**Ontonagon River**				
R.57 Water Quality Value@		1.3	57.0	6.8	7.2
Mean Concentration+		1.238	0.745	2.390	0.157
Range of Concentrations		0 - 2.93	0.331 - 1.26	1.14 - 3.4	0.061 - 0.299
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
530027	**Pere Marquette River**				
R.57 Water Quality Value@		1.3	120.0	15.0	19.0
Mean Concentration+		2.138	0.358	0.464	0.402
Range of Concentrations		1.94 - 2.42	0.223 - 0.533	0.398 - 0.574	0.26 - 0.572
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
490006	**Pine River**				
R.57 Water Quality Value@		1.3	72.0	8.7	10.0
Mean Concentration+		4.200	2.626	2.219	1.321
Range of Concentrations		1.47 - 11.19	0.709 - 8.08	0.649 - 6.12	0.309 - 4.17
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
580046	**River Raisin**				
R.57 Water Quality Value@		1.3	160.0	20.0	28.0
Mean Concentration+		3.592	1.057	3.195	1.085
Range of Concentrations		1.47 - 9.54	0.196 - 3.52	1.6 - 5.55	0.275 - 3.78
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
380393	**River Raisin (Headwaters)**				
R.57 Water Quality Value@		1.3	150.0	18.0	25.0
Mean Concentration+		1.185	0.026	0.459	0.139
Range of Concentrations		0.74 - 1.67	0 - 0.087	0.258 - 0.611	0.054 - 0.209
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 water quality values are expressed as dissolved metal.
+ = Calculated value; may not be rounded to appropriate number of significant figures.
* = Number of samples exceeding Rule 57 water quality value / number of samples analyzed.

Table 11. 4 Rule 57 water quality values, mean and range of concentrations, and exceedance rates for mercury and selected trace metal water quality indicators.

STORET ID	Station	Mercury (ng/L)	Chromium (ug/L)	Copper (ug/L)	Lead (ug/L)
820070	**River Rouge**				
R.57 Water Quality Value@		1.3	110.0	13.0	16.0
Mean Concentration+		3.253	1.153	2.765	1.680
Range of Concentrations		2.26 - 4.97	0.667 - 2.08	2.06 - 3.94	1.24 - 2.37
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
090177	**Saginaw River**				
R.57 Water Quality Value@		1.3	150.0	19.0	27.0
Mean Concentration+		2.772	0.933	2.222	1.125
Range of Concentrations		1.36 - 4.2	0.345 - 1.4	1.47 - 2.63	0.711 - 1.61
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
730023	**Shiawassee River**				
R.57 Water Quality Value@		1.3	170.0	21.0	30.0
Mean Concentration+		2.355	0.518	1.773	0.666
Range of Concentrations		0.87 - 4.26	0.215 - 0.788	1.27 - 2.25	0.304 - 1.2
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
440173	**South Branch Flint River**				
R.57 Water Quality Value@		1.3	180.0	23.0	33.0
Mean Concentration+		1.095	0.026	0.557	0.121
Range of Concentrations		0.49 - 1.75	0 - 0.051	0.424 - 0.737	0.079 - 0.163
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
110628	**St. Joseph River (Lower)**				
R.57 Water Quality Value@		1.3	170.0	21.0	30.0
Mean Concentration+		4.278	0.427	1.546	0.895
Range of Concentrations		2.87 - 5.95	0.233 - 0.626	0.953 - 2.07	0.693 - 1.28
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
750273	**St. Joseph River (Upper)**				
R.57 Water Quality Value@		1.3	150.0	19.0	26.0
Mean Concentration+		1.848	0.097	0.707	0.356
Range of Concentrations		1.41 - 2.29	0.059 - 0.122	0.621 - 0.835	0.241 - 0.511
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
210032	**Sturgeon River**				
R.57 Water Quality Value@		1.3	77.0	9.3	11.0
Mean Concentration+		2.170	0.235	0.342	0.137
Range of Concentrations		0.87 - 3.74	0.145 - 0.372	0.275 - 0.444	0.046 - 0.281
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
170141	**Tahquamenon River**				
R.57 Water Quality Value@		1.3	54.0	6.4	6.7
Mean Concentration+		2.830	0.281	0.375	0.183
Range of Concentrations		1.15 - 7.43	0.077 - 0.653	0.17 - 0.74	0.062 - 0.476
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 water quality values are expressed as dissolved metal.
+ = Calculated value; may not be rounded to appropriate number of significant figures.
* = Number of samples exceeding Rule 57 water quality value / number of samples analyzed.

Table 11. 5 Rule 57 water quality values, mean and range of concentrations, and exceedance rates for mercury and selected trace metal water quality indicators.

STORET ID	Station	Mercury (ng/L)	Chromium (ug/L)	Copper (ug/L)	Lead (ug/L)
040123	**Thunder Bay River**				
R.57 Water Quality Value@		1.3	110.0	14.0	18.0
Mean Concentration+		1.330	0.025	0.443	0.087
Range of Concentrations		0.32 - 2.51	0 - 0.06	0.115 - 0.802	0.051 - 0.112
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
730025	**Tittabawassee River**				
R.57 Water Quality Value@		1.3	150.0	19.0	27.0
Mean Concentration+		2.140	0.496	1.738	0.474
Range of Concentrations		1.06 - 3.44	0.417 - 0.566	1.47 - 2.24	0.326 - 0.736
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 water quality values are expressed as dissolved metal.
+ = Calculated value; may not be rounded to appropriate number of significant figures.
* = Number of samples exceeding Rule 57 water quality value / number of samples analyzed.

Table 12. Concentrations of total PCB measured at Michigan rivers. The Rule 57 water quality value for total PCB = 0.026 ng/L.

STORET ID	Station	Sample Collection Date	Total PCB+ (ng/L)
350061	Au Sable River	6/24/2003	0.082
740385	Black River	10/3/2003	0.871
280014	Boardman River	6/25/2003	0.374
		7/9/2003	2.508
730024	Cass River	5/27/2003	0.744
160073	Cheboygan River	10/8/2003	0.026
500233	Clinton River	10/16/2003	6.111
280318	East Creek	4/30/2003	0.100
210102	Escanaba River	7/15/2003	0.333
730285	Flint River	8/12/2003	1.773
		7/30/2003	1.425
700123	Grand River (Lower)	10/29/2003	0.698
340025	Grand River (Upper)	6/17/2003	1.232
580364	Huron River	9/17/2003	1.636
030077	Kalamazoo River (Lower)	6/10/2003	17.088
390057	Kalamazoo River (Upper)	6/16/2003	4.359
510088	Manistee River	4/29/2003	0.407
770073	Manistique River	10/30/2003	0.048
550038	Menominee River	9/9/2003	0.574
610273	Muskegon River (Lower)	6/11/2003	0.202
670008	Muskegon River (Upper)	6/24/2003	0.164
660038	Ontonagon River	7/16/2003	0.150
530027	Pere Marquette River	6/25/2003	0.876
		7/9/2003	0.745
490006	Pine River	8/18/2003	0.277
580046	River Raisin	11/12/2003	7.562
380393	River Raisin (Headwaters)	8/19/2003	0.230
820070	River Rouge	9/18/2003	10.659
090177	Saginaw River	7/29/2003	13.657
730023	Shiawassee River	10/15/2003	0.427
440173	South Branch Flint River	10/9/2003	0.234
110628	St. Joseph River (Lower)	5/22/2003	3.493
750273	St. Joseph River (Upper)	5/21/2003	0.594
210032	Sturgeon River	9/4/2003	0.042
170141	Tahquamenon River	7/8/2003	0.069
040123	Thunder Bay River	10/7/2003	0.181
730025	Tittabawassee River	5/28/2003	0.790

Table 13.1 Dioxin and furan concentrations measured at selected stations. Shown are the raw results for each sample or replicate and blank; the adjusted results; the congener-specific and total TEC for each sample or replicate; and the applicable Rule 57 water quality values. All concentrations are in pg/L (ppq).

			Tittabawassee River (LBUS031)			Sample Dated 7/9/2003		Tittabawassee River (RBUS031)			Sample Dated 7/9/2003	
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	ND 2.1	ND 1.9	0.0	0.0000	WV = 0.0031	ND 1.7	ND 1.9	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 3.3	ND 3.0	0.0	0.0000		ND 3.9	ND 3.0	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 2.1	ND 1.8	0.0	0.0000		ND 1.9	ND 1.8	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 2.1	ND 1.8	0.0	0.0000		ND 1.9	ND 1.8	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 2.1	ND 1.8	0.0	0.0000		ND 1.9	ND 1.8	0.0	0.0000	
1234678-HpCDD	0.01	0.05	ND 3.3	ND 3.3	0.0	0.0000		ND 2.9	ND 3.3	0.0	0.0000	
12346789-OCDD	0.001	0.01	J 24.0	ND 6.0	24.0	0.0002		ND 19.4	ND 6.0	0.0	0.0000	
2378-TCDF	0.1	0.8	ND 1.5	ND 1.5	0.0	0.0000		ND 1.5	ND 1.5	0.0	0.0000	
12378-PeCDF	0.05	0.2	ND 1.4	ND 1.2	0.0	0.0000		ND 1.7	ND 1.2	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 1.6	ND 1.6	0.0	0.0000		ND 1.9	ND 1.6	0.0	0.0000	
123478-HxCDF	0.1	0.08	J,B 3.0	ND 1.1	3.0	0.0240		ND 1.2	ND 1.1	0.0	0.0000	
123678-HxCDF	0.1	0.2	ND 1.3	ND 1.2	0.0	0.0000		ND 1.2	ND 1.2	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 1.3	ND 1.2	0.0	0.0000		ND 1.1	ND 1.2	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 1.6	ND 1.6	0.0	0.0000		ND 1.5	ND 1.6	0.0	0.0000	
1234678-HpCDF	0.01	0.01	ND 1.9	ND 1.9	0.0	0.0000		ND 1.7	ND 1.9	0.0	0.0000	
1234789-HpCDF	0.01	0.4	ND 2.5	ND 2.5	0.0	0.0000		ND 2.3	ND 2.5	0.0	0.0000	
12346789-OCDF	0.001	0.02	ND 4.2	ND 4.5	0.0	0.0000		ND 4.7	ND 4.5	0.0	0.0000	
					Σ TEC =	0.0242	HCV = 0.0086			Σ TEC =	0.0000	HCV = 0.0086

			Tittabawassee River (MIDUS031)			Sample Dated 7/9/2003		Tittabawassee River (MIDUS031R)			Replicate Dated 7/9/2003	
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	ND 1.8	ND 1.9	0.0	0.0000	WV = 0.0031	ND 1.7	ND 1.9	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 2.8	ND 3.0	0.0	0.0000		ND 2.7	ND 3.0	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 1.6	ND 1.8	0.0	0.0000		ND 1.7	ND 1.8	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 1.7	ND 1.8	0.0	0.0000		ND 1.7	ND 1.8	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 1.7	ND 1.8	0.0	0.0000		ND 1.7	ND 1.8	0.0	0.0000	
1234678-HpCDD	0.01	0.05	ND 3.5	ND 3.3	0.0	0.0000		ND 2.7	ND 3.3	0.0	0.0000	
12346789-OCDD	0.001	0.01	ND 22.3	ND 6.0	0.0	0.0000		ND 5.6	ND 6.0	0.0	0.0000	
2378-TCDF	0.1	0.8	ND 1.4	ND 1.5	0.0	0.0000		ND 1.2	ND 1.5	0.0	0.0000	
12378-PeCDF	0.05	0.2	ND 1.7	ND 1.2	0.0	0.0000		ND 1.2	ND 1.2	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 1.5	ND 1.6	0.0	0.0000		ND 1.3	ND 1.6	0.0	0.0000	
123478-HxCDF	0.1	0.08	J,B 3.0	ND 1.1	3.0	0.0240		ND 2.7	ND 1.1	0.0	0.0000	
123678-HxCDF	0.1	0.2	ND 1.1	ND 1.2	0.0	0.0000		ND 1.0	ND 1.2	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 1.1	ND 1.2	0.0	0.0000		ND 1.0	ND 1.2	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 2.3	ND 1.6	0.0	0.0000		ND 1.4	ND 1.6	0.0	0.0000	
1234678-HpCDF	0.01	0.01	J 3.3	ND 1.9	3.3	0.0003		ND 1.5	ND 1.9	0.0	0.0000	
1234789-HpCDF	0.01	0.4	ND 2.3	ND 2.5	0.0	0.0000		ND 2.2	ND 2.5	0.0	0.0000	
12346789-OCDF	0.001	0.02	ND 4.2	ND 4.5	0.0	0.0000		ND 4.1	ND 4.5	0.0	0.0000	
					Σ TEC =	0.0243	HCV = 0.0086			Σ TEC =	0.0000	HCV = 0.0086

Adjusted = Sample concentrations below analytical detection were adjusted to zero; sample concentrations at or above analytical detection were blank corrected IF blank was also at or above analytical detection.

B = Analyte was detected in the laboratory method blank as well as in an associated field sample.

BEF = Bioaccumulation equivalency factor.

HCV = Human Cancer Value - Non-Drinking Water.

J = Indicates a concentration based on an analyte to internal standard ratio which is below the calibration curve. Concentrations outside the calibration curve are estimates only.

LBUS031 = Left bank, upstream of Dow outfall 031.

MIDUS031 = Mid stream, upstream of Dow outfall 031.

ND = Concentration below the detection level shown.

RBUS031 = Right bank, upstream of Dow outfall 031.

TEC = 2,3,7,8-TCDD toxicity equivalence concentration. TECs were calculated in accordance with the Michigan Part 8 Rules.

TEF = Toxicity equivalency factor.

WV = Wildlife Value.

Table 13.2 Dioxin and furan concentrations measured at selected stations. Shown are the raw results for each sample or replicate and blank; the adjusted results; the congener-specific and total TEC for each sample or replicate; and the applicable Rule 57 water quality values. All concentrations are in pg/L (ppq).

			Tittabawassee River (730025)		Sample Dated 4/15/2003			Tittabawassee River (730025)		Replicate Dated 4/15/2003		
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	ND 2.9	ND 2.0	0.0	0.0000	WV = 0.0031	ND 3.6	ND 2.0	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 3.9	ND 2.8	0.0	0.0000		ND 5.6	ND 2.8	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 2.4	ND 1.8	0.0	0.0000		ND 3.5	ND 1.8	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 2.6	ND 1.8	0.0	0.0000		ND 3.4	ND 1.8	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 2.5	ND 1.8	0.0	0.0000		ND 3.4	ND 1.8	0.0	0.0000	
1234678-HpCDD	0.01	0.05	ND 4.0	ND 3.1	0.0	0.0000		J 21.6	ND 3.1	21.6	0.0108	
12346789-OCDD	0.001	0.01	J 42.5	ND 6.8	42.5	0.0004		285.0	ND 6.8	285.0	0.0029	
2378-TCDF	0.1	0.8	J 4.5	ND 1.2	4.5	0.3600		J 5.5	ND 1.2	5.5	0.4400	
12378-PeCDF	0.05	0.2	ND 2.0	ND 1.5	0.0	0.0000		ND 2.6	ND 1.5	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 2.3	ND 1.7	0.0	0.0000		ND 3.1	ND 1.7	0.0	0.0000	
123478-HxCDF	0.1	0.08	J 2.7	J 1.7	1.0	0.0080		J 3.0	J 1.7	1.3	0.0104	
123678-HxCDF	0.1	0.2	ND 1.4	ND 1.1	0.0	0.0000		ND 1.9	ND 1.1	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 1.4	ND 1.0	0.0	0.0000		ND 1.9	ND 1.0	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 1.9	ND 1.5	0.0	0.0000		ND 2.8	ND 1.5	0.0	0.0000	
1234678-HpCDF	0.01	0.01	J 5.1	ND 1.5	5.1	0.0005		J 9.9	ND 1.5	9.9	0.0010	
1234789-HpCDF	0.01	0.4	ND 2.8	ND 2.1	0.0	0.0000		ND 3.6	ND 2.1	0.0	0.0000	
12346789-OCDF	0.001	0.02	J 11.8	ND 5.2	11.8	0.0002		J 59.6	ND 5.2	59.6	0.0012	
					Σ TEC =	0.3692	HCV = 0.0086			Σ TEC =	0.4662	HCV = 0.0086

			Tittabawassee River (730025)		Sample Dated 5/28/2003			Tittabawassee River (730025)		Replicate Dated 5/28/2003		
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	ND 3.1	ND 1.5	0.0	0.0000	WV = 0.0031	ND 2.7	ND 1.5	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 4.0	ND 1.8	0.0	0.0000		ND 3.5	ND 1.8	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 3.8	ND 1.9	0.0	0.0000		ND 3.4	ND 1.9	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 3.7	ND 1.8	0.0	0.0000		ND 3.4	ND 1.8	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 3.9	ND 1.9	0.0	0.0000		ND 3.5	ND 1.9	0.0	0.0000	
1234678-HpCDD	0.01	0.05	J 17.2	ND 3.1	17.2	0.0086		J 21.3	ND 3.1	21.3	0.0107	
12346789-OCDD	0.001	0.01	178.0	ND 5.8	178.0	0.0018		119.0	ND 5.8	119.0	0.0012	
2378-TCDF	0.1	0.8	14.1	ND 1.0	14.1	1.1280		J 9.6	ND 1.0	9.6	0.7680	
12378-PeCDF	0.05	0.2	J 8.2	ND 1.1	8.2	0.0820		ND 1.9	ND 1.1	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 2.2	ND 1.2	0.0	0.0000		ND 2.2	ND 1.2	0.0	0.0000	
123478-HxCDF	0.1	0.08	J 8.4	ND 1.2	8.4	0.0672		J 5.2	ND 1.2	5.2	0.0416	
123678-HxCDF	0.1	0.2	ND 1.9	ND 1.2	0.0	0.0000		ND 1.8	ND 1.2	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 2.1	ND 1.0	0.0	0.0000		ND 1.9	ND 1.0	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 2.6	ND 1.2	0.0	0.0000		ND 2.3	ND 1.2	0.0	0.0000	
1234678-HpCDF	0.01	0.01	J 19.9	ND 2.0	19.9	0.0020		J 16.4	ND 2.0	16.4	0.0016	
1234789-HpCDF	0.01	0.4	ND 4.2	ND 2.0	0.0	0.0000		ND 3.8	ND 2.0	0.0	0.0000	
12346789-OCDF	0.001	0.02	J 38.7	ND 4.5	38.7	0.0008		J 47.5	ND 4.5	47.5	0.0010	
					Σ TEC =	1.2903	HCV = 0.0086			Σ TEC =	0.8240	HCV = 0.0086

Adjusted = Sample concentrations below analytical detection were adjusted to zero; sample concentrations at or above analytical detection were blank corrected IF blank was also at or above analytical detection.

B = Analyte was detected in the laboratory method blank as well as in an associated field sample.

BEF = Bioaccumulation equivalency factor.

HCV = Human Cancer Value - Non-Drinking Water.

J = Indicates a concentration based on an analyte to internal standard ratio which is below the calibration curve. Concentrations outside the calibration curve are estimates only.

ND = Concentration below the detection level shown.

TEC = 2,3,7,8-TCDD toxicity equivalence concentration. TECs were calculated in accordance with the Michigan Part 8 Rules.

TEF = Toxicity equivalency factor.

WV = Wildlife Value.

Table 13.3 Dioxin and furan concentrations measured at selected stations. Shown are the raw results for each sample or replicate and blank; the adjusted results; the congener-specific and total TEC for each sample or replicate; and the applicable Rule 57 water quality values. All concentrations are in pg/L (ppq).

			Tittabawassee River (730025)		Sample Dated 9/4/2003			Tittabawassee River (730025)		Replicate Dated 9/4/2003		
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	ND 0.9	ND 1.0	0.0	0.0000	WV = 0.0031	ND 0.8	ND 1.0	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 1.6	J 3.0	0.0	0.0000		ND 5.9	J 3.0	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 1.4	ND 2.6	0.0	0.0000		J 4.0	ND 2.6	4.0	0.1200	
123678-HxCDD	0.1	0.1	ND 1.4	ND 3.0	0.0	0.0000		J 5.1	ND 3.0	5.1	0.0510	
123789-HxCDD	0.1	0.1	ND 1.4	J 3.3	0.0	0.0000		J 4.6	J 3.3	1.3	0.0130	
1234678-HpCDD	0.01	0.05	ND 8.3	ND 2.2	0.0	0.0000		J 11.9	ND 2.2	11.9	0.0060	
12346789-OCDD	0.001	0.01	J,B 73.6	ND 6.0	73.6	0.0007		J,B 65.7	ND 6.0	65.7	0.0007	
2378-TCDF	0.1	0.8	9.7	ND 0.8	9.7	0.7760		10.7	ND 0.8	10.7	0.8560	
12378-PeCDF	0.05	0.2	ND 4.1	J 3.5	0.0	0.0000		J 8.2	J 3.5	4.7	0.0470	
23478-PeCDF	0.5	1.6	J,B 4.9	ND 2.7	4.9	3.9200		J 8.2	ND 2.7	8.2	6.5600	
123478-HxCDF	0.1	0.08	J,B 4.8	J 3.4	1.4	0.0112		ND 9.3	J 3.4	0.0	0.0000	
123678-HxCDF	0.1	0.2	ND 0.8	J 2.7	0.0	0.0000		J 4.0	J 2.7	1.3	0.0260	
234678-HxCDF	0.1	0.7	ND 0.9	ND 2.9	0.0	0.0000		ND 4.0	ND 2.9	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 1.1	J,B 4.1	0.0	0.0000		J,B 3.9	J,B 4.1	0.0	0.0000	
1234678-HpCDF	0.01	0.01	J,B 9.1	ND 2.0	9.1	0.0009		J 10.9	ND 2.0	10.9	0.0011	
1234789-HpCDF	0.01	0.4	ND 1.6	ND 1.8	0.0	0.0000		J 4.7	ND 1.8	4.7	0.0188	
12346789-OCDF	0.001	0.02	J,B 20.2	ND 3.1	20.2	0.0004		ND 18.3	ND 3.1	0.0	0.0000	
					Σ TEC =	4.7093	HCV = 0.0086			Σ TEC =	7.6995	HCV = 0.0086

			Tittabawassee River (730025)		Sample Dated 9/29/2003			Tittabawassee River (730025)		Replicate Dated 9/29/2003		
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	J 5.3	ND 1.5	5.3	5.3000	WV = 0.0031	ND 1.2	ND 1.5	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	J 9.3	ND 1.6	9.3	4.1850		ND 1.5	ND 1.6	0.0	0.0000	
123478-HxCDD	0.1	0.3	J 9.3	ND 1.7	9.3	0.2790		ND 1.4	ND 1.7	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 7.5	ND 1.8	0.0	0.0000		ND 1.4	ND 1.8	0.0	0.0000	
123789-HxCDD	0.1	0.1	J,B 10.4	ND 1.8	10.4	0.1040		ND 1.5	ND 1.8	0.0	0.0000	
1234678-HpCDD	0.01	0.05	J 12.5	ND 2.7	12.5	0.0063		J 5.3	ND 2.7	5.3	0.0027	
12346789-OCDD	0.001	0.01	J 44.8	ND 4.4	44.8	0.0004		J 35.8	ND 4.4	35.8	0.0004	
2378-TCDF	0.1	0.8	J 7.8	ND 1.1	7.8	0.6240		J 3.7	ND 1.1	3.7	0.2960	
12378-PeCDF	0.05	0.2	J 13.8	ND 0.8	13.8	0.1380		ND 0.8	ND 0.8	0.0	0.0000	
23478-PeCDF	0.5	1.6	J 10.9	ND 0.9	10.9	8.7200		ND 1	ND 0.9	0.0	0.0000	
123478-HxCDF	0.1	0.08	J,B 9.6	ND 1.3	9.6	0.0768		ND 0.9	ND 1.3	0.0	0.0000	
123678-HxCDF	0.1	0.2	J 10.3	ND 1.2	10.3	0.2060		ND 1	ND 1.2	0.0	0.0000	
234678-HxCDF	0.1	0.7	J 10.1	ND 1.2	10.1	0.7070		ND 0.9	ND 1.2	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 10.3	ND 1.7	0.0	0.0000		ND 1.5	ND 1.7	0.0	0.0000	
1234678-HpCDF	0.01	0.01	ND 9.3	ND 1.7	0.0	0.0000		J 4.2	ND 1.7	4.2	0.0004	
1234789-HpCDF	0.01	0.4	J 8.6	ND 2.3	8.6	0.0344		ND 1.9	ND 2.3	0.0	0.0000	
12346789-OCDF	0.001	0.02	ND 19.0	ND 3.4	0.0	0.0000		J 8.6	ND 3.4	8.6	0.0002	
					Σ TEC =	20.3809	HCV = 0.0086			Σ TEC =	0.2996	HCV = 0.0086

Adjusted = Sample concentrations below analytical detection were adjusted to zero; sample concentrations at or above analytical detection were blank corrected IF blank was also at or above analytical detection.

B = Analyte was detected in the laboratory method blank as well as in an associated field sample.

BEF = Bioaccumulation equivalency factor.

HCV = Human Cancer Value - Non-Drinking Water.

J = Indicates a concentration based on an analyte to internal standard ratio which is below the calibration curve. Concentrations outside the calibration curve are estimates only.

ND = Concentration below the detection level shown.

TEC = 2,3,7,8-TCDD toxicity equivalence concentration. TECs were calculated in accordance with the Michigan Part 8 Rules.

TEF = Toxicity equivalency factor.

WV = Wildlife Value.

Table 13.4 Dioxin and furan concentrations measured at selected stations. Shown are the raw results for each sample or replicate and blank; the adjusted results; the congener-specific and total TEC for each sample or replicate; and the applicable Rule 57 water quality values. All concentrations are in pg/L (ppq).

			Saginaw River (090177)		Sample Dated 5/27/2003			Shiawassee River (730023)		Sample Dated 5/27/2003		
Congener	TEF	BEF	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value	Result	Blank	Adjusted Result	TEC	R.57 Water Quality Value
2378-TCDD	1	1	ND 1.8	ND 1.5	0.0	0.0000	WV = 0.0031	ND 1.4	ND 1.5	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 2.1	ND 1.8	0.0	0.0000		ND 1.5	ND 1.8	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 2.3	ND 1.9	0.0	0.0000		ND 1.8	ND 1.9	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 2.4	ND 1.8	0.0	0.0000		ND 1.7	ND 1.8	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 2.4	ND 1.9	0.0	0.0000		ND 1.7	ND 1.9	0.0	0.0000	
1234678-HpCDD	0.01	0.05	J 27.6	ND 3.1	27.6	0.0138		ND 3.2	ND 3.1	0.0	0.0000	
12346789-OCDD	0.001	0.01	201.0	ND 5.8	201.0	0.0020		J 18.9	ND 5.8	18.9	0.0002	
2378-TCDF	0.1	0.8	ND 16.8	ND 1.0	0.0	0.0000		ND 1.0	ND 1.0	0.0	0.0000	
12378-PeCDF	0.05	0.2	J 6.4	ND 1.1	6.4	0.0640		ND 0.9	ND 1.1	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 6.6	ND 1.2	0.0	0.0000		ND 1.0	ND 1.2	0.0	0.0000	
123478-HxCDF	0.1	0.08	ND 6.2	ND 1.2	0.0	0.0000		J 3.1	ND 1.2	3.1	0.0248	
123678-HxCDF	0.1	0.2	ND 3.4	ND 1.2	0.0	0.0000		ND 1.1	ND 1.2	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 1.5	ND 1.0	0.0	0.0000		ND 1.1	ND 1.0	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 2.0	ND 1.2	0.0	0.0000		ND 1.5	ND 1.2	0.0	0.0000	
1234678-HpCDF	0.01	0.01	J 25.1	ND 2.0	25.1	0.0025		ND 1.6	ND 2.0	0.0	0.0000	
1234789-HpCDF	0.01	0.4	ND 3.4	ND 2.0	0.0	0.0000		ND 2.6	ND 2.0	0.0	0.0000	
12346789-OCDF	0.001	0.02	J 52.7	ND 4.5	52.7	0.0011		ND 4.6	ND 4.5	0.0	0.0000	
					Σ TEC =	0.0834	HCV = 0.0086			Σ TEC =	0.0250	HCV = 0.0086

Adjusted = Sample concentrations below analytical detection were adjusted to zero; sample concentrations at or above analytical detection were blank corrected IF blank was also at or above analytical detection.

B = Analyte was detected in the laboratory method blank as well as in an associated field sample.

BEF = Bioaccumulation equivalency factor.

HCV = Human Cancer Value - Non-Drinking Water.

J = Indicates a concentration based on an analyte to internal standard ratio which is below the calibration curve. Concentrations outside the calibration curve are estimates only.

ND = Concentration below the detection level shown.

TEC = 2,3,7,8-TCDD toxicity equivalence concentration. TECs were calculated in accordance with the Michigan Part 8 Rules.

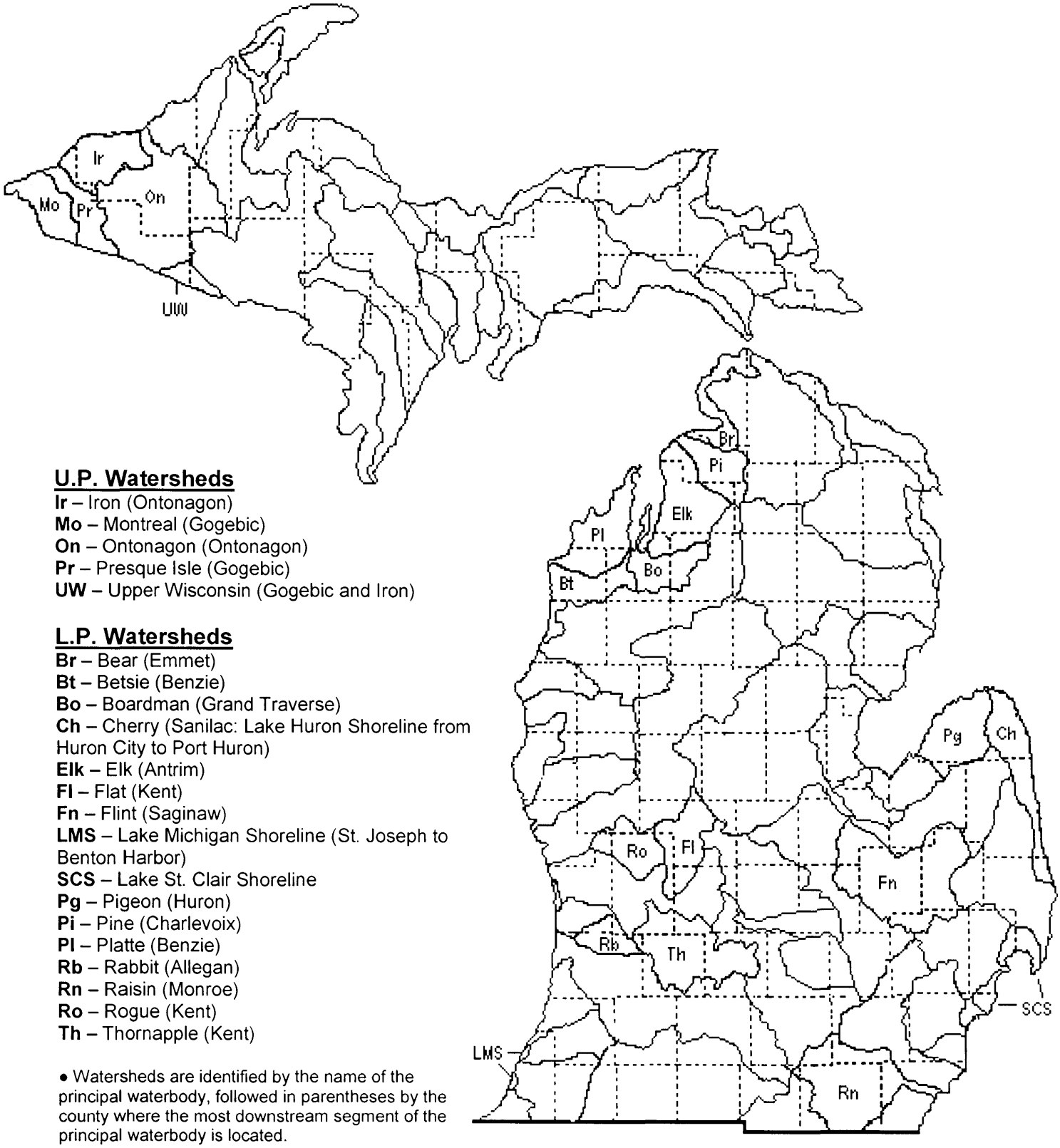
TEF = Toxicity equivalency factor.

WV = Wildlife Value.

Table 14. PFOS and PFOA concentrations measured at selected stations. Sampling took place in 2001.

STORET ID	Station	Sample Collection Date	PFOS (ng/L)	PFOA (ng/L)
350061	Au Sable	3/7/2001	6.34	1.16
740385	Black	3/19/2001	2.78	9.51
		3/19/2001	5.13	8.05
		3/19/2001	3.67	5.99
730024	Cass	3/10/2001	1.50	15.83
		11/27/2001	2.95	5.75
210102	Escanaba	4/9/2001	2.11	3.68
		4/9/2001	2.35	1.44
		8/23/2001	3.09	7.12
730285	Flint	2/15/2001	12.31	11.94
380083	Grand (Headwaters)	2/13/2001	1.04	7.91
		7/25/2001	2.04	8.32
340025	Grand (Upper)	2/11/2001	4.96	13.37
580364	Huron	2/14/2001	5.72	16.14
030077	Kalamazoo (Lower)	2/14/2001	23.51	35.86
390057	Kalamazoo (Upper)	2/13/2001	9.16	24.19
		7/25/2001	29.26	15.53
770073	Manistique	3/28/2001	0.98	2.75
610273	Muskegon (Lower)	3/27/2001	1.37	6.45
		7/31/2001	< 0.5	15.17
670008	Muskegon (Upper)	3/7/2001	1.90	4.01
		7/30/2001	2.13	4.43
530027	Pere Marquette	3/27/2001	5.32	9.65
		7/30/2001	< 0.5	10.31
580046	Raisin	2/14/2001	< 0.5	16.87
		2/14/2001	3.54	14.07
820070	Rouge	4/2/2001	6.13	7.84
090177	Saginaw	2/10/2001	12.69	24.08
		2/10/2001	10.18	21.54
730023	Shiawassee	2/15/2001	2.83	23.01
110628	St. Joseph (Lower)	2/12/2001	11.32	8.74
750273	St. Joseph (Upper)	11/20/2001	7.22	23.87
170141	Tahquamenon	4/25/2001	2.21	4.46
		8/20/2001	< 0.5	13.77
		8/20/2001	2.16	6.21
040123	Thunder Bay	3/6/2001	0.87	3.58
070070	Tioga	4/17/2001	1.82	3.77
		4/17/2001	3.06	11.52
		4/17/2001	3.13	3.77
		8/13/2001	3.35	9.84
		8/13/2001	3.52	9.66

Figure 1. Monitoring cycle year 2003 watersheds.



U.P. Watersheds

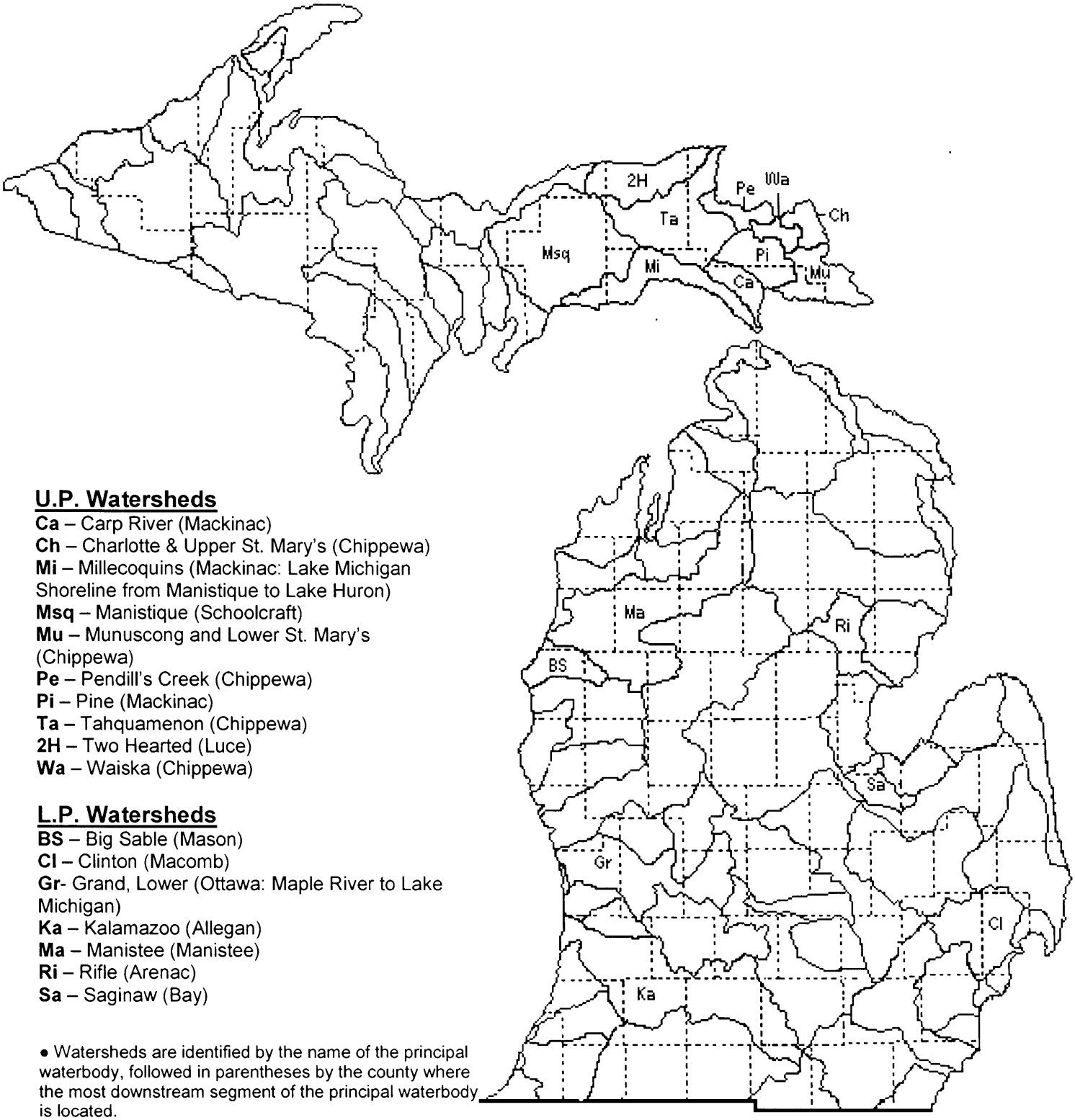
Ir – Iron (Ontonagon)
Mo – Montreal (Gogebic)
On – Ontonagon (Ontonagon)
Pr – Presque Isle (Gogebic)
UW – Upper Wisconsin (Gogebic and Iron)

L.P. Watersheds

Br – Bear (Emmet)
Bt – Betsie (Benzie)
Bo – Boardman (Grand Traverse)
Ch – Cherry (Sanilac: Lake Huron Shoreline from Huron City to Port Huron)
Elk – Elk (Antrim)
Fl – Flat (Kent)
Fn – Flint (Saginaw)
LMS – Lake Michigan Shoreline (St. Joseph to Benton Harbor)
SCS – Lake St. Clair Shoreline
Pg – Pigeon (Huron)
Pi – Pine (Charlevoix)
Pl – Platte (Benzie)
Rb – Rabbit (Allegan)
Rn – Raisin (Monroe)
Ro – Rogue (Kent)
Th – Thornapple (Kent)

• Watersheds are identified by the name of the principal waterbody, followed in parentheses by the county where the most downstream segment of the principal waterbody is located.

