MI/DEQ/WD-04/049

MICHIGAN WATER CHEMISTRY MONITORING
Great Lakes Tributaries

2002 Report

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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 February and November 2002. Results obtained from tributary monitoring efforts undertaken between February and November 2001 are summarized in the July 2003 report (MI/DEQ/WD-03/085). Additional tributary monitoring reports include MI/DEQ/SWQ-02/092, covering efforts undertaken between July and November 2000; and MI/DEQ/SWQ-02/025, covering efforts undertaken between June 1998 and 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 35 stations in 31 tributary watersheds in 2002. Sampling stations were located at or near the mouth of the main stream of each watershed; at a mid-reach location in selected key watersheds; and, for each in-basin year watershed, at a location considered representative of the highest overall water quality in the watershed.

- Nine of 35 stations were sampled intensively (12 times) during periods of high flow and base/low flow, with an emphasis on the former. The remaining 26 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 2002 at the Pere Marquette and Muskegon Rivers, more frequent PCB sampling was carried out throughout these watersheds at a total of 17 stations. This effort was undertaken as part of a special study designed to provide data in support of the MDEQ-Water Division's (WD's) Total Maximum Daily Load (TMDL) development process. The results of this special study are presented and discussed in a separate report.

- Contaminants of interest at selected stations in 2002 included dioxins and furans at the Tittabawassee, West Branch Tittabawassee, Cass, Flint, and Shiawassee Rivers. This sampling effort was undertaken in continued support of a separate project designed to provide a baseline characterization of Saginaw Bay Watershed sediments.

- 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 as additional data become available from the WCMP.

- Total PCB concentrations were lowest in the sample collected at the Thunder Bay River (0.07 nanograms per liter [ng/L]), and highest in the sample collected at the Lower Kalamazoo River (3.9 ng/L).

- Among intensively monitored stations, median normalized total mercury concentrations were lowest at the Au Sable River (0.16 ng/L), and highest at the Menominee and Lower Kalamazoo Rivers (3.4 ng/L and 3.3 ng/L, respectively).

- Among non-intensively monitored stations, median actual total mercury concentrations were lowest at the Thunder Bay River (0.36 ng/L), and highest at the Tahquamenon River (4.8 ng/L).

- Among intensively monitored stations, median normalized total phosphorus and suspended solids (TSS) were lowest at the Au Sable River (total phosphorus = 0.01 milligrams per liter [mg/L]; TSS < 4 mg/L); and chloride was lowest at the Menominee River (4.9 mg/L). Median normalized total phosphorus and chloride were highest at the Clinton River (total phosphorus = 0.17 mg/L; chloride = 126 mg/L); and median normalized TSS were highest at the Saginaw River (22 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 Paint and Tahquamenon Rivers (2 mg/L); and TSS was less than the quantification level of 4.0 mg/L at the Escanaba, Paint and Thunder Bay Rivers, and Perry Creek. Median actual total phosphorus and TSS were highest at the Flint River (total phosphorus = 0.12 mg/L; TSS = 35 mg/L); and chloride was highest at the Huron River Headwaters (112 mg/L).

- Among minimally impacted sites and downstream, potentially impacted sites, concentrations of most contaminants were generally lower at minimally impacted sites. The most notable exception was Perry Creek, which exhibited significantly higher concentrations of total chloride, mercury, chromium, copper and lead compared with its downstream, potentially impacted site, the Au Sable River ($p < 0.05$).

- All samples analyzed for total CN met the Michigan Rule 57 water quality value for free CN (5.2 micrograms per liter [ug/L]).

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

- All samples analyzed for total chromium, copper, and lead met applicable Michigan Rule 57 water quality values.

- Of the 35 stations sampled for mercury, 5 (the Au Sable, Cheboygan and Upper St. Joseph Rivers, Perry Creek, and the Huron River Headwaters) showed no exceedances of the Michigan Rule 57 water quality value for mercury (1.3 ng/L). At 23 of 35 sites, representing a total of 109 samples, total Hg exceeded 1.3 ng/L in at least 50 percent of samples collected. The remaining 7 monitoring stations showed at least 1 sample in exceedance of the Hg Rule 57 water quality value.

- All samples analyzed for total PCB exceeded the Michigan Rule 57 water quality value of 0.026 ng/L at all 35 stations.

- Adjusted concentrations of 2,3,7,8-TCDD (dioxin) were zero picograms per liter [pg/L] in all 8 samples analyzed from the Tittabawassee, Cass, Flint, Shiawassee, and West Branch Tittabawassee Rivers; all 8 samples met the Michigan Rule 57 water quality value of 0.0031 pg/L for dioxin. In contrast, 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 6 of the 8 samples analyzed. Only the Shiawassee and West Branch Tittabawassee Rivers had total TECs which met the Michigan Rule 57 water quality value of 0.0086 pg/L applicable to total TEC. In the 6 exceeding samples, total TECs ranged from 0.026 pg/L at the Cass River, to 0.25 pg/L at the Tittabawassee River.

SECTION 2.0

INTRODUCTION

In June 1998, the MDEQ-WD initiated its 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-WD 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 February through November 2002 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-WD, or at www.michigan.gov).