Figure 2. Monitoring cycle year 2004 watersheds.



U.P. Watersheds

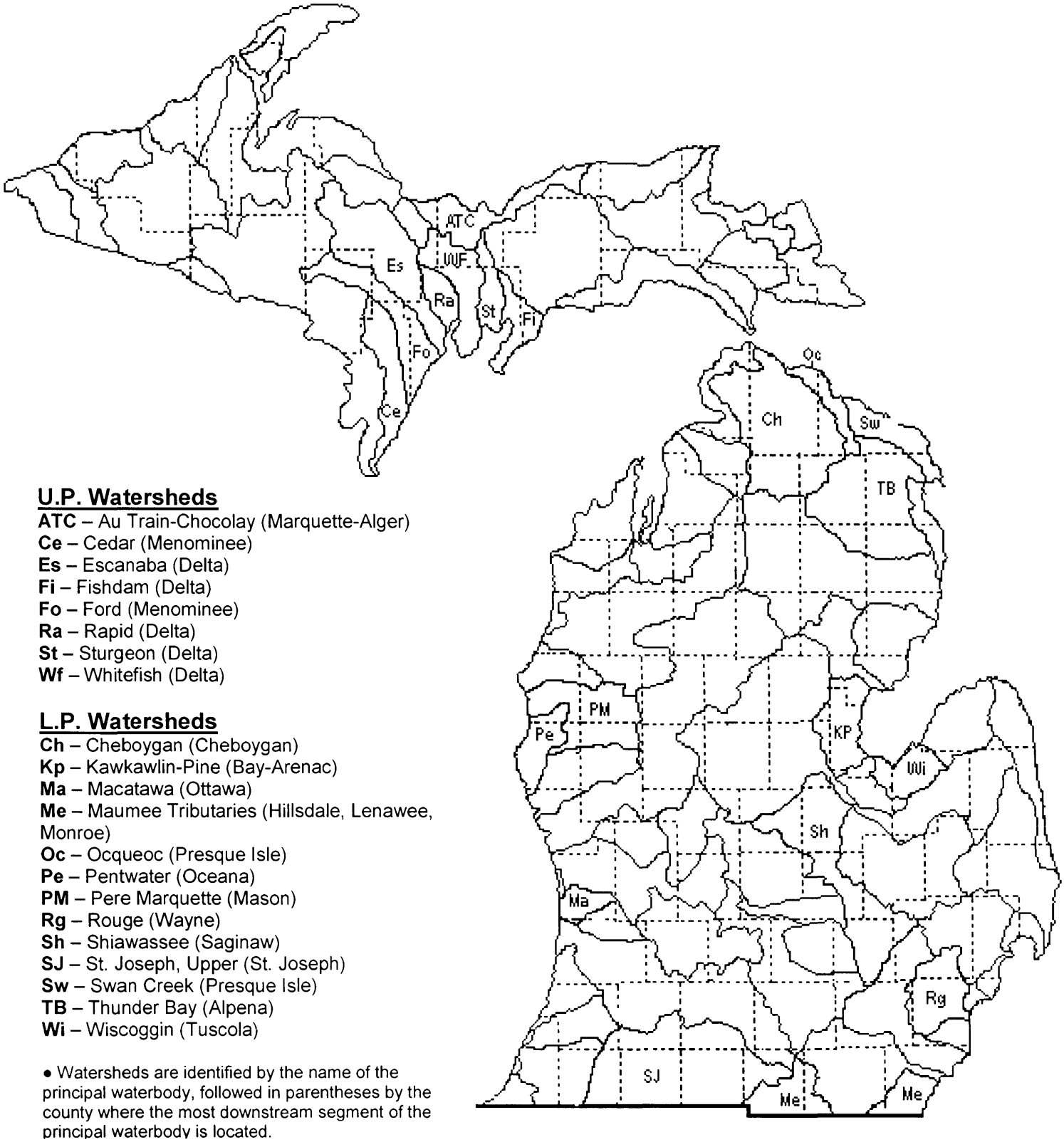
Ca – Carp River (Mackinac)
Ch – Charlotte & Upper St. Mary's (Chippewa)
Mi – Millecoquins (Mackinac: Lake Michigan Shoreline from Manistique to Lake Huron)
Msq – Manistique (Schoolcraft)
Mu – Munuscong and Lower St. Mary's (Chippewa)
Pe – Pendill's Creek (Chippewa)
Pi – Pine (Mackinac)
Ta – Tahquamenon (Chippewa)
2H – Two Hearted (Luce)
Wa – Waiska (Chippewa)

L.P. Watersheds

BS – Big Sable (Mason)
Cl – Clinton (Macomb)
Gr- Grand, Lower (Ottawa: Maple River to Lake Michigan)
Ka – Kalamazoo (Allegan)
Ma – Manistee (Manistee)
Ri – Rifle (Arenac)
Sa – Saginaw (Bay)

• Watersheds are identified by the name of the principal waterbody, followed in parentheses by the county where the most downstream segment of the principal waterbody is located.

Figure 3. Monitoring cycle year 2005 watersheds.



U.P. Watersheds

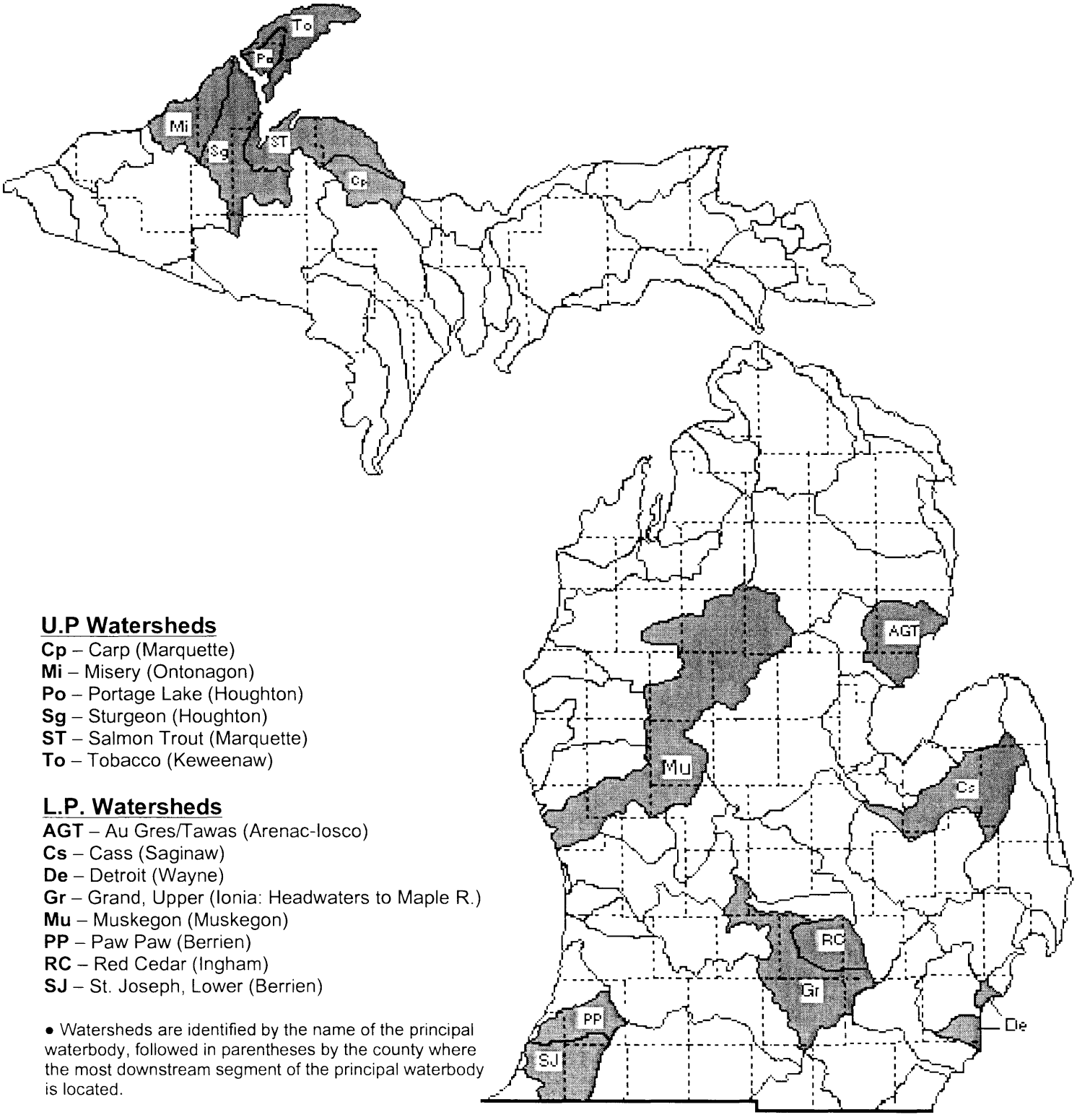
ATC – Au Train-Chocolay (Marquette-Alger)
Ce – Cedar (Menominee)
Es – Escanaba (Delta)
Fi – Fishdam (Delta)
Fo – Ford (Menominee)
Ra – Rapid (Delta)
St – Sturgeon (Delta)
Wf – Whitefish (Delta)

L.P. Watersheds

Ch – Cheboygan (Cheboygan)
Kp – Kawkawlin-Pine (Bay-Arenac)
Ma – Macatawa (Ottawa)
Me – Maumee Tributaries (Hillsdale, Lenawee, Monroe)
Oc – Ocqueoc (Presque Isle)
Pe – Pentwater (Oceana)
PM – Pere Marquette (Mason)
Rg – Rouge (Wayne)
Sh – Shiawassee (Saginaw)
SJ – St. Joseph, Upper (St. Joseph)
Sw – Swan Creek (Presque Isle)
TB – Thunder Bay (Alpena)
Wi – Wiscoggin (Tuscola)

• Watersheds are identified by the name of the principal waterbody, followed in parentheses by the county where the most downstream segment of the principal waterbody is located.

Figure 4. Monitoring cycle year 2006 watersheds.



U.P Watersheds

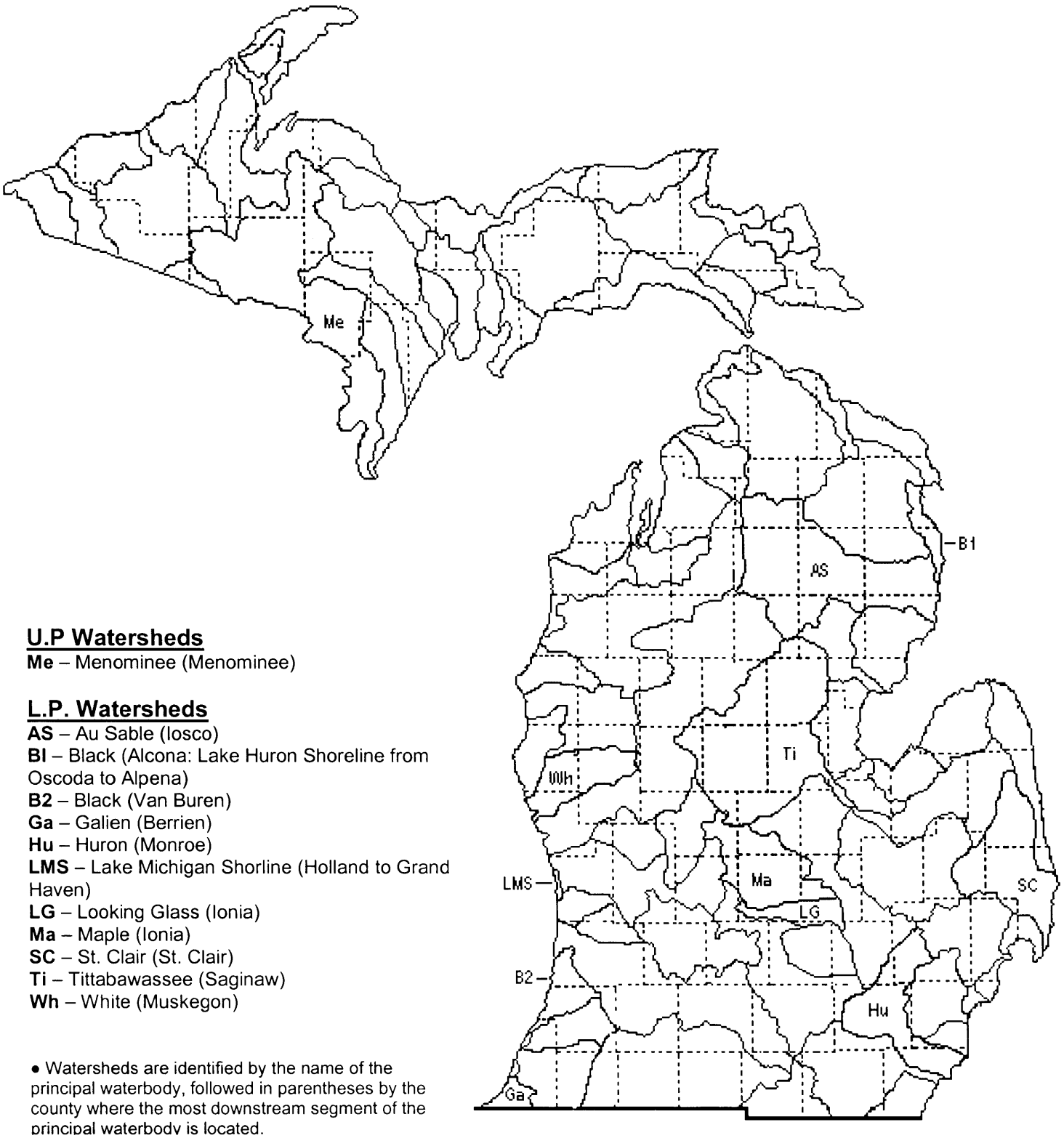
Cp – Carp (Marquette)
Mi – Misery (Ontonagon)
Po – Portage Lake (Houghton)
Sg – Sturgeon (Houghton)
ST – Salmon Trout (Marquette)
To – Tobacco (Keweenaw)

L.P. Watersheds

AGT – Au Gres/Tawas (Arenac-Iosco)
Cs – Cass (Saginaw)
De – Detroit (Wayne)
Gr – Grand, Upper (Ionia: Headwaters to Maple R.)
Mu – Muskegon (Muskegon)
PP – Paw Paw (Berrien)
RC – Red Cedar (Ingham)
SJ – St. Joseph, Lower (Berrien)

• Watersheds are identified by the name of the principal waterbody, followed in parentheses by the county where the most downstream segment of the principal waterbody is located.

Figure 5. Monitoring cycle year 2007 watersheds.



U.P Watersheds

Me – Menominee (Menominee)

L.P. Watersheds

AS – Au Sable (Iosco)
Bl – Black (Alcona: Lake Huron Shoreline from Oscoda to Alpena)
B2 – Black (Van Buren)
Ga – Galien (Berrien)
Hu – Huron (Monroe)
LMS – Lake Michigan Shorline (Holland to Grand Haven)
LG – Looking Glass (Ionia)
Ma – Maple (Ionia)
SC – St. Clair (St. Clair)
Ti – Tittabawassee (Saginaw)
Wh – White (Muskegon)

• Watersheds are identified by the name of the principal waterbody, followed in parentheses by the county where the most downstream segment of the principal waterbody is located.

Figure 6. Intensive water chemistry trend monitoring locations and associated watersheds.

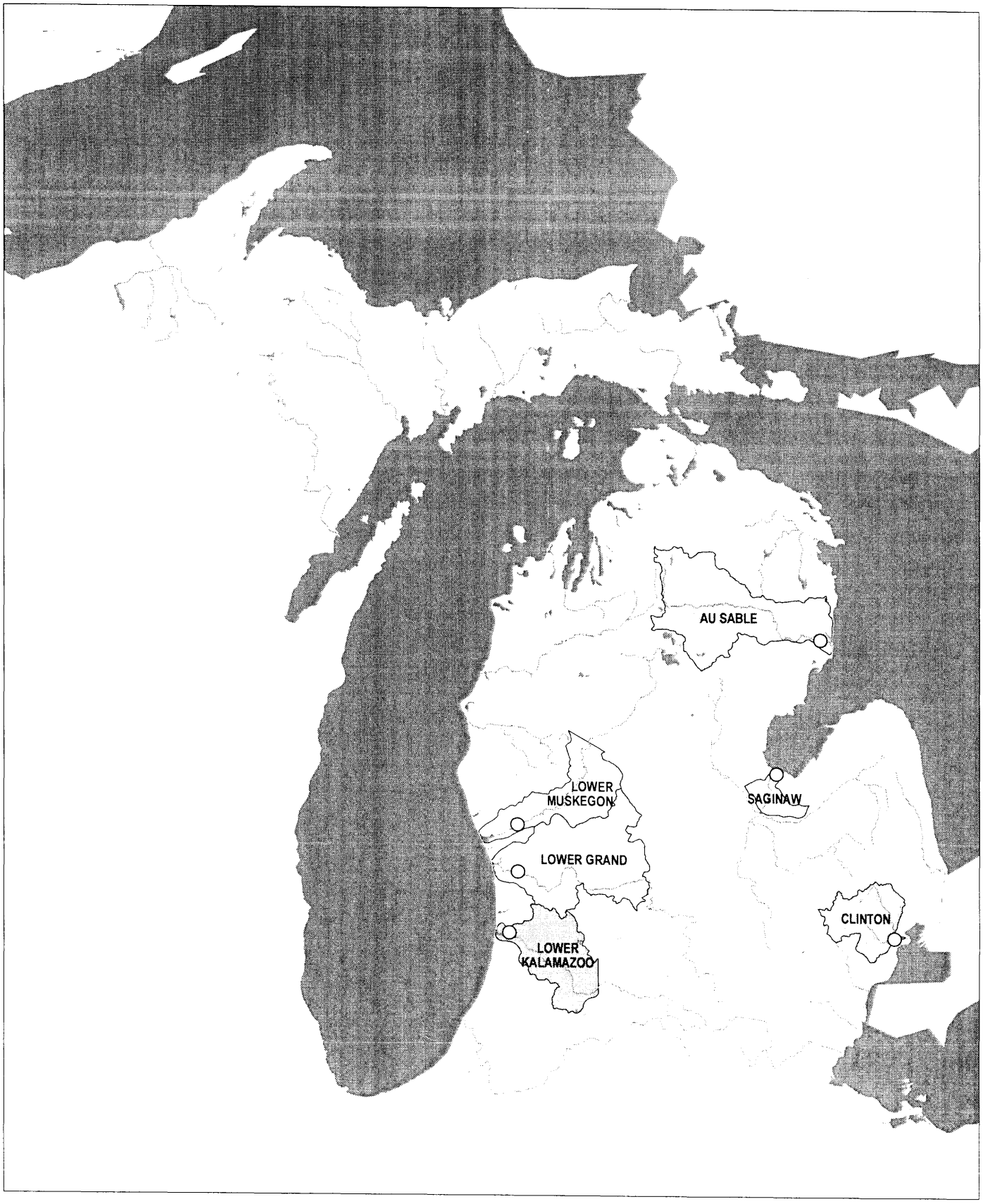


Figure 7. Integrator water chemistry trend monitoring locations and associated watersheds.

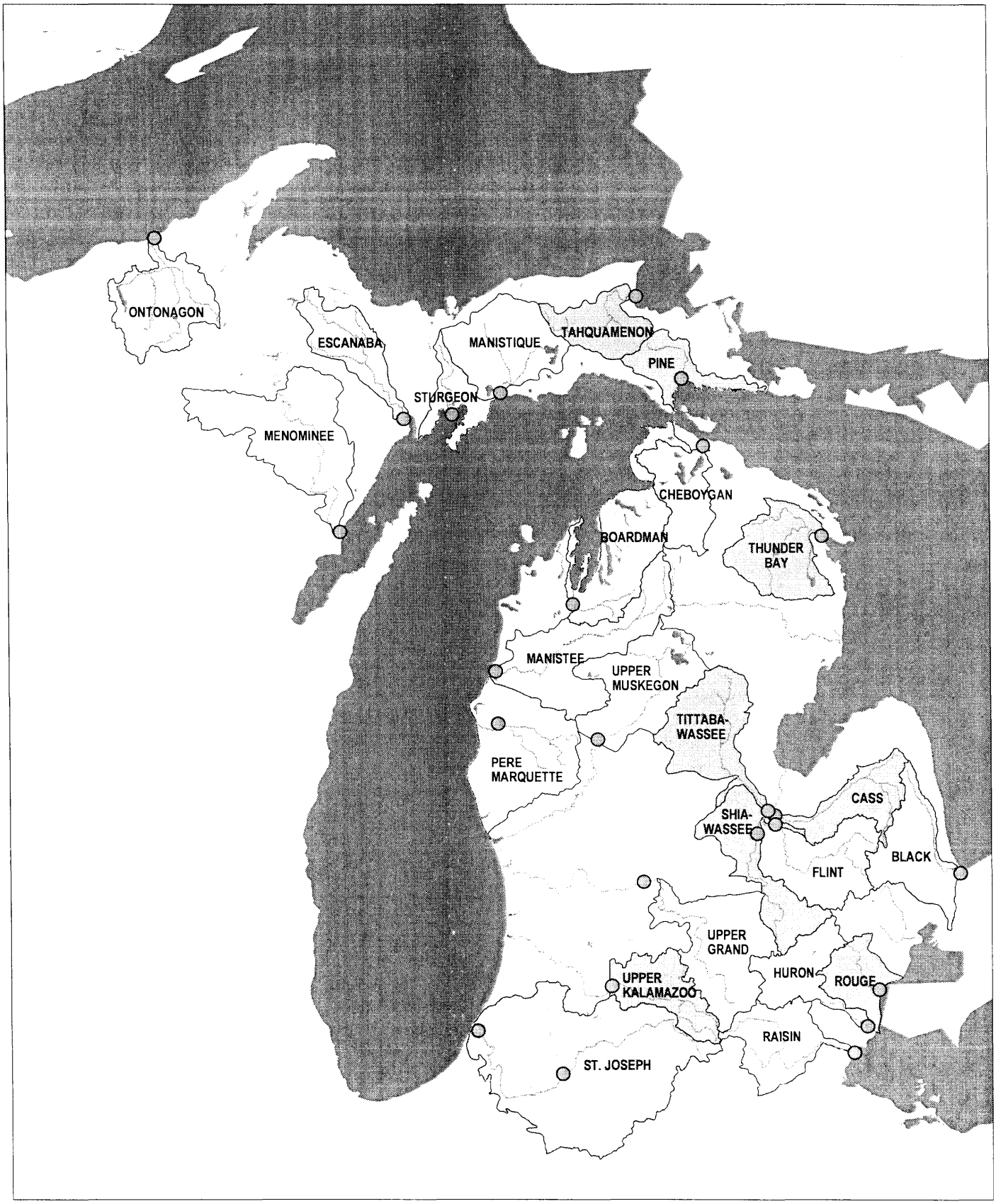


Figure 8. Comparison of total phosphorus among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

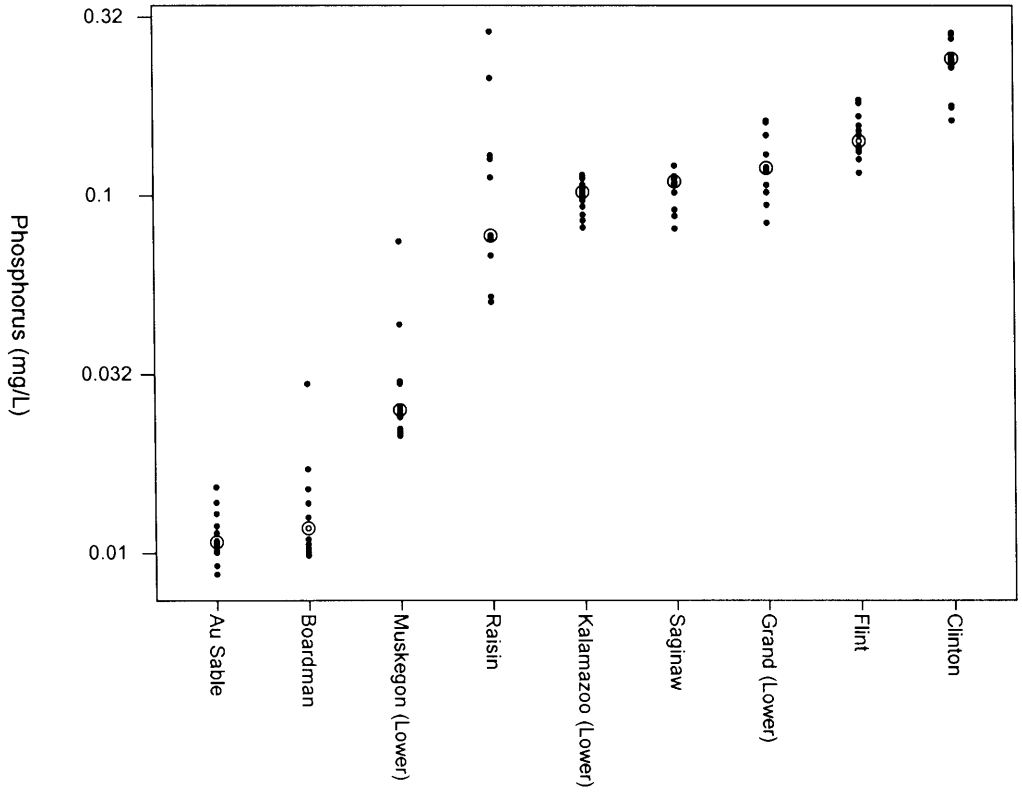


Figure 9. Comparison of total chloride among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge. A mean chloride concentration in natural fresh water is 8.3 mg/L (Livingstone 1963).

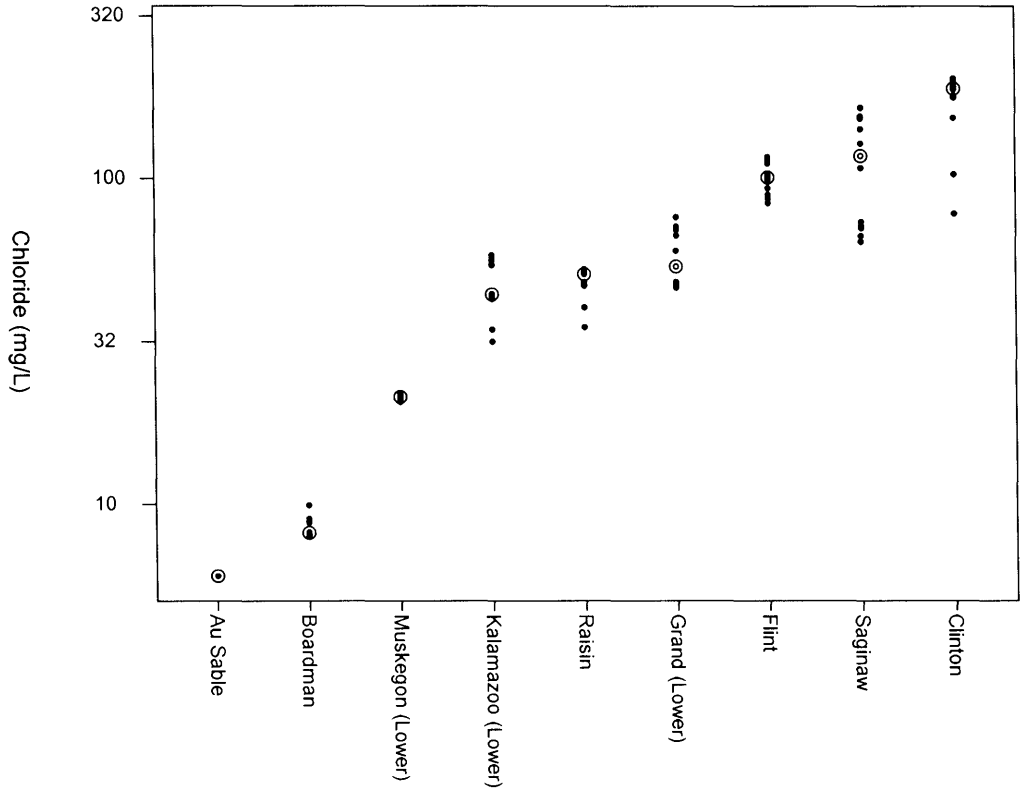


Figure 10. Comparison of total suspended solids among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

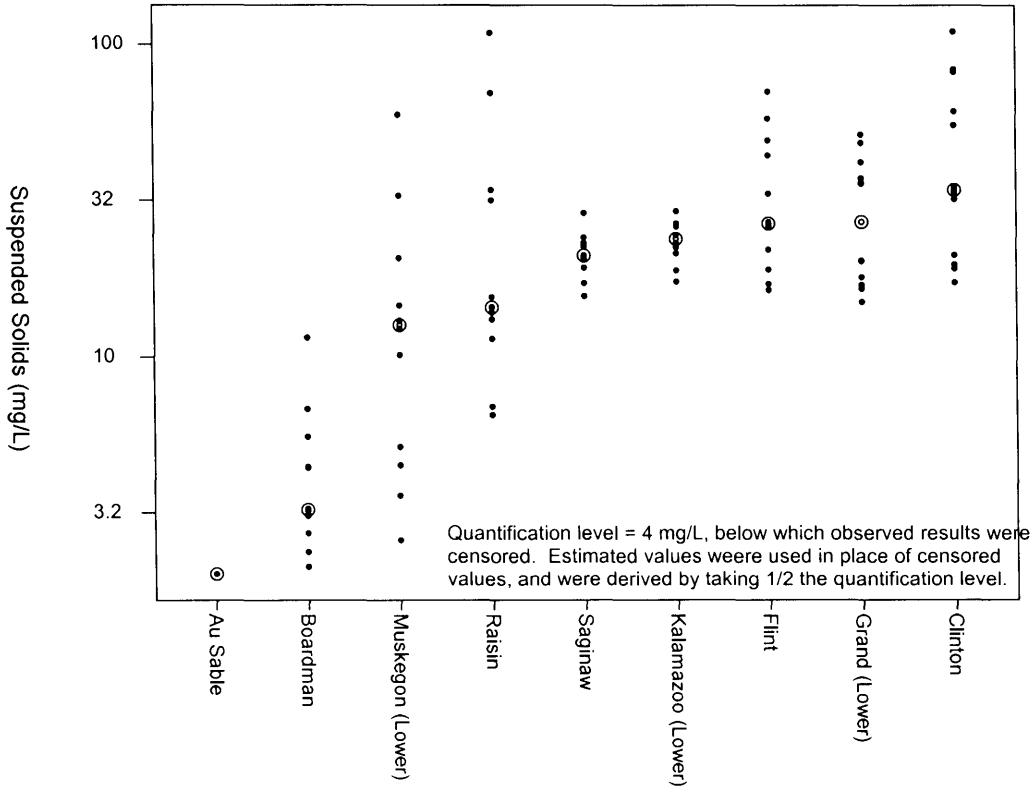


Figure 11. Comparison of total mercury among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

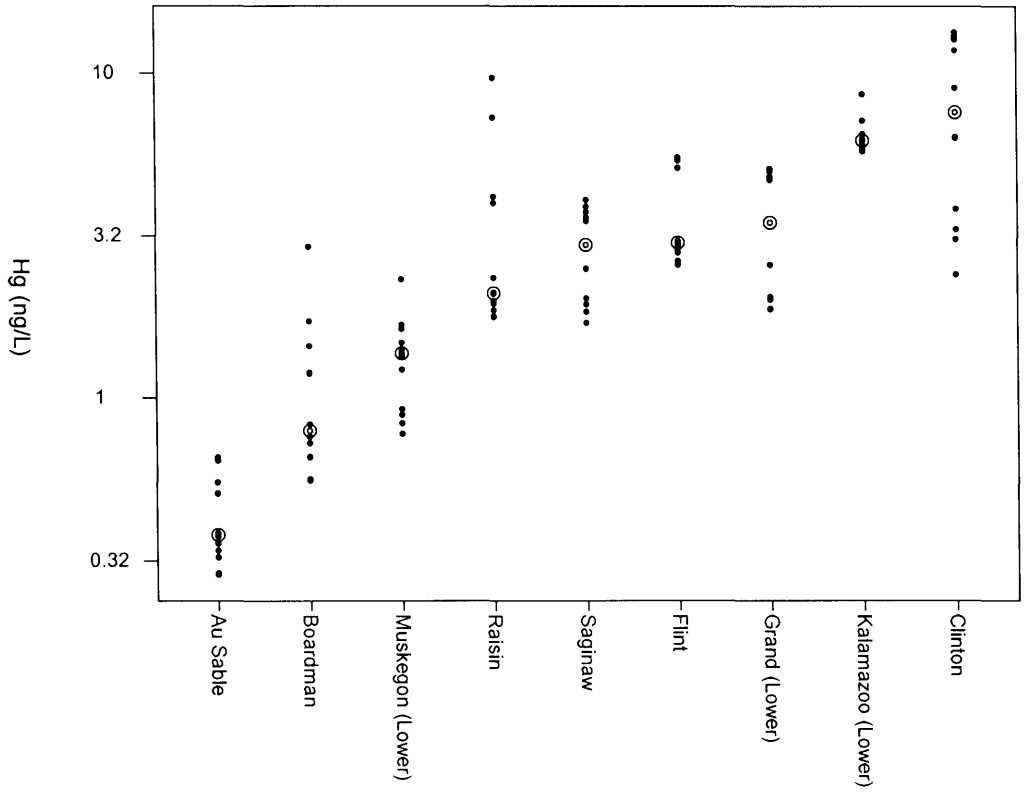


Figure 12. Comparison of total chromium among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

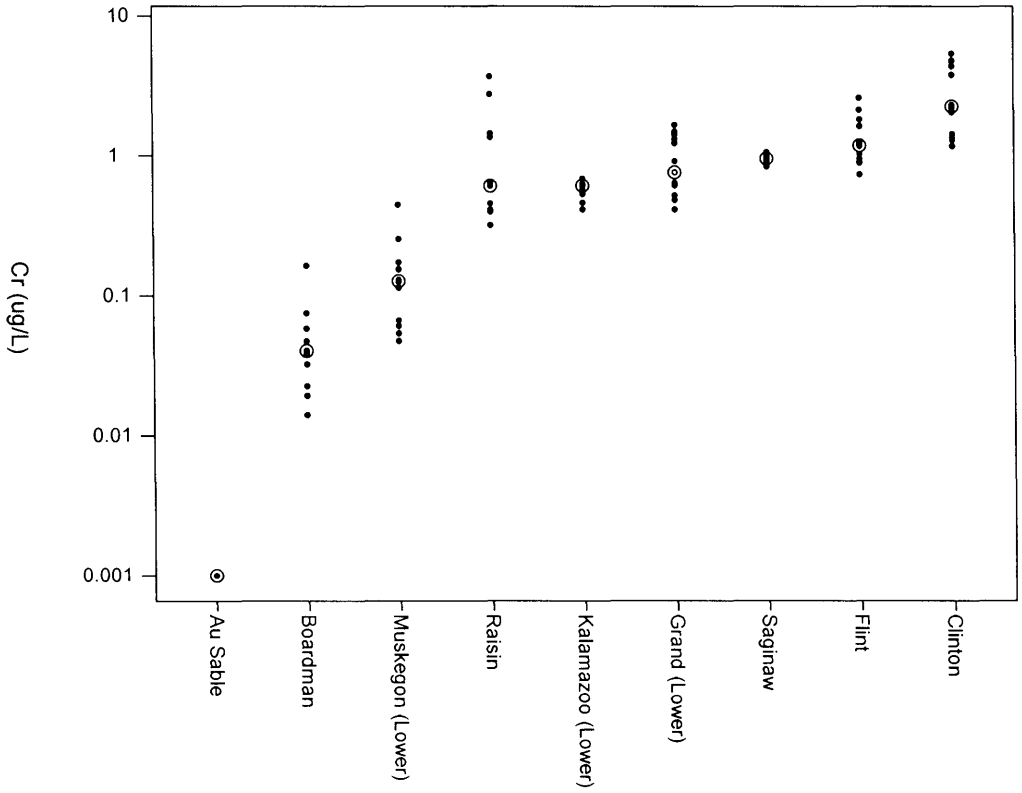


Figure 13. Comparison of total copper among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

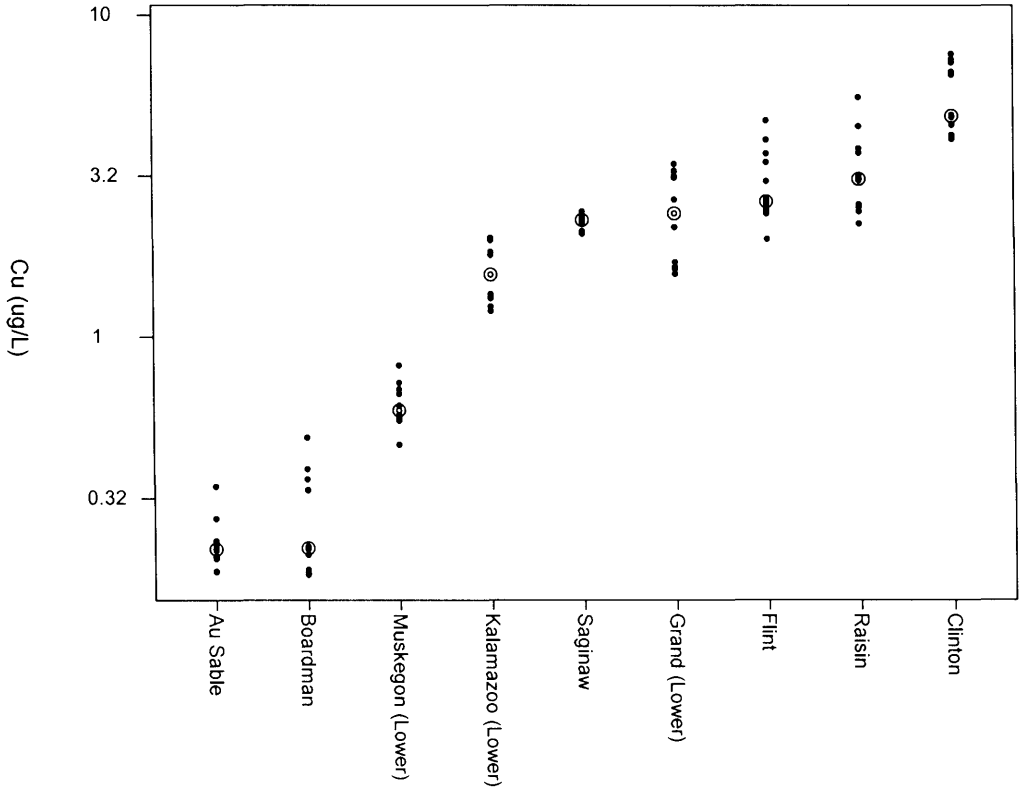


Figure 14. Comparison of total lead among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

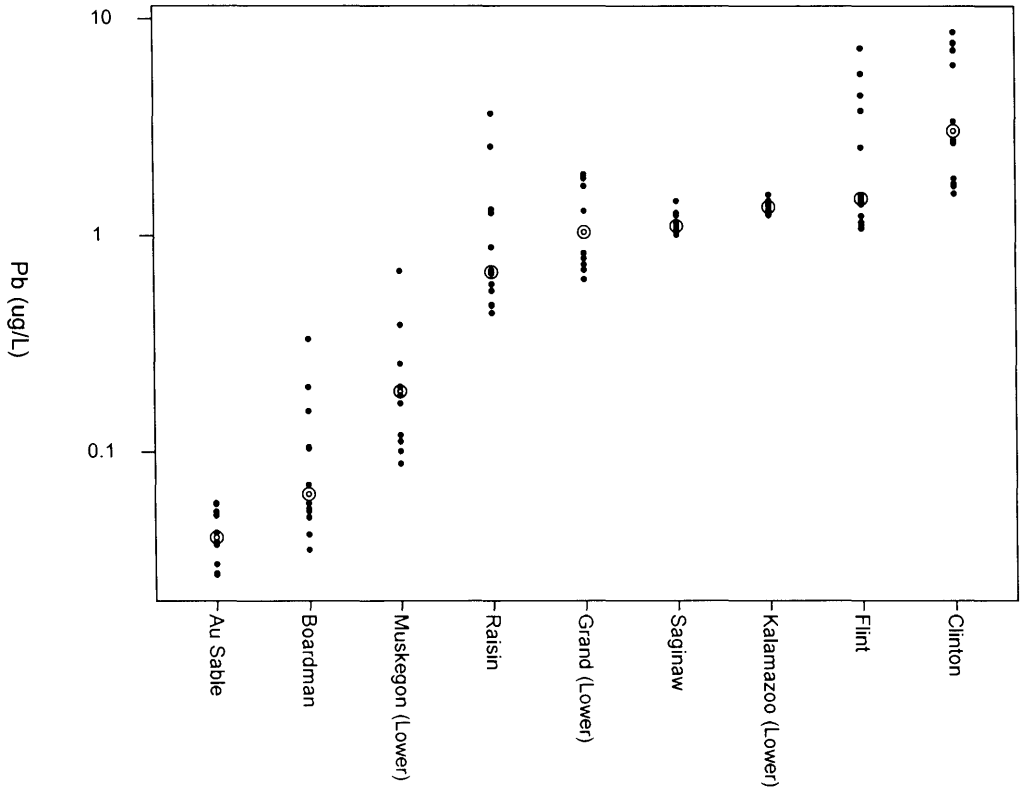


Figure 15. Comparison of total phosphorus among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples.