Results obtained from tributary monitoring efforts undertaken February through November 2001 are summarized in the July 2003 WCMP report (MI/DEQ/WD-03/085); results obtained from tributary monitoring efforts undertaken July through November 2000 are summarized in the June 2002 WCMP 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 WCMP report (MI/DEQ/SWQ-02/025). Results obtained from monitoring efforts undertaken in 2000 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/WD-03/060); and results obtained at these bay stations in 1998 and 1999 are presented and discussed with previously unpublished results in the January 2001 report by the same name (MI/DEQ/SWQ-01/017). Results obtained from monitoring efforts undertaken between June 1998 and November 2000 on Great Lakes connecting waters are presented and discussed with previously unpublished results in the report entitled, "Great Lakes Connecting Channels Data Evaluation and Trend Analysis Report" (MI/DEQ/WD-03/071). These reports are available upon request from the MDEQ-WD, 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 2002, 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. The WCMP is coordinated by the MDEQ-WD.

SECTION 3.0

STUDY DESIGN AND METHODS

A total of 35 stations in 31 tributary watersheds were monitored between February and November 2002 as part of the WCMP. This report summarizes all available analytical results from samples collected during this period.

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 basin cycle defined and utilized by the National Pollutant Discharge Elimination System (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 basin years. Figure 1 shows the watershed units allocated to basin year 1, which coincides with 2002. Figures 2 and 3 show the watershed units allocated to basin years 2, 3, 4 and 5, which coincide with 2003, 2004, 2005 and 2006, 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 basin 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 basin year: Au Sable, Clinton, Lower Grand, Lower Kalamazoo, Lower Muskegon, and Saginaw River Watersheds (Figure 4). 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.

The study design of the WCMP calls for intensive sites to be 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 1 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 5). Integrator sites represent water quality conditions of major streams and rivers in large, heterogeneous basins. Monitoring stations at 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.

The study design of the WCMP calls for integrator sites to be 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, the study design of the WCMP calls for integrator sites to be 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

Basin year 1 (2002) watersheds included the Au Sable, Huron, Menominee, and Tittabawassee River Watersheds. The minimally impacted sites selected to represent each of these in-basin year watersheds included Perry Creek, the Huron River Headwaters, Paint River, and the West Branch Tittabawassee River, respectively. These sites were believed to represent the best water quality that can be expected within each in-basin 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.

The study design of the WCMP calls for minimally impacted sites to be 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 Hydrolab™ or YSI™ water quality monitoring sonde.

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 2002, monitoring for total CN continued at a rate of 1 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 2002 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 1631C (USEPA 2001). 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

The study design of the WCMP calls 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-WD 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 2002, one dioxin/furan sample, replicate and blank were collected at the Tittabawassee River during each sampling event, and at the Cass, Flint, Shiawassee, and West Branch Tittabawassee River during one sampling event. The sample collection and handling protocol used were those specified by MDEQ-WHMD (available upon request from the MDEQ-WD). Samples were collected from a single point in the flow of the stream at approximately 0.3 – 1.0m

depth. Analyses were performed by Triangle Laboratories, Incorporated, in accordance with USEPA Method 1613B (USEPA 1994).

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 early stage of the WCMP, temporal trend analyses are not yet possible.

Detecting 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 serve to obscure smaller, non-climatological contaminant trends (Harned et al. 1981). Where sample size permits, the effects of stream discharge can be controlled for using Locally Weighted Scatterplot Smoothing (LOWESS), (Helsel 1991). Spatial trend analyses presented for intensively monitored sites were prepared with data normalized using LOWESS, as will temporal trend analyses presented in future WCMP reports.

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. Often in such cases, the laboratory reports either the analyte's quantification level coded with a K, or (as with total CN, base/neutral organics, MTBE and BTEX), it reports only ND. In other cases, however, the laboratory reports the "lowest normally reportable value," coded with a W. Lowest normally reportable values represent the lowest concentration that the analytical device can read, rounded to the appropriate number of significant figures. In cases where the laboratory does report observed concentrations below quantification, such results are reported with a T code.

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 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 HT by the laboratory. Results coded HT 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 14. 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).

3.3.2 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.

Currently the WCMP does not incorporate a randomized sampling design component. For this reason its ability to yield spatial comparison information is restricted to those sites that were actually sampled; the sampling design of the WCMP does not support extrapolation of the results to sites that were not sampled. The MDEQ-WD is in the process of developing a randomized sampling design component; implementation of this component is planned for 2005.

3.3.4 Loading Rate Estimates

Loading rate estimates were calculated for all water quality indicators. 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 dioxins and furans, total PCB, total CN, base/neutral organics, MTBE, and BTEX 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); for Cr, Cu, and Pb, the applicable Rule 57 water quality value is the final chronic value (FCV); and for total PCB, the applicable Rule 57 water quality value is the human cancer value (HCV). 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 for 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 dioxins and furans, the concentration of 2,3,7,8-TCDD is compared with the WV, and 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 possible in this early stage of the WCMP. These analyses will be prepared and presented in future WCMP reports when a sufficient number of years of data are available to support them. 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 212 water samples between February and November 2002. The PCB sample collected at the West Branch Tittabawassee River on November 14, 2002 was invalidated due to contamination. Table 8 lists all existing 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 25, 26 and 27, 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. In 2002, 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 contaminant concentration, and the resulting graphs (Figures 7 - 13) are discussed below. Graphs represent concentrations normalized to stream discharge and logarithmically transformed.

4.2.1.1 Phosphorus, Chloride and Suspended Solids

Among intensively monitored stations, median normalized total phosphorus and TSS were lowest at the Au Sable River (total phosphorus = 0.01 mg/L; TSS < 4 mg/L); and chloride was lowest at the Menominee River (4.9 mg/L). Median normalized total phosphorus and chloride were highest at the Clinton River (total phosphorus = 0.17 mg/L; chloride = 126 mg/L); and median normalized TSS were highest at the Saginaw River (22 mg/L).