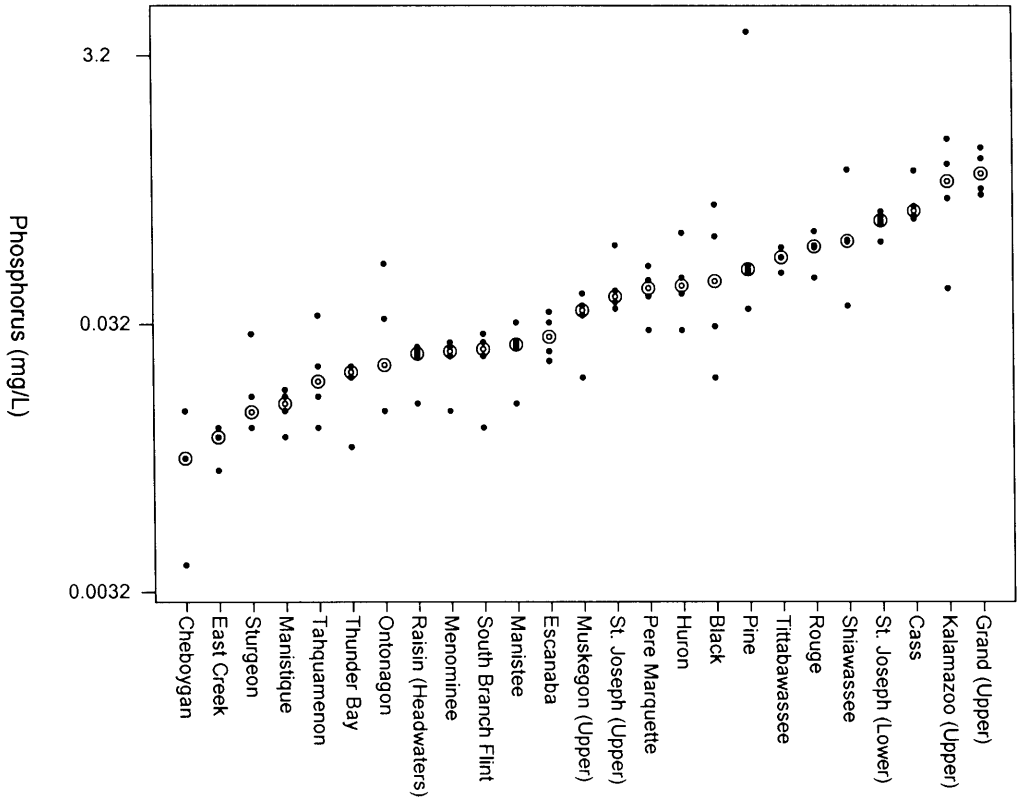


Figure 16. Comparison of total chloride among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples. A mean chloride concentration in natural fresh water is 8.3 mg/L (Livingstone 1963).

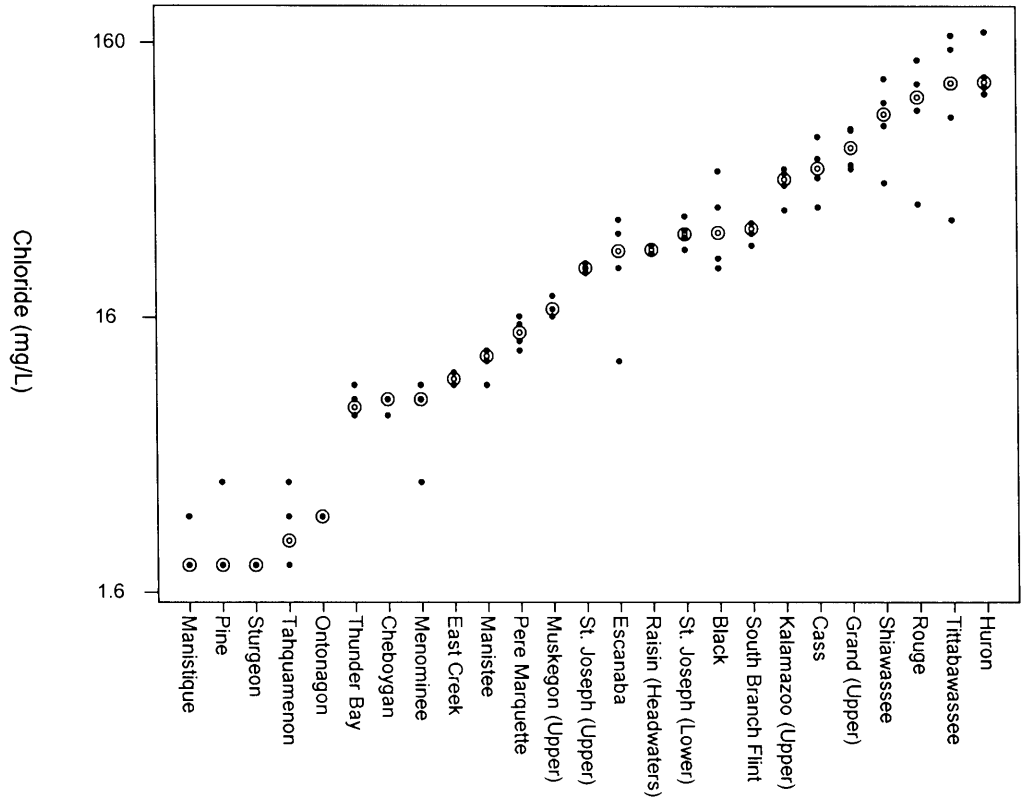


Figure 17. Comparison of total suspended solids among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples.

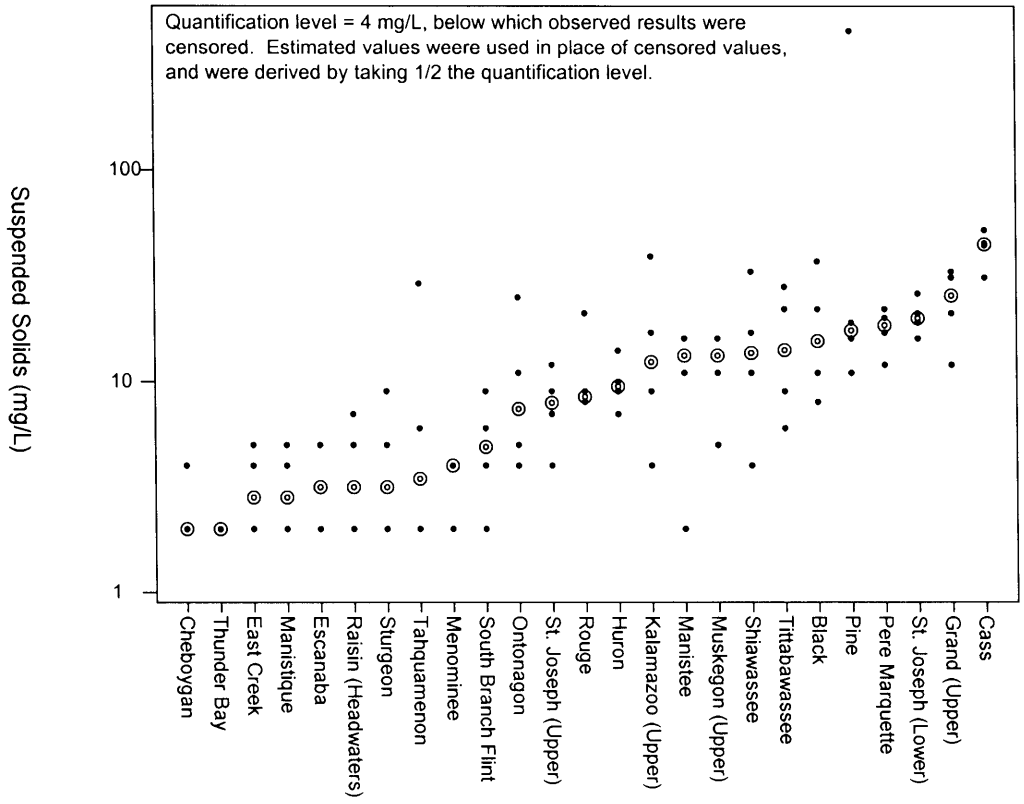


Figure 18. Comparison of total mercury among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples.

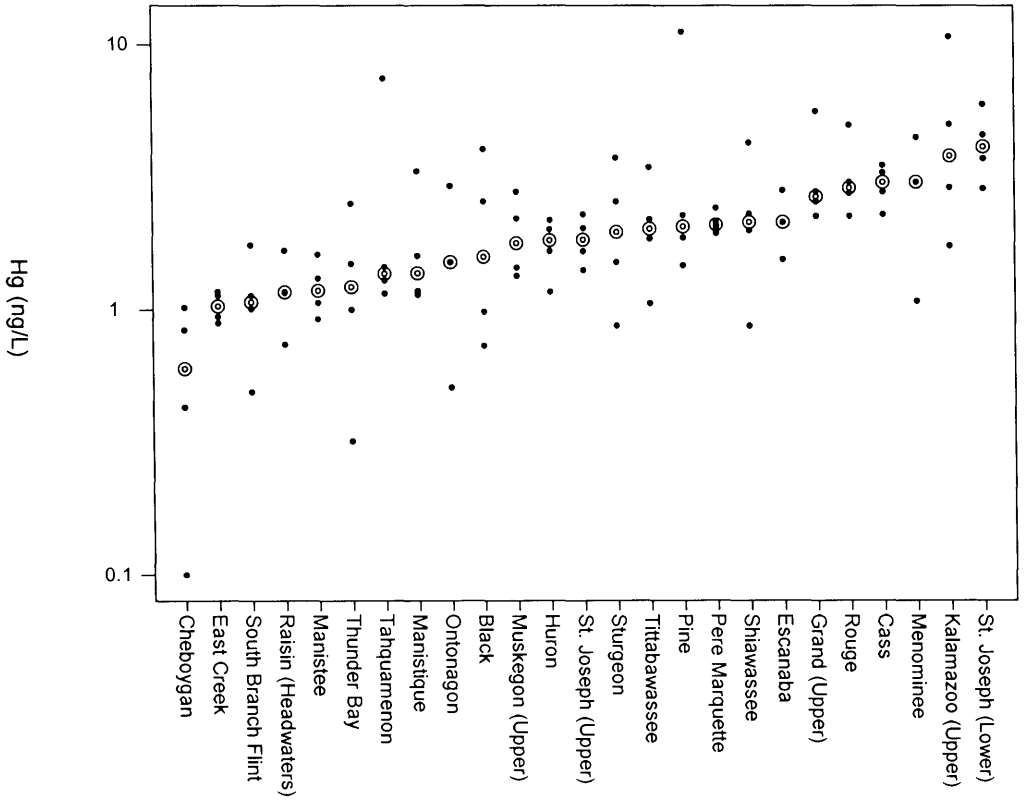


Figure 19. Comparison of total chromium among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples.

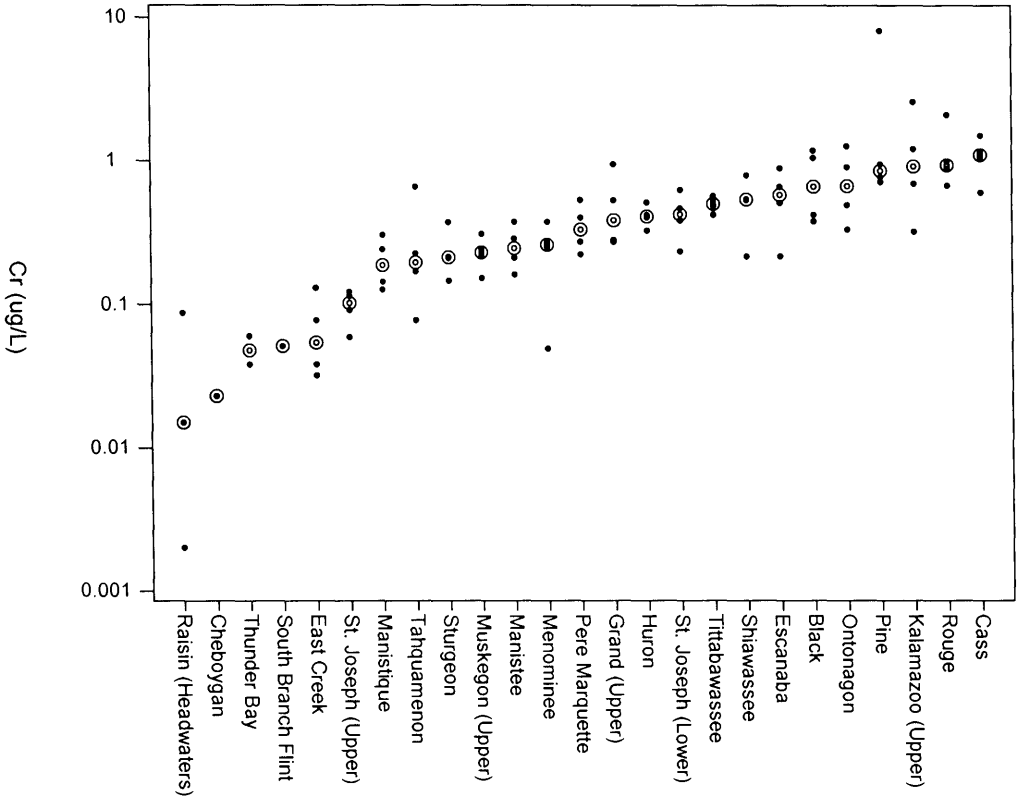


Figure 20. Comparison of total copper among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples.

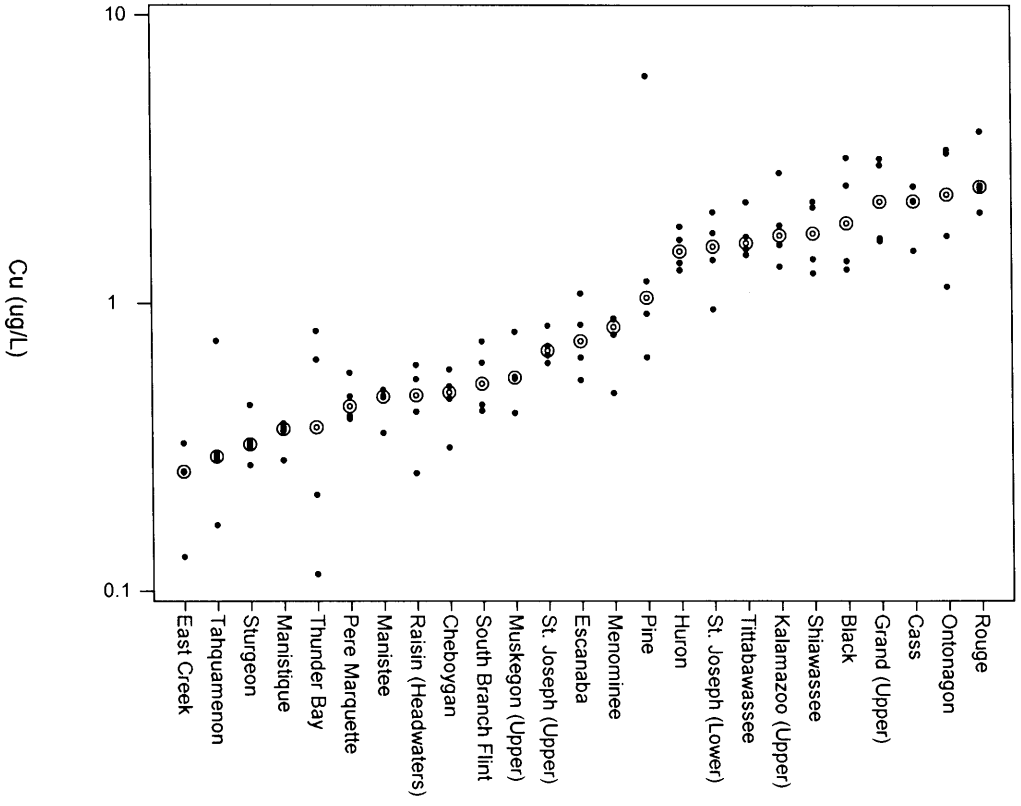


Figure 21. Comparison of total lead among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2003; fewer than 4 data points indicates identical results obtained for multiple samples.

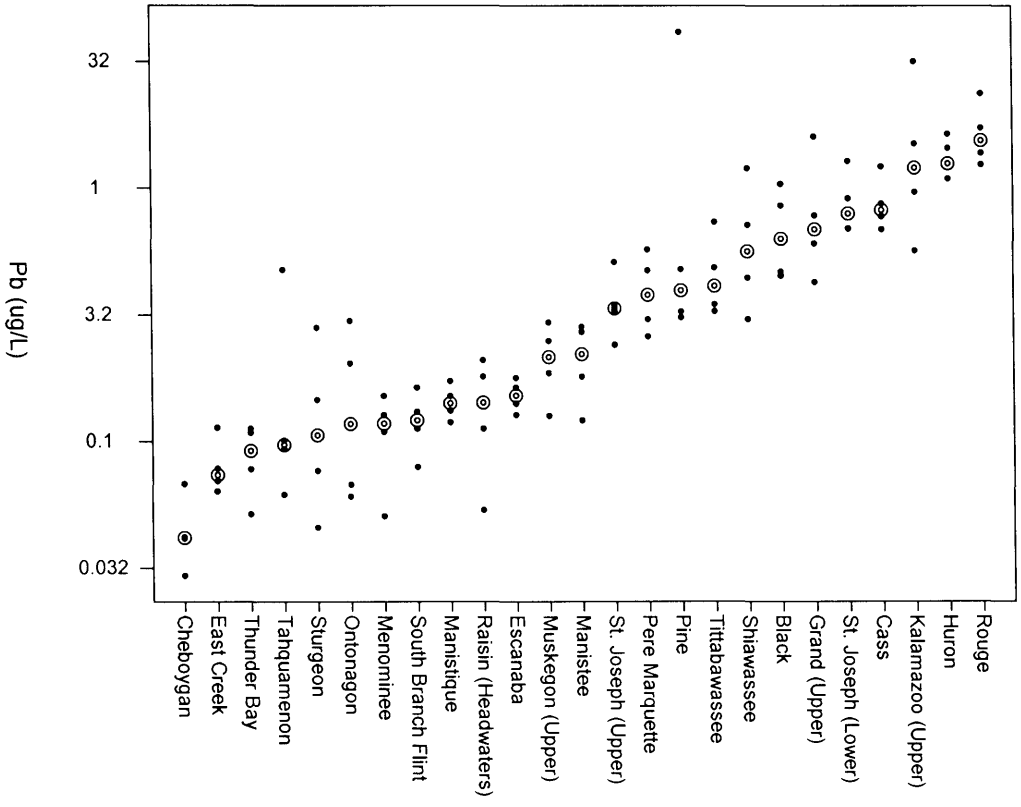


Figure 22. Diagram of the features of a box plot.

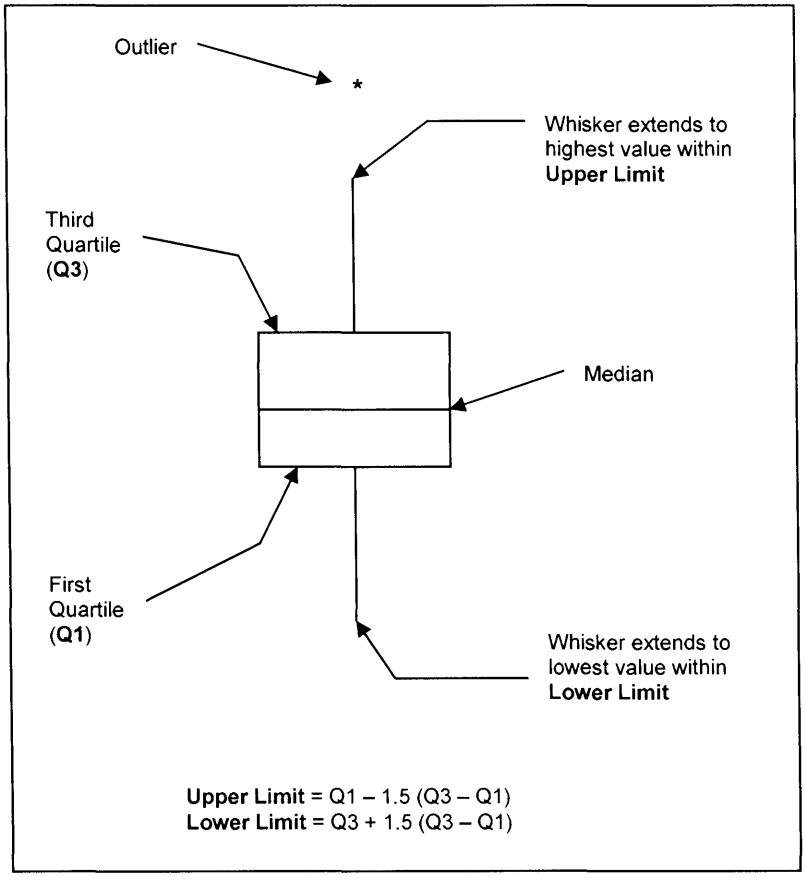


Figure 23. Total phosphorus concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003.

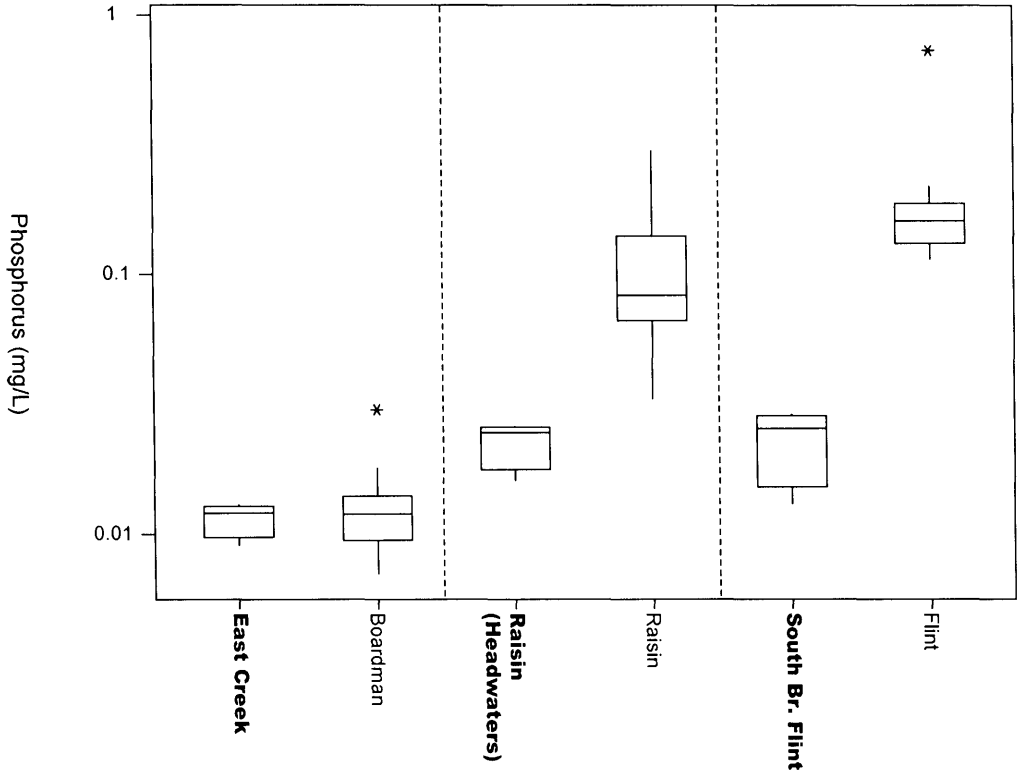


Figure 24. Total chloride concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003. A mean chloride concentration in natural fresh water is 8.3 mg/L (Livingstone 1963).

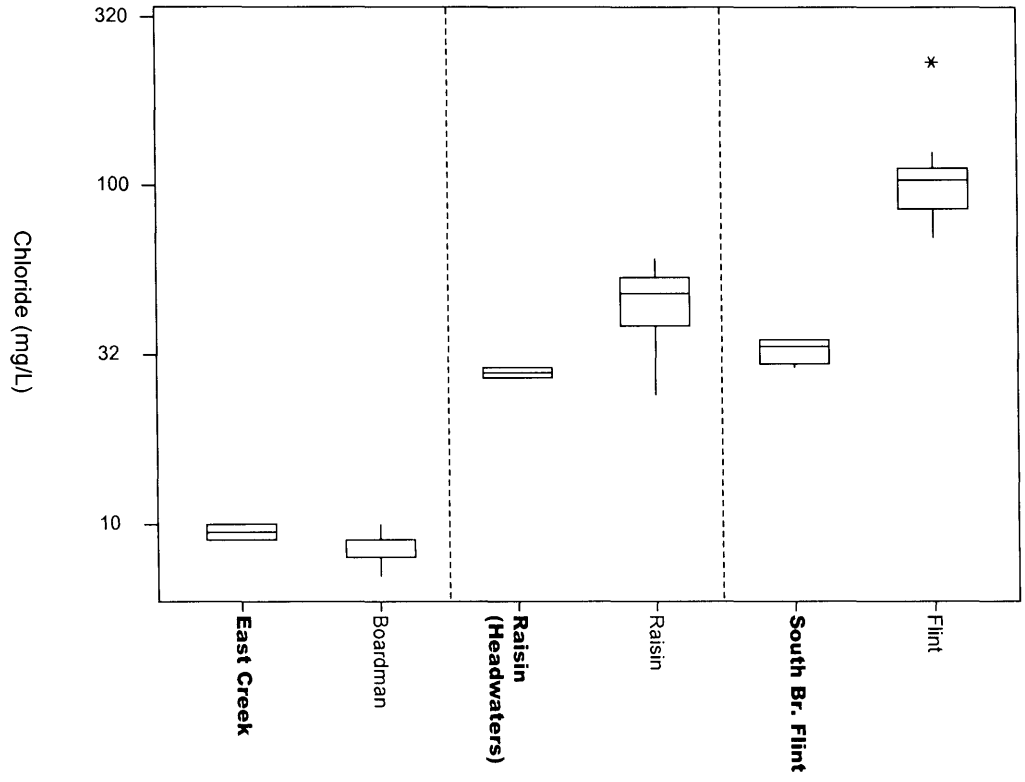


Figure 25. Total suspended solids concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003.

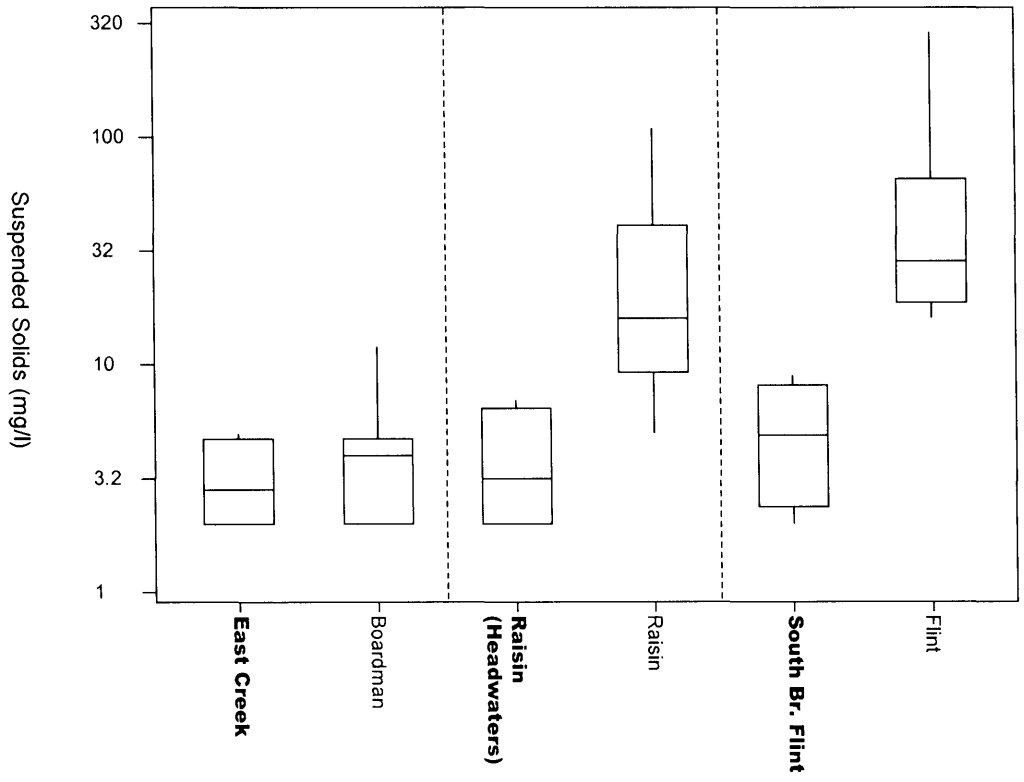


Figure 26. Total mercury concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003.

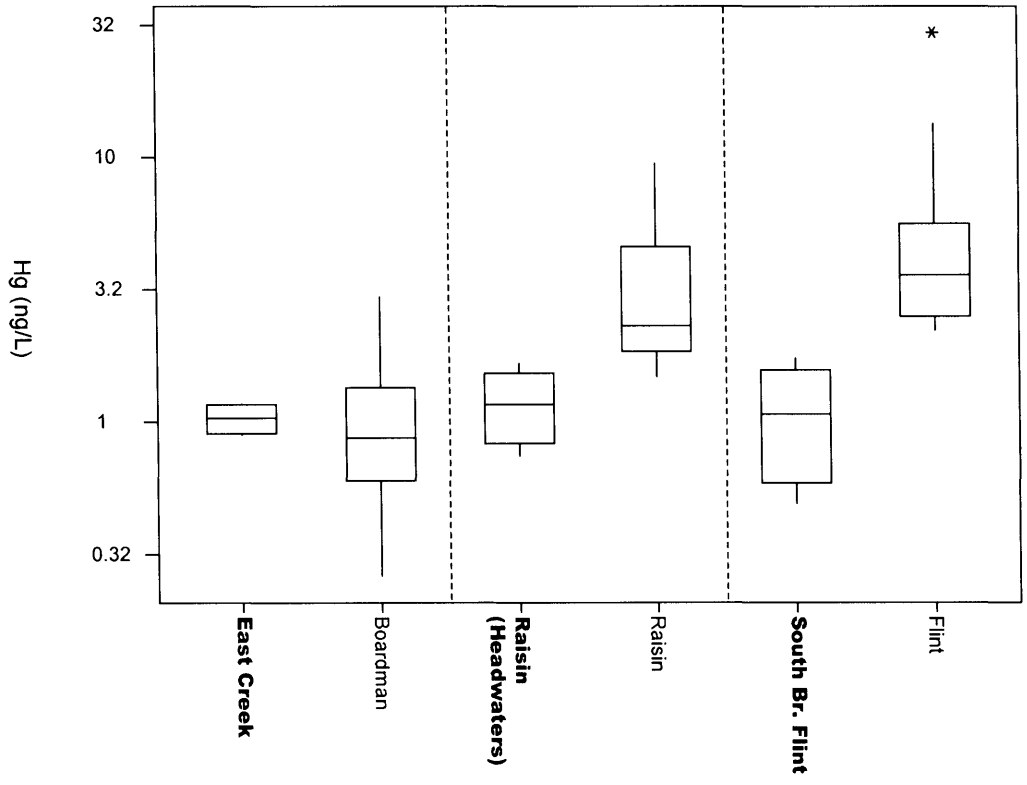


Figure 27. Total chromium concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003.

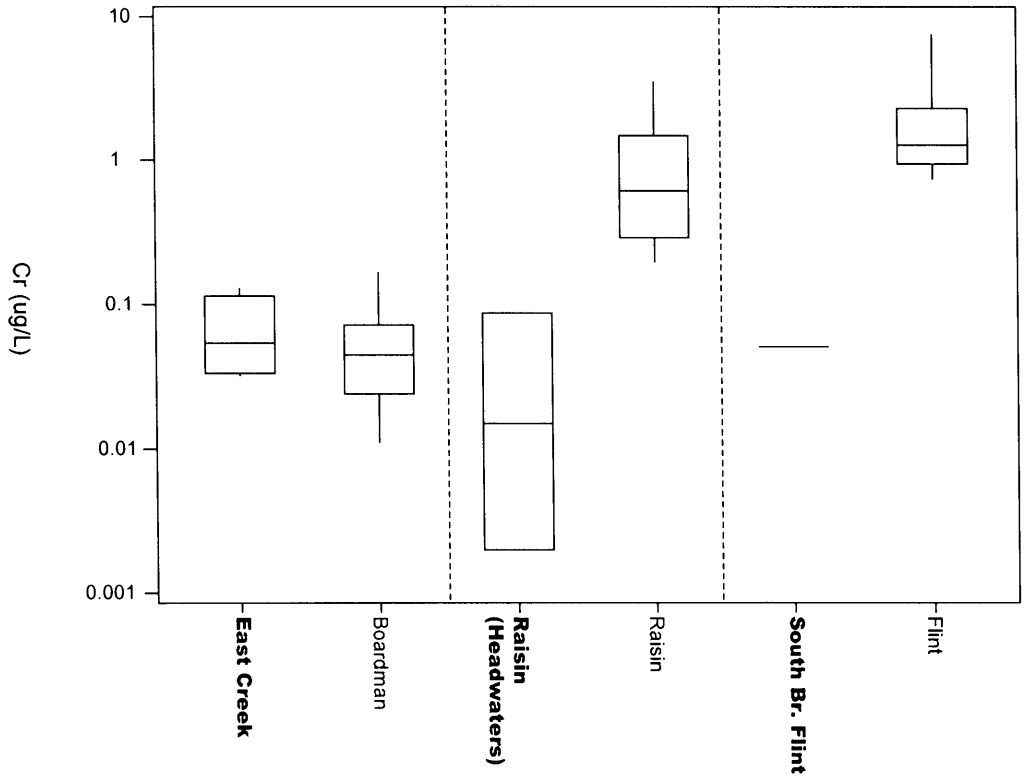


Figure 28. Total copper concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003.

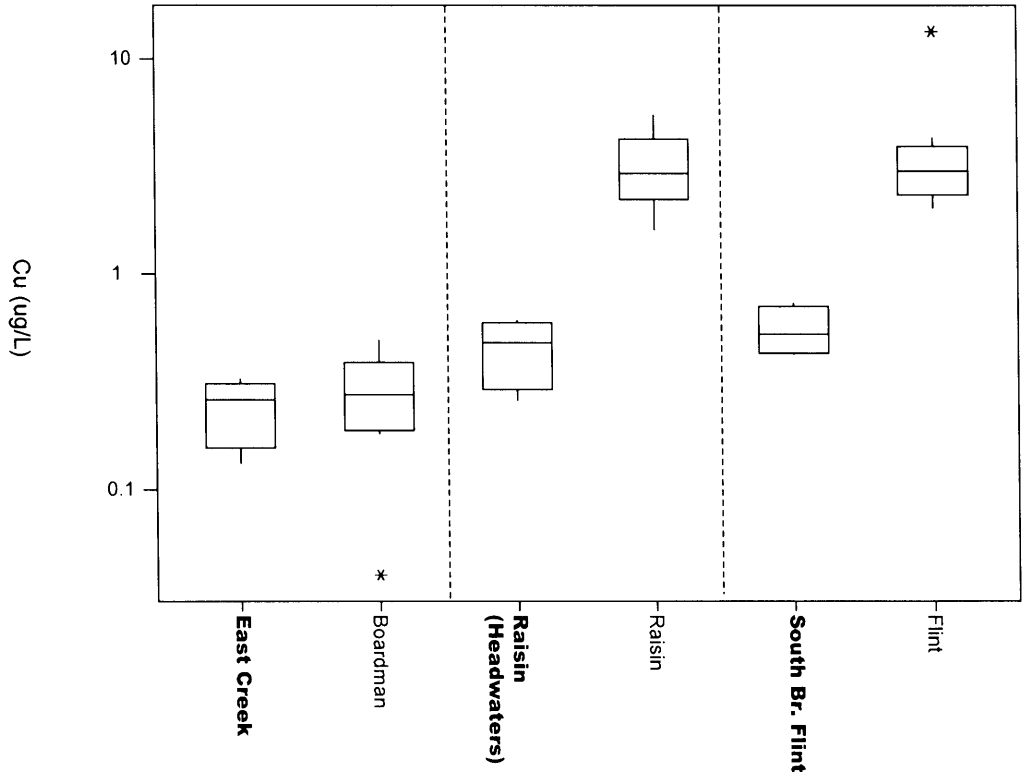


Figure 29. Total lead concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2003.