4.2.1.2 Mercury and Trace Metals

The graphs presented in Figures 10 - 13 show intensively monitored sites ranked lowest to highest according to median normalized total Hg, Cr, Cu and Pb concentration. Among intensively monitored sites, the Au Sable River ranked lowest in all contaminants (median normalized total Hg = 0.16 ng/L; Cr = 0 ug/L; Cu = 0.2 ug/L; Pb = 0.04 ug/L); the Clinton River ranked highest in median normalized total Cr, Cu and Pb (Cr = 1.5 ug/L; Cu = 4.3 ug/L; Pb = 1.7

ug/L); and the Menominee and Lower Kalamazoo Rivers ranked highest in median normalized total Hg (3.4 ng/L and 3.3 ng/L, respectively).

4.2.2 Spatial Comparisons Among Non-Intensively Monitored Sites

Monitoring for total phosphorus, chloride, TSS, Hg, Cr, Cu, and Pb took place at 26 non-intensively monitored sites including minimally impacted sites (Table 1). These sites were ranked lowest to highest according to median contaminant concentration, and the resulting graphs (Figures 14 - 20) are discussed below. Graphs represent actual contaminant concentrations logarithmically transformed.

4.2.2.1 Phosphorus, Chloride and Suspended Solids

The graphs presented in Figures 14 - 16 show non-intensively monitored sites ranked lowest to highest according to median total phosphorus, chloride and TSS concentration, respectively. Among these sites, median actual total phosphorus was lowest at the Cheboygan River (0.01 mg/L); chloride was lowest at the Paint and Tahquamenon Rivers (2 mg/L); and TSS was less than the quantification level of 4.0 mg/L at the Escanaba, Paint and Thunder Bay Rivers, and Perry Creek. Median actual total phosphorus and TSS were highest at the Flint River (total phosphorus = 0.12 mg/L; TSS = 35 mg/L); and chloride was highest at the Huron River Headwaters (112 mg/L)..

4.2.2.2 Mercury and Trace Metals

The graphs presented in Figures 17 - 20 show non-intensively monitored sites ranked lowest to highest according to median total Hg, Cr, Cu, and Pb concentration, respectively. Among these sites, the Thunder Bay River ranked lowest in total Hg (0.36 ng/L); the Cheboygan River ranked lowest in total Cr and Pb (0.002 ug/L and 0.044 ug/L, respectively); and the Paint River ranked lowest in total Cu (0.33 ug/L). Median total Hg was highest at the Tahquamenon River (4.9 ng/L); Cr was highest at Perry Creek (2.2 ug/L); Cu was highest at the Ontonagon River (4 ug/L); and Pb was highest at the River Rouge (2.3 ug/L).

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 21 - 23 for concentrations of water quality indicators measured at each location in 2002. 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 6 gives an explanation of the features of a typical box plot and provides a means of interpreting the box plot graphs presented in Figures 21 – 23.

As expected, concentrations of most contaminants were lower at most minimally impacted sites compared with associated downstream, potentially impacted sites. One exception was Paint Creek, at which total Cr concentrations were higher compared with those found at the Menominee River, although this difference was not significant. The most notable exception was Perry Creek, which exhibited higher concentrations of nearly all contaminants compared with its downstream, potentially impacted site, the Au Sable River; differences were significant for concentrations of total chloride, mercury, chromium, copper and lead ($p < 0.05$).

Because the Au Sable River monitoring station is located downstream of numerous dams, contaminants present have numerous opportunities to settle out before reaching the monitoring site. This may explain the lower contaminant concentrations found in the Au Sable River compared with Perry Creek. If so, it may be difficult to find a site within the Au Sable River Watershed with better water quality than that exhibited by the Au Sable River below the dams. Nevertheless, alternatives to Perry Creek are being considered and a new minimally impacted site will be selected for the Au Sable River Watershed.

4.2.4 Polychlorinated Biphenyls

Total PCB was sampled at least once at all stations monitored in 2002. The graph presented in Figure 24 shows all stations ranked lowest to highest according to total PCB concentration; the 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 Thunder Bay River (0.07 ng/L), and the highest concentration was found in the sample collected at the Lower Kalamazoo River (20 ng/L). The PCB sample collected at the West Branch Tittabawassee River was invalidated due to contamination, therefore no PCB results were available from this station.

In 2002, more frequent PCB sampling was carried out at the Upper and Lower Muskegon Rivers and Pere Marquette River monitoring stations, and at other locations throughout these watersheds. This effort was undertaken as part of a 2-year special study designed to provide data in support of the MDEQ-WD's TMDL development process. The 2002 results of this special PCB monitoring study are presented in a separate report available upon request from the USGS (Fogarty 2004); this report will be updated and expanded to include the 2003 results.

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 28 - 36).

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 Au Sable River (8 metric tons per year [mt/year], 6,800 mt/year, and 30 mt/year, respectively). The most significant contributor of total phosphorus, chloride and TSS loadings was the Saginaw River (500 mt/year, 250,000 mt/year, and 180,000 mt/year, respectively).

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 contributor of total Hg, Cr, Cu and Pb was the Au Sable River (0.37 kilograms per year [kg/year], 25 kg/year, 230 kg/year, and 37 kg/year, respectively). The most significant contributor of total Hg was the Menominee River (28 kg/year); and the most significant contributor of total Cr, Cu and Pb was the Saginaw River (6,200 kg/year, 10,500 kg/year, and 8,000 kg/year, respectively).

4.4 COMPARISONS WITH MICHIGAN RULE 57 WATER QUALITY VALUES

Individual sample concentrations and, for contaminants sampled multiple times at a single monitoring station, the mean concentration of each analyte, 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 samples analyzed for total CN were below analytical quantification (5.0 ug/L) at all stations. The Michigan Rule 57 water quality value based on free CN is 5.2 ug/L. Therefore, all samples analyzed for total CN met the Michigan Rule 57 water quality value for CN.

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. As shown in Table 11, one of these contaminants (bis(2-ethylhexyl)phthalate) was found in concentrations above analytical quantification (QL = 2 ug/L) in one sample. This sample, collected at the Upper Muskegon River, contained a bis(2-ethylhexyl)phthalate concentration of 2.1 ug/L. This result meets the bis(2-ethylhexyl)phthalate Rule 57 water quality value (HCV = 32 ug/L).

Table 4 lists MTBE and BTEX with their quantification levels and Rule 57 water quality values. All MTBE samples collected in 2002 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 one sample (from the Black River) 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 Black River contained 2.5 ug/L benzene, 3.3 ug/L toluene and 7.4 ug/L total xylene, each well below

applicable Rule 57 water quality values. The concentration of ethylbenzene in this sample was 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 12. 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 (see Figure 37).

No exceedances were found in any samples analyzed for total Cr, Cu or Pb. All samples collected for total Hg at 5 of 35 monitoring stations met the Hg Rule 57 water quality value of 1.3 ng/L; specifically, the Au Sable, Cheboygan and Upper St. Joseph Rivers, Perry Creek, and the Huron River Headwaters. At 23 of 35 sites, representing a total of 109 samples, total Hg exceeded 1.3 ng/L in at least 50 percent of samples collected. The remaining 7 monitoring stations showed at least 1 sample in exceedance of the Hg Rule 57 water quality value.

4.4.4 Polychlorinated Biphenyls

Total PCB concentrations measured at each monitoring station are shown in Table 13. Results showed that total PCB exceeded the PCB Rule 57 water quality value of 0.026 ng/L in all samples analyzed at all stations. The lowest concentration of total PCB was found in the sample collected at the Thunder Bay River (0.07 ng/L), and the highest concentration was found in the sample collected at the Lower Kalamazoo River (20 ng/L).

4.4.5 Dioxins and Furans

Adjusted concentrations of 2,3,7,8-TCDD (dioxin) were zero pg/L in all 8 samples analyzed from the Tittabawassee, Cass, Flint, Shiawassee, and West Branch Tittabawassee Rivers; all 8 samples met the Michigan Rule 57 water quality value of 0.0031 pg/L for dioxin. In contrast, 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 6 of the 8 samples analyzed. Only the Shiawassee and West Branch Tittabawassee Rivers had total TECs which met the Michigan Rule 57 water quality value of 0.0086 pg/L applicable to total TEC. In the 6 exceeding samples, total TECs ranged from 0.026 pg/L at the Cass River, to 0.25 pg/L at the Tittabawassee River.

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SECTION 5.0

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Table 1. 2002 WCMP 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.	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 2002 Intensively Monitored				
Huron	2000' DS of Rockwood WWTP, Berlin Twp.	Monroe	580364	42.04528 °N, - 83.21417 °W
Menominee	26th St. bridge, city of Menominee	Menominee	550038	45.10625 °N, - 87.63556 °W
Tittabawassee	Central Rd. bridge, Spaulding Twp.	Saginaw	730025	43.39278 °N, - 84.01111 °W
Integrator Sites - Year 2002 Non-Intensively Monitored				
Black	Water St. boat launch DS of RR bridge	St. Clair	740385	42.97356 °N, - 82.42029 °W
Boardman	Beitner Rd., Garfield Twp., Sec. 3	Grand Traverse	280014	44.67528 °N, - 85.63070 °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
Flint	M-13, Spaulding Twp.	Saginaw	730285	43.30857 °N, - 83.95328 °W
Grand (Upper)	M-66 bridge, Ionia Twp. Sec. 30	Ionia	340025	42.97195 °N, - 85.07000 °W
Kalamazoo (Upper)	G Ave. bridge, 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
Muskegon (Upper)	Hersey Rd. bridge, 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
Raisin	ERA Dock, city of Monroe	Monroe	580046	41.90056 °N, - 83.35444 °W
Rouge	W. Jefferson Ave. Bridge	Wayne	820070	42.28056 °N, - 83.12889 °W
Shiawassee	Fergus Rd. Bridge, 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. Bridge, Alpena Twp.	Alpena	040123	45.06694 °N, - 83.47194 °W
Minimally Impacted Sites - Year 2002 (Non-Intensively Monitored)				
Perry Creek[1]	McKinley Rd (F32), Sec. 9	Oscoda	680056	44.65805 °N, - 84.08313 °W
Huron (Headwaters)[2]	Whitmore Lake Rd (Old U.S. 23), Green Oak Twp.	Livingston	470521	42.47139 °N, - 83.75639 °W
Paint River[3]	USFS 137, N. of Gibbs City	Iron	360124	46.22945 °N, - 88.70008 °W
W. Br. Tittabawassee[4]	Fitzwater Rd, Butman Twp.	Gladwin	260068	44.10417 °N, - 84.38861 °W

[1]Au Sable River watershed

[2]Huron River watershed

[3]Menominee River watershed

[4]Tittabawassee River watershed

Table 2. Nutrients and conventionals analyzed for the WCMP, and their analytical quantification levels.