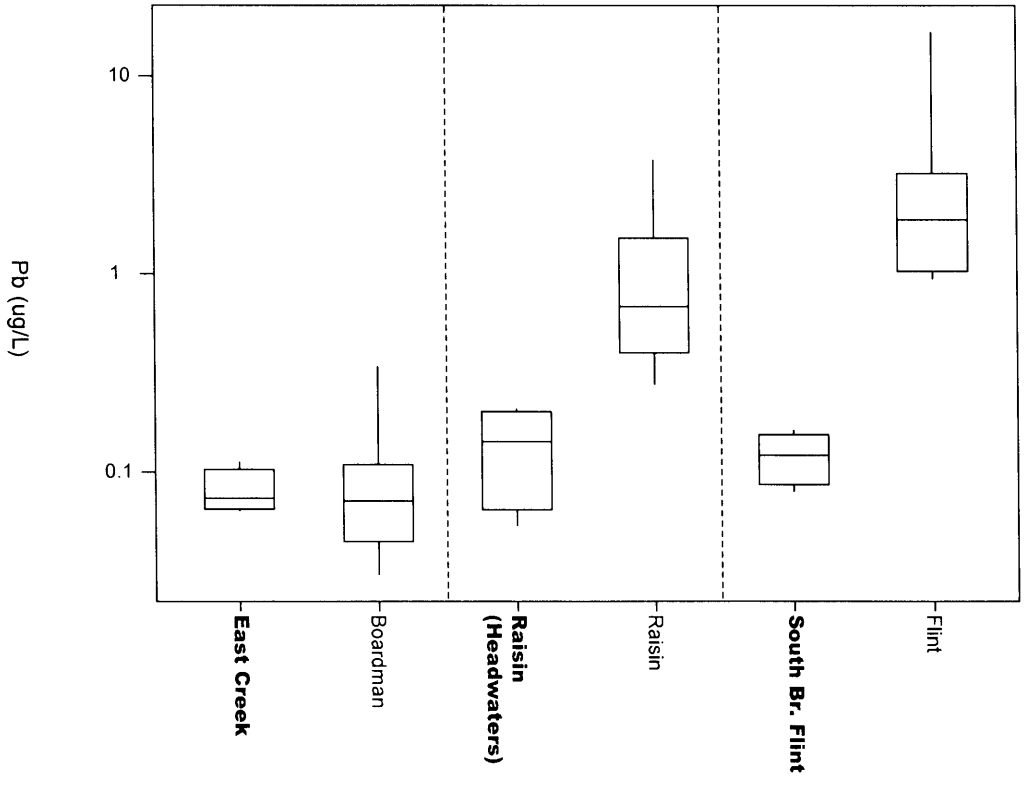


Figure 30. Comparison of total PCB concentrations among all stations sampled in 2003. Open circles designate values representing the mean of two determinations. PCB Rule 57 water quality value = 0.026 ng/L.

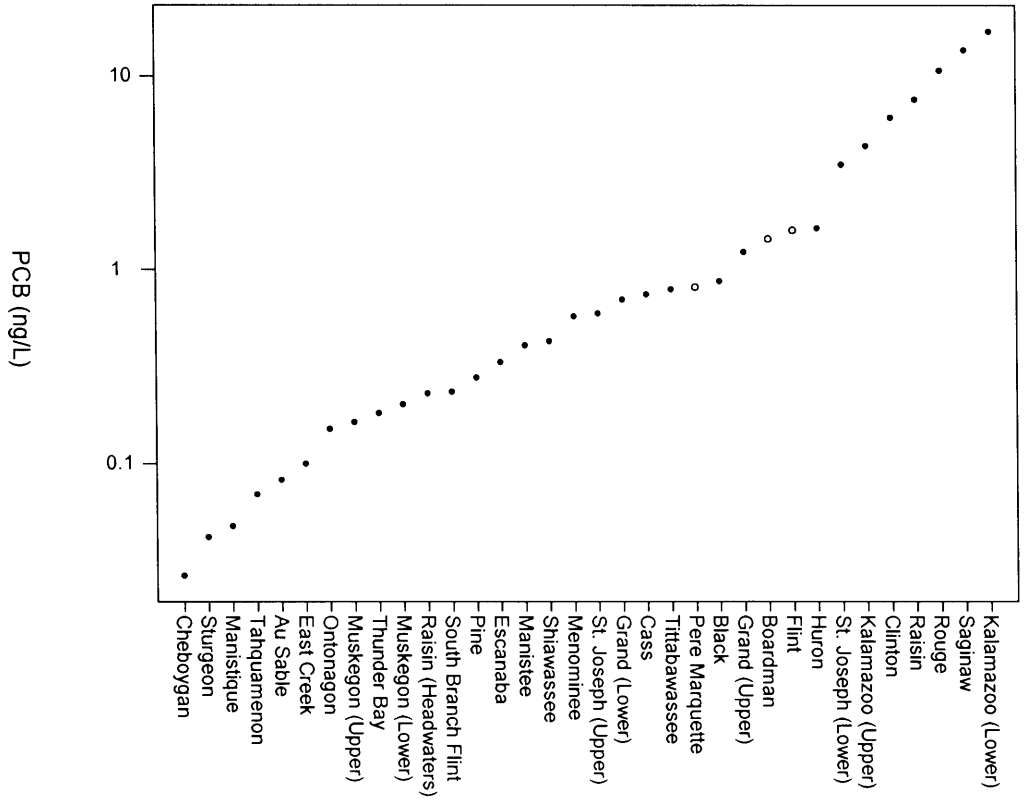


Figure 31. Comparison of PFOS concentrations among stations for which data were available. Sampling took place in 2001. Open circles designate values representing the mean of two or more determinations.

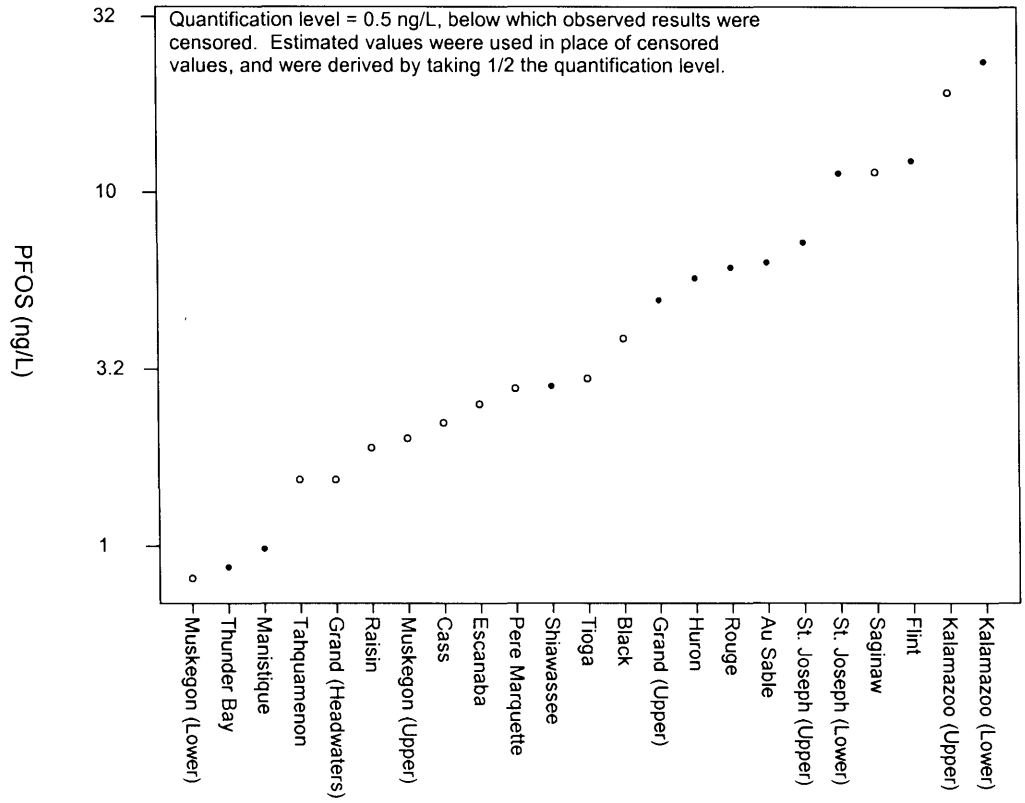
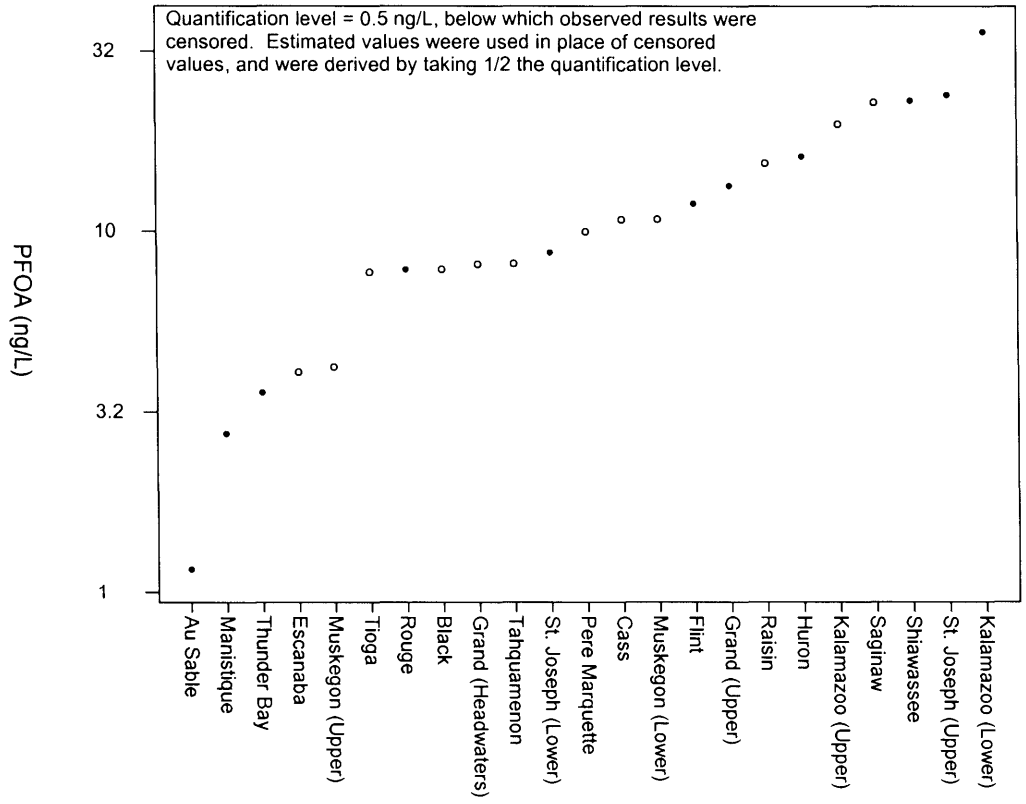


Figure 32. Comparison of PFOA concentrations among stations for which data were available. Sampling took place in 2001. Open circles designate values representing the mean of two or more determinations.



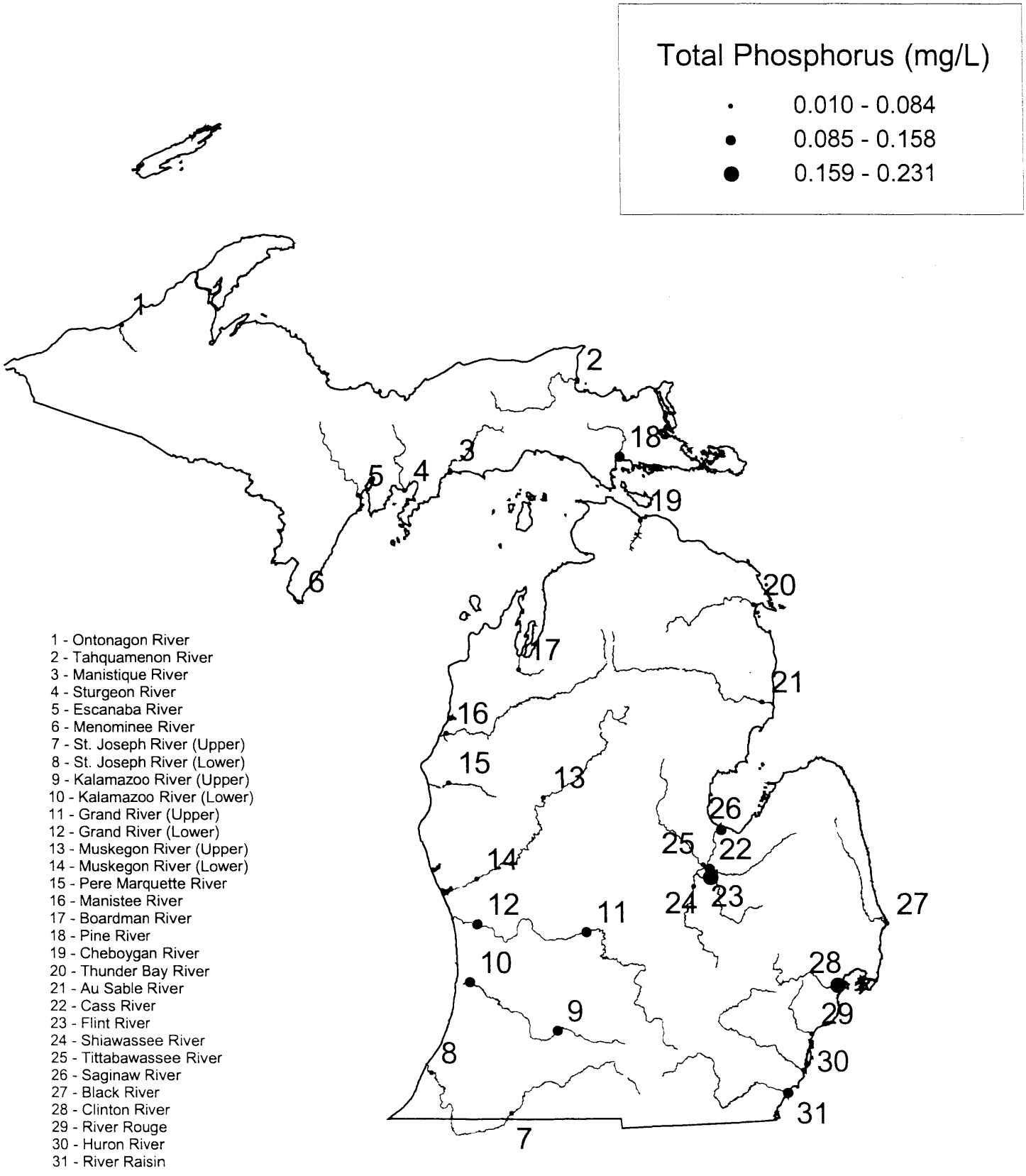


Figure 33. Mean total phosphorus concentrations at integrator and intensive sites, WCMP 2003.

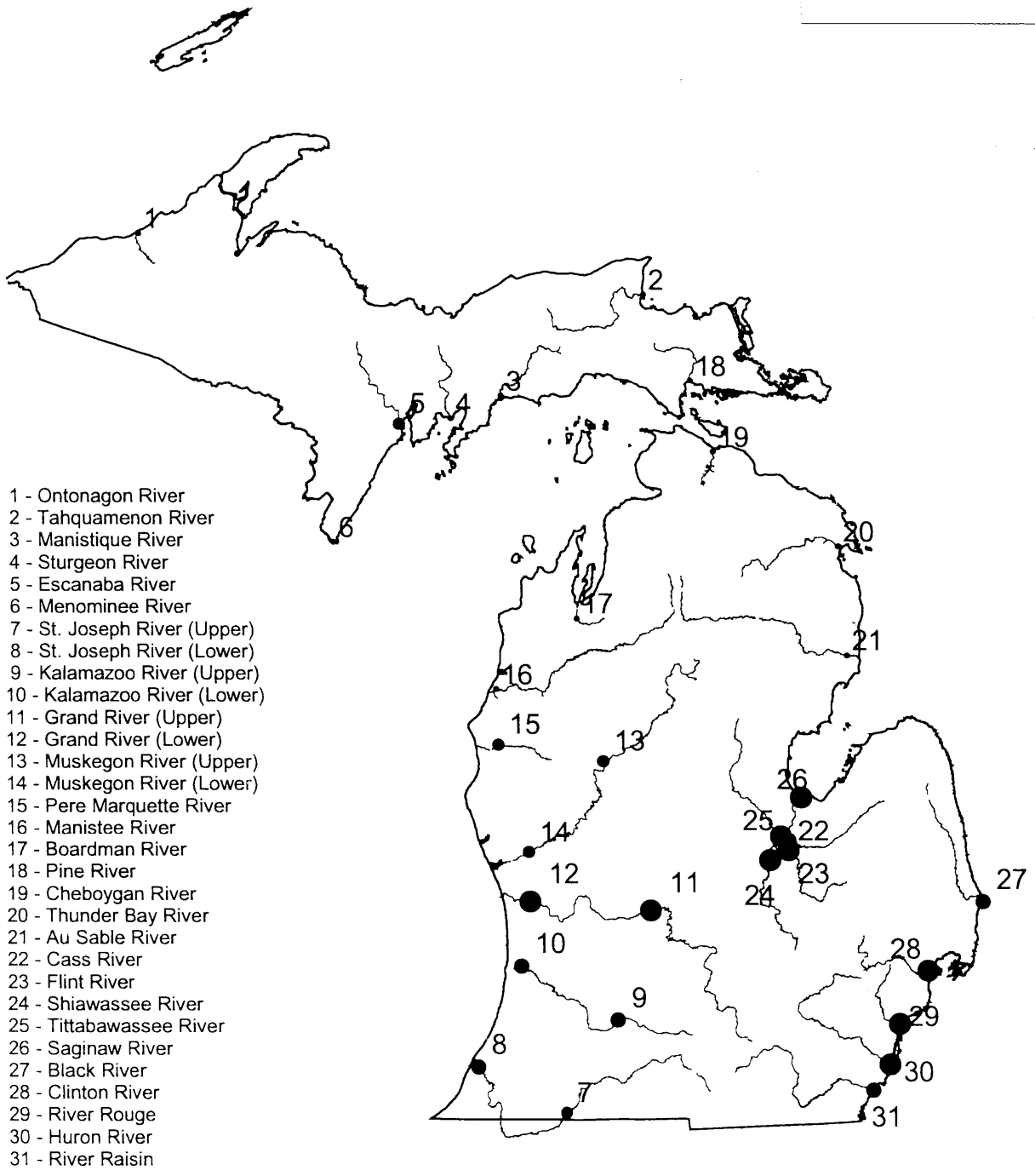


Figure 34. Mean total chloride concentrations at integrator and intensive sites, WCMP 2003.

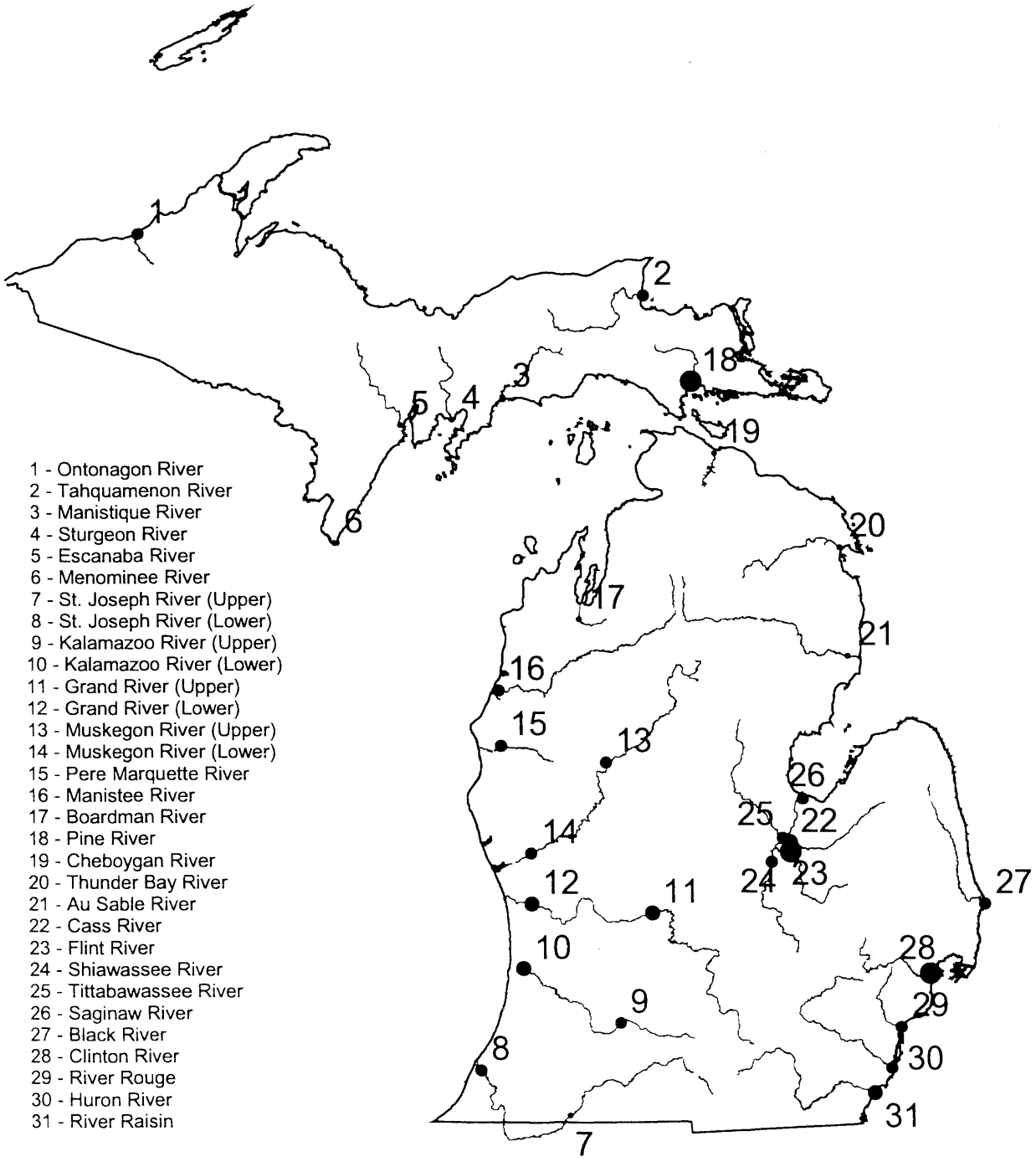


Figure 35. Mean total suspended solids concentrations at integrator and intensive sites, WCMP 2003.

Figure 36. Au Sable River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

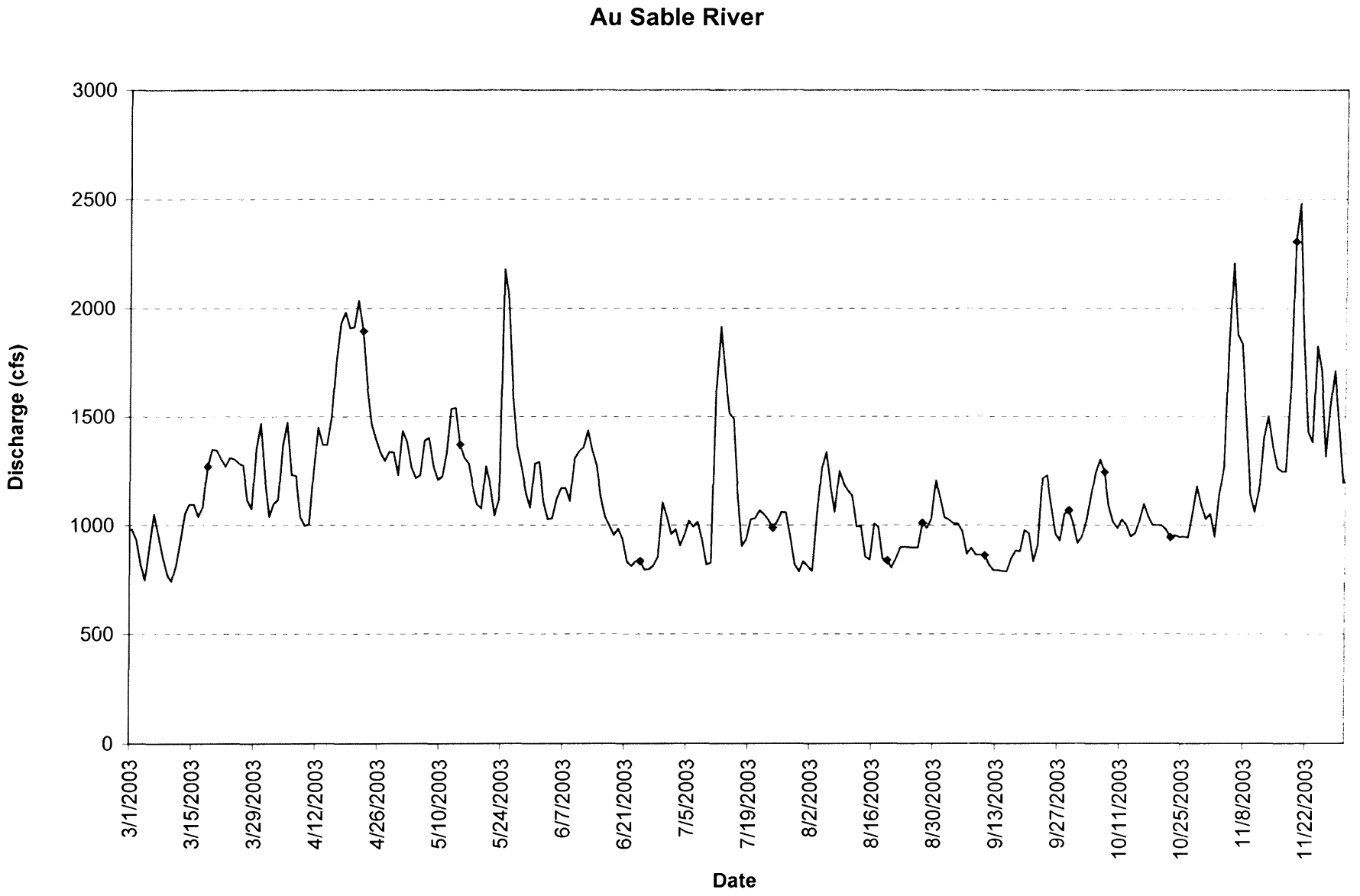


Figure 37. Boardman River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

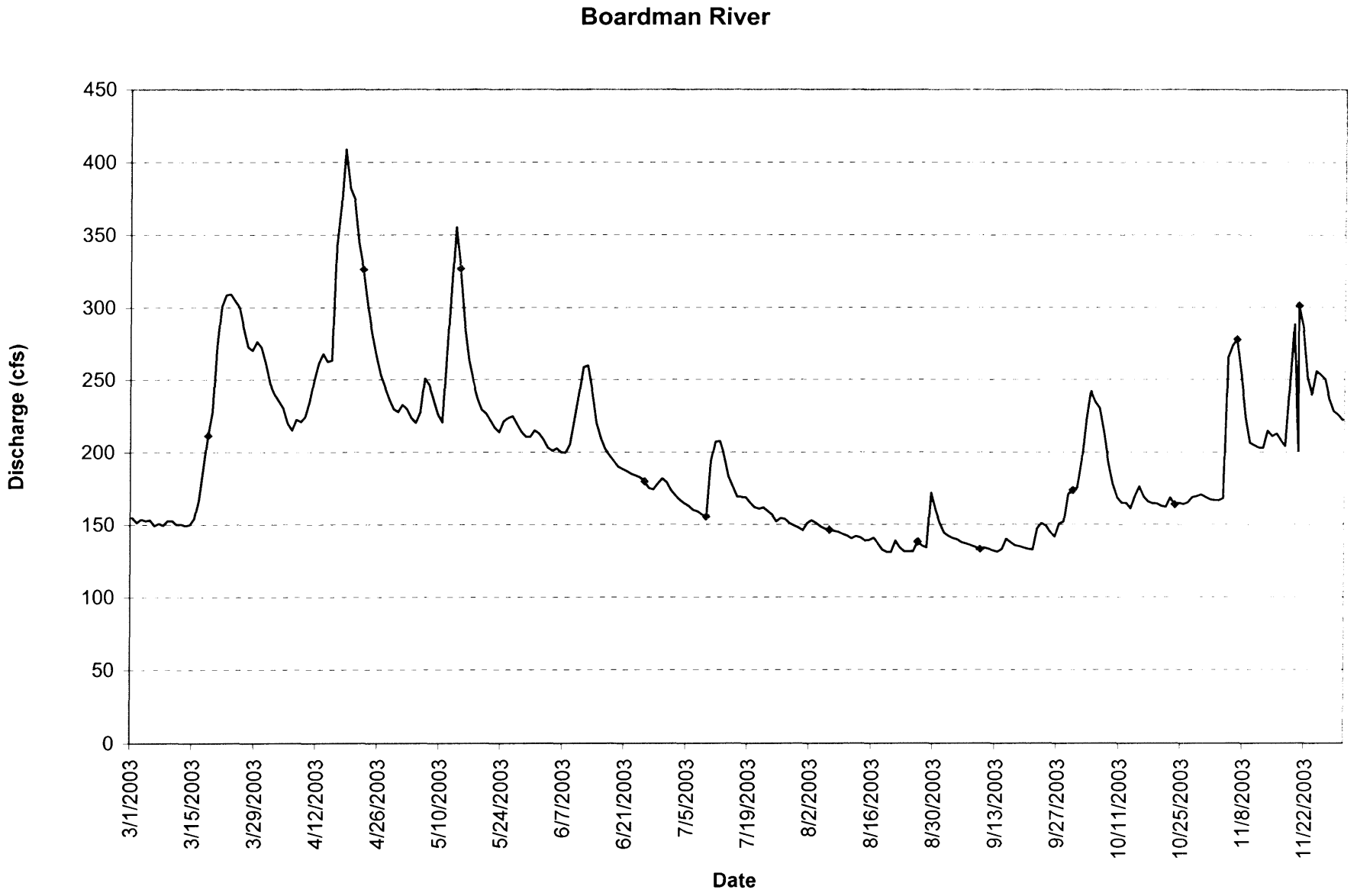


Figure 38. Clinton River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

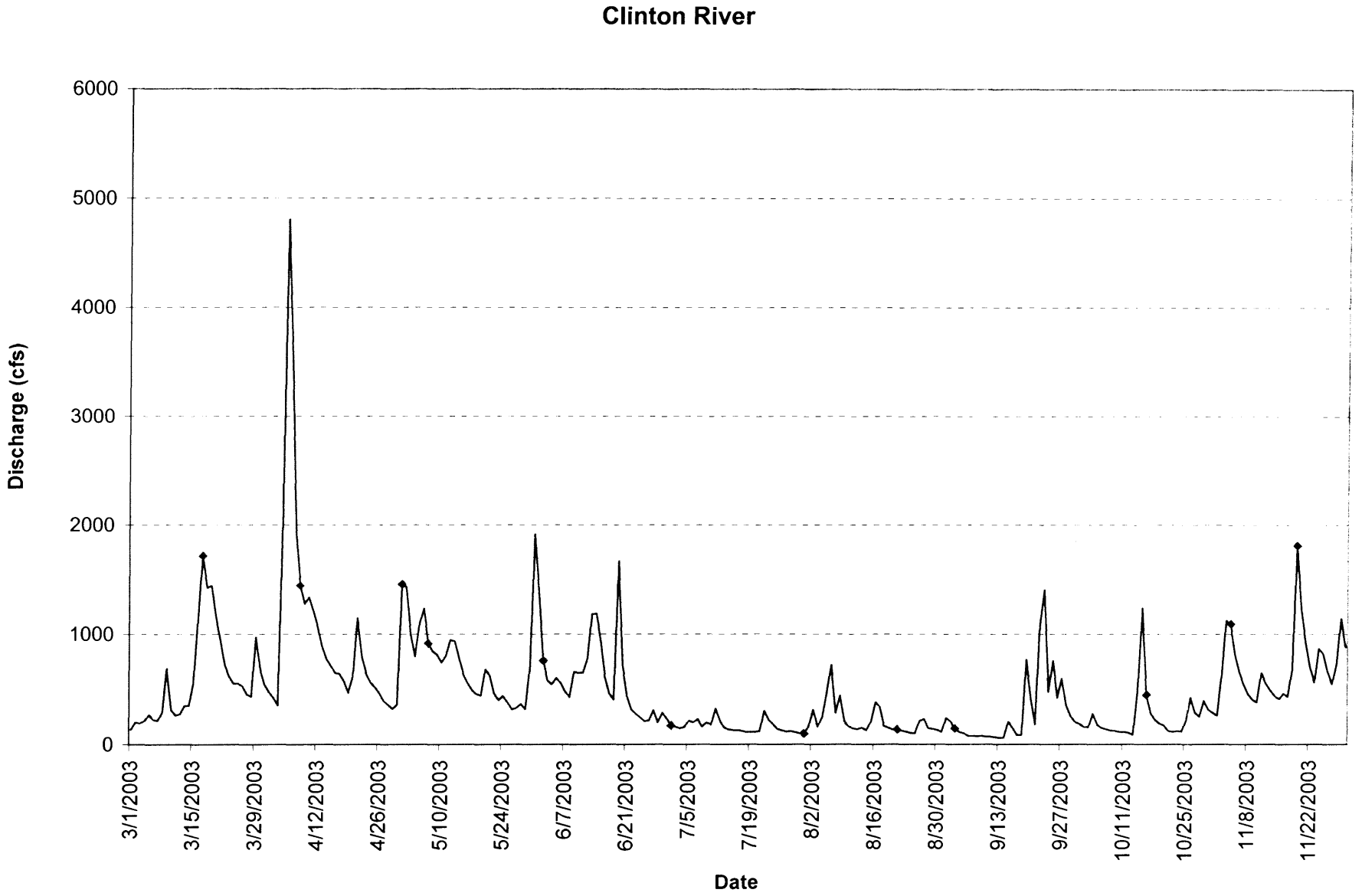


Figure 39. Flint River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

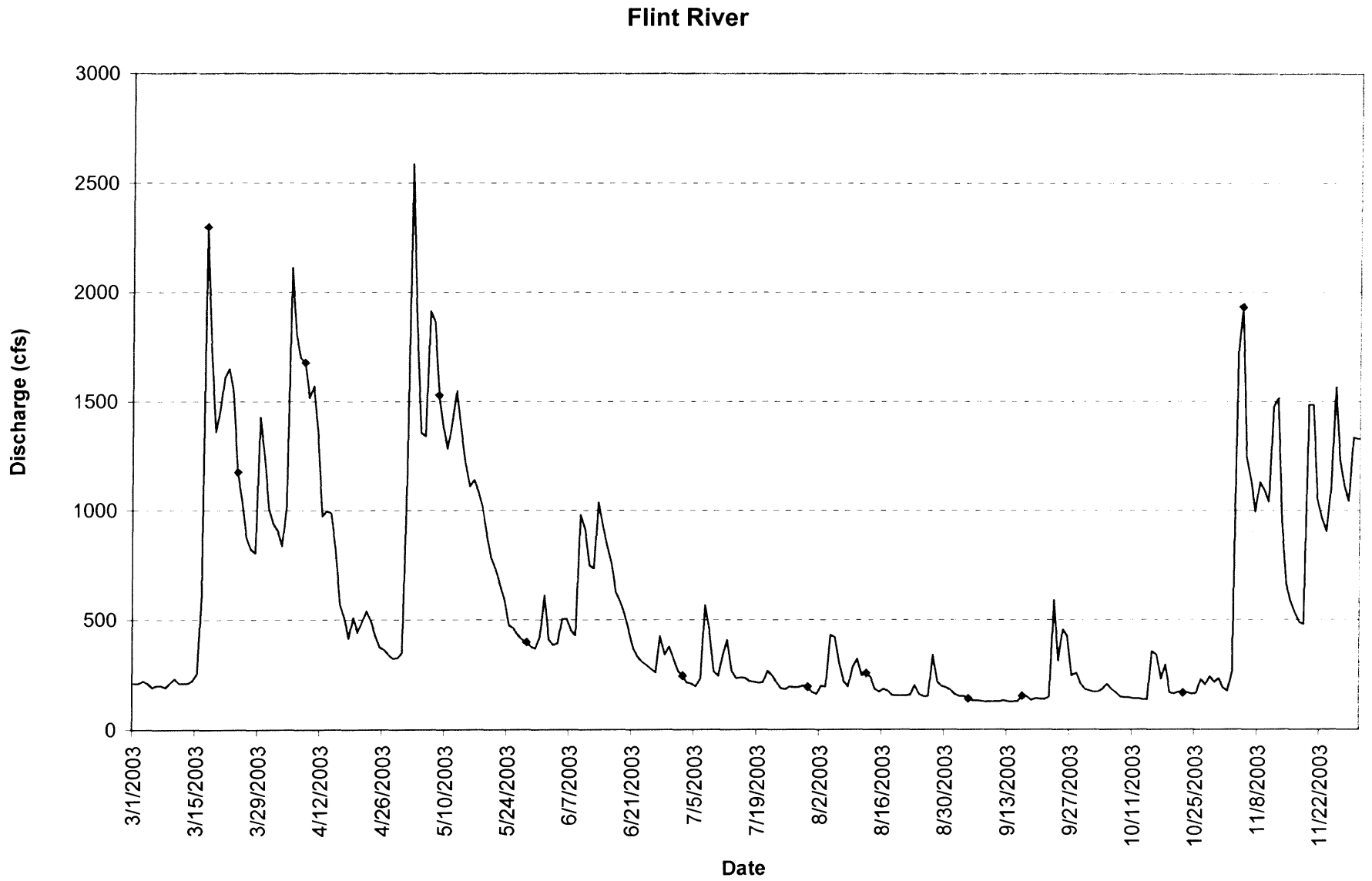


Figure 40. Lower Grand River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

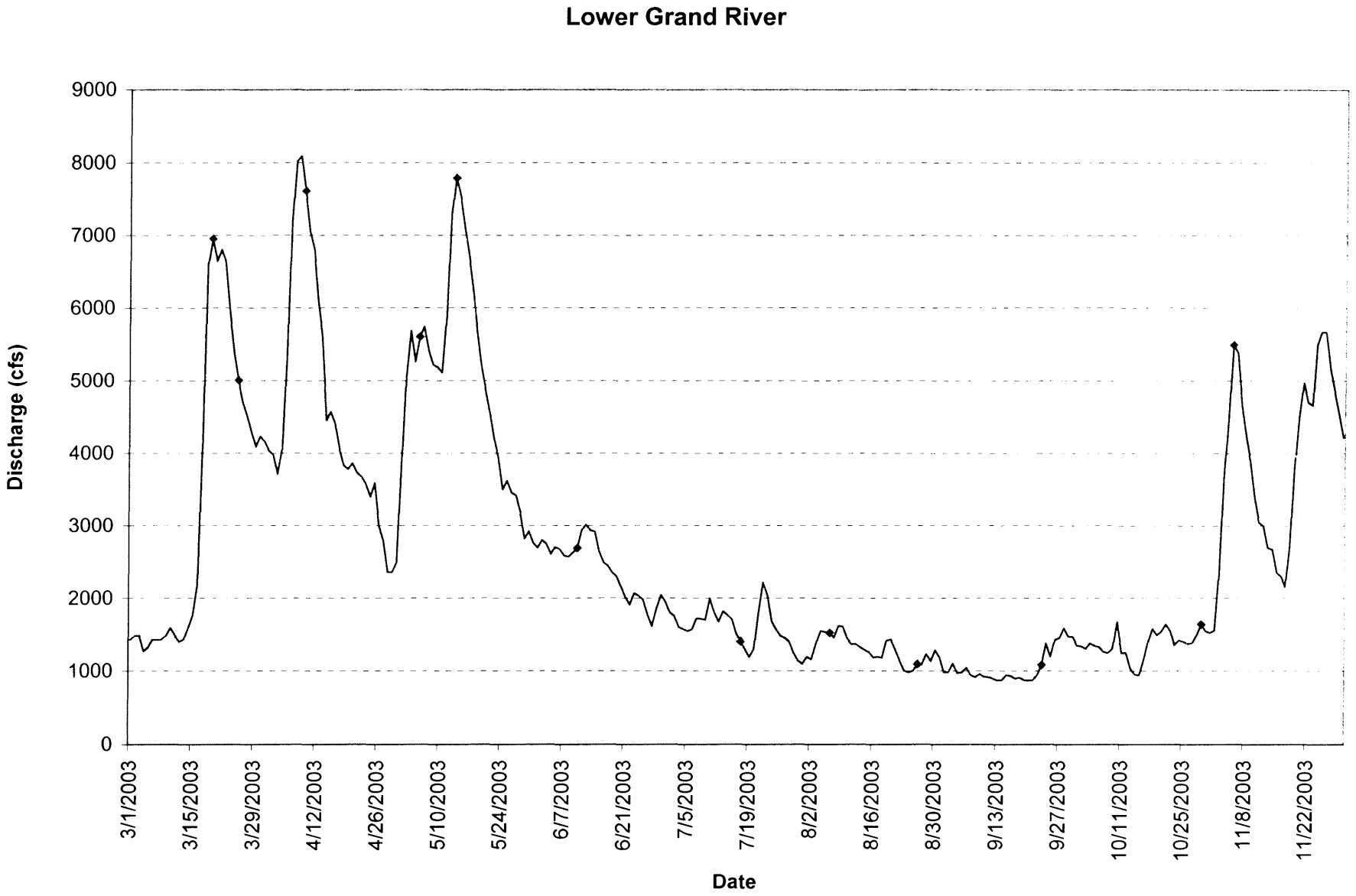


Figure 41. Lower Kalamazoo River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

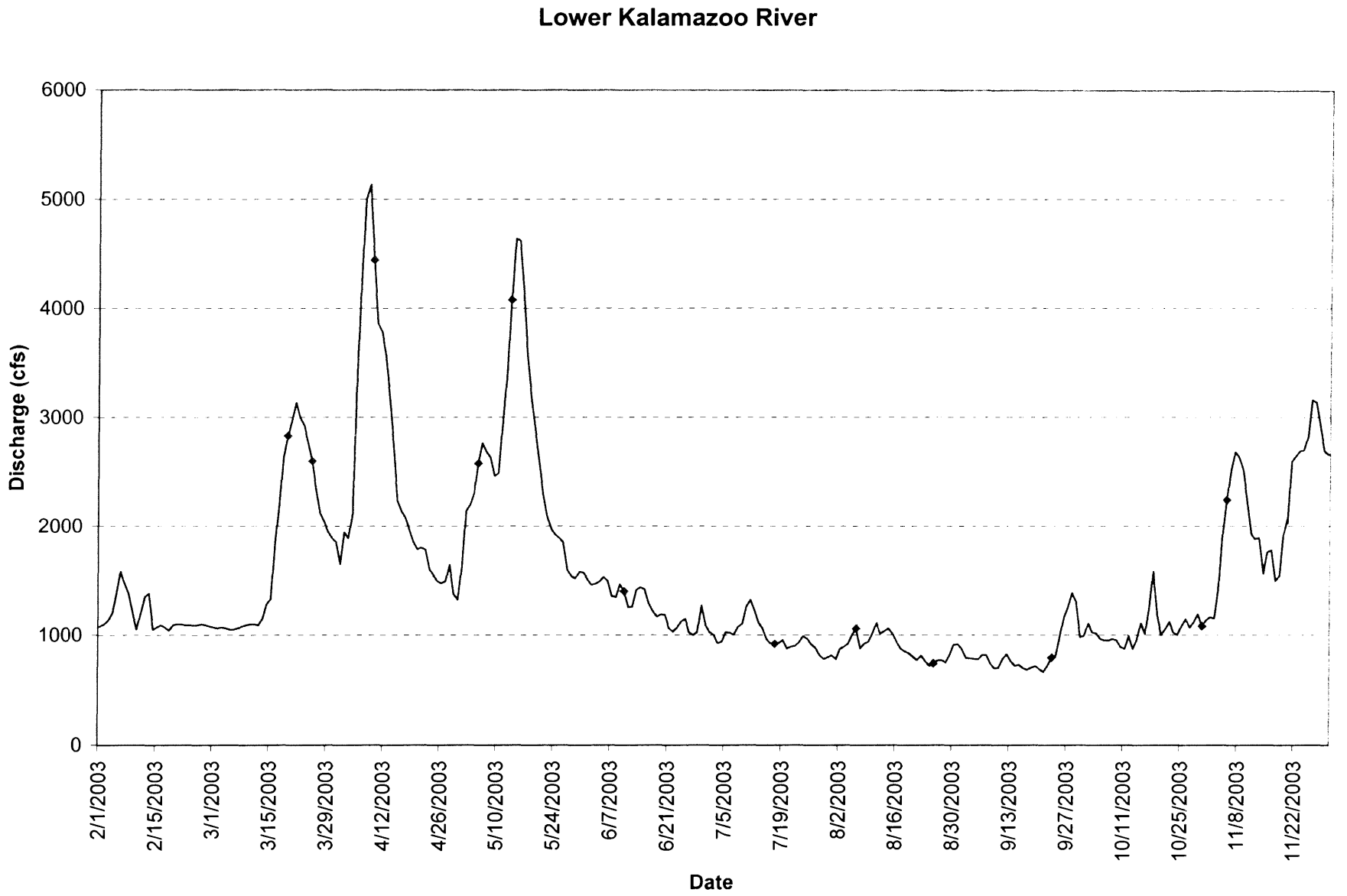


Figure 42. Lower Muskegon River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

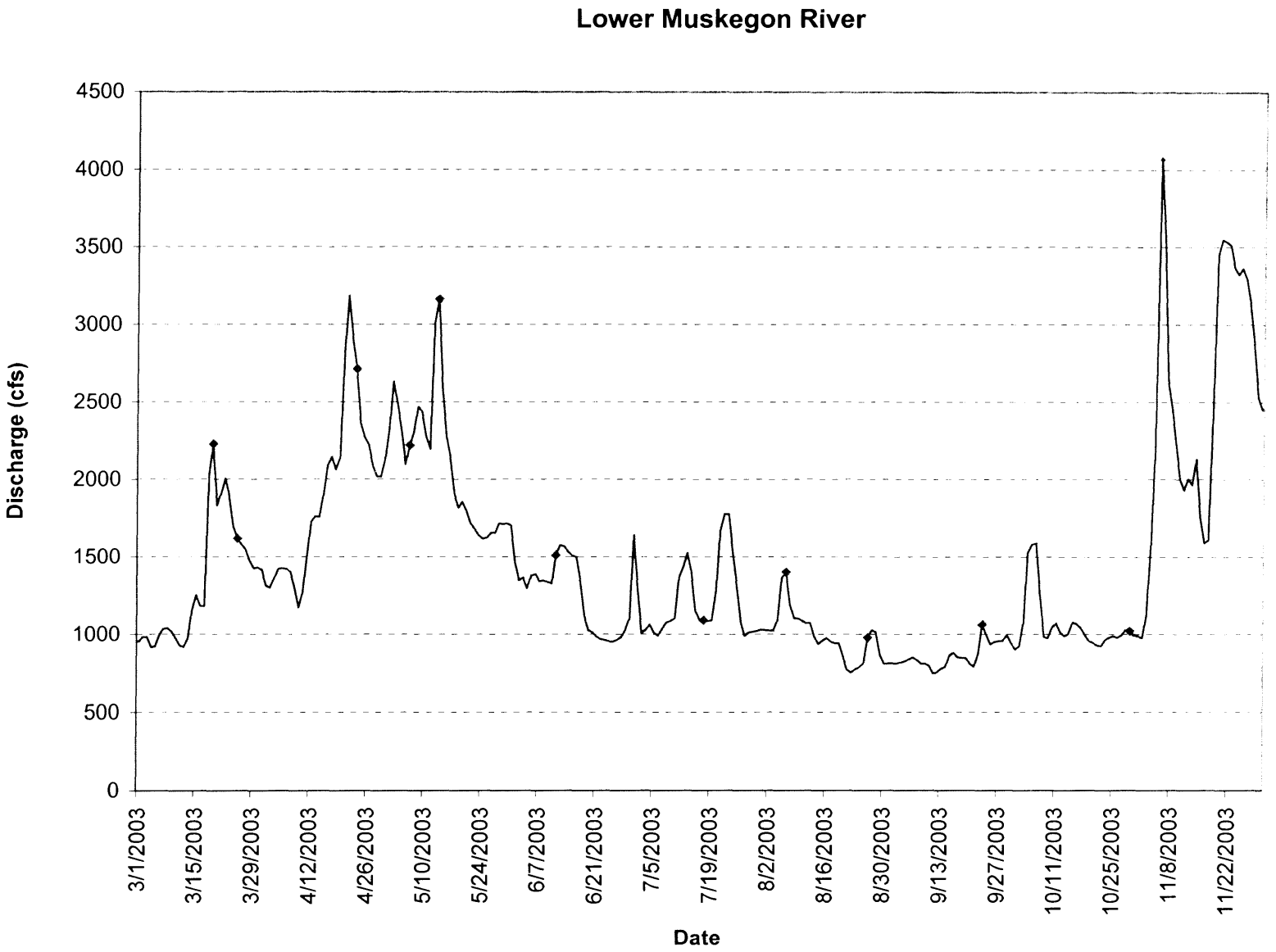


Figure 43. River Raisin hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

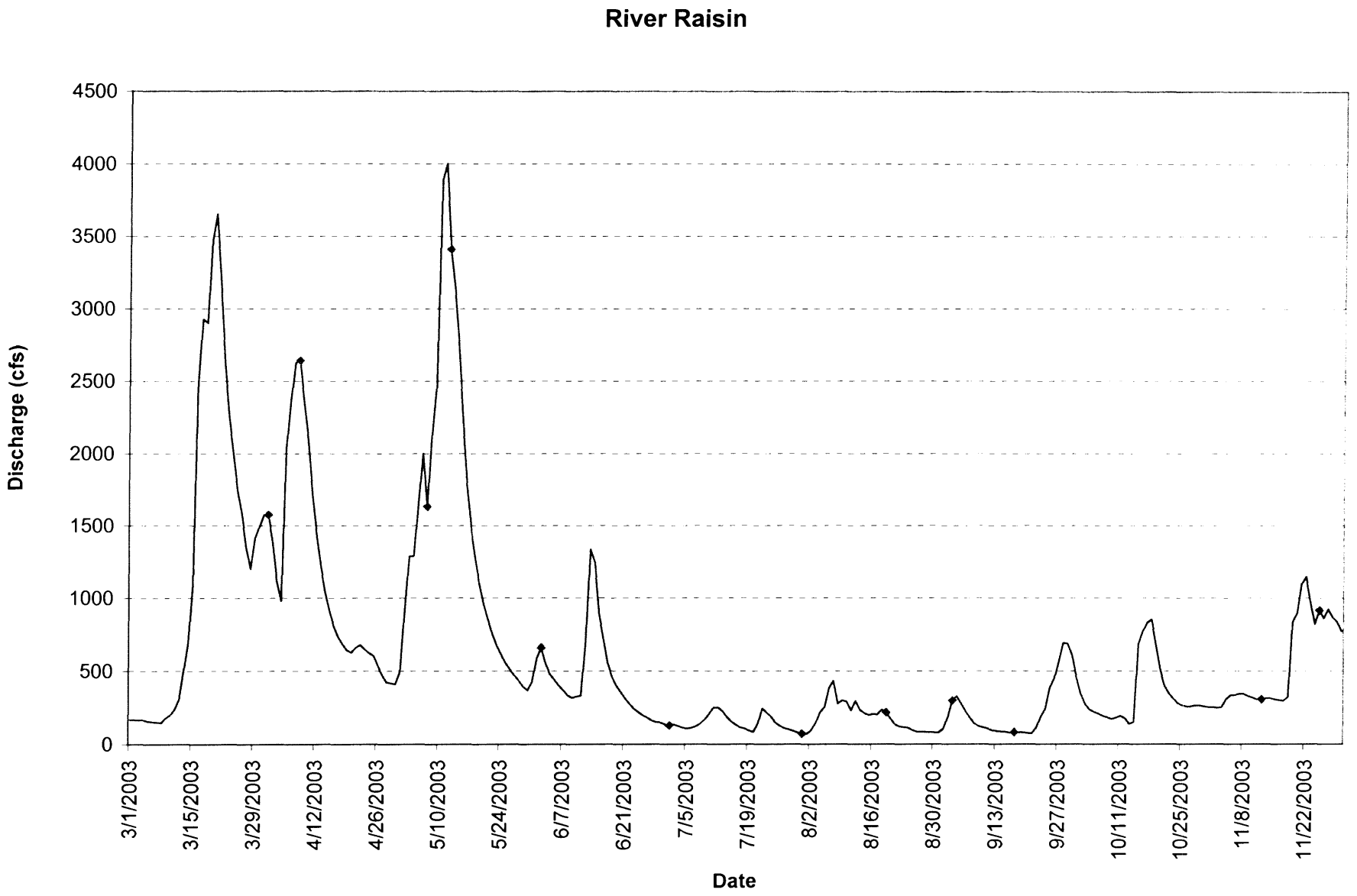
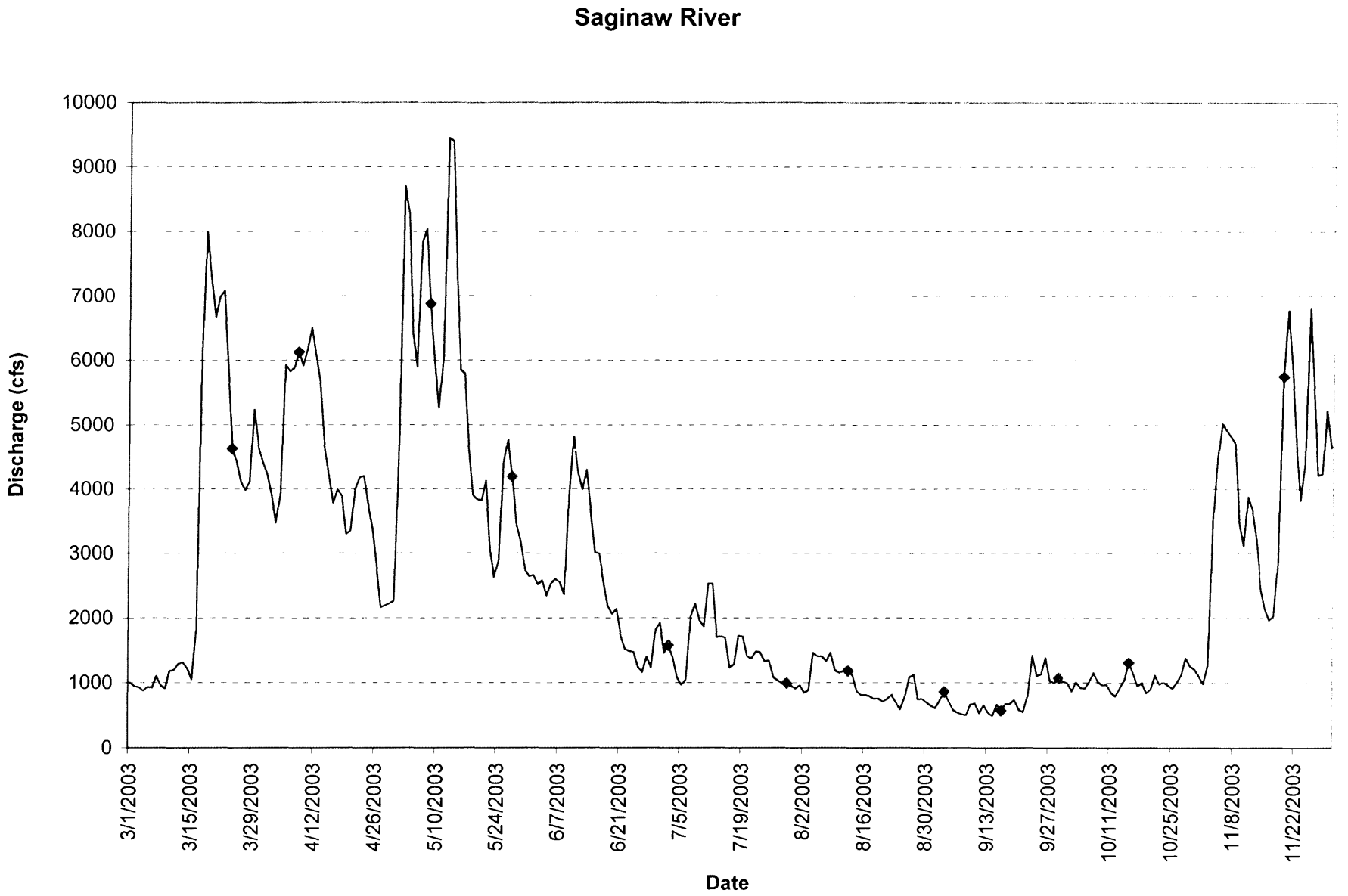


Figure 44. Saginaw River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.



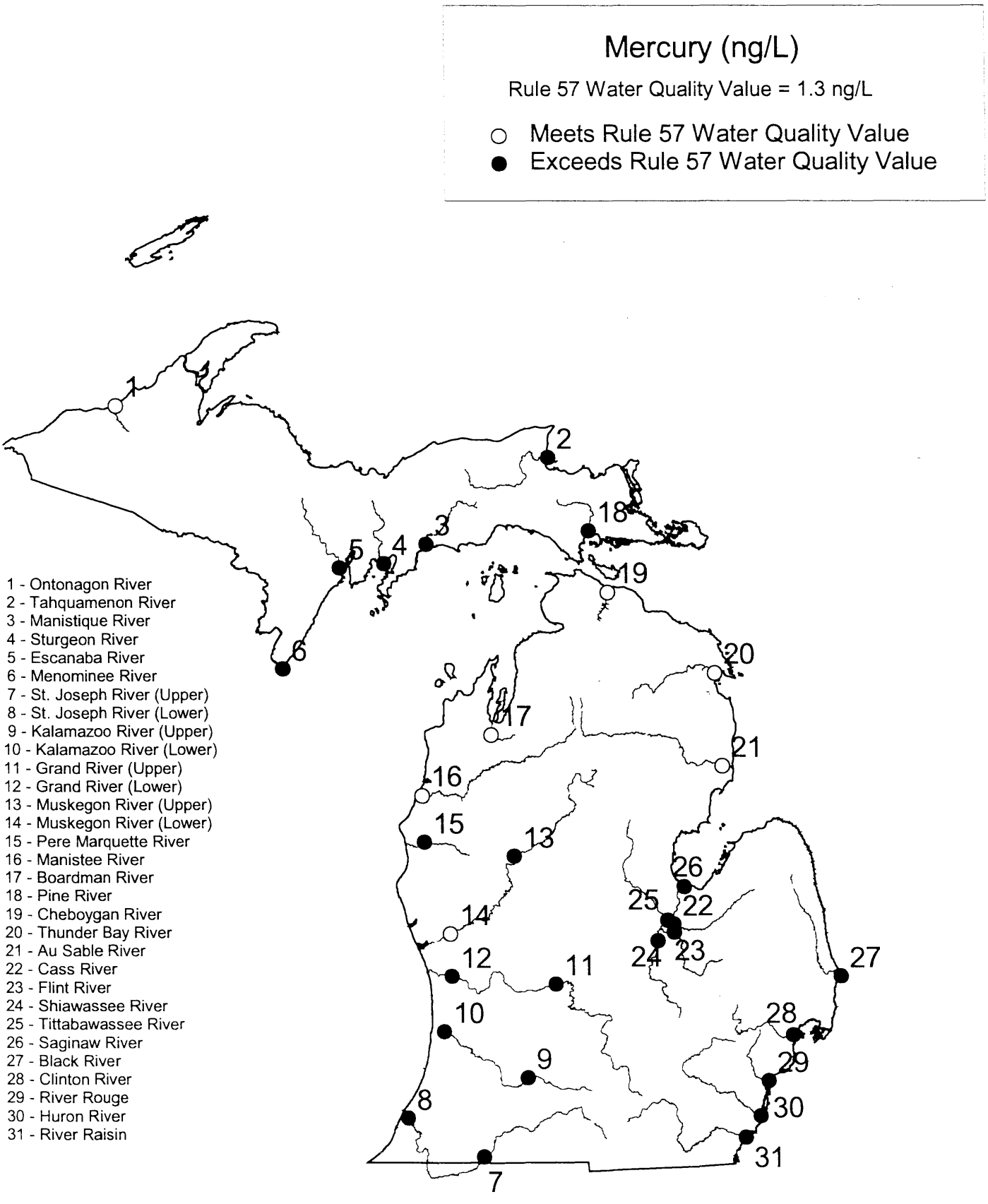


Figure 45. The occurrence of mercury Rule 57 water quality value exceedances at integrator and intensive sites, WCMP 2003. Mean mercury concentration was used to determine exceedance.

APPENDIX A

Additional Water Chemistry Data Summarized in the 2003 Report

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
350061 Au Sable River										
3/18/2003	0.020	0.119	0.002	0.090	0.011	T 0.002	7.0	0.6	6.0	4.9
4/22/2003	0.024	0.112	H 0.002	0.150	0.005	T H 0.002	6.0	0.6	6.0	4.7
5/14/2003	0.017	0.086	0.003	0.220	0.009	T 0.002	9.0	0.6	6.0	3.8
6/24/2003	0.014	0.010	0.002	0.220	0.006	0.003	8.0	0.6	6.0	5.2
7/24/2003	0.015	ND	0.003	0.340	0.013	T 0.002	10.0	0.7	6.0	4.6
8/19/2003	0.014	T 0.003	0.002	0.260	0.011	0.003	5.0	0.4	6.0	5.5
8/27/2003	0.012	T 0.003	0.003	0.190	0.013	0.025	4.0	0.5	6.0	5.0
9/10/2003	0.010	W 0.001	T 0.001	0.170	0.013	0.004	6.0	0.4	6.0	4.8
9/29/2003	0.010	T 0.006	T 0.001	0.230	0.017	T 0.004	6.0	0.4	5.0	4.9
10/7/2003	T 0.006	ND	T 0.001	0.190	0.010	T 0.002	7.0	0.6	6.0	4.4
10/22/2003	0.012	T 0.007	T 0.001	0.170	0.011	T 0.004	4.0	0.7	6.0	4.9
11/19/2003	0.015	0.018	0.002	0.230	0.012	0.005	9.0	0.7	6.0	4.8
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.014	* 0.031	0.002	0.205	0.011	0.005	6.8	0.6	5.9	4.8
Median+:	0.014	# 0.007	0.002	0.205	0.011	0.003	6.5	0.6	6.0	4.9
740385 Black River										
4/14/2003	D 0.060	7.460	0.041	1.270	0.088	0.028	73.0	D 5.0	54.0	17.0
6/4/2003	0.041	1.500	0.019	0.670	0.067	0.015	47.0	2.8	40.0	18.1
8/13/2003	0.030	0.144	H 0.008	0.550	0.031	H 0.005	25.0	1.8	26.0	13.1
10/8/2003	0.040	0.230	T 0.004	0.250	0.020	T 0.005	28.0	1.9	24.0	13.5
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.043	2.334	0.018	0.685	0.052	0.013	43.3	2.9	36.0	15.4
Median+:	0.041	0.865	0.014	0.610	0.049	0.010	37.5	2.4	33.0	15.3

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
350061	Au Sable River										
3/18/2003		ND	230.0	1.7	333	12.3	7.7	0.9	169	ND	147.00
4/22/2003		ND	180.0	1.3	264	12.1	7.7	4.4	139	ND	118.00
5/14/2003		ND	190.0	3.4	310	10.2	8.1	12.3	149	ND	115.00
6/24/2003		ND	200.0	4.8	306	8.5	7.6	21.5	142	ND	129.00
7/24/2003		ND	190.0	5.0	293	8.1	7.8	22.4	145	ND	116.00
8/19/2003		ND	190.0	3.8	292	7.5	8.0	24.1	140	ND	125.00
8/27/2003		ND	190.0	3.5	295	7.5	7.7	23.8	143	ND	120.00
9/10/2003		ND	190.0	3.3	285	7.5	7.9	21.5	140	ND	128.00
9/29/2003		ND	190.0	3.1	261	8.6	8.0	17.5	140	H ND	125.00
10/7/2003		ND	190.0	3.4	295	9.5	8.3	13.5	144	ND	121.00
10/22/2003		ND	200.0	2.7	298	9.6	8.0	12.0	148	ND	132.00
11/19/2003		ND	210.0	2.9	294	11.2	7.9	6.2	150	ND	140.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		* 2.0	195.8	3.2	294	9.4	7.9	15.0	146	* 0.5	126.33
Median+:		# 2.0	190.0	3.4	295	9.1	7.9	15.5	144	# 0.5	125.00
740385	Black River										
4/14/2003		22.0	430.0	9.5	632	10.9	8.0	8.7	290	28.0	131.00
6/4/2003		37.0	360.0	7.4	531	8.8	7.7	14.7	242	30.0	150.00
8/13/2003		11.0	250.0	3.2	365	7.0	8.0	24.2	157	11.0	109.00
10/8/2003		8.0	230.0	2.5	356	9.2	8.0	12.1	144	7.5	101.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		19.5	317.5	5.7	471	9.0	7.9	14.9	208	19.1	122.75
Median+:		16.5	305.0	5.3	448	9.0	8.0	13.4	200	19.5	120.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
280014 Boardman River										
3/18/2003	0.026	0.380	0.005	0.320	0.030	0.003	6.0	0.9	10.0	6.6
4/22/2003	T 0.009	0.260	H 0.004	0.380	0.014	H 0.003	7.0	0.7	9.0	5.6
5/14/2003	T 0.008	0.192	0.003	0.280	0.018	0.003	6.0	0.7	7.0	3.9
6/25/2003	0.010	0.134	H 0.003	0.210	0.014	H 0.003	5.0	0.6	8.0	3.5
7/9/2003	T 0.008	0.145	0.002	0.350	0.011	W 0.001	5.0	0.6	8.0	4.6
8/6/2003	T 0.007	0.139	0.002	0.180	0.013	0.003	ND	0.8	8.0	4.9
8/26/2003	T 0.005	0.153	0.003	0.180	0.011	T 0.001	2.0	0.7	8.0	5.0
9/9/2003	T 0.005	0.146	0.004	0.110	0.008	0.005	5.0	0.8	8.0	6.0
9/30/2003	T 0.004	0.180	T 0.002	0.210	T 0.009	T 0.002	6.0	0.7	8.0	5.3
10/23/2003	T 0.007	0.220	0.003	0.160	T 0.007	T 0.002	4.0	0.8	9.0	4.1
11/6/2003	0.022	0.230	0.003	0.240	0.013	0.003	6.0	0.8	8.0	5.9
11/20/2003	0.015	0.250	0.003	0.250	0.011	0.004	8.0	0.8	9.0	4.4
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.011	0.202	0.003	0.239	0.013	0.003	* 5.1	0.7	8.3	5.0
Median+:	# 0.008	0.186	0.003	0.225	0.012	0.003	5.5	0.8	8.0	5.0
730024 Cass River										
4/15/2003	D ND	6.860	0.045	1.160	0.087	0.019	82.0	5.0	51.0	17.3
5/27/2003	D ND	2.380	0.016	1.140	0.078	0.005	86.0	3.7	40.0	14.8
7/30/2003	D ND	2.270	0.035	1.040	0.080	0.021	53.0	D 5.1	60.0	27.6
9/4/2003	0.040	0.450	0.022	1.010	0.118	0.019	60.0	D 5.8	72.0	39.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.014	2.990	0.030	1.088	0.091	0.016	70.3	4.9	55.8	24.9
Median+:	# 0.005	2.325	0.029	1.090	0.084	0.019	71.0	5.1	55.5	22.5

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)		Turbidity (NTU)	Alkalinity (mg CaCO3/L)
280014	Boardman River											
3/18/2003		12.0	220.0	3.2	316	12.0	8.0	4.8	156		5.1	126.00
4/22/2003		5.0	200.0	5.7	287	11.4	8.1	8.8	149		2.6	125.00
5/14/2003		5.0	200.0	3.7	330	10.2	7.7	9.8	154		3.3	131.00
6/25/2003		ND	210.0	2.6	335	10.7	8.0	22.5	161		1.7	141.00
7/9/2003		ND	220.0	2.9	338	9.8	8.1	18.5	162	ND		145.00
8/6/2003		4.0	210.0	2.1	312	9.6	8.2	20.2	162	ND		135.00
8/26/2003		ND	220.0	2.2	321	9.4	8.0	18.6	163		1.4	141.00
9/9/2003		ND	220.0	2.1	333	10.6	8.1	17.0	165	ND		151.00
9/30/2003		4.0	220.0	2.4	344	9.7	7.8	9.6	167	H ND		151.00
10/23/2003		4.0	230.0	2.6	349	10.6	7.8	7.3	165	ND		151.00
11/6/2003		ND	210.0	4.2	323	11.0	7.9	6.2	151		2.5	139.00
11/20/2003		4.0	210.0	4.6	315	11.3	8.0	4.8	153		2.5	135.00
No. of Samples:		12	12	12	12	12	12	12	12		12	12
Mean+:		* 4.0	214.2	3.2	325	10.5	8.0	12.3	159	*	1.8	139.25
Median+:		4.0	215.0	2.8	327	10.6	8.0	9.7	162		1.6	140.00
730024	Cass River											
4/15/2003		45.0	460.0	8.5	693	10.2	8.0	11.4	318		29.0	170.00
5/27/2003		31.0	470.0	11.0	729	9.3	8.0	16.8	376		21.0	229.00
7/30/2003		44.0	440.0	7.5	682	11.2	7.8	23.9	291		41.0	196.00
9/4/2003		52.0	450.0	7.2	694	6.2	7.8	21.1	267		55.0	180.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:		43.0	455.0	8.6	700	9.2	7.9	18.3	313		36.5	193.75
Median+:		44.5	455.0	8.0	694	9.8	7.9	19.0	305		35.0	188.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
160073 Cheboygan River										
4/17/2003	0.035	0.143	0.003	0.280	0.015	0.004	7.0	0.9	8.0	4.5
6/23/2003	0.017	0.034	ND	0.290	0.010	ND	8.0	1.1	8.0	4.7
8/18/2003	0.010	T 0.001	0.002	0.370	0.010	T 0.002	4.0	0.7	8.0	6.6
10/8/2003	0.015	0.028	T 0.002	0.250	T 0.004	T 0.001	6.0	0.9	7.0	6.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.019	0.052	* 0.002	0.298	0.010	* 0.002	6.3	0.9	7.8	5.5
Median+:	0.016	0.031	0.002	0.285	0.010	# 0.002	6.5	0.9	8.0	5.5
500233 Clinton River										
3/17/2003	0.760	1.120	0.060	3.100	0.440	0.058	23.0	7.1	282.0	154.0
4/8/2003	D 0.140	3.900	0.048	1.030	0.097	0.036	49.0	4.8	242.0	127.0
5/1/2003	0.490	1.190	0.063	2.400	0.460	0.054	25.0	3.9	D 172.0	D 105.0
5/7/2003	D 0.080	2.160	0.037	1.100	0.117	0.043	48.0	4.8	D 176.0	94.2
6/2/2003	0.124	2.060	0.043	1.230	0.137	0.053	48.0	4.9	D 159.0	85.8
7/1/2003	D 0.150	2.320	0.080	0.930	0.186	0.120	37.0	D 5.7	D 190.0	D 101.0
7/31/2003	D 0.090	2.940	0.064	0.990	0.320	0.220	47.0	D 7.6	D 218.0	D 122.0
8/21/2003	D 0.140	2.120	0.081	1.000	0.156	0.108	42.0	D 6.7	D 180.0	103.0
9/3/2003	0.114	1.870	0.061	1.060	0.270	0.155	35.0	D 6.3	D 169.0	96.6
10/16/2003	0.023	1.360	0.029	0.970	0.179	0.075	36.0	D 5.1	97.0	55.9
11/4/2003	0.055	1.320	0.026	1.070	0.175	0.052	34.0	D 5.5	103.0	55.2
11/19/2003	0.075	1.060	0.052	1.140	0.240	0.097	28.0	4.5	79.0	38.9
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.187	1.952	0.054	1.335	0.231	0.089	37.7	5.6	172.3	94.9
Median+:	0.119	1.965	0.056	1.065	0.183	0.067	36.5	5.3	174.0	98.8

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
160073	Cheboygan River										
4/17/2003		4.0	200.0	5.2	303	12.4	8.0	4.0	151	2.0	126.00
6/23/2003		ND	210.0	5.7	325	9.5	8.1	21.5	160	ND	134.00
8/18/2003		ND	200.0	5.6	305	8.9	8.2	26.0	145	ND	128.00
10/8/2003		ND	210.0	4.8	313	10.2	8.4	10.9	151	ND	132.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 2.5	205.0	5.3	312	10.3	8.2	15.6	152	* 0.9	130.00
Median+:		# 2.0	205.0	5.4	309	9.9	8.2	16.2	151	# 0.5	130.00
500233	Clinton River										
3/17/2003		170.0	730.0	I 16.0	1080	10.3	7.6	1.8	142	140.0	76.00
4/8/2003		21.0	790.0	6.7	1170	12.1	7.9	1.8	270	20.0	160.00
5/1/2003		220.0	510.0	I 10.0	758	7.8	7.6	12.3	136	130.0	65.00
5/7/2003		28.0	650.0	8.3	978	8.0	7.8	14.4	287	23.0	179.00
6/2/2003		24.0	620.0	9.5	920	8.1	7.7	14.1	292	23.0	187.00
7/1/2003		26.0	690.0	7.5	1090	7.4	7.8	24.0	280	20.0	187.00
7/31/2003		16.0	750.0	6.0	1190	7.0	7.8	22.4	277	10.0	172.00
8/21/2003		15.0	650.0	6.9	1033	6.0	7.5	22.3	261	14.0	171.00
9/3/2003		21.0	600.0	7.2	938	7.5	7.7	21.7	224	19.0	150.00
10/16/2003		34.0	420.0	7.4	631	7.9	7.5	11.5	181	34.0	124.00
11/4/2003		55.0	450.0	7.8	684	8.0	7.4	11.2	211	48.0	137.00
11/19/2003		110.0	350.0	7.7	535	8.6	7.7	10.8	156	83.0	108.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		61.7	600.8	8.4	917	8.2	7.7	14.0	226	47.0	143.00
Median+:		27.0	635.0	7.6	958	8.0	7.7	13.2	243	23.0	155.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
280318 East Creek										
4/30/2003	T 0.008	0.770	0.003	0.360	0.012	T 0.002	8.0	0.8	9.0	6.0
7/9/2003	T 0.009	0.970	0.004	0.210	0.009	T 0.002	4.0	0.8	10.0	4.6
8/26/2003	T 0.008	0.920	0.006	0.270	0.012	0.006	4.0	0.9	10.0	5.9
9/30/2003	T 0.003	0.820	T 0.002	0.240	0.013	T 0.002	8.0	0.9	9.0	3.7
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.007	0.870	0.004	0.270	0.012	0.003	6.0	0.9	9.5	5.1
Median+:	# 0.008	0.870	0.004	0.255	0.012	# 0.002	6.0	0.9	9.5	5.3
210102 Escanaba River										
5/6/2003	0.045	0.200	0.007	0.540	0.023	0.004	19.0	1.7	11.0	19.7
7/15/2003	0.060	0.082	0.019	0.410	0.035	0.010	50.0	3.3	24.0	50.3
9/8/2003	0.040	0.079	0.022	0.560	0.032	0.006	74.0	4.8	36.0	74.2
10/28/2003	0.074	0.081	0.010	0.540	0.025	0.007	66.0	4.0	32.0	68.9
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.055	0.111	0.015	0.513	0.029	0.007	52.3	3.5	25.8	53.3
Median+:	0.053	0.082	0.015	0.540	0.029	0.007	58.0	3.7	28.0	59.6

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)		Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)		Alkalinity (mg CaCO3/L)
280318	East Creek												
4/30/2003		ND		220.0	3.3	317	10.8	7.9	8.2	163	ND		131.00
7/9/2003		ND		240.0	2.7	365	9.4	7.8	13.5	171	ND		155.00
8/26/2003			4.0	230.0	2.6	343	9.0	8.0	17.0	175	ND		147.00
9/30/2003			5.0	220.0	3.6	343	10.5	8.0	8.1	166	H	2.1	148.00
No. of Samples:			4	4	4	4	4	4	4	4		4	4
Mean+:		*	3.3	227.5	3.1	342	9.9	7.9	11.7	169	*	0.9	145.25
Median+:		#	3.0	225.0	3.0	343	10.0	8.0	10.9	169	#	0.5	147.50
210102	Escanaba River												
5/6/2003			5.0	160.0	13.0	245	10.9	7.8	8.8	88		3.0	
7/15/2003		ND		310.0	16.0	481	7.4	8.2	22.6	123		3.6	137.00
9/8/2003		ND		380.0	19.0	578	7.2	7.8	19.9	129		3.5	153.00
10/28/2003			5.0	340.0	18.0	492	10.3	7.5	7.5	111		6.0	146.00
No. of Samples:			4	4	4	4	4	4	4	4		4	4
Mean+:		*	3.5	297.5	16.5	449	9.0	7.8	14.7	113		4.0	145.33
Median+:		#	3.5	325.0	17.0	487	8.9	7.8	14.4	117		3.6	146.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
730285	Flint River										
3/17/2003		0.930	1.280	0.061	4.500	0.730	0.050	24.0	6.7	232.0	119.0
3/24/2003		0.220	1.730	0.034	1.210	0.137	0.025	48.0	4.4	82.0	48.2
4/8/2003		D 0.110	2.500	0.028	1.220	0.127	0.021	51.0	4.6	97.0	51.4
5/8/2003		D 0.070	2.170	0.030	1.200	0.146	0.028	55.0	4.0	80.0	40.8
5/28/2003		D ND	2.780	0.023	1.130	0.114	0.054	62.0	4.6	101.0	54.5
7/2/2003		D ND	3.360	0.038	1.000	0.169	0.093	43.0	D 5.0	D 109.0	60.6
7/30/2003		D ND	3.270	0.032	1.100	0.169	0.091	43.0	D 5.6	D 112.0	68.1
8/12/2003		D 0.040	2.880	0.024	0.830	0.195	0.121	42.0	D 5.1	96.0	56.9
9/4/2003		D ND	4.570	0.033	0.960	0.158	0.104	43.0	D 6.1	D 113.0	68.5
9/16/2003		D 0.090	5.800	0.056	1.220	0.130	0.080	51.0	D 7.7	D 126.0	75.7
10/22/2003		0.036	0.620	0.015	1.540	0.163	0.010	67.0	3.8	107.0	40.5
11/4/2003		0.148	0.900	0.023	1.250	0.220	0.065	28.0	3.9	70.0	37.2
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		* 0.139	2.655	0.033	1.430	0.205	0.062	46.4	5.1	110.4	60.1
Median+:		0.055	2.640	0.031	1.205	0.161	0.060	45.5	4.8	104.0	55.7