Analyte	Quantification Level (mg/L)
Ammonia	0.010
Carbon, Total Organic	0.5
Chloride	1.0
Conductivity*	
Cyanide@	0.005
Hardness (Ca2CO3)	5.0
Nitrate#	
Nitrite	0.002
Nitrogen, Kjeldahl	0.10
Oxygen, Dissolved*	
pH*	
Phosphate, Ortho	0.003
Phosphorous, Total	0.005
Solids, Total Dissolved#	
Solids, Total Suspended	4.0
Sulfate	2.0
Temperature*	
Turbidity	1.0^

* = Field measured; may additionally be measured in the laboratory.
@ = Michigan Rule 57 water quality value = 0.0052 mg/L.
# = Calculated from other independent parameters.
^ = 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.

Prior to June 1, 2002*:

Analyte	Detection Level	Quantification Level	Units
Hg	0.1	0.3	ng/L
Cd	0.01	0.03	ug/L
Cr	0.02	0.06	ug/L
Cu	0.01	0.04	ug/L
Pb	0.005	0.015	ug/L
Ni	0.09	0.3	ug/L
Zn	0.04	0.13	ug/L

Since June 1, 2002*:

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

* = The WSLH's analytical instrumentation was changed in June 2002.

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.
	C	Value calculated from other independent parameters.
	DM	Dilution required due to matrix problems.
	HT	Recommended laboratory holding time was exceeded before analysis.
	INT	Interference encountered during analysis resulted in no obtainable value.
	K	Concentration below the quantification level shown.
	NAV	Requested analysis not available.
	NH	Non-homogenous sample made analysis of a representative sample questionable.
	PI	Possible interference may have affected the accuracy of the laboratory result.
	QC	Quality control problems exist.
	ST	Recommended sample preservation technique not used.
	T	Value reported is less than the quantification level.
	W	Observed result was below the lowest normally reportable value shown.
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 station sampling history.

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

[1]Basin Year 1 minimally impacted site.

[5]Basin Year 5 minimally impacted site.

Table 9. 2002 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	251,548	23%	74.00	4,520
	Grand River (Lower)	160,587	4%	55.17	3,800
	Tittabawassee River	89,695	22%	79.92	1,960
	Kalamazoo River (Lower)	61,599	10%	44.25	1,270
	Clinton River	57,285	8%	126.08	485
	Huron River	41,189	5%	99.42	474
	Muskegon River (Lower)	31,296	4%	19.67	2,000
	Menominee River	23,374	8%	5.33	5,260
	Au Sable River	6,808	9%	6.75	1,260
Tot Phosphorus		metric tons/year	(+/-)	mg/L	cfs
	Saginaw River	513	72%	0.12	4,520
	Grand River (Lower)	322	11%	0.08	3,800
	Menominee River	209	34%	0.04	5,260
	Kalamazoo River (Lower)	202	95%	0.07	1,270
	Tittabawassee River	125	25%	0.07	1,960
	Clinton River	83	24%	0.18	485
	Muskegon River (Lower)	37	22%	0.02	2,000
	Huron River	16	19%	0.04	474
	Au Sable River	8	17%	0.01	1,260
TSS		metric tons/year	(+/-)	mg/L	cfs
	Saginaw River	180,572	133%	37.17	4,520
	Grand River (Lower)	91,974	19%	20.42	3,800
	Menominee River	58,344	68%	10.58	5,260
	Tittabawassee River	35,958	71%	21.75	1,960
	Clinton River	24,422	50%	34.92	485
	Kalamazoo River (Lower)	22,478	27%	16.67	1,270
	Muskegon River (Lower)	14,159	15%	7.08	2,000
	Huron River	4,637	39%	12.92	474
	Au Sable River	30	47%	5.92	1,260

+ = 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. 2002 loading rate estimates for total mercury and trace metal water quality indicators.

Parameter	Station	Loading Rate+	95% C.I.	Mean Concentration+	Mean Flow+*
Chromium		kg/year	(+/-)	ug/L	cfs
	Saginaw River	6,240	95%	1.35	4,520
	Grand River (Lower)	3,571	33%	0.72	3,800
	Menominee River	1,946	32%	0.38	5,260
	Tittabawassee River	1,298	36%	0.67	1,960
	Clinton River	1,186	33%	1.94	485
	Kalamazoo River (Lower)	839	47%	0.44	1,720
	Muskegon River (Lower)	210	54%	0.08	2,000
	Huron River	156	28%	0.42	474
	Au Sable River	25	22%	0.02	1,260
Copper		kg/year	(+/-)	ug/L	cfs
	Saginaw River	10,529	46%	2.41	4,520
	Grand River (Lower)	7,930	13%	1.76	3,800
	Menominee River	4,745	12%	0.95	5,260
	Tittabawassee River	3,151	10%	1.82	1,960
	Kalamazoo River (Lower)	2,117	22%	1.21	1,720
	Clinton River	2,116	23%	4.06	485
	Muskegon River (Lower)	1,051	9%	0.53	2,000
	Huron River	702	8%	1.52	474
	Au Sable River	232	15%	0.22	1,260
Lead		kg/year	(+/-)	ug/L	cfs
	Saginaw River	7,990	126%	1.64	4,520
	Grand River (Lower)	4,797	28%	0.97	3,800
	Kalamazoo River (Lower)	1,752	25%	1.06	1,720
	Clinton River	1,649	48%	2.59	485
	Tittabawassee River	1,432	38%	0.75	1,960
	Menominee River	1,406	37%	0.28	5,260
	Huron River	560	19%	1.27	474
	Muskegon River (Lower)	272	41%	0.12	2,000
	Au Sable River	37	30%	0.04	1,260
Mercury		kg/year	(+/-)	ng/L	cfs
	Menominee River	28	22%	4.81	5,260
	Saginaw River	19	111%	3.67	4,520
	Grand River (Lower)	13	35%	2.48	3,800
	Kalamazoo River (Lower)	6	13%	3.38	1,270
	Tittabawassee River	6	17%	2.53	1,960
	Clinton River	3	40%	4.82	485
	Muskegon River (Lower)	2	20%	0.72	2,000
	Huron River	1	20%	1.43	474
	Au Sable River	0.37	55%	0.25	1,260

+ = 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. Rule 57 water quality values and sample concentrations for base/neutral organics. Results shown are restricted to those found above the quantification level.

STORET ID	Station	Bis(2-ethylhexyl) phthalate (ug/L)
670008	**Muskegon River (Upper)**	
	R.57 Water Quality Value	32.0
	Sample Concentration	2.1

Table 12. 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+		0.248	0.017	0.224	0.044
Range of Concentrations		0.01 - 0.56	0 - 0.111	0.135 - 0.523	0.025 - 0.090
Exceedance Rate*		0 / 12	0 / 12	0 / 12	0 / 12
740385	**Black River**				
R.57 Water Quality Value@		1.3	150.0	19.0	26.0
Mean Concentration+		1.318	0.512	2.465	0.626
Range of Concentrations		0.54 - 2.98	0.146 - 1.24	1.13 - 4.08	0.218 - 1.66
Exceedance Rate*		1 / 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+		1.395	0.116	0.325	0.186
Range of Concentrations		0.25 - 2.34	0 - 0.248	0.124 - 0.444	0.024 - 0.322
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
730024	**Cass River**				
R.57 Water Quality Value@		1.3	170.0	21.0	30.0
Mean Concentration+		2.443	0.964	2.035	0.832
Range of Concentrations		1.71 - 4.22	0.461 - 1.71	1.55 - 2.73	0.491 - 1.18
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+		0.483	0.010	0.591	0.047
Range of Concentrations		0.16 - 0.67	0 - 0.033	0.37 - 0.969	0.036 - 0.065
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+		4.823	1.939	4.058	2.585
Range of Concentrations		0.9 - 15.54	0.45 - 5.45	1.82 - 7.32	0.519 - 8.38
Exceedance Rate*		10 / 12	0 / 12	0 / 12	0 / 12
210102	**Escanaba River**				
R.57 Water Quality Value@		1.3	74.0	8.9	10.0
Mean Concentration+		2.160	0.290	0.662	0.153
Range of Concentrations		0.92 - 3.28	0.216 - 0.369	0.508 - 0.87	0.123 - 0.206
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
730285	**Flint River**				
R.57 Water Quality Value@		1.3	160.0	21.0	29.0
Mean Concentration+		5.595	1.175	2.810	2.320
Range of Concentrations		1.2 - 11.98	0.556 - 1.79	1.9 - 3.65	1.07 - 3.72
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. 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)
700123	**Grand River (Lower)**				
R.57 Water Quality Value@		1.3	160.0	20.0	29.0
Mean Concentration+		2.481	0.717	1.761	0.966
Range of Concentrations		0.66 - 6.76	0.17 - 2.08	1.18 - 2.95	0.293 - 2.33
Exceedance Rate*		6 / 12	0 / 12	0 / 12	0 / 12
340025	**Grand River (Upper)**				
R.57 Water Quality Value@		1.3	160.0	21.0	29.0
Mean Concentration+		1.640	0.305	1.795	0.637
Range of Concentrations		0.58 - 2.92	0.112 - 0.495	1.44 - 2.13	0.261 - 0.914
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
580364	**Huron River**				
R.57 Water Quality Value@		1.3	190.0	24.0	36.0
Mean Concentration+		1.427	0.415	1.523	1.270
Range of Concentrations		0.4 - 4.1	0.136 - 1.27	1.03 - 2.38	0.475 - 2.75
Exceedance Rate*		4 / 12	0 / 12	0 / 12	0 / 12
470521	**Huron River (Headwaters)**				
R.57 Water Quality Value@		1.3	160.0	20.0	28.0
Mean Concentration+		0.868	0.104	0.863	0.276
Range of Concentrations		0.3 - 1.28	0.017 - 0.175	0.713 - 0.973	0.08 - 0.482
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
030077	**Kalamazoo River (Lower)**				
R.57 Water Quality Value@		1.3	160.0	19.0	27.0
Mean Concentration+		3.384	0.438	1.215	1.058
Range of Concentrations		1.09 - 5.41	0.077 - 1.21	0.806 - 2.16	0.387 - 2.29
Exceedance Rate*		11 / 12	0 / 12	0 / 12	0 / 12
390057	**Kalamazoo River (Upper)**				
R.57 Water Quality Value@		1.3	170.0	21.0	30.0
Mean Concentration+		2.033	0.511	0.955	0.672
Range of Concentrations		1.3 - 2.96	0.21 - 0.887	0.657 - 1.2	0.331 - 1.01
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
510088	**Manistee River**				
R.57 Water Quality Value@		1.3	100.0	13.0	16.0
Mean Concentration+		1.038	0.168	0.349	0.175
Range of Concentrations		0.31 - 1.74	0.048 - 0.29	0.223 - 0.434	0.112 - 0.221
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
770073	**Manistique River**				
R.57 Water Quality Value@		1.3	57.0	6.8	7.2
Mean Concentration+		3.263	0.274	0.385	0.236
Range of Concentrations		1.92 - 5.05	0.212 - 0.335	0.339 - 0.428	0.213 - 0.247
Exceedance Rate*		4 / 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. 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	71.0	8.6	9.7
Mean Concentration+		4.806	0.376	0.949	0.276
Range of Concentrations		0.88 - 12.1	0.137 - 0.976	0.54 - 1.64	0.079 - 0.851
Exceedance Rate*		11 / 12	0 / 12	0 / 12	0 / 12
610273	**Muskegon River (Lower)**				
R.57 Water Quality Value@		1.3	110.0	14.0	18.0
Mean Concentration+		0.723	0.080	0.527	0.125
Range of Concentrations		0.23 - 1.51	0 - 0.348	0.338 - 0.703	0.041 - 0.309
Exceedance Rate*		3 / 12	0 / 12	0 / 12	0 / 12
670008	**Muskegon River (Upper)**				
R.57 Water Quality Value@		1.3	100.0	13.0	16.0
Mean Concentration+		1.382	0.155	0.522	0.213
Range of Concentrations		0.66 - 2.06	0.036 - 0.252	0.34 - 0.652	0.079 - 0.405
Exceedance Rate*		3 / 5	0 / 5	0 / 5	0 / 5
660038	**Ontonagon River**				
R.57 Water Quality Value@		1.3	47.0	5.5	5.6
Mean Concentration+		3.095	1.532	3.930	0.430
Range of Concentrations		0.3 - 6.05	0.698 - 2.87	2.91 - 4.91	0.222 - 0.739
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
360124	**Paint River**				