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
730285 Flint River										
3/17/2003	290.0	650.0	I 18.0	957	10.4	7.5	3.3	150	180.0	85.00
3/24/2003	32.0	470.0	7.1	691	11.6	7.8	4.3	252	19.0	170.00
4/8/2003	28.0	470.0	7.9	692	12.2	8.0	2.4	239	19.0	151.00
5/8/2003	44.0	470.0	8.8	695	9.3	7.9	13.2	283	25.0	174.00
5/28/2003	17.0	540.0	9.1	605	8.9	7.7	18.2	303	9.5	196.00
7/2/2003	25.0	530.0	8.8	833	7.1	8.0	24.4	277	18.0	175.00
7/30/2003	29.0	530.0	8.6	826	7.6	8.5	25.3	276	18.0	181.00
8/12/2003	27.0	470.0	7.9	724	7.6	8.1	22.4	229	19.0	159.00
9/4/2003	17.0	520.0	7.8	798	8.4	7.8	23.4	244	15.0	160.00
9/16/2003	16.0	550.0	8.2	840	7.4	8.1	18.6	231	12.0	135.00
10/22/2003	78.0	560.0	I 15.0	887	8.8	7.8	9.9	346	78.0	205.00
11/4/2003	75.0	350.0	7.1	529	9.0	7.6	10.3	180	52.0	127.00
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	56.5	509.2	9.5	756	9.0	7.9	14.6	251	38.7	159.83
Median+:	28.5	525.0	8.4	761	8.9	7.9	15.7	248	19.0	165.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
700123	Grand River (Lower)										
3/19/2003		0.780	2.100	0.041	2.700	0.300	0.075	39.0	5.7	76.0	42.3
3/25/2003		0.810	2.400	0.054	2.200	0.139	0.046	50.0	5.0	45.0	22.0
4/9/2003	D	0.310	4.200	0.042	1.180	0.094	0.043	59.0	3.6	51.0	26.1
5/5/2003	D	0.120	2.360	0.040	1.190	0.125	0.012	58.0	3.3	51.0	24.9
5/13/2003		0.095	2.070	0.034	1.160	0.137	0.036	54.0	3.3	45.0	21.6
6/10/2003		0.019	1.650	0.028	0.920	0.085	0.006	54.0	3.0	60.0	31.2
7/17/2003		0.016	0.560	0.032	1.310	0.101	0.004	61.0	3.6	72.0	38.3
8/6/2003		0.012	0.410	0.038	1.170	0.131	0.009	35.0	3.1	56.0	28.7
8/26/2003		0.016	1.120	0.074	1.330	0.142	0.026	48.0	3.8	77.0	41.5
9/23/2003		0.061	1.390	0.056	0.810	0.093	0.011	56.0	4.1	76.0	43.9
10/29/2003		0.360	1.420	0.061	1.000	0.078	0.024	56.0	3.8	69.0	36.4
11/5/2003		0.200	1.560	0.039	1.230	0.210	0.039	40.0	4.1	43.0	23.7
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		0.233	1.770	0.045	1.350	0.136	0.028	50.8	3.9	60.1	31.7
Median+:		0.108	1.605	0.041	1.185	0.128	0.025	54.0	3.7	58.0	30.0
340025	Grand River (Upper)										
4/16/2003	D	0.050	5.000	0.038	1.190	0.144	0.029	89.0	3.6	55.0	24.8
6/17/2003	D	ND	3.580	0.024	1.090	0.101	0.005	60.0	4.1	57.0	27.5
8/7/2003		0.016	0.055	0.029	1.440	0.131	0.007	52.0	4.1	76.0	42.0
9/9/2003		0.014	0.410	0.025	0.990	0.096	0.009	59.0	4.5	77.0	46.4
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:	*	0.021	2.261	0.029	1.178	0.118	0.013	65.0	4.1	66.3	35.2
Median+:		0.015	1.995	0.027	1.140	0.116	0.008	59.5	4.1	66.5	34.8

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
700123	Grand River (Lower)										
3/19/2003		91.0	420.0	I 11.0	612	11.3	7.7	1.3	221	38.0	146.00
3/25/2003		28.0	370.0	11.0	540	10.7	7.7	6.2	228	12.0	142.00
4/9/2003		36.0	400.0	7.8	593	12.0	7.7	3.4	245	25.0	151.00
5/5/2003		45.0	420.0	8.4	624	9.3	7.9	14.5	281	16.0	181.00
5/13/2003		37.0	390.0	9.9	591	8.9	8.0	12.9	266	25.0	171.00
6/10/2003		17.0	460.0	7.0	707	11.0	8.3	18.6	297	11.0	218.00
7/17/2003		21.0	450.0	6.9	702	13.7	8.5	24.3	274	11.0	190.00
8/6/2003		25.0	370.0	6.6	560	10.0	8.3	23.8	216	15.0	145.00
8/26/2003		23.0	440.0	5.4	680	8.1	7.8	24.2	250	16.0	154.00
9/23/2003		14.0	450.0	4.7	769	8.8	8.1	17.7	267	9.0	174.00
10/29/2003		8.0	470.0	5.0	800	10.2	7.9	8.3	279	5.0	217.00
11/5/2003		69.0	350.0	7.2	533	9.1	7.6	10.1	207	52.0	157.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		34.5	415.8	7.6	643	10.3	8.0	13.8	253	19.6	170.50
Median+:		26.5	420.0	7.1	618	10.1	7.9	13.7	258	15.5	164.00
340025	Grand River (Upper)										
4/16/2003	H	31.0	470.0	I 12.0	715	9.2	8.0	14.0	309	19.0	169.00
6/17/2003		21.0	480.0	8.8	739	8.7	8.0	21.4	316	14.0	225.00
8/7/2003		33.0	420.0	8.7	695	11.7	8.7	24.4	223	17.0	135.00
9/9/2003		12.0	430.0	6.3	690	6.5	8.1	21.1	232	8.2	155.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		24.3	450.0	9.0	710	9.0	8.2	20.2	270	14.6	171.00
Median+:		26.0	450.0	8.8	705	9.0	8.1	21.3	271	15.5	162.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
580364 Huron River										
4/1/2003	0.129	1.480	0.024	1.020	0.041	0.008	67.0	4.8	174.0	103.0
6/3/2003	0.052	0.700	0.013	0.700	0.030	0.006	D 121.0	3.5	D 103.0	53.9
8/20/2003	0.042	0.026	0.007	0.820	0.069	0.015	D 115.0	3.8	D 109.0	56.8
9/17/2003	0.052	0.046	0.007	0.690	0.047	0.021	D 104.0	4.1	D 119.0	59.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.069	0.563	0.013	0.808	0.047	0.013	101.8	4.1	126.3	68.2
Median+:	0.052	0.373	0.010	0.760	0.044	0.012	109.5	4.0	114.0	57.9
030077 Kalamazoo River (Lower)										
3/19/2003	D 0.160	2.300	0.032	0.950	0.118	0.047	31.0	3.6	49.0	27.0
3/25/2003	D 0.100	2.200	0.028	0.860	0.071	0.029	43.0	3.3	38.0	19.7
4/9/2003	D 0.050	2.400	0.029	0.880	0.071	0.027	42.0	3.2	31.0	16.1
5/5/2003	0.014	1.660	0.027	1.160	0.135	0.005	38.0	3.3	40.0	21.7
5/13/2003	0.026	1.260	0.024	0.990	0.130	0.017	39.0	3.1	35.0	19.3
6/10/2003	0.028	0.970	0.019	1.000	0.084	0.008	39.0	2.5	44.0	24.5
7/17/2003	0.014	0.520	0.023	1.130	0.111	0.005	34.0	2.8	54.0	28.9
8/6/2003	0.125	0.470	0.032	1.230	0.125	0.007	28.0	3.3	60.0	33.0
8/25/2003	0.045	0.470	H 0.041	1.130	0.127	H 0.011	29.0	3.1	57.0	33.0
9/23/2003	0.056	0.840	0.021	0.750	0.068	T 0.009	35.0	3.3	60.0	35.7
10/30/2003	0.057	1.130	0.015	0.550	0.049	0.013	38.0	3.0	50.0	29.8
11/5/2003	D 0.100	2.860	0.044	0.930	0.130	0.050	43.0	4.4	48.0	27.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.065	1.423	0.028	0.963	0.102	0.019	36.6	3.2	47.2	26.3
Median+:	0.053	1.195	0.028	0.970	0.115	0.012	38.0	3.3	48.5	27.0

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
580364 Huron River										
4/1/2003	7.0	680.0	5.5	1040	12.5	8.0	5.8	302	4.1	183.00
6/3/2003	10.0	590.0	7.4	880	8.0	8.0	17.4	346	5.7	178.00
8/20/2003	14.0	570.0	6.9	870	5.6	7.7	23.5	320	12.0	147.00
9/17/2003	9.0	550.0	6.1	970	6.3	7.7	22.0	280	8.7	140.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	10.0	597.5	6.5	940	8.1	7.9	17.2	312	7.6	162.00
Median+:	9.5	580.0	6.5	925	7.2	7.9	19.7	311	7.2	162.50
030077 Kalamazoo River (Lower)										
3/19/2003	19.0	380.0	6.2	546	10.9	7.8	3.8	235	13.0	166.00
3/25/2003	15.0	360.0	7.0	526	10.4	7.8	7.8	235	J 7.0	159.00
4/9/2003	12.0	330.0	7.3	480	11.8	7.7	3.0	214	15.0	154.00
5/5/2003	34.0	370.0	7.7	542	9.5	7.8	14.2	253	17.0	177.00
5/13/2003	26.0	350.0	10.0	528	8.2	7.7	12.3	248	16.0	179.00
6/10/2003	31.0	400.0	7.5	622	9.1	7.8	17.0	255	15.0	208.00
7/17/2003	43.0	380.0	6.7	576	10.1	8.2	23.1	226	21.0	181.00
8/6/2003	38.0	380.0	5.7	579	6.7	7.6	22.8	214	17.0	155.00
8/25/2003	27.0	370.0	5.0	569	7.7	8.0	24.8	216	16.0	157.00
9/23/2003	18.0	400.0	4.6	672	8.2	8.0	17.6	243	8.0	182.00
10/30/2003	7.0	420.0	4.4	633	9.7	7.9	8.3	263	3.8	231.00
11/5/2003	26.0	410.0	6.7	651	8.6	7.7	10.5	261	30.0	201.00
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	24.7	379.2	6.6	577	9.2	7.8	13.8	239	14.9	179.17
Median+:	26.0	380.0	6.7	573	9.3	7.8	13.3	239	15.5	178.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
390057 Kalamazoo River (Upper)										
4/16/2003	0.106	1.410	0.026	1.110	0.125	0.013	52.0	2.2	39.0	17.6
6/16/2003	0.100	0.930	0.053	0.710	0.093	0.024	34.0	2.7	48.0	24.1
8/25/2003	0.051	0.920	H 0.015	0.570	0.155	H 0.087	31.0	2.4	55.0	27.5
9/24/2003	0.031	0.770	0.011	0.520	0.043	0.014	35.0	2.5	53.0	27.3
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.072	1.008	0.026	0.728	0.104	0.035	38.0	2.5	48.8	24.1
Median+:	0.076	0.925	0.021	0.640	0.109	0.019	34.5	2.5	50.5	25.7
510088 Manistee River										
4/29/2003	0.025	0.270	0.005	0.340	0.032	0.006	10.0	0.8	9.0	5.0
7/8/2003	0.011	0.130	0.005	0.220	0.027	0.004	8.0	0.9	12.0	6.4
8/7/2003	0.021	0.139	0.007	0.300	0.026	0.006	4.0	0.7	12.0	6.6
9/9/2003	0.012	0.106	0.005	0.160	0.016	0.003	9.0	0.9	11.0	6.7
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.017	0.161	0.006	0.255	0.025	0.005	7.8	0.8	11.0	6.2
Median+:	0.017	0.135	0.005	0.260	0.027	0.005	8.5	0.9	11.5	6.5
770073 Manistique River										
5/6/2003	0.021	0.059	0.004	0.410	0.018	0.003	12.0	0.5	2.0	1.6
7/14/2003	0.015	0.062	0.003	0.360	0.015	T 0.002	15.0	0.8	2.0	ND
9/17/2003	0.014	0.070	0.005	0.340	0.017	0.004	20.0	0.8	2.0	2.1
10/30/2003	0.029	0.065	0.003	0.390	0.012	0.003	19.0	0.6	3.0	2.4
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.020	0.064	0.004	0.375	0.016	0.003	16.5	0.7	2.3	* 1.7
Median+:	0.018	0.064	0.004	0.375	0.016	0.003	17.0	0.7	2.0	1.9

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
390057 Kalamazoo River (Upper)											
4/16/2003	H	39.0	410.0	I 9.3	617	7.7	8.0	15.7	278	12.0	204.00
6/16/2003		17.0	430.0	5.7	689	7.1	7.7	21.1	286	7.3	247.00
8/25/2003		9.0	430.0	4.5	673	6.8	7.7	22.6	284	4.6	212.00
9/24/2003		4.0	420.0	4.0	661	8.3	7.9	15.2	279	2.8	222.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		17.3	422.5	5.9	660	7.5	7.8	18.7	282	6.7	221.25
Median+:		13.0	425.0	5.1	667	7.4	7.8	18.4	282	6.0	217.00
510088 Manistee River											
4/29/2003		16.0	210.0	3.9	305	10.0	8.0	12.3	162	7.8	122.00
7/8/2003		16.0	220.0	3.4	342	8.3	8.0	22.3	160	8.0	135.00
8/7/2003		11.0	220.0	3.1	342	8.0	8.0	21.9	160	5.9	131.00
9/9/2003	ND		220.0	2.1	334	8.6	8.0	20.3	160	3.6	142.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:	*	11.3	217.5	3.1	331	8.7	8.0	19.2	161	6.3	132.50
Median+:		13.5	220.0	3.3	338	8.5	8.0	21.1	160	6.9	133.00
770073 Manistique River											
5/6/2003		5.0	90.0	9.4	129	9.9	7.5	10.2	65	4.0	40.00
7/14/2003	A	4.0	130.0	6.0	202	8.6	7.4	20.8	95	6.2	71.00
9/17/2003	ND		140.0	6.5	213	9.9	7.5	17.5	94	5.9	69.00
10/30/2003	ND		120.0	8.2	161	12.0	7.4	5.6	89	4.2	65.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:	*	3.3	120.0	7.5	176	10.1	7.5	13.5	86	5.1	61.25
Median+:	#	3.0	125.0	7.4	182	9.9	7.5	13.9	92	5.1	67.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
550038 Menominee River										
5/1/2003	0.022	0.161	0.007	0.470	0.026	0.005	6.0	1.3	4.0	4.2
7/17/2003	0.013	0.011	0.003	0.350	0.024	0.003	18.0	1.5	9.0	11.1
9/9/2003	T 0.004	ND	0.002	0.350	0.027	T 0.001	16.0	1.6	8.0	11.7
10/29/2003	T 0.009	T 0.006	0.002	0.400	0.015	0.003	18.0	1.8	8.0	13.1
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.012	* 0.046	0.004	0.393	0.023	0.003	14.5	1.6	7.3	10.0
Median+:	0.011	# 0.009	0.003	0.375	0.025	0.003	17.0	1.6	8.0	11.4
610273 Muskegon River (Lower)										
3/19/2003	0.049	0.680	0.012	0.350	0.041	0.006	17.0	1.2	24.0	13.2
3/25/2003	0.092	0.670	0.014	0.430	0.030	0.007	18.0	1.6	21.0	11.8
4/23/2003	0.034	0.540	H 0.021	0.350	0.020	H 0.003	16.0	1.4	22.0	10.9
5/6/2003	0.021	0.540	0.009	0.340	0.026	0.004	18.0	1.4	20.0	10.8
5/13/2003	0.034	0.560	0.011	0.450	0.035	0.005	17.0	1.5	19.0	10.0
6/11/2003	0.027	0.530	0.006	0.340	0.012	T 0.001	14.0	1.4	22.0	12.0
7/17/2003	0.015	0.300	0.010	0.400	0.021	T 0.002	18.0	1.2	22.0	11.6
8/6/2003	0.013	0.240	0.010	0.400	0.029	0.005	13.0	1.3	22.0	11.7
8/26/2003	0.019	0.162	0.009	0.440	0.024	0.004	14.0	1.6	19.0	12.9
9/23/2003	0.015	0.115	T 0.004	0.340	0.021	T 0.007	17.0	1.4	22.0	12.4
10/29/2003	0.021	0.270	0.006	0.310	0.020	0.008	17.0	1.2	22.0	13.3
11/5/2003	0.068	0.340	0.013	0.620	0.079	0.017	15.0	1.4	21.0	11.3
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.034	0.412	0.010	0.398	0.030	0.006	16.2	1.4	21.3	11.8
Median+:	0.024	0.435	0.010	0.375	0.025	0.005	17.0	1.4	22.0	11.8

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
550038	Menominee River										
5/1/2003		ND	120.0	10.0	178	11.2	7.7	11.0	81	2.3	60.00
7/17/2003		4.0	190.0	6.9	164	7.6	7.7	23.1	116	2.3	102.00
9/9/2003		4.0	190.0	7.0	293	8.2	8.0	22.3	121	2.6	109.00
10/29/2003		4.0	200.0	6.6	308	10.9	7.9	7.5	134	ND	124.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 3.5	175.0	7.6	236	9.5	7.8	16.0	113	* 1.9	98.75
Median+:		4.0	190.0	7.0	236	9.6	7.8	16.7	119	2.3	105.50
610273	Muskegon River (Lower)										
3/19/2003		48.0	290.0	3.8	414	12.5	7.8	2.0	203	6.2	154.00
3/25/2003		16.0	270.0	5.5	391	11.8	7.9	5.2	188	6.4	144.00
4/23/2003		11.0	260.0	3.5	377	11.6	8.0	6.7	180	2.8	153.00
5/6/2003		13.0	250.0	4.7	372	10.3	7.8	11.0	175	3.1	137.00
5/13/2003		A 28.0	240.0	5.9	362	10.0	8.0	11.3	177	5.0	132.00
6/11/2003		6.0	260.0	5.4	407	9.0	7.5	15.1	179	2.4	145.00
7/17/2003		6.0	250.0	5.3	377	8.3	8.1	22.0	174	3.4	146.00
8/6/2003		11.0	250.0	5.6	372	7.9	8.1	22.7	170	4.5	131.00
8/26/2003		ND	250.0	5.4	371	7.7	7.8	21.4	168	2.1	134.00
9/23/2003		A 4.0	250.0	4.9	404	8.4	8.0	16.6	179	2.5	137.00
10/29/2003		4.0	270.0	3.9	425	10.2	7.8	9.0	186	ND	159.00
11/5/2003		61.0	260.0	4.7	386	9.8	7.8	10.4	175	14.0	145.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		* 17.5	258.3	4.9	388	9.8	7.9	12.8	180	* 4.4	143.08
Median+:		11.0	255.0	5.1	382	9.9	7.9	11.2	178	3.3	144.50

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
670008 Muskegon River (Upper)										
4/29/2003	0.018	0.158	0.005	0.630	0.041	0.005	13.0	1.5	17.0	9.7
6/24/2003	0.012	0.123	0.005	0.450	0.034	0.003	9.0	1.1	19.0	9.6
8/7/2003	0.010	0.155	0.005	0.530	0.037	0.012	4.0	1.3	16.0	9.6
9/9/2003	T 0.007	0.097	0.004	0.240	0.020	0.004	11.0	1.0	17.0	10.4
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.012	0.133	0.005	0.463	0.033	0.006	9.3	1.2	17.3	9.8
Median+:	0.011	0.139	0.005	0.490	0.036	0.005	10.0	1.2	17.0	9.7
660038 Ontonagon River										
5/7/2003	T 0.006	0.025	0.019	0.370	0.053	0.041	3.0	1.0	3.0	1.8
7/16/2003	T 0.005	0.006	0.004	0.280	0.033	0.004	2.0	1.3	3.0	2.4
9/8/2003	T 0.003	ND	0.004	0.250	0.015	0.004	2.0	1.1	3.0	3.3
10/28/2003	T 0.007	ND	0.004	0.240	0.015	0.008	2.0	1.0	3.0	3.6
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.005	* 0.010	0.008	0.285	0.029	0.014	2.3	1.1	3.0	2.8
Median+:	# 0.006	# 0.006	0.004	0.265	0.024	0.006	2.0	1.1	3.0	2.9
530027 Pere Marquette River										
4/29/2003	0.020	0.079	0.004	0.400	0.040	0.011	16.0	0.8	13.0	7.1
6/25/2003	0.024	0.064	0.004	0.450	0.046	0.011	18.0	0.7	15.0	9.0
7/9/2003	0.021	0.110	0.005	0.360	0.052	0.011	13.0	0.8	12.0	6.4
9/9/2003	0.016	0.064	0.004	0.250	0.030	0.009	17.0	0.8	16.0	10.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.020	0.079	0.004	0.365	0.042	0.011	16.0	0.8	14.0	8.1
Median+:	0.021	0.072	0.004	0.380	0.043	0.011	16.5	0.8	14.0	8.1

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
670008 Muskegon River (Upper)										
4/29/2003	16.0	210.0	8.6	299	9.2	7.6	12.1	153	7.3	111.00
6/24/2003	11.0	250.0	5.7	390	8.2	7.7	20.3	181	6.6	152.00
8/7/2003	16.0	240.0	6.2	378	7.9	8.1	20.3	166	6.7	142.00
9/9/2003	5.0	250.0	3.9	383	9.0	8.1	17.6	178	3.4	161.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	12.0	237.5	6.1	363	8.6	7.9	17.6	170	6.0	141.50
Median+:	13.5	245.0	6.0	381	8.6	7.9	19.0	172	6.7	147.00
660038 Ontonagon River										
5/7/2003	25.0	80.0	7.5	119	9.7	7.1	11.5	58	41.0	48.00
7/16/2003	11.0	100.0	5.9	164	7.6	7.7	23.1	73	26.0	70.00
9/8/2003	4.0	120.0	5.2	179	8.6	7.9	21.0	82	7.5	76.00
10/28/2003	5.0	110.0	5.2	155	11.5	8.0	5.5	75	8.5	67.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	11.3	102.5	6.0	154	9.4	7.7	15.3	72	20.8	65.25
Median+:	8.0	105.0	5.6	160	9.2	7.8	16.3	74	17.3	68.50
530027 Pere Marquette River										
4/29/2003	17.0	230.0	4.5	342	9.3	7.9	12.6	180	5.9	135.00
6/25/2003	20.0	240.0	3.8	360	7.5	7.6	20.4	182	12.0	144.00
7/9/2003	22.0	230.0	3.4	359	8.2	7.5	18.4	164	11.0	136.00
9/9/2003	12.0	250.0	2.2	377	9.1	7.9	17.2	176	6.2	148.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	17.8	237.5	3.5	360	8.5	7.7	17.2	176	8.8	140.75
Median+:	18.5	235.0	3.6	360	8.7	7.8	17.8	178	8.6	140.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
490006 Pine River										
4/16/2003	0.082	0.078	0.019	0.910	0.390	0.041	4.0	2.2	2.0	1.5
6/26/2003	0.020	T 0.003	H 0.006	0.330	0.036	H 0.009	4.0	0.7	2.0	ND
8/18/2003	0.019	ND	0.014	0.360	0.049	0.024	5.0	1.1	2.0	1.9
10/14/2003	0.010	ND	0.006	0.390	0.052	0.007	8.0	1.0	4.0	2.7
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.033	* 0.023	0.011	0.498	0.132	0.020	5.3	1.3	2.5	* 1.7
Median+:	0.020	# 0.005	0.010	0.375	0.051	0.017	4.5	1.1	2.0	1.7
580046 River Raisin										
4/1/2003	D 0.060	7.300	0.042	0.930	0.088	0.032	62.0	3.6	48.0	18.4
4/8/2003	D 0.100	10.000	0.066	1.270	0.186	0.094	47.0	4.2	40.0	14.1
5/7/2003	D 0.100	10.900	0.072	1.210	0.149	0.050	49.0	3.4	47.0	15.9
5/12/2003	D 0.090	10.900	0.086	1.430	0.300	0.063	41.0	4.0	35.0	10.7
6/2/2003	D ND	3.680	0.021	0.950	0.058	0.005	66.0	3.5	54.0	23.2
7/1/2003	0.011	1.330	0.023	1.050	0.069	0.017	66.0	4.2	61.0	27.1
7/31/2003	D ND	2.950	0.048	0.860	0.090	0.016	37.0	3.6	38.0	18.5
8/19/2003	T 0.009	1.380	0.044	0.970	0.078	0.014	45.0	4.2	52.0	24.3
9/3/2003	0.074	0.260	0.013	0.660	0.066	0.013	48.0	4.1	59.0	29.7
9/17/2003	0.104	0.300	0.022	0.750	0.067	0.023	60.0	4.3	51.0	25.0
11/12/2003	0.076	0.880	0.013	0.400	0.033	0.017	30.0	2.4	24.0	13.9
11/25/2003	D 0.050	6.860	H 0.039	0.940	0.117	H 0.047	51.0	D 5.8	48.0	16.8
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	* 0.057	4.728	0.041	0.952	0.108	0.033	50.2	3.9	46.4	19.8
Median+:	0.067	3.315	0.041	0.945	0.083	0.020	48.5	4.1	48.0	18.5

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
490006 Pine River										
4/16/2003	460.0	80.0	I 15.0	106	12.3	7.9	2.0	60	D 350.0	49.00
6/26/2003	11.0	140.0	7.6	229	8.0	8.0	24.5	117	18.0	100.00
8/18/2003	16.0	150.0	7.3	228	7.9	8.2	21.7	115	29.0	102.00
10/14/2003	19.0	130.0	9.9	178	10.0	7.7	10.5	96	24.0	85.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	126.5	125.0	10.0	185	9.6	8.0	14.7	97	105.3	84.00
Median+:	17.5	135.0	8.8	203	9.0	8.0	16.1	106	26.5	92.50
580046 River Raisin										
4/1/2003	17.0	420.0	6.4	637	11.4	7.8	6.7	296	17.0	164.00
4/8/2003	61.0	370.0	I 8.9	544	12.7	7.8	2.9	242	91.0	130.00
5/7/2003	54.0	440.0	6.7	651	9.3	7.7	14.3	307	44.0	166.00
5/12/2003	110.0	370.0	I 9.7	542	9.9	7.2	13.1	249	110.0	139.00
6/2/2003	15.0	470.0	6.6	732	9.3	8.1	16.6	331	11.0	216.00
7/1/2003	18.0	420.0	7.5	652	11.8	7.8	24.8	265	11.0	157.00
7/31/2003	9.0	310.0	5.3	430	9.8	8.4	25.6	193	6.2	122.00
8/19/2003	10.0	390.0	6.0	610	11.1	8.4	26.6	245	8.2	160.00
9/3/2003	9.0	390.0	5.1	604	7.8	7.7	21.0	237	11.0	149.00
9/17/2003	17.0	360.0	4.5	557	7.3	7.8	22.8	209	22.0	141.00
11/12/2003	5.0	250.0	3.1	393	10.4	8.0	10.9	156	4.2	118.00
11/25/2003	15.0	460.0	8.2	694	12.3	7.6	5.5	316	29.0	205.00
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	28.3	387.5	6.5	587	10.3	7.9	15.9	254	30.4	155.58
Median+:	16.0	390.0	6.5	607	10.2	7.8	15.5	247	14.0	153.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
380393 River Raisin (Headwaters)										
4/14/2003	0.014	0.310	0.005	0.600	0.024	T 0.001	30.0	1.9	27.0	12.5
6/3/2003	0.038	0.141	0.008	0.630	0.025	T 0.002	22.0	1.5	27.0	11.0
8/19/2003	0.037	0.107	0.009	0.490	0.026	0.005	18.0	1.4	29.0	13.9
11/12/2003	0.020	0.240	0.004	0.500	0.016	0.003	26.0	2.0	29.0	13.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.027	0.200	0.007	0.555	0.023	0.003	24.0	1.7	28.0	12.6
Median+:	0.029	0.191	0.007	0.550	0.025	# 0.003	24.0	1.7	28.0	12.8
820070 River Rouge										
4/14/2003	0.078	0.850	0.018	0.510	0.061	0.020	27.0	3.9	D 112.0	60.0
6/3/2003	0.200	0.770	0.032	0.930	0.070	0.020	31.0	D 9.6	D 137.0	71.8
8/20/2003	0.117	0.390	0.028	0.500	0.047	0.023	16.0	D 5.0	41.0	19.4
9/18/2003	0.110	0.830	0.033	0.520	0.062	0.025	26.0	D 7.2	90.0	44.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.126	0.710	0.028	0.615	0.060	0.022	25.0	6.4	95.0	49.0
Median+:	0.114	0.800	0.030	0.515	0.062	0.022	26.5	6.1	101.0	52.4

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
380393	River Raisin (Headwaters)										
4/14/2003		7.0	310.0	7.2	451	9.8	8.0	10.8	226	2.1	159.00
6/3/2003		5.0	320.0	7.6	479	8.9	7.8	17.1	228	2.6	172.00
8/19/2003		ND	330.0	5.4	502	7.7	7.5	20.1	232	ND	186.00
11/12/2003		ND	330.0	6.1	508	10.4	7.8	6.6	235	ND	194.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 4.0	322.5	6.6	485	9.2	7.8	13.7	230	* 1.4	177.75
Median+:		# 3.5	325.0	6.7	491	9.4	7.8	14.0	230	1.3	179.00
820070	River Rouge										
4/14/2003		21.0	410.0	4.4	601	10.8	7.9	7.5	163	16.0	92.00
6/3/2003		9.0	490.0	5.6	726	6.6	7.6	16.4	191	9.2	112.00
8/20/2003		8.0	230.0	3.1	347	6.0	7.9	28.0	115	8.8	75.00
9/18/2003		8.0	360.0	3.6	565	5.8	7.5	24.2	147	8.8	96.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		11.5	372.5	4.2	560	7.3	7.7	19.0	154	10.7	93.75
Median+:		8.5	385.0	4.0	583	6.3	7.8	20.3	155	9.0	94.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
090177 Saginaw River										
3/24/2003	0.500	1.440	0.037	1.460	0.110	0.023	40.0	5.0	58.0	31.7
4/8/2003	D 0.220	4.000	0.042	1.070	0.093	0.028	50.0	4.4	117.0	61.5
5/8/2003	D 0.120	3.850	0.046	1.020	0.083	0.034	45.0	3.6	68.0	31.5
5/27/2003	0.090	1.730	0.029	1.010	0.103	0.018	48.0	3.2	70.0	32.8
7/2/2003	0.340	1.030	0.079	1.270	0.116	0.043	38.0	4.2	D 111.0	55.6
7/29/2003	0.390	1.640	0.081	1.340	0.109	0.043	35.0	4.4	103.0	53.7
8/12/2003	0.390	1.010	0.088	1.320	0.122	0.048	39.0	4.6	D 135.0	72.3
9/3/2003	0.350	1.000	0.109	1.260	0.107	0.049	42.0	4.9	D 176.0	91.0
9/16/2003	0.480	1.210	0.113	1.480	0.123	0.049	41.0	D 5.0	D 149.0	79.5
9/29/2003	0.490	1.750	0.091	1.670	0.155	0.070	42.0	D 5.9	D 175.0	93.1
10/15/2003	0.185	1.540	0.033	1.050	0.086	0.025	40.0	4.3	D 120.0	66.9
11/19/2003	0.135	1.790	0.031	0.890	0.073	0.022	50.0	4.0	74.0	32.4
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.308	1.833	0.065	1.237	0.107	0.038	42.5	4.5	113.0	58.5
Median+:	0.345	1.590	0.063	1.265	0.108	0.039	41.5	4.4	114.0	58.6
730023 Shiawassee River										
3/24/2003	0.250	1.760	0.048	1.190	0.119	0.022	48.0	4.5	49.0	25.3
5/28/2003	0.048	0.690	0.011	0.840	0.064	0.020	50.0	4.5	79.0	38.4
7/29/2003	0.048	0.500	0.011	0.590	0.065	0.028	41.0	4.8	D 96.0	54.4
10/15/2003	0.011	0.320	0.004	0.670	0.037	T 0.002	41.0	D 5.8	D 117.0	66.3
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.089	0.818	0.019	0.823	0.071	0.018	45.0	4.9	85.3	46.1
Median+:	0.048	0.595	0.011	0.755	0.065	0.021	44.5	4.7	87.5	46.4

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
090177 Saginaw River										
3/24/2003	12.0	380.0	8.0	554	10.7	7.5	2.0	214	17.0	140.00
4/8/2003	17.0	520.0	7.8	771	12.4	8.0	1.6	252	23.0	153.00
5/8/2003	29.0	430.0	8.1	634	8.5	7.5	13.3	273	24.0	169.00
5/27/2003	37.0	440.0	9.0	687	9.0	7.6	16.1	273	28.0	180.00
7/2/2003	24.0	510.0	9.1	800	4.7	7.5	24.8	268	24.0	178.00
7/29/2003	19.0	480.0	7.8	732	5.9	7.9	24.5	242	18.0	159.00
8/12/2003	30.0	530.0	7.7	825	5.2	7.8	24.3	228	29.0	154.00
9/3/2003	11.0	610.0	7.9	947	5.5	7.7	23.6	254	16.0	146.00
9/16/2003	18.0	560.0	7.6	853	5.2	7.6	21.5	227	21.0	148.00
9/29/2003	26.0	600.0	7.5	924	6.3	7.6	16.1	233	H 26.0	144.00
10/15/2003	17.0	500.0	6.8	768	7.7	7.7	13.3	222	15.0	153.00
11/19/2003	13.0	450.0	6.6	710	10.4	7.8	6.4	249	12.0	176.00
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	21.1	500.8	7.8	767	7.6	7.7	15.6	245	21.1	158.33
Median+:	18.5	505.0	7.8	770	7.0	7.7	16.1	246	22.0	153.50
730023 Shiawassee River										
3/24/2003	33.0	400.0	8.2	576	11.5	8.0	4.9	237	18.0	163.00
5/28/2003	17.0	480.0	8.1	707	8.3	8.0	18.8	315	8.9	223.00
7/29/2003	11.0	500.0	5.5	765	7.5	8.2	21.9	275	7.4	183.00
10/15/2003	4.0	530.0	7.0	816	8.3	7.8	11.0	255	2.4	204.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	16.3	477.5	7.2	716	8.9	8.0	14.2	271	9.2	193.25
Median+:	14.0	490.0	7.6	736	8.3	8.0	14.9	265	8.2	193.50

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
440173 South Branch Flint River										
4/15/2003	0.013	0.078	0.004	0.480	0.027	0.004	46.0	1.9	29.0	10.3
6/4/2003	0.016	0.044	0.002	0.520	0.024	0.004	26.0	D 6.7	32.0	12.0
8/13/2003	0.020	0.124	0.003	0.570	0.029	T 0.001	21.0	1.6	35.0	12.6
10/9/2003	0.011	0.021	T 0.001	0.330	0.013	T 0.004	32.0	1.7	35.0	14.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.015	0.067	0.003	0.475	0.023	0.003	31.3	3.0	32.8	12.4
Median+:	0.015	0.061	0.003	0.500	0.026	0.004	29.0	1.8	33.5	12.3
110628 St. Joseph River (Lower)										
3/26/2003	0.017	1.860	0.026	0.750	0.079	0.007	50.0	2.5	31.0	15.2
5/22/2003	D ND	2.180	0.021	0.790	0.075	0.020	45.0	2.5	28.0	12.7
7/17/2003	T 0.009	1.580	0.025	0.740	0.064	0.004	44.0	2.4	33.0	17.1
9/23/2003	0.020	1.160	T 0.009	0.660	0.083	0.014	41.0	2.8	37.0	19.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.013	1.695	0.020	0.735	0.075	0.011	45.0	2.6	32.3	16.0
Median+:	0.013	1.720	0.023	0.745	0.077	0.011	44.5	2.5	32.0	16.2
750273 St. Joseph River (Upper)										
3/26/2003	0.049	1.730	0.026	0.630	0.038	0.004	44.0	2.2	24.0	10.3
5/21/2003	0.045	1.310	0.017	0.700	0.036	0.004	40.0	1.8	23.0	9.5
8/25/2003	0.080	0.890	H 0.027	0.790	0.062	H 0.015	30.0	1.8	24.0	10.7
9/24/2003	0.069	1.210	0.017	0.610	0.042	T 0.007	34.0	1.8	25.0	11.1
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.061	1.285	0.022	0.683	0.045	0.008	37.0	1.9	24.0	10.4
Median+:	0.059	1.260	0.022	0.665	0.040	0.006	37.0	1.8	24.0	10.5

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
440173	South Branch Flint River										
4/15/2003		6.0	380.0	7.0	560	9.5	8.0	11.3	283	2.3	208.00
6/4/2003		9.0	400.0	8.9	591	9.1	8.1	13.8	304	2.7	255.00
8/13/2003		4.0	400.0	6.8	609	8.0	7.8	19.9	298	2.2	247.00
10/9/2003	ND		420.0	5.1	636	9.3	8.0	11.8	319	1.3	271.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:	*	5.3	400.0	7.0	599	9.0	8.0	14.2	301	2.1	245.25
Median+:		5.0	400.0	6.9	600	9.2	8.0	12.8	301	2.3	251.00
110628	St. Joseph River (Lower)										
3/26/2003		26.0	380.0	5.1	555	10.0	7.9	9.6	277	8.1	193.00
5/22/2003		21.0	370.0	7.7	536	8.9	7.6	16.2	270	13.0	193.00
7/17/2003		16.0	370.0	4.7	568	11.0	8.3	25.7	268	9.0	203.00
9/23/2003		19.0	380.0	5.1	631	9.0	8.1	19.2	269	9.5	201.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		20.5	375.0	5.7	573	9.7	8.0	17.7	271	9.9	197.50
Median+:		20.0	375.0	5.1	562	9.5	8.0	17.7	270	9.3	197.00
750273	St. Joseph River (Upper)										
3/26/2003		12.0	330.0	5.3	490	10.1	7.9	10.4	244	3.6	170.00
5/21/2003		9.0	340.0	7.2	504	7.9	7.5	17.2	251	5.5	184.00
8/25/2003		7.0	310.0	5.5	476	7.1	7.9	25.7	222	5.3	160.00
9/24/2003	A	4.0	320.0	4.2	494	7.5	7.6	17.5	241	4.5	177.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		8.0	325.0	5.6	491	8.2	7.7	17.7	240	4.7	172.75
Median+:		8.0	325.0	5.4	492	7.7	7.8	17.4	243	4.9	173.50

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
210032 Sturgeon River										
5/6/2003	0.061	0.110	0.006	0.580	0.029	0.003	24.0	0.7	2.0	ND
7/14/2003	0.016	0.071	0.004	0.340	0.017	T 0.002	34.0	0.9	2.0	1.7
9/4/2003	0.013	0.012	0.003	0.350	0.013	0.005	17.0	1.0	2.0	3.4
10/30/2003	0.020	0.102	0.005	0.530	0.013	0.003	28.0	1.1	2.0	2.1
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.028	0.074	0.005	0.450	0.018	0.003	25.8	0.9	2.0	* 1.9
Median+:	0.018	0.087	0.005	0.440	0.015	0.003	26.0	1.0	2.0	1.9
170141 Tahquamenon River										
4/16/2003	0.018	0.082	0.006	0.510	0.034	0.004	6.0	0.7	2.0	ND
7/8/2003	T 0.008	0.091	0.004	0.440	0.022	0.004	6.0	1.0	2.0	1.9
8/20/2003	0.015	0.063	0.004	0.470	0.013	T 0.002	6.0	0.8	3.0	ND
10/6/2003	0.015	0.094	T 0.004	0.390	0.017	T 0.003	13.0	0.7	4.0	2.3
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.014	0.083	0.005	0.453	0.022	0.003	7.8	0.8	2.8	* 1.3
Median+:	0.015	0.087	0.004	0.455	0.020	0.004	6.0	0.8	2.5	1.2
040123 Thunder Bay River										
4/17/2003	0.021	0.290	0.007	0.520	0.022	0.003	14.0	1.5	9.0	5.6
6/23/2003	0.028	0.046	ND	0.670	0.022	ND	6.0	0.9	8.0	5.9
8/19/2003	0.017	0.008	0.002	0.400	0.020	0.005	5.0	0.6	7.0	7.1
10/7/2003	0.011	T 0.008	T 0.001	0.280	0.011	T 0.002	7.0	0.9	7.0	6.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.019	0.088	* 0.003	0.468	0.019	* 0.003	8.0	1.0	7.8	6.2
Median+:	0.019	0.027	# 0.002	0.460	0.021	# 0.003	6.5	0.9	7.5	6.1