R.57 Water Quality Value@		1.3	49.0	5.9	6.0
Mean Concentration+		2.048	0.594	0.421	0.068
Range of Concentrations		0.57 - 5.23	0.496 - 0.657	0.269 - 0.75	0.037 - 0.134
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
530027	**Pere Marquette River**				
R.57 Water Quality Value@		1.3	100.0	13.0	16.0
Mean Concentration+		1.748	0.243	0.432	0.304
Range of Concentrations		0.94 - 3	0.184 - 0.328	0.358 - 0.58	0.121 - 0.59
Exceedance Rate*		4 / 5	0 / 5	0 / 5	0 / 5
680056	**Perry Creek**				
R.57 Water Quality Value@		1.3	120.0	16.0	21.0
Mean Concentration+		0.595	2.395	0.441	0.077
Range of Concentrations		0.4 - 0.83	1.83 - 3.43	0.346 - 0.52	0.047 - 0.135
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
490006	**Pine River**				
R.57 Water Quality Value@		1.3	71.0	8.6	9.7
Mean Concentration+		3.493	1.278	1.223	0.601
Range of Concentrations		1.57 - 6.52	0.831 - 1.8	1.01 - 1.62	0.472 - 0.899
Exceedance Rate*		4 / 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. 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)
580046	**River Raisin**				
R.57 Water Quality Value@		1.3	150.0	19.0	27.0
Mean Concentration+		4.050	1.341	3.520	1.539
Range of Concentrations		1.18 - 12.04	0.18 - 4.23	1.85 - 5.18	0.532 - 4.19
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
820070	**River Rouge**				
R.57 Water Quality Value@		1.3	92.0	11.0	14.0
Mean Concentration+		4.305	2.005	3.468	2.920
Range of Concentrations		2.17 - 7.83	0.883 - 3.77	2.34 - 5.39	1.46 - 5.68
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
090177	**Saginaw River**				
R.57 Water Quality Value@		1.3	150.0	19.0	26.0
Mean Concentration+		3.665	1.352	2.410	1.637
Range of Concentrations		0.4 - 16.85	0.387 - 5.09	1.47 - 5.51	0.472 - 7.32
Exceedance Rate*		9 / 12	0 / 12	0 / 12	0 / 12
730023	**Shiawassee River**				
R.57 Water Quality Value@		1.3	170.0	22.0	31.0
Mean Concentration+		1.815	0.542	1.560	0.580
Range of Concentrations		0.66 - 3.39	0.191 - 0.85	1.15 - 1.79	0.331 - 0.77
Exceedance Rate*		2 / 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+		2.308	0.304	1.348	0.634
Range of Concentrations		1.33 - 3.56	0.102 - 0.481	1.22 - 1.46	0.497 - 0.854
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
750273	**St. Joseph River (Upper)**				
R.57 Water Quality Value@		1.3	160.0	20.0	27.0
Mean Concentration+		1.005	0.091	0.559	0.230
Range of Concentrations		0.65 - 1.22	0.005 - 0.141	0.409 - 0.64	0.197 - 0.265
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
210032	**Sturgeon River**				
R.57 Water Quality Value@		1.3	62.0	7.4	8.1
Mean Concentration+		4.503	0.397	0.485	0.309
Range of Concentrations		2.46 - 6.81	0.357 - 0.453	0.414 - 0.647	0.245 - 0.365
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
170141	**Tahquamenon River**				
R.57 Water Quality Value@		1.3	45.0	5.3	5.2
Mean Concentration+		4.943	0.411	0.492	0.357
Range of Concentrations		2.49 - 7.48	0.266 - 0.565	0.393 - 0.606	0.173 - 0.543
Exceedance Rate*		4 / 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. 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+		0.773	0.054	0.333	0.157
Range of Concentrations		0.3 - 2.06	0 - 0.172	0.155 - 0.504	0.059 - 0.251
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
730025	**Tittabawassee River**				
R.57 Water Quality Value@		1.3	140.0	18.0	24.0
Mean Concentration+		2.532	0.672	1.823	0.747
Range of Concentrations		0.48 - 6.95	0.057 - 2.25	1.24 - 2.75	0.11 - 2.53
Exceedance Rate*		6 / 12	0 / 12	0 / 12	0 / 12
260068	**West Branch Tittabawassee**				
R.57 Water Quality Value@		1.3	120.0	15.0	20.0
Mean Concentration+		0.910	0.090	0.404	0.147
Range of Concentrations		0.58 - 1.46	0 - 0.213	0.292 - 0.558	0.071 - 0.233
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 13.1 Concentrations of total PCB measured at Michigan rivers on sampling dates shown. 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	7/10/2002	0.211
740385	Black River	6/4/2002	0.657
280014	Boardman River	5/30/2002	0.273
730024	Cass River	8/21/2002	1.038
160073	Cheboygan River	7/9/2002	0.247
500233	Clinton River	9/17/2002	4.231
210102	Escanaba River	5/7/2002	0.151
730285	Flint River	7/11/2002	1.763
700123	Grand River (Lower)	4/10/2002	1.679
340025	Grand River (Upper)	4/23/2002	1.375
580364	Huron River	6/5/2002	2.668
470521	Huron River (Headwaters)	8/28/2002	2.236
030077	Kalamazoo River (Lower)	7/30/2002	20.443
390057	Kalamazoo River (Upper)	7/17/2002	3.868
510088	Manistee River	5/29/2002	0.265
770073	Manistique River	8/14/2002	2.357
550038	Menominee River	6/18/2002	0.541
610273	Muskegon River (Lower)	4/11/2002	0.269
		5/16/2002	0.193
		6/27/2002	0.309
		8/8/2002	0.360
		10/10/2002	0.169
670008	Muskegon River (Upper)	5/14/2002	0.376
		6/25/2002	0.331
		8/6/2002	0.253
660038	Ontonagon River	7/17/2002	0.329
360124	Paint River	9/24/2002	0.381
530027	Pere Marquette River	5/15/2002	0.262
		6/26/2002	0.699
		8/7/2002	0.806
680056	Perry Creek	8/20/2002	0.221
490006	Pine River	10/21/2002	0.182
580046	River Raisin	4/17/2002	2.246