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)		Turbidity (NTU)	Alkalinity (mg CaCO3/L)
210032	Sturgeon River											
5/6/2003		9.0	100.0	12.0	151	10.0	7.6	8.5	77		5.6	38.00
7/14/2003	ND		170.0	8.9	264	8.6	7.4	22.2	128		4.2	80.00
9/4/2003	ND		160.0	9.0	241	9.1	7.7	17.6	123		3.1	91.00
10/30/2003		5.0	120.0	14.0	165	12.1	7.3	5.9	93		3.7	60.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:	*	4.5	137.5	11.0	205	10.0	7.5	13.6	105		4.2	67.25
Median+:	#	3.5	140.0	10.5	203	9.6	7.5	13.1	108		4.0	70.00
170141	Tahquamenon River											
4/16/2003		29.0	40.0	I 18.0	57	13.2	7.4	2.0	31		13.0	24.00
7/8/2003	ND		110.0	8.4	170	8.3	7.6	22.5	77		2.9	66.00
8/20/2003	ND		120.0	10.0	180	7.4	7.6	23.4	85		2.3	69.00
10/6/2003		6.0	110.0	11.0	172	10.9	8.0	8.0	79		2.9	58.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:	*	9.8	95.0	11.9	145	10.0	7.7	14.0	68		5.3	54.25
Median+:		4.0	110.0	10.5	171	9.6	7.6	15.3	78		2.9	62.00
040123	Thunder Bay River											
4/17/2003	ND		210.0	9.9	315	11.5	7.6	5.0	152		4.1	123.00
6/23/2003	ND		230.0	14.0	370	8.0	7.9	23.5	182		1.7	163.00
8/19/2003	ND		210.0	7.1	325	6.8	7.7	23.8	158	ND		143.00
10/7/2003	ND		230.0	7.5	344	11.5	8.3	10.0	171	ND		151.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:	*	2.0	220.0	9.6	339	9.5	7.9	15.6	166	*	1.7	145.00
Median+:	#	2.0	220.0	8.7	335	9.8	7.8	16.8	165		1.1	147.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Ammonia (mg N/L)	Nitrate (mg N/L)	Nitrite (mg N/L)	Kjeldahl Nitrogen (mg N/L)	Phosphorus (mg P/L)	Ortho Phosphate (mg P/L)	Sulfate (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sodium (mg/L)
730025 Tittabawassee River										
4/15/2003	0.050	3.170	0.026	0.830	0.056	0.008	45.0	3.4	85.0	38.9
5/28/2003	0.032	0.990	0.015	0.750	0.061	0.010	36.0	2.2	36.0	18.1
7/29/2003	0.062	0.880	0.039	0.750	0.056	0.019	32.0	3.8	D 169.0	89.2
9/4/2003	0.045	0.290	0.017	0.710	0.049	0.017	39.0	2.6	D 150.0	77.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.047	1.333	0.024	0.760	0.056	0.014	38.0	3.0	110.0	56.0
Median+:	0.048	0.935	0.022	0.750	0.056	0.014	37.5	3.0	117.5	58.4

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductance (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
730025 Tittabawassee River										
4/15/2003	22.0	460.0	6.7	624	10.6	8.1	11.3	272	H 10.1	157.00
5/28/2003	28.0	330.0	9.0	492	8.4	7.5	16.5	228	14.0	158.00
7/29/2003	9.0	600.0	7.0	932	8.6	8.2	23.5	252	5.9	146.00
9/4/2003	6.0	530.0	7.1	820	7.7	8.1	21.1	228	7.2	146.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	16.3	480.0	7.5	717	8.8	8.0	18.1	245	9.3	151.75
Median+:	15.5	495.0	7.1	722	8.5	8.1	18.8	240	8.7	151.50

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes censored value(s), which for calculation purposes was assigned a value equal to 1/2 the quantification level.
# = Median was obtained using reported value(s) below quantification and/or censored value(s) assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
D = Analyte value quantified from a dilution(s); quantification level raised.
H = Recommended laboratory holding time was exceeded.
I = Dilution required due to matrix interference; quantification level raised.
J = Analyte was positively identified. Value is an estimate.
ND = Observed result was below the quantification level.
P = Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
T = Reported value is less than the quantification level.
W = Reported value is less than the method detection level.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)		Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)		Zinc (ug/L)
350061	Au Sable River									
	3/18/2003	0.340	0.001	0.037	CCB	0.198	0.843	0.080		0.270
	4/22/2003	0.700	0.000	0.000		0.277	0.716	0.052		0.460
	5/14/2003	0.340	0.000	0.000		0.211	0.656	0.055		0.300
	6/24/2003	0.820	0.000	0.000	ICB, MBQC, LCQC	0.294	0.527	0.034		0.100
	7/24/2003	0.530	0.000	0.000		0.156	0.658	0.035		0.150
	8/19/2003	0.180	0.000	0.000		0.142	0.449	0.023		0.080
	8/27/2003	0.410	0.000	0.014		0.271	0.550	0.026		0.130
	9/10/2003	0.690	0.000	0.000		0.208	0.504	0.028		0.110
	9/29/2003	0.360	0.000	0.000	CCB	0.429	0.435	0.046		0.190
	10/7/2003	0.170	0.000	0.000	CCB	0.194	0.597	0.060		0.130
	10/22/2003	0.100	0.000	0.000	CCB	0.177	0.500	0.044		0.380
	11/19/2003	0.420	0.003	0.000		0.183	0.729	0.052	MBQC	0.188
	No. of Samples:	12	12	12		12	12	12		12
	Mean+:	0.422	0.000	0.004		0.228	0.597	0.044		0.207
	Median+:	0.385	0.000	0.000		0.203	0.574	0.045		0.169
740385	Black River									
	4/14/2003	4.020	0.036	1.040		3.190	2.910	0.854		6.250
	6/4/2003	2.550	0.022	1.170	ICB, MBQC, LCQC	2.560	2.830	1.040		5.320
	8/13/2003	0.980	0.004	0.418		1.400	1.310	0.469		2.460
	10/8/2003	0.730	0.003	0.377	CCB	1.310	1.360	0.452		2.460
	No. of Samples:	4	4	4		4	4	4		4
	Mean+:	2.070	0.016	0.751		2.115	2.103	0.704		4.123
	Median+:	1.765	0.013	0.729		1.980	2.095	0.662		3.890

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
280014	Boardman River							
	3/18/2003	2.970	0.004	0.167	CCB 0.495	1.000	0.342	1.670
	4/22/2003	1.880	0.000	0.057	0.388	0.805	0.114	0.600
	5/14/2003	1.330	0.000	0.067	0.322	0.815	0.183	0.770
	6/25/2003	0.920	0.000	0.026	ICB, MBQC, LCQC 0.181	0.505	0.072	0.340
	7/9/2003	0.590	0.000	0.090	0.185	0.774	0.071	0.600
	8/6/2003	0.820	0.000	0.040	0.224	0.528	0.056	0.250
	8/26/2003	0.630	0.002	0.050	0.245	0.612	0.042	0.180
	9/9/2003	0.760	0.000	0.028	0.199	0.619	0.030	0.140
	9/30/2003	0.510	0.000	0.000	CCB 0.450	0.701	0.051	0.220
	10/23/2003	0.260	0.000	0.000	CCB 0.040	0.568	0.030	0.170
	11/6/2003	CCB 1.350	0.005	0.011	0.389	0.843	0.092	MBQC 0.478
	11/20/2003	1.080	0.004	0.019	0.310	0.814	0.095	MBQC 0.549
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	1.092	0.001	0.046	0.286	0.715	0.098	0.497
	Median+:	0.870	0.000	0.034	0.278	0.738	0.071	0.409
730024	Cass River							
	4/15/2003	3.510	0.027	1.140	2.540	3.000	0.870	5.090
	5/27/2003	2.780	0.000	0.600	1.520	2.900	0.775	3.540
	7/30/2003	2.290	0.001	1.050	2.260	3.140	0.689	4.020
	9/4/2003	3.290	0.034	1.490	2.250	3.630	1.220	5.430
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.968	0.016	1.070	2.143	3.168	0.889	4.520
	Median+:	3.035	0.014	1.095	2.255	3.070	0.823	4.555

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)		Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
160073	Cheboygan River								
	4/17/2003	1.020	0.004	0.000		0.516	0.661	0.068	0.610
	6/23/2003	0.430	0.000	0.023	ICB, MBQC, LCQC	0.589	0.610	0.041	0.220
	8/18/2003	0.840	0.000	0.000		0.467	0.463	0.042	0.380
	10/8/2003	0.100	0.000	0.000	CCB	0.317	0.661	0.029	0.120
	No. of Samples:	4	4	4		4	4	4	4
	Mean+:	0.598	0.001	0.006		0.472	0.599	0.045	0.333
	Median+:	0.635	0.000	0.000		0.492	0.636	0.042	0.300
500233	Clinton River								
	3/17/2003	21.640	0.160	5.160		10.100	6.440	8.450	46.300
	4/8/2003	5.050	0.059	1.820		4.700	3.070	1.380	9.880
	5/1/2003	33.630	0.414	14.700		19.800	8.150	21.100	22.000
	5/7/2003	4.000	0.045	1.440		4.010	4.060	1.610	9.850
	6/2/2003	4.680	0.060	1.400		3.670	4.050	1.960	13.300
	7/1/2003	2.720	0.041	1.440		4.800	5.050	1.750	12.100
	7/31/2003	3.310	0.036	1.280		5.520	7.660	1.500	15.000
	8/21/2003	3.880	0.014	1.120		2.780	10.900	1.780	12.800
	9/3/2003	2.420	0.049	1.390		3.520	5.680	1.760	11.300
	10/16/2003	9.460	0.058	2.380	CCB	4.870	4.070	2.800	18.300
	11/4/2003	7.080	0.090	2.680		4.950	3.900	4.020	22.900
	11/19/2003	13.090	0.188	5.350		8.040	5.190	8.670	45.900
	No. of Samples:	12	12	12		12	12	12	12
	Mean+:	9.247	0.101	3.347		6.397	5.685	4.732	28.303
	Median+:	4.865	0.059	1.630		4.835	5.120	1.870	14.150

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
280318	East Creek							
	4/30/2003	0.890	0.000	0.038	0.262	0.776	0.063	0.510
	7/9/2003	0.940	0.000	0.077	0.132	0.665	0.078	0.540
	8/26/2003	1.170	0.010	0.130	0.327	0.606	0.070	0.430
	9/30/2003	1.130	0.000	0.032	CCB 0.260	0.607	0.113	0.610
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.033	0.003	0.069	0.245	0.664	0.081	0.523
	Median+:	1.035	0.000	0.058	0.261	0.636	0.074	0.525
210102	Escanaba River							
	5/6/2003	2.820	0.000	ISQC 0.216	0.542	0.554	0.141	LCQC 2.320
	7/15/2003	2.140	0.018	0.658	0.841	0.853	0.178	4.470
	9/8/2003	0.000	0.061	0.887	1.080	0.792	0.127	6.860
	10/28/2003	1.550	0.025	0.508	0.648	0.850	0.163	MBQC 4.010
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.628	0.026	0.567	0.778	0.762	0.152	4.415
	Median+:	1.845	0.022	0.583	0.745	0.821	0.152	4.240

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
730285	Flint River							
	3/17/2003	29.710	0.202	7.580	13.500	8.730	16.900	87.300
	3/24/2003	5.410	0.036	1.190	3.060	3.450	2.400	14.500
	4/8/2003	5.690	0.040	1.440	3.160	2.890	1.950	12.000
	5/8/2003	5.110	0.034	1.650	3.570	3.940	3.460	14.500
	5/28/2003	2.570	0.000	0.732	2.020	3.710	1.540	7.560
	7/2/2003	3.780	0.029	1.370	4.050	5.150	1.810	9.320
	7/30/2003	2.200	0.004	1.000	2.570	4.700	0.960	6.580
	8/12/2003	2.480	0.011	1.040	2.230	4.150	1.130	7.030
	9/4/2003	2.410	0.032	0.927	2.300	4.880	1.000	8.650
	9/16/2003	3.410	0.021	0.878	2.450	6.270	0.938	9.570
	10/22/2003	3.150	0.023	2.550	CCB 2.970	6.040	2.570	13.700
	11/4/2003	13.440	0.066	2.640	4.320	4.040	5.980	26.300
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	6.613	0.042	1.916	3.850	4.829	3.387	18.084
	Median+:	3.595	0.031	1.280	3.015	4.425	1.880	10.785

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
700123	Grand River (Lower)							
	3/19/2003	11.230	0.073	2.180	5.460	4.280	3.660	15.000
	3/25/2003	4.730	0.027	0.629	CCB 2.220	2.430	0.793	4.480
	4/9/2003	5.370	0.040	1.260	3.130	2.790	1.650	7.220
	5/5/2003	5.140	0.037	1.560	3.310	3.440	1.930	7.150
	5/13/2003	4.190	0.028	1.440	3.150	3.220	2.060	8.370
	6/10/2003	2.620	0.015	0.654	ICB, MBQC, LCQC 2.220	3.000	0.797	3.970
	7/17/2003	2.130	0.005	0.573	1.710	3.740	0.704	3.910
	8/6/2003	3.260	0.000	0.745	2.050	3.000	1.000	4.410
	8/26/2003	1.320	0.022	0.532	1.460	3.040	0.962	3.910
	9/23/2003	2.100	0.005	0.613	CCB 1.830	2.980	0.630	3.820
	10/29/2003	CCB 1.230	0.013	0.216	1.280	2.920	0.444	MBQC 3.170
	11/5/2003	13.050	0.067	2.660	4.210	3.340	5.360	24.000
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	4.698	0.028	1.089	2.669	3.182	1.666	7.451
	Median+:	3.725	0.025	0.700	2.220	3.020	0.981	4.445
340025	Grand River (Upper)							
	4/16/2003	5.600	0.046	0.937	3.170	3.370	1.600	6.620
	6/17/2003	2.560	0.019	0.526	ICB, MBQC, LCQC 3.010	3.400	0.782	3.300
	8/7/2003	2.260	0.006	0.279	1.680	3.230	0.605	1.980
	9/9/2003	2.800	0.014	0.271	1.640	3.640	0.426	1.490
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.305	0.021	0.503	2.375	3.410	0.853	3.348
	Median+:	2.680	0.017	0.403	2.345	3.385	0.694	2.640

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)		Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)		Zinc (ug/L)
580364	Huron River									
	4/1/2003	2.180	0.049	0.508		1.840	2.460	1.090		7.550
	6/3/2003	1.170	0.022	0.325	ICB, MBQC, LCQC	1.660	2.880	1.090		3.380
	8/20/2003	2.010	0.011	0.415		1.300	2.950	1.640		4.550
	9/17/2003	1.660	0.013	0.401		1.380	2.800	1.440		3.710
	No. of Samples:	4	4	4		4	4	4		4
	Mean+:	1.755	0.024	0.412		1.545	2.773	1.315		4.798
	Median+:	1.835	0.018	0.408		1.520	2.840	1.265		4.130
030077	Kalamazoo River (Lower)									
	3/19/2003	5.650	0.025	0.509		2.170	2.100	1.010		4.920
	3/25/2003	4.880	0.020	0.317		1.330	1.700	0.849		2.760
	4/9/2003	5.130	0.026	0.585		1.980	1.850	1.030		3.260
	5/5/2003	10.040	0.016	0.824		2.300	2.480	2.360		4.640
	5/13/2003	7.020	0.004	0.666		1.570	2.320	2.000		3.940
	6/10/2003	8.950	0.016	0.608	ICB, MBQC, LCQC	1.400	1.940	1.470		3.030
	7/17/2003	8.570	0.006	0.834		1.550	2.520	1.860		4.580
	8/6/2003	9.190	0.004	0.793		1.590	2.530	1.780		3.620
	8/25/2003	6.080	0.026	0.631		1.210	2.160	1.250		2.930
	9/23/2003	4.320	0.004	0.475	CCB	1.330	2.090	0.983		2.160
	10/30/2003	2.600	0.011	0.050		0.857	1.890	0.732	MBQC	1.880
	11/5/2003	6.650	0.029	0.842		1.890	2.510	1.650	MBQC	4.980
	No. of Samples:	12	12	12		12	12	12		12
	Mean+:	6.590	0.016	0.595		1.598	2.174	1.415		3.558
	Median+:	6.365	0.016	0.620		1.560	2.130	1.360		3.440

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
390057	Kalamazoo River (Upper)							
	4/16/2003	10.720	0.097	2.570	2.830	2.360	3.170	12.100
	6/16/2003	5.000	0.046	1.200	ICB, MBQC, LCQC 1.860	2.030	1.500	6.030
	8/25/2003	2.890	0.033	0.689	1.590	1.700	0.968	4.500
	9/24/2003	1.740	0.010	0.320	CCB 1.340	1.650	0.567	2.700
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	5.088	0.047	1.195	1.905	1.935	1.551	6.333
	Median+:	3.945	0.040	0.945	1.725	1.865	1.234	5.265
510088	Manistee River							
	4/29/2003	1.310	0.000	0.285	0.473	0.908	0.284	1.120
	7/8/2003	1.610	0.000	0.374	0.501	0.990	0.271	1.040
	8/7/2003	0.920	0.000	0.209	0.477	0.694	0.180	0.600
	9/9/2003	1.060	0.003	0.160	0.355	0.674	0.121	0.710
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.225	0.001	0.257	0.452	0.817	0.214	0.868
	Median+:	1.185	0.000	0.247	0.475	0.801	0.226	0.875
770073	Manistique River							
	5/6/2003	3.330	0.000	ISQC 0.240	0.384	0.361	0.173	LCQC 0.880
	7/14/2003	1.140	0.000	0.302	0.286	0.554	0.119	0.660
	9/17/2003	1.600	0.000	0.126	CCB 0.372	0.474	0.151	0.730
	10/30/2003	1.180	0.006	0.144	0.363	0.535	0.132	MBQC 0.589
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.813	0.002	0.203	0.351	0.481	0.144	0.715
	Median+:	1.390	0.000	0.192	0.368	0.505	0.142	0.695

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
550038	Menominee River							
	5/1/2003	4.470	0.000	0.373	0.880	0.643	0.127	1.290
	7/17/2003	3.030	0.000	0.268	0.886	0.841	0.151	1.110
	9/9/2003	0.000	0.009	0.249	0.778	0.765	0.109	0.880
	10/29/2003	1.080	0.005	0.049	0.489	0.717	0.051 MBQC	0.706
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.145	0.004	0.235	0.758	0.742	0.109	0.997
	Median+:	2.055	0.003	0.259	0.829	0.741	0.118	0.995
610273	Muskegon River (Lower)							
	3/19/2003	1.690	0.012	0.319	CCB 0.709	1.340	0.460	1.730
	3/25/2003	1.740	0.012	0.114	CCB 0.409	1.090	0.224	1.070
	4/23/2003	1.410	0.000	0.132	0.515	1.020	0.227	0.830
	5/6/2003	1.220	0.000	0.089	0.905	1.000	0.186	1.030
	5/13/2003	1.130	0.000	0.213	0.706	1.110	0.349	1.240
	6/11/2003	1.220	0.000	0.114	ICB, MBQC, LCQC 0.649	0.776	0.122	0.500
	7/17/2003	1.250	0.000	0.102	0.559	0.862	0.147	0.540
	8/6/2003	1.200	0.000	0.150	0.628	0.760	0.189	0.690
	8/26/2003	0.930	0.015	0.109	0.563	0.739	0.090	0.410
	9/23/2003	0.790	0.000	0.010	CCB 0.748	1.250	0.091	0.370
	10/29/2003 CCB	0.450	0.002	0.000	0.366	0.870	0.097 MBQC	0.326
	11/5/2003	2.460	0.010	0.466	0.826	1.280	0.700 MBQC	1.980
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	1.291	0.004	0.152	0.632	1.008	0.240	0.893
	Median+:	1.220	0.000	0.114	0.639	1.010	0.188	0.760

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
670008	Muskegon River (Upper)							
	4/29/2003	2.780	0.000	0.309	0.795	1.000	0.295	1.690
	6/24/2003	1.340	0.000	0.241 ICB, MBQC, LCQC	0.556	0.759	0.186	1.530
	8/7/2003	2.210	0.003	0.220	0.549	0.784	0.249	1.170
	9/9/2003	1.440	0.000	0.152	0.417	0.798	0.126	0.670
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.943	0.001	0.231	0.579	0.835	0.214	1.265
	Median+:	1.825	0.000	0.231	0.553	0.791	0.218	1.350
660038	Ontonagon River							
	5/7/2003	2.930	0.000	ISQC 1.260	3.400	1.250	0.299	LCQC 2.140
	7/16/2003	1.510	0.001	0.899	3.310	1.090	0.203	1.480
	9/8/2003	0.000	0.000	0.490	1.710	0.659	0.061	0.450
	10/28/2003	0.510	0.003	0.331	1.140	0.657	0.067	MBQC 0.497
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.238	0.001	0.745	2.390	0.914	0.157	1.142
	Median+:	1.010	0.001	0.695	2.510	0.875	0.135	0.989
530027	Pere Marquette River							
	4/29/2003	1.940	0.000	0.223	0.407	0.896	0.303	1.160
	6/25/2003	2.140	0.004	0.402 ICB, MBQC, LCQC	0.476	0.795	0.474	1.630
	7/9/2003	2.420	0.006	0.533	0.574	0.904	0.572	1.870
	9/9/2003	2.050	0.004	0.273	0.398	0.677	0.260	1.160
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.138	0.004	0.358	0.464	0.818	0.402	1.455
	Median+:	2.095	0.004	0.338	0.442	0.846	0.389	1.395

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
490006	Pine River							
	4/16/2003	11.190	0.069	8.080	6.120	6.020	4.170	16.500
	6/26/2003	2.270	0.001	0.709	ICB, MBQC, LCQC 0.918	0.970	0.309	1.360
	8/18/2003	1.870	0.002	0.946	1.190	1.120	0.479	7.140
	10/14/2003	1.470	0.000	0.767	CCB 0.649	0.943	0.325	1.870
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	4.200	0.018	2.626	2.219	2.263	1.321	6.718
	Median+:	2.070	0.002	0.857	1.054	1.045	0.402	4.505
580046	River Raisin							
	4/1/2003	3.390	0.038	0.771	2.570	3.030	0.664	3.980
	4/8/2003	7.560	0.068	3.050	4.500	4.740	2.270	13.700
	5/7/2003	4.400	0.043	1.700	3.590	4.490	1.670	8.450
	5/12/2003	9.540	0.092	3.520	5.550	6.000	3.780	20.000
	6/2/2003	1.660	0.000	0.196	1.600	2.630	0.380	2.200
	7/1/2003	1.820	0.009	0.323	3.100	2.990	0.410	12.100
	7/31/2003	2.200	0.008	0.404	4.660	2.620	0.400	2.340
	8/19/2003	1.910	0.002	0.229	1.960	2.320	0.399	1.830
	9/3/2003	2.080	0.019	0.565	2.120	2.840	0.705	3.390
	9/17/2003	4.660	0.017	0.984	2.790	2.790	1.130	4.660
	11/12/2003	CCB 1.470	0.025	0.280	3.150	1.910	0.275	MBQC 2.140
	11/25/2003	2.410	0.038	0.661	2.750	3.330	0.938	MBQC 12.500
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	3.592	0.030	1.057	3.195	3.308	1.085	7.274
	Median+:	2.305	0.022	0.613	2.945	2.915	0.685	4.320

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID			Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)		Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)		Zinc (ug/L)
380393	River Raisin (Headwaters)										
	4/14/2003		1.670	0.008	0.002		0.611	1.120	0.209		0.980
	6/3/2003		1.170	0.000	0.087	ICB, MBQC, LCQC	0.546	1.180	0.180		0.650
	8/19/2003		1.160	0.000	0.015		0.258	0.840	0.112		0.800
	11/12/2003	CCB	0.740	0.003	0.000		0.421	1.170	0.054	MBQC	0.398
	No. of Samples:		4	4	4		4	4	4		4
	Mean+:		1.185	0.003	0.026		0.459	1.078	0.139		0.707
	Median+:		1.165	0.002	0.009		0.484	1.145	0.146		0.725
820070	River Rouge										
	4/14/2003		4.970	0.071	2.080		3.940	2.510	2.370		12.300
	6/3/2003		2.260	0.025	0.876	ICB, MBQC, LCQC	2.500	2.490	1.240		6.230
	8/20/2003		2.750	0.021	0.667		2.060	1.480	1.380		7.290
	9/18/2003		3.030	0.035	0.990		2.560	2.200	1.730		8.250
	No. of Samples:		4	4	4		4	4	4		4
	Mean+:		3.253	0.038	1.153		2.765	2.170	1.680		8.518
	Median+:		2.890	0.030	0.933		2.530	2.345	1.555		7.770

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
090177	Saginaw River							
	3/24/2003	3.410	0.023	0.600	2.080	2.310	1.050	5.410
	4/8/2003	3.350	0.029	1.060	2.280	2.520	1.040	6.100
	5/8/2003	3.700	0.014	0.900	2.510	2.900	1.240	5.290
	5/27/2003	4.100	0.017	1.220	2.130	3.120	1.610	7.330
	7/2/2003	2.630	0.013	1.130	2.140	3.690	1.330	4.910
	7/29/2003	1.850	0.000	0.856	2.340	2.910	0.999	3.770
	8/12/2003	3.000	0.015	1.070	2.570	2.950	1.270	5.240
	9/3/2003	2.130	0.021	0.767	1.970	3.350	0.861	3.370
	9/16/2003	4.200	0.023	1.020	2.320	3.500	1.200	4.650
	9/29/2003	1.820	0.019	1.400	CCB 2.630	3.940	1.380	6.310
	10/15/2003	1.360	0.009	0.828	CCB 2.220	2.910	0.807	4.530
	11/19/2003	1.710	0.015	0.345	1.470	2.280	0.711	MBQC 3.680
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	2.772	0.017	0.933	2.222	3.032	1.125	5.049
	Median+:	2.815	0.016	0.960	2.250	2.930	1.125	5.075
730023	Shiawassee River							
	3/24/2003	4.260	0.026	0.788	2.250	2.560	1.200	4.890
	5/28/2003	2.300	0.000	0.529	1.420	2.440	0.717	2.820
	7/29/2003	1.990	0.000	0.539	2.150	2.570	0.444	2.200
	10/15/2003	0.870	0.000	0.215	CCB 1.270	1.820	0.304	2.040
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.355	0.007	0.518	1.773	2.348	0.666	2.988
	Median+:	2.145	0.000	0.534	1.785	2.500	0.581	2.510

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)		Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
440173	South Branch Flint River								
	4/15/2003	1.750	0.007	0.000		0.622	1.310	0.112	0.850
	6/4/2003	1.130	0.000	0.051	ICB, MBQC, LCQC	0.737	1.280	0.131	0.600
	8/13/2003	1.010	0.001	0.051		0.445	0.954	0.163	0.760
	10/9/2003	0.490	0.000	0.000	CCB	0.424	1.320	0.079	0.440
	No. of Samples:	4	4	4		4	4	4	4
	Mean+:	1.095	0.002	0.026		0.557	1.216	0.121	0.663
	Median+:	1.070	0.001	0.026		0.534	1.295	0.122	0.680
110628	St. Joseph River (Lower)								
	3/26/2003	4.570	0.021	0.233	CCB	0.953	1.510	0.693	3.000
	5/22/2003	5.950	0.033	0.465		1.750	2.070	1.280	4.450
	7/17/2003	2.870	0.015	0.383		1.410	2.140	0.694	2.830
	9/23/2003	3.720	0.032	0.626	CCB	2.070	2.360	0.912	3.460
	No. of Samples:	4	4	4		4	4	4	4
	Mean+:	4.278	0.025	0.427		1.546	2.020	0.895	3.435
	Median+:	4.145	0.027	0.424		1.580	2.105	0.803	3.230
750273	St. Joseph River (Upper)								
	3/26/2003	2.030	0.014	0.091	CCB	0.659	1.440	0.326	1.210
	5/21/2003	1.660	0.000	0.114		0.713	1.590	0.511	1.650
	8/25/2003	2.290	0.009	0.122		0.621	1.150	0.241	0.910
	9/24/2003	1.410	0.006	0.059	CCB	0.835	1.250	0.345	0.910
	No. of Samples:	4	4	4		4	4	4	4
	Mean+:	1.848	0.007	0.097		0.707	1.358	0.356	1.170
	Median+:	1.845	0.008	0.103		0.686	1.345	0.336	1.060

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
210032	Sturgeon River							
	5/6/2003	3.740	0.000	ISQC 0.372	0.444	0.508	0.281	LCQC 1.600
	7/14/2003	1.510	0.000	0.213	0.275	0.622	0.076	0.700
	9/4/2003	0.870	0.000	0.210	0.319	0.517	0.046	1.640
	10/30/2003	2.560	0.008	0.145	0.331	0.600	0.146	MBQC 1.160
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.170	0.002	0.235	0.342	0.562	0.137	1.275
	Median+:	2.035	0.000	0.212	0.325	0.559	0.111	1.380
170141	Tahquamenon River							
	4/16/2003	7.430	0.030	0.653	0.740	0.544	0.476	4.560
	7/8/2003	1.450	0.000	0.225	0.300	0.422	0.093	0.570
	8/20/2003	1.150	0.000	0.169	0.289	0.380	0.062	0.460
	10/6/2003	1.290	0.000	0.077	CCB 0.170	0.414	0.101	0.620
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.830	0.008	0.281	0.375	0.440	0.183	1.553
	Median+:	1.370	0.000	0.197	0.295	0.418	0.097	0.595
040123	Thunder Bay River							
	4/17/2003	2.510	0.008	0.038	0.802	0.917	0.108	1.000
	6/23/2003	1.490	0.000	0.060	ICB, MBQC, LCQC 0.638	0.910	0.112	1.570
	8/19/2003	1.000	0.000	0.000	0.217	0.554	0.078	0.320
	10/7/2003	0.320	0.000	0.000	CCB 0.115	0.628	0.051	0.220
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.330	0.002	0.025	0.443	0.752	0.087	0.778
	Median+:	1.245	0.000	0.019	0.428	0.769	0.093	0.660

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
730025	Tittabawassee River							
	4/15/2003	2.200	0.020	0.480	1.700	1.810	0.486	3.070
	5/28/2003	3.440	0.000	0.566	1.540	1.810	0.736	3.440
	7/29/2003	1.860	0.000	0.519	2.240	2.030	0.348	2.050
	9/4/2003	1.060	0.013	0.417	1.470	1.570	0.326	1.880
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.140	0.008	0.496	1.738	1.805	0.474	2.610
	Median+:	2.030	0.007	0.500	1.620	1.810	0.417	2.560

+ = Calculated value; not rounded to the appropriate number of significant figures.
BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
HT = Recommended laboratory holding time was exceeded before analysis.
ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
LCQC = Laboratory control exceeded quality control criteria.
MBQC = Method blank exceeded level of detection.
MS = Matrix spike exceeded quality control criteria.
MSD = Matrix spike duplicate exceeded quality control criteria.

STORET ID		Cong. 101 (ng/L)	Cong. 118 (ng/L)	Cong. 123+149 (ng/L)	Cong. 128 (ng/L)	Cong. 132+153+105 (ng/L)	Cong. 135+144 (ng/L)	Cong. 136 (ng/L)	Cong. 137+176 (ng/L)	Cong. 141 (ng/L)	Cong. 146 (ng/L)	Cong. 15+17 (ng/L)	Cong. 151 (ng/L)
350061	Au Sable River												
	6/24/2003	0.003	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.014	0.000
740385	Black River												
	10/3/2003	0.035	0.026	0.010	0.005	0.029	0.004	0.000	0.000	0.002	NAI	0.022	0.003
280014	Boardman River												
	6/25/2003	0.008	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.019	0.001
	7/9/2003	0.130	0.021	0.014	0.003	0.033	0.010	0.010	0.000	0.005	0.008	0.092	0.011
730024	Cass River												
	5/27/2003	0.016	0.017	0.010	0.005	0.024	0.004	0.000	0.000	0.000	NAI	0.016	0.003
160073	Cheboygan River												
	10/8/2003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
500233	Clinton River												
	10/16/2003	0.181	0.130	0.228	0.060	0.420	0.085	NAI	0.000	0.063	0.075	0.066	0.087
280318	East Creek												
	4/30/2003	0.003	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	NAI	0.008	0.000
210102	Escanaba River												
	7/15/2003	0.014	0.004	NAI	0.001	0.007	0.002	0.000	0.000	0.000	NAI	0.028	0.002
730285	Flint River												
	7/30/2003	0.032	0.033	0.051	0.020	0.063	0.018	0.000	0.001	0.017	NAI	0.045	NAI
	8/12/2003	0.069	0.039	0.062	0.023	0.115	0.022	0.000	0.000	0.016	NAI	0.034	0.019
700123	Grand River (Lower)												
	10/29/2003	0.027	0.029	0.018	0.009	0.047	0.007	0.000	0.000	0.000	NAI	0.014	0.005
340025	Grand River (Upper)												
	6/17/2003	0.055	0.054	0.045	0.020	0.105	0.017	0.000	0.001	0.011	0.019	0.016	0.014
580364	Huron River												
	9/17/2003	0.068	0.059	0.036	0.016	0.089	0.013	0.000	0.000	0.010	NAI	0.036	0.012

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 101 (ng/L)	Cong. 118 (ng/L)	Cong. 123+149 (ng/L)	Cong. 128 (ng/L)	Cong. 132+153+105 (ng/L)	Cong. 135+144 (ng/L)	Cong. 136 (ng/L)	Cong. 137+176 (ng/L)	Cong. 141 (ng/L)	Cong. 146 (ng/L)	Cong. 15+17 (ng/L)	Cong. 151 (ng/L)
030077	Kalamazoo River (Lower)												
	6/10/2003	0.496	0.380	0.240	0.085	0.499	0.085	0.046	0.002	0.049	0.120	0.584	0.071
390057	Kalamazoo River (Upper)												
	6/16/2003	0.229	0.163	0.139	0.060	0.306	0.052	0.014	0.002	0.037	0.045	0.027	0.045
510088	Manistee River												
	4/29/2003	0.013	0.016	0.009	0.005	0.034	0.003	0.000	0.000	0.003	0.013	0.011	0.003
770073	Manistique River												
	10/30/2003	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
550038	Menominee River												
	9/9/2003	0.028	0.010	0.008	0.004	0.024	0.004	0.000	0.000	0.000	0.006	0.029	0.004
610273	Muskegon River (Lower)												
	6/11/2003	0.006	0.006	0.004	0.002	0.005	0.000	0.000	0.000	0.001	NAI	0.011	0.001
670008	Muskegon River (Upper)												
	6/24/2003	0.003	0.003	0.002	0.000	0.003	0.000	0.000	0.000	0.000	NAI	0.017	0.000
660038	Ontonagon River												
	7/16/2003	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.017	0.000
530027	Pere Marquette River												
	6/25/2003	0.028	0.039	0.022	0.011	0.080	0.006	0.000	0.000	0.006	0.021	0.010	0.006
	7/9/2003	0.029	0.037	0.021	0.011	0.077	0.007	0.000	0.000	0.007	0.021	0.014	0.006
490006	Pine River												
	8/18/2003	0.007	0.007	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000
580046	River Raisin												
	11/12/2003	0.098	0.085	0.031	0.009	0.082	0.014	0.000	0.000	NAI	0.013	0.578	0.012
380393	River Raisin (Headwaters)												
	8/19/2003	0.000	0.004	0.002	0.001	0.005	0.000	0.000	0.000	0.000	0.000	0.019	0.000
820070	River Rouge												
	9/18/2003	0.270	0.152	0.230	0.039	0.443	0.089	NAI	0.006	0.079	0.076	0.336	0.100

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID	Cong. 101 (ng/L)	Cong. 118 (ng/L)	Cong. 123+149 (ng/L)	Cong. 128 (ng/L)	Cong. 132+153+105 (ng/L)	Cong. 135+144 (ng/L)	Cong. 136 (ng/L)	Cong. 137+176 (ng/L)	Cong. 141 (ng/L)	Cong. 146 (ng/L)	Cong. 15+17 (ng/L)	Cong. 151 (ng/L)
090177 Saginaw River												
7/29/2003	0.210	0.185	0.091	0.033	0.223	0.042	0.013	0.000	0.015	NAI	0.973	NAI
730023 Shiawassee River												
10/15/2003	0.007	0.010	0.004	0.002	0.009	0.000	0.000	0.000	0.000	NAI	0.019	0.000
440173 South Branch Flint River												
10/9/2003	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.000
110628 St. Joseph River (Lower)												
5/22/2003	0.151	0.117	0.130	0.041	0.242	0.049	0.015	0.003	0.043	0.074	0.041	0.048
750273 St. Joseph River (Upper)												
5/21/2003	0.020	0.017	0.012	0.004	0.011	0.005	0.000	0.000	0.004	NAI	0.019	0.004
210032 Sturgeon River												
9/4/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
170141 Tahquamenon River												
7/8/2003	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.013	0.000
040123 Thunder Bay River												
10/7/2003	0.014	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
730025 Tittabawassee River												
5/28/2003	0.031	0.030	0.010	0.006	0.028	0.005	0.000	0.000	0.000	NAI	NAI	0.004

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 158 (ng/L)	Cong. 16+32 (ng/L)	Cong. 163+138 (ng/L)	Cong. 167 (ng/L)	Cong. 170+190 (ng/L)	Cong. 172 (ng/L)	Cong. 174 (ng/L)	Cong. 177 (ng/L)	Cong. 178 (ng/L)	Cong. 18 (ng/L)	Cong. 180 (ng/L)	Cong. 183 (ng/L)	Cong. 185 (ng/L)
350061	Au Sable River													
	6/24/2003	0.000	0.007	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000
740385	Black River													
	10/3/2003	0.000	0.034	0.027	0.000	0.004	0.000	0.004	0.003	0.000	0.015	0.008	0.002	0.000
280014	Boardman River													
	6/25/2003	0.000	0.023	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.001	0.000	0.000
	7/9/2003	0.005	0.080	0.026	0.000	0.000	0.000	0.003	0.000	0.000	0.057	0.003	0.002	0.000
730024	Cass River													
	5/27/2003	0.003	0.014	0.033	0.000	0.005	0.001	0.005	0.004	0.001	0.011	0.009	0.002	0.000
160073	Cheboygan River													
	10/8/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
500233	Clinton River													
	10/16/2003	0.063	NAI	0.442	0.025	0.123	0.035	0.124	0.082	0.039	0.055	0.251	0.066	0.013
280318	East Creek													
	4/30/2003	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000
210102	Escanaba River													
	7/15/2003	0.001	0.022	0.009	0.000	0.001	0.000	0.001	0.000	0.000	0.013	0.002	0.001	0.000
730285	Flint River													
	7/30/2003	0.020	NAI	0.116	0.006	0.028	0.007	0.028	0.020	0.009	0.047	0.055	0.015	0.003
	8/12/2003	0.017	0.035	0.131	0.000	0.030	0.007	0.029	0.020	0.009	0.022	0.056	0.016	0.003
700123	Grand River (Lower)													
	10/29/2003	0.000	0.025	0.051	0.003	0.008	0.000	0.007	0.006	0.003	0.009	0.017	0.004	0.000
340025	Grand River (Upper)													
	6/17/2003	0.013	0.013	0.115	0.005	0.021	0.005	0.018	0.015	0.007	0.011	0.039	0.011	0.002
580364	Huron River													
	9/17/2003	NAI	0.057	0.095	0.006	0.020	0.000	0.016	0.013	0.000	0.026	0.035	0.009	0.000