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

Table 13.2 Concentrations of total PCB measured at Michigan rivers on sampling dates shown. The Rule 57 water quality value for total PCB = 0.026 ng/L.

STORET ID	Station	Sample Collection Date	Total PCB+ (ng/L)
820070	River Rouge	6/18/2002	13.701
090177	Saginaw River	4/18/2002	6.554
730023	Shiawassee River	7/10/2002	0.990
110628	St. Joseph River (Lower)	9/4/2002	1.538
750273	St. Joseph River (Upper)	4/30/2002	0.315
210032	Sturgeon River	8/22/2002	0.209
170141	Tahquamenon River	10/16/2002	0.147
040123	Thunder Bay River	10/22/2002	0.069
730025	Tittabawassee River	5/9/2002	0.827

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

Table 14.1 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 (730025)		Sample Dated 9/19/2002			Tittabawassee River (730025)		Replicate Dated 9/19/2002		
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 3.2	ND 1.2	0.0	0.0000	WV = 0.0031	ND 1.1	ND 1.2	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 3.9	ND 1.2	0.0	0.0000		ND 1.1	ND 1.2	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 3.9	ND 1.1	0.0	0.0000		ND 1.1	ND 1.1	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 4.1	ND 1.2	0.0	0.0000		ND 1.1	ND 1.2	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 3.8	ND 1.2	0.0	0.0000		ND 1.1	ND 1.2	0.0	0.0000	
1234678-HpCDD	0.01	0.05	ND 18.4	J,B 5.8	0.0	0.0000		J,B 10.8	J,B 5.8	5.0	0.0025	
12346789-OCDD	0.001	0.01	138.0	J,B 38.9	99.1	0.0010		J,B 77.4	J,B 38.9	38.5	0.0004	
2378-TCDF	0.1	0.8	10.8	J 9.5	1.3	0.1040		J 7.9	J 9.5	0.0	0.0000	
12378-PeCDF	0.05	0.2	J 14.5	ND 0.9	14.5	0.1450		ND 0.8	ND 0.9	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 2.6	J 4.1	0.0	0.0000		J 2.8	J 4.1	0.0	0.0000	
123478-HxCDF	0.1	0.08	ND 10.0	J,B 6.4	0.0	0.0000		J,B 4.8	J,B 6.4	0.0	0.0000	
123678-HxCDF	0.1	0.2	ND 2.5	J,B 2.2	0.0	0.0000		ND 0.7	J,B 2.2	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 2.7	J,B 1.7	0.0	0.0000		0.8	J,B 1.7	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 4.1	ND 1.1	0.0	0.0000		1.1	ND 1.1	1.1	0.0660	
1234678-HpCDF	0.01	0.01	28.1	J,B 9.5	18.6	0.0019		J,B 14.0	J,B 9.5	4.5	0.0005	
1234789-HpCDF	0.01	0.4	ND 6.6	ND 1.5	0.0	0.0000		ND 1.6	ND 1.5	0.0	0.0000	
12346789-OCDF	0.001	0.02	50.1	J,B 11.9	38.2	0.0008		J,B 22.9	J,B 11.9	11.0	0.0002	
					Σ TEC =	0.2526	HCV = 0.0086			Σ TEC =	0.0696	HCV = 0.0086

			Tittabawassee River (730025)		Sample Dated 11/15/2002			Tittabawassee River (730025)		Replicate Dated 11/15/2002		
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 1.1	ND 0.7	0.0	0.0000	WV = 0.0031	ND 1.6	ND 0.7	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 1.6	ND 1.0	0.0	0.0000		ND 2.5	ND 1.0	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 2.1	ND 1.3	0.0	0.0000		ND 3.4	ND