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 158 (ng/L)	Cong. 16+32 (ng/L)	Cong. 163+138 (ng/L)	Cong. 167 (ng/L)	Cong. 170+190 (ng/L)	Cong. 172 (ng/L)	Cong. 174 (ng/L)	Cong. 177 (ng/L)	Cong. 178 (ng/L)	Cong. 18 (ng/L)	Cong. 180 (ng/L)	Cong. 183 (ng/L)	Cong. 185 (ng/L)
030077	Kalamazoo River (Lower)													
	6/10/2003	0.040	0.401	0.504	0.015	0.062	0.017	0.061	0.048	0.021	0.509	0.120	0.034	0.005
390057	Kalamazoo River (Upper)													
	6/16/2003	0.047	0.048	0.341	0.018	0.051	0.013	0.048	0.037	0.015	0.030	0.085	0.024	0.004
510088	Manistee River													
	4/29/2003	0.003	0.014	0.041	0.000	0.005	0.002	0.004	0.005	0.004	0.009	0.014	0.004	0.000
770073	Manistique River													
	10/30/2003	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
550038	Menominee River													
	9/9/2003	0.000	0.019	0.025	0.000	0.004	0.000	0.004	0.000	0.000	0.012	0.006	0.000	0.000
610273	Muskegon River (Lower)													
	6/11/2003	0.000	0.009	NAI	0.000	0.002	0.000	0.002	0.002	0.000	0.009	0.004	0.001	0.000
670008	Muskegon River (Upper)													
	6/24/2003	0.000	0.018	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.000
660038	Ontonagon River													
	7/16/2003	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000
530027	Pere Marquette River													
	6/25/2003	0.000	0.119	0.089	0.000	0.014	0.006	0.009	0.010	0.007	0.008	0.029	0.009	0.000
	7/9/2003	0.000	NAI	0.086	0.002	0.014	0.007	0.009	0.010	0.006	0.010	0.028	0.009	0.000
490006	Pine River													
	8/18/2003	0.000	0.016	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.009	0.002	0.000	0.000
580046	River Raisin													
	11/12/2003	0.008	0.409	0.061	0.002	0.015	0.004	0.014	0.011	0.005	0.203	0.032	0.009	0.001
380393	River Raisin (Headwaters)													
	8/19/2003	0.000	0.015	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.002	0.000	0.000
820070	River Rouge													
	9/18/2003	0.059	0.499	0.422	0.021	0.173	0.041	0.144	0.096	0.049	0.317	0.305	0.075	0.015

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 158 (ng/L)	Cong. 16+32 (ng/L)	Cong. 163+138 (ng/L)	Cong. 167 (ng/L)	Cong. 170+190 (ng/L)	Cong. 172 (ng/L)	Cong. 174 (ng/L)	Cong. 177 (ng/L)	Cong. 178 (ng/L)	Cong. 18 (ng/L)	Cong. 180 (ng/L)	Cong. 183 (ng/L)	Cong. 185 (ng/L)
090177	Saginaw River													
	7/29/2003	0.028	0.636	0.202	0.000	0.041	0.008	0.041	0.033	0.013	0.539	0.086	0.024	0.004
730023	Shiawassee River													
	10/15/2003	0.000	NAI	0.013	0.000	0.002	0.000	0.002	0.001	0.000	0.023	0.003	0.000	0.000
440173	South Branch Flint River													
	10/9/2003	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.003	0.000	0.000
110628	St. Joseph River (Lower)													
	5/22/2003	0.033	NAI	0.291	0.014	0.072	0.019	0.066	0.048	0.021	0.030	0.129	0.041	0.007
750273	St. Joseph River (Upper)													
	5/21/2003	0.004	0.025	NAI	0.000	0.005	0.002	0.006	0.004	0.002	0.015	0.010	0.003	0.000
210032	Sturgeon River													
	9/4/2003	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
170141	Tahquamenon River													
	7/8/2003	0.000	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
040123	Thunder Bay River													
	10/7/2003	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
730025	Tittabawassee River													
	5/28/2003	0.005	NAI	0.045	NAI	0.007	0.000	0.005	NAI	0.000	0.017	0.011	0.005	0.000

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 24+27 (ng/L)	Cong. 25 (ng/L)	Cong. 26 (ng/L)	Cong. 28+31 (ng/L)	Cong. 3 (ng/L)	Cong. 33 (ng/L)	Cong. 37+42 (ng/L)	Cong. 4+10 (ng/L)	Cong. 40 (ng/L)	Cong. 41+71+64 (ng/L)	Cong. 44 (ng/L)	Cong. 45 (ng/L)	Cong. 46 (ng/L)
350061	Au Sable River													
	6/24/2003	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	NAI	0.002	0.005	0.000	0.000
740385	Black River													
	10/3/2003	0.000	0.000	0.000	0.040	0.000	0.015	0.019	0.000	0.000	0.036	0.039	0.000	0.000
280014	Boardman River													
	6/25/2003	0.000	0.004	0.002	0.041	0.000	0.008	NAI	0.016	NAI	0.008	0.012	0.000	0.000
	7/9/2003	0.005	0.012	0.013	0.262	0.000	0.084	0.080	0.025	0.021	0.077	0.107	0.006	0.004
730024	Cass River													
	5/27/2003	0.002	0.000	0.000	0.029	0.000	0.007	0.000	0.013	NAI	0.012	0.013	0.002	0.000
160073	Cheboygan River													
	10/8/2003	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.000	0.000	0.000	0.000	0.000	0.000
500233	Clinton River													
	10/16/2003	0.010	NAI	NAI	0.206	0.000	0.043	0.168	0.031	0.029	0.114	0.111	0.015	0.006
280318	East Creek													
	4/30/2003	0.000	0.000	0.000	0.007	0.000	0.000	NAI	0.000	0.000	0.000	0.005	0.000	0.000
210102	Escanaba River													
	7/15/2003	0.000	0.001	0.000	0.034	0.000	0.008	NAI	0.014	NAI	0.010	0.013	0.000	0.000
730285	Flint River													
	7/30/2003	0.007	0.000	0.000	0.059	0.000	0.015	NAI	NAI	0.016	0.034	0.032	0.006	0.000
	8/12/2003	0.000	0.000	0.000	0.056	0.000	0.012	NAI	0.031	0.000	0.026	0.029	0.005	0.005
700123	Grand River (Lower)													
	10/29/2003	0.000	0.000	0.000	0.020	0.000	0.009	NAI	0.000	0.006	0.014	0.015	0.000	0.000
340025	Grand River (Upper)													
	6/17/2003	0.000	0.003	0.000	0.025	0.000	0.000	NAI	0.000	NAI	0.014	0.017	0.000	0.001
580364	Huron River													
	9/17/2003	0.000	0.000	0.000	0.077	0.000	0.032	NAI	0.046	0.000	0.041	0.050	0.000	0.000

+ = Calculated value; may not rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 24+27 (ng/L)	Cong. 25 (ng/L)	Cong. 26 (ng/L)	Cong. 28+31 (ng/L)	Cong. 3 (ng/L)	Cong. 33 (ng/L)	Cong. 37+42 (ng/L)	Cong. 4+10 (ng/L)	Cong. 40 (ng/L)	Cong. 41+71+64 (ng/L)	Cong. 44 (ng/L)	Cong. 45 (ng/L)	Cong. 46 (ng/L)
030077	Kalamazoo River (Lower)													
	6/10/2003	0.053	0.114	0.209	1.763	0.000	0.127	0.496	0.111	0.174	0.637	0.698	0.119	0.071
390057	Kalamazoo River (Upper)													
	6/16/2003	0.004	0.011	0.009	0.108	0.000	NAI	0.055	0.027	0.011	0.075	0.101	0.006	0.005
510088	Manistee River													
	4/29/2003	0.000	0.000	0.000	0.010	0.000	0.004	0.000	0.015	0.000	0.002	0.006	0.000	0.000
770073	Manistique River													
	10/30/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
550038	Menominee River													
	9/9/2003	NAI	0.000	0.000	0.037	0.000	0.013	NAI	0.000	0.000	0.013	0.022	0.000	0.000
610273	Muskegon River (Lower)													
	6/11/2003	0.000	0.000	0.000	0.012	0.000	0.004	NAI	0.000	0.000	0.005	0.005	0.000	0.000
670008	Muskegon River (Upper)													
	6/24/2003	0.000	0.000	0.000	0.017	0.000	0.000	NAI	NAI	0.000	0.000	0.011	0.000	0.000
660038	Ontonagon River													
	7/16/2003	0.000	0.000	0.000	0.009	0.000	0.004	NAI	0.000	NAI	0.002	0.006	0.000	0.001
530027	Pere Marquette River													
	6/25/2003	0.000	0.000	0.000	NAI	0.000	NAI	0.000	0.026	0.000	0.005	0.010	0.000	0.000
	7/9/2003	0.000	0.000	0.000	0.000	0.000	NAI	NAI	0.041	0.000	0.005	0.011	0.000	0.000
490006	Pine River													
	8/18/2003	0.000	0.000	0.000	0.016	0.000	0.000	0.000	0.015	NAI	0.007	0.009	0.000	0.001
580046	River Raisin													
	11/12/2003	0.081	0.149	0.229	0.652	0.000	0.051	0.187	0.349	0.073	0.301	0.308	0.048	0.039
380393	River Raisin (Headwaters)													
	8/19/2003	0.000	0.000	0.000	0.011	0.000	0.000	NAI	0.000	0.000	0.000	0.012	0.000	0.000
820070	River Rouge													
	9/18/2003	0.037	0.076	0.072	0.904	0.000	0.152	0.368	0.107	0.074	0.294	0.300	0.052	0.024

+ = Calculated value; may not rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 24+27 (ng/L)	Cong. 25 (ng/L)	Cong. 26 (ng/L)	Cong. 28+31 (ng/L)	Cong. 3 (ng/L)	Cong. 33 (ng/L)	Cong. 37+42 (ng/L)	Cong. 4+10 (ng/L)	Cong. 40 (ng/L)	Cong. 41+71+64 (ng/L)	Cong. 44 (ng/L)	Cong. 45 (ng/L)	Cong. 46 (ng/L)
090177	Saginaw River													
	7/29/2003	0.094	0.341	0.704	1.529	0.000	0.060	0.379	0.519	0.145	0.546	0.570	0.109	0.074
730023	Shiawassee River													
	10/15/2003	0.000	0.000	0.000	0.031	0.000	0.004	NAI	0.000	0.000	0.022	0.011	0.006	0.000
440173	South Branch Flint River													
	10/9/2003	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.000	0.000	0.000	0.007	0.005	0.000
110628	St. Joseph River (Lower)													
	5/22/2003	0.006	0.013	0.013	0.089	0.000	0.019	NAI	0.030	0.022	0.052	0.055	0.006	0.003
750273	St. Joseph River (Upper)													
	5/21/2003	0.003	0.003	0.003	0.026	0.000	0.000	NAI	0.000	NAI	0.020	0.020	0.000	0.000
210032	Sturgeon River													
	9/4/2003	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.000	0.000	0.000	0.000	0.000	0.000
170141	Tahquamenon River													
	7/8/2003	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.012	NAI	0.002	0.005	0.000	0.000
040123	Thunder Bay River													
	10/7/2003	0.000	0.000	0.000	0.018	0.000	0.000	NAI	0.000	0.000	0.000	0.010	0.000	0.000
730025	Tittabawassee River													
	5/28/2003	0.003	0.000	NAI	0.050	0.000	NAI	NAI	0.000	NAI	0.026	0.031	0.000	0.000

+ = Calculated value; may not rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 47+48 (ng/L)	Cong. 49 (ng/L)	Cong. 51 (ng/L)	Cong. 52 (ng/L)	Cong. 53 (ng/L)	Cong. 56+60 (ng/L)	Cong. 6 (ng/L)	Cong. 63 (ng/L)	Cong. 66 (ng/L)	Cong. 7+9 (ng/L)	Cong. 70+76 (ng/L)	Cong. 74 (ng/L)	Cong. 77+110 (ng/L)
350061	Au Sable River													
	6/24/2003	0.000	NAI	0.000	0.010	0.000	0.000	0.000	0.000	0.000	NAI	0.004	0.000	0.005
740385	Black River													
	10/3/2003	0.018	0.025	0.003	0.070	0.002	0.033	0.000	0.000	0.059	0.000	0.040	0.020	0.048
280014	Boardman River													
	6/25/2003	0.015	0.005	0.005	0.019	0.007	0.003	0.012	0.000	0.004	0.008	0.007	0.002	0.009
	7/9/2003	0.071	0.067	0.008	0.165	0.025	0.038	NAI	0.003	0.063	NAI	0.101	0.028	0.117
730024	Cass River													
	5/27/2003	0.010	0.010	0.003	0.281	0.000	0.010	0.000	0.000	0.021	0.010	0.015	0.005	0.024
160073	Cheboygan River													
	10/8/2003	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
500233	Clinton River													
	10/16/2003	0.053	0.044	0.012	0.644	0.011	0.072	0.000	0.000	0.119	0.000	0.063	0.011	0.297
280318	East Creek													
	4/30/2003	0.003	0.000	0.002	0.012	0.000	0.002	0.003	0.000	0.000	0.005	0.004	0.000	0.005
210102	Escanaba River													
	7/15/2003	0.013	0.013	0.002	0.022	0.003	0.004	NAI	0.000	0.010	NAI	0.012	0.002	0.016
730285	Flint River													
	7/30/2003	0.015	0.016	0.007	NAI	0.000	0.014	0.000	0.000	0.026	NAI	0.015	NAI	0.075
	8/12/2003	0.016	0.020	0.008	0.145	0.003	0.019	0.013	0.000	0.045	NAI	0.030	0.010	0.105
700123	Grand River (Lower)													
	10/29/2003	0.000	NAI	0.000	0.106	0.000	0.009	0.000	0.000	0.016	0.009	0.016	0.000	0.046
340025	Grand River (Upper)													
	6/17/2003	0.010	0.011	0.003	0.086	0.000	0.011	0.000	0.000	0.036	0.008	0.028	0.008	0.082
580364	Huron River													
	9/17/2003	0.021	0.022	0.000	0.121	0.000	0.035	0.000	0.000	0.076	0.023	0.043	0.012	0.090

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 47+48 (ng/L)	Cong. 49 (ng/L)	Cong. 51 (ng/L)	Cong. 52 (ng/L)	Cong. 53 (ng/L)	Cong. 56+60 (ng/L)	Cong. 6 (ng/L)	Cong. 63 (ng/L)	Cong. 66 (ng/L)	Cong. 7+9 (ng/L)	Cong. 70+76 (ng/L)	Cong. 74 (ng/L)	Cong. 77+110 (ng/L)
030077	Kalamazoo River (Lower)													
	6/10/2003	0.417	0.667	0.035	1.038	0.054	0.334	NAI	0.045	0.917	0.044	0.548	0.215	0.735
390057	Kalamazoo River (Upper)													
	6/16/2003	0.043	0.077	0.007	0.210	0.007	0.059	NAI	0.004	0.140	0.009	0.094	0.032	0.338
510088	Manistee River													
	4/29/2003	0.004	0.000	0.003	0.023	0.000	0.003	0.004	0.000	0.011	0.005	0.006	0.003	0.015
770073	Manistique River													
	10/30/2003	0.000	0.000	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
550038	Menominee River													
	9/9/2003	0.014	0.019	0.000	0.030	0.000	0.000	0.000	0.000	0.020	NAI	0.021	0.000	0.031
610273	Muskegon River (Lower)													
	6/11/2003	0.007	0.005	0.005	0.033	0.000	0.002	0.000	0.000	0.003	0.000	0.006	0.002	0.010
670008	Muskegon River (Upper)													
	6/24/2003	0.005	0.006	0.004	0.020	0.000	0.000	0.010	0.000	0.000	NAI	0.000	0.000	0.006
660038	Ontonagon River													
	7/16/2003	0.006	0.005	0.002	0.008	0.000	0.002	0.000	0.000	0.003	NAI	0.008	0.000	0.003
530027	Pere Marquette River													
	6/25/2003	0.010	0.000	0.005	NAI	0.000	0.008	0.000	0.000	0.040	0.007	0.020	0.009	0.037
	7/9/2003	0.009	NAI	NAI	NAI	0.000	0.008	0.000	0.000	0.037	0.010	0.016	0.009	0.034
490006	Pine River													
	8/18/2003	0.009	0.006	0.003	0.013	0.000	0.014	0.000	0.000	0.015	NAI	0.011	0.006	0.010
580046	River Raisin													
	11/12/2003	0.237	0.296	0.041	0.467	0.064	0.129	0.119	0.020	0.297	NAI	0.126	0.096	0.193
380393	River Raisin (Headwaters)													
	8/19/2003	0.003	0.000	0.003	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
820070	River Rouge													
	9/18/2003	0.161	0.186	0.039	0.501	0.070	0.180	NAI	0.014	0.282	0.000	0.203	0.105	0.334

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 47+48 (ng/L)	Cong. 49 (ng/L)	Cong. 51 (ng/L)	Cong. 52 (ng/L)	Cong. 53 (ng/L)	Cong. 56+60 (ng/L)	Cong. 6 (ng/L)	Cong. 63 (ng/L)	Cong. 66 (ng/L)	Cong. 7+9 (ng/L)	Cong. 70+76 (ng/L)	Cong. 74 (ng/L)	Cong. 77+110 (ng/L)
090177	Saginaw River													
	7/29/2003	0.332	0.611	0.054	1.066	0.072	0.168	NAI	0.040	0.402	NAI	0.228	0.140	0.360
730023	Shiawassee River													
	10/15/2003	0.000	0.012	0.000	0.015	0.000	0.007	0.000	0.000	0.012	0.000	0.023	0.000	0.016
440173	South Branch Flint River													
	10/9/2003	0.000	0.000	0.000	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.004
110628	St. Joseph River (Lower)													
	5/22/2003	0.024	0.049	0.006	0.162	0.006	0.034	0.007	0.003	0.061	0.005	0.059	0.023	0.195
750273	St. Joseph River (Upper)													
	5/21/2003	0.015	0.020	0.004	0.062	0.002	0.012	0.000	0.000	0.021	0.008	0.020	0.006	0.033
210032	Sturgeon River													
	9/4/2003	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
170141	Tahquamenon River													
	7/8/2003	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.000	0.000	0.004
040123	Thunder Bay River													
	10/7/2003	0.000	0.009	0.000	0.020	0.000	0.000	0.000	0.000	0.007	0.000	0.011	0.000	0.016
730025	Tittabawassee River													
	5/28/2003	0.009	0.016	0.004	0.162	0.004	0.023	0.000	0.000	0.050	0.000	0.026	0.013	NAI

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 8+5 (ng/L)	Cong. 82 (ng/L)	Cong. 83 (ng/L)	Cong. 85 (ng/L)	Cong. 87 (ng/L)	Cong. 89 (ng/L)	Cong. 91 (ng/L)	Cong. 92+84 (ng/L)	Cong. 95 (ng/L)	Cong. 97 (ng/L)	Cong. 99 (ng/L)
350061	Au Sable River											
	6/24/2003	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.001
740385	Black River											
	10/3/2003	NAI	0.005	0.004	0.009	0.019	0.003	0.009	0.027	0.036	0.011	0.014
280014	Boardman River											
	6/25/2003	0.081	0.000	0.000	0.001	0.004	0.000	0.000	0.008	0.011	0.002	0.002
	7/9/2003	NAI	0.010	0.007	0.021	0.057	0.012	0.031	0.143	0.158	0.029	0.040
730024	Cass River											
	5/27/2003	NAI	0.000	0.000	0.007	0.011	NAI	0.005	NAI	0.015	0.006	0.009
160073	Cheboygan River											
	10/8/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000
500233	Clinton River											
	10/16/2003	NAI	0.026	0.022	0.045	0.080	0.016	0.058	0.159	0.252	0.048	0.066
280318	East Creek											
	4/30/2003	NAI	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.001
210102	Escanaba River											
	7/15/2003	NAI	0.000	0.002	0.002	0.006	0.000	0.000	NAI	0.017	0.003	0.005
730285	Flint River											
	7/30/2003	0.165	NAI	0.000	0.010	0.019	0.004	0.008	0.037	0.056	0.015	0.014
	8/12/2003	NAI	0.006	0.007	0.015	0.028	0.005	0.017	0.052	0.096	0.017	0.022
700123	Grand River (Lower)											
	10/29/2003	0.000	0.004	0.003	0.008	0.016	0.004	0.008	0.020	0.028	0.009	0.011
340025	Grand River (Upper)											
	6/17/2003	NAI	0.008	0.006	0.016	0.027	NAI	0.006	NAI	0.052	0.015	0.024
580364	Huron River											
	9/17/2003	0.050	0.007	0.000	0.017	0.028	0.016	NAI	NAI	0.050	0.015	0.027

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 8+5 (ng/L)	Cong. 82 (ng/L)	Cong. 83 (ng/L)	Cong. 85 (ng/L)	Cong. 87 (ng/L)	Cong. 89 (ng/L)	Cong. 91 (ng/L)	Cong. 92+84 (ng/L)	Cong. 95 (ng/L)	Cong. 97 (ng/L)	Cong. 99 (ng/L)
030077	Kalamazoo River (Lower)											
	6/10/2003	0.247	0.096	0.056	0.136	0.185	0.028	0.155	0.551	0.520	0.149	0.290
390057	Kalamazoo River (Upper)											
	6/16/2003	NAI	0.031	0.026	0.056	0.104	0.016	0.038	0.161	0.240	0.059	0.086
510088	Manistee River											
	4/29/2003	NAI	0.001	0.000	0.007	0.006	0.001	0.002	0.000	0.007	0.003	0.008
770073	Manistique River											
	10/30/2003	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.005	0.000	0.000
550038	Menominee River											
	9/9/2003	0.054	0.002	0.000	0.005	0.011	0.000	0.000	0.029	0.032	0.006	0.009
610273	Muskegon River (Lower)											
	6/11/2003	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.006	0.002	0.004
670008	Muskegon River (Upper)											
	6/24/2003	NAI	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.007	0.000	0.002
660038	Ontonagon River											
	7/16/2003	0.039	NAI	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.000	0.001
530027	Pere Marquette River											
	6/25/2003	0.015	0.002	0.000	0.016	0.013	0.003	0.000	NAI	0.017	0.008	0.020
	7/9/2003	0.000	0.002	0.002	0.015	0.012	0.003	0.000	NAI	0.015	0.008	0.019
490006	Pine River											
	8/18/2003	0.048	NAI	0.000	0.002	0.005	0.000	0.001	0.000	0.005	0.002	0.003
580046	River Raisin											
	11/12/2003	0.473	0.019	0.016	0.039	0.045	0.010	0.058	0.177	0.142	0.031	0.053
380393	River Raisin (Headwaters)											
	8/19/2003	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
820070	River Rouge											
	9/18/2003	0.284	0.035	0.030	0.061	0.103	0.025	0.083	0.221	0.283	0.067	0.091

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 8+5 (ng/L)	Cong. 82 (ng/L)	Cong. 83 (ng/L)	Cong. 85 (ng/L)	Cong. 87 (ng/L)	Cong. 89 (ng/L)	Cong. 91 (ng/L)	Cong. 92+84 (ng/L)	Cong. 95 (ng/L)	Cong. 97 (ng/L)	Cong. 99 (ng/L)
090177	Saginaw River											
	7/29/2003	NAI	0.047	0.036	0.068	0.088	0.029	0.135	0.278	0.309	0.063	0.104
730023	Shiawassee River											
	10/15/2003	0.094	0.000	0.000	0.004	0.005	0.004	0.000	0.009	0.009	0.004	0.005
440173	South Branch Flint River											
	10/9/2003	0.097	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
110628	St. Joseph River (Lower)											
	5/22/2003	0.035	0.017	0.005	0.030	0.066	0.010	0.018	0.085	0.140	0.036	0.049
750273	St. Joseph River (Upper)											
	5/21/2003	NAI	0.000	0.003	0.006	0.012	0.003	0.008	0.022	0.027	0.007	0.010
210032	Sturgeon River											
	9/4/2003	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
170141	Tahquamenon River											
	7/8/2003	NAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
040123	Thunder Bay River											
	10/7/2003	0.032	0.000	0.000	0.000	0.005	0.000	0.000	NAI	0.017	0.003	0.005
730025	Tittabawassee River											
	5/28/2003	0.033	0.003	0.000	0.010	0.017	NAI	NAI	0.000	0.033	0.009	0.014

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 187+182 (ng/L)	Cong. 19 (ng/L)	Cong. 193 (ng/L)	Cong. 194 (ng/L)	Cong. 198 (ng/L)	Cong. 199 (ng/L)	Cong. 201 (ng/L)	Cong. 202+171 (ng/L)	Cong. 203+196 (ng/L)	Cong. 206 (ng/L)	Cong. 207 (ng/L)	Cong. 208+195 (ng/L)	Cong. 22 (ng/L)
350061	Au Sable River													
	6/24/2003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
740385	Black River													
	10/3/2003	0.004	0.000	0.000	0.002	0.000	0.000	0.004	0.001	0.003	0.001	0.000	0.001	0.014
280014	Boardman River													
	6/25/2003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	NAI
	7/9/2003	0.004	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.094
730024	Cass River													
	5/27/2003	0.005	0.002	0.000	0.003	0.000	0.000	0.006	0.002	0.006	0.003	0.000	0.002	0.011
160073	Cheboygan River													
	10/8/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
500233	Clinton River													
	10/16/2003	0.111	NAI	0.024	0.058	0.003	0.007	0.099	0.030	0.112	0.027	0.000	0.027	0.067
280318	East Creek													
	4/30/2003	0.001	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012
210102	Escanaba River													
	7/15/2003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.014
730285	Flint River													
	7/30/2003	0.025	0.000	0.007	0.019	0.000	0.001	0.022	0.010	0.020	0.010	0.000	0.009	NAI
	8/12/2003	0.026	NAI	0.006	0.018	0.000	0.002	0.027	0.011	0.031	0.011	0.000	0.008	0.019
700123	Grand River (Lower)													
	10/29/2003	0.007	0.000	0.000	0.004	0.000	0.000	0.000	0.003	0.009	0.005	0.000	0.003	0.000
340025	Grand River (Upper)													
	6/17/2003	0.020	0.000	0.003	0.010	0.000	0.001	0.017	0.007	0.019	0.007	0.000	0.006	0.009
580364	Huron River													
	9/17/2003	0.018	0.000	0.000	0.012	0.000	0.000	0.019	0.006	0.020	0.008	0.000	0.005	0.031

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 187+182 (ng/L)	Cong. 19 (ng/L)	Cong. 193 (ng/L)	Cong. 194 (ng/L)	Cong. 198 (ng/L)	Cong. 199 (ng/L)	Cong. 201 (ng/L)	Cong. 202+171 (ng/L)	Cong. 203+196 (ng/L)	Cong. 206 (ng/L)	Cong. 207 (ng/L)	Cong. 208+195 (ng/L)	Cong. 22 (ng/L)
030077	Kalamazoo River (Lower)													
	6/10/2003	0.065	0.035	0.008	0.030	0.000	0.004	0.060	0.017	0.059	0.021	0.000	0.013	0.247
390057	Kalamazoo River (Upper)													
	6/16/2003	0.043	0.003	0.007	0.022	0.000	0.003	0.039	0.013	0.041	0.017	0.002	0.012	0.029
510088	Manistee River													
	4/29/2003	0.009	0.004	0.000	0.003	0.000	0.000	0.006	0.002	0.007	0.001	0.000	0.001	0.007
770073	Manistique River													
	10/30/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
550038	Menominee River													
	9/9/2003	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013
610273	Muskegon River (Lower)													
	6/11/2003	0.003	0.005	0.000	0.001	0.000	0.000	0.002	0.001	0.004	0.000	0.000	0.000	0.005
670008	Muskegon River (Upper)													
	6/24/2003	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
660038	Ontonagon River													
	7/16/2003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
530027	Pere Marquette River													
	6/25/2003	0.020	0.000	0.003	0.008	0.000	0.000	0.016	0.005	0.017	0.004	0.000	0.003	NAI
	7/9/2003	0.019	0.005	0.003	0.007	0.000	0.000	0.016	0.005	0.017	0.004	0.000	0.004	NAI
490006	Pine River													
	8/18/2003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.008
580046	River Raisin													
	11/12/2003	0.017	0.094	0.002	0.010	0.000	0.000	0.016	0.004	0.017	0.005	0.000	0.004	0.083
380393	River Raisin (Headwaters)													
	8/19/2003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
820070	River Rouge													
	9/18/2003	0.132	0.022	0.026	0.072	0.003	0.010	0.120	0.035	0.139	0.025	0.002	0.031	0.189

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

STORET ID		Cong. 187+182 (ng/L)	Cong. 19 (ng/L)	Cong. 193 (ng/L)	Cong. 194 (ng/L)	Cong. 198 (ng/L)	Cong. 199 (ng/L)	Cong. 201 (ng/L)	Cong. 202+171 (ng/L)	Cong. 203+196 (ng/L)	Cong. 206 (ng/L)	Cong. 207 (ng/L)	Cong. 208+195 (ng/L)	Cong. 22 (ng/L)
090177	Saginaw River													
	7/29/2003	0.040	0.114	0.011	0.028	0.000	0.002	0.037	0.015	0.032	0.011	0.000	0.016	0.213
730023	Shiawassee River													
	10/15/2003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036
440173	South Branch Flint River													
	10/9/2003	0.000	NAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.054
110628	St. Joseph River (Lower)													
	5/22/2003	0.061	0.000	0.010	0.034	0.002	0.005	0.058	0.024	0.072	0.025	0.001	0.018	0.026
750273	St. Joseph River (Upper)													
	5/21/2003	0.006	0.006	0.000	0.004	0.000	0.000	0.005	0.003	0.010	0.005	0.000	0.002	0.010
210032	Sturgeon River													
	9/4/2003	0.000	NAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
170141	Tahquamenon River													
	7/8/2003	0.001	NAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
040123	Thunder Bay River													
	10/7/2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
730025	Tittabawassee River													
	5/28/2003	0.003	0.000	0.000	0.004	0.000	0.000	0.004	0.003	0.006	0.005	0.000	NAI	0.020

+ = Calculated value; may not be rounded to appropriate number of significant figures.
EST = Estimated value; analyte present above detection limit but not quantified within expected limits of precision.
FBK = Analyte had a measurable value above the established quality control limit when blank was analyzed using the same equipment and analytical method.
FMS = Failed matrix spike criteria; recovery of matrix spike was outside established quality control limits.
NAI = Not analyzed due to uncontrollable interference.
NDD = Not detected due to dilution.

APPENDIX B

PCB Special Study Results Obtained in 2002, and Locations Sampled

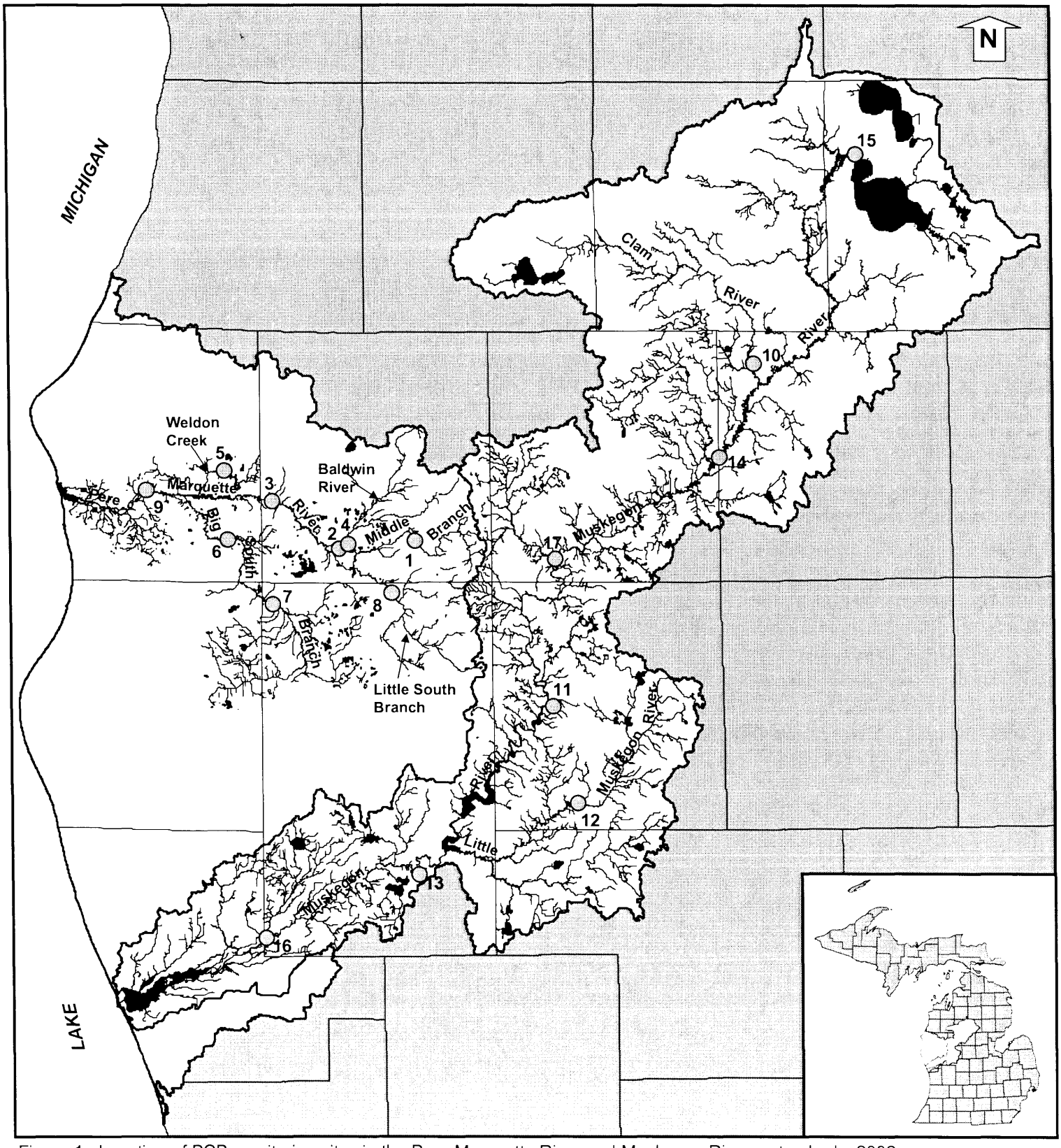


Figure 1. Location of PCB monitoring sites in the Pere Marquette River and Muskegon River watersheds, 2002.

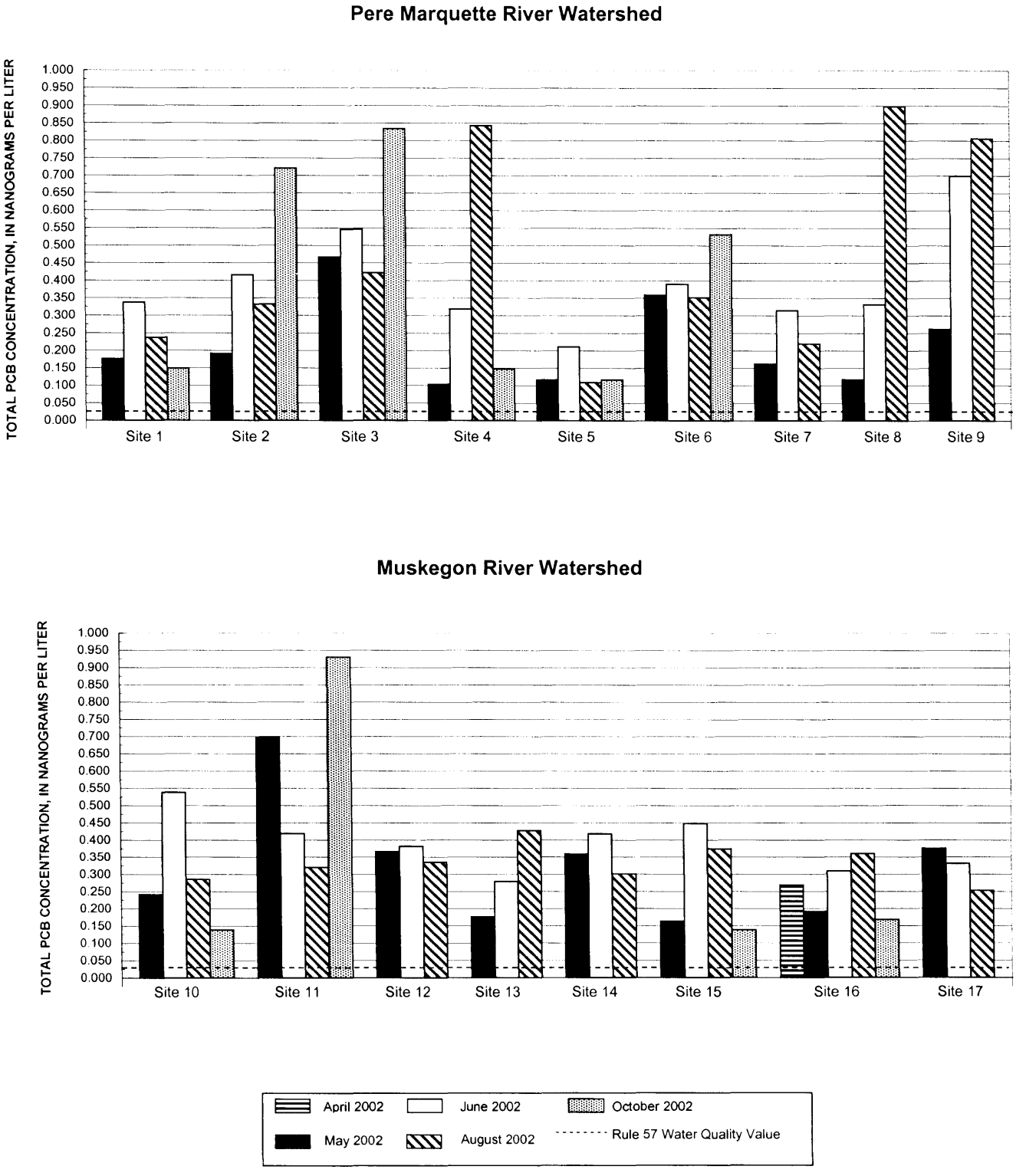


Figure 2. Total PCB concentrations in the Pere Marquette River and Muskegon River watersheds, 2002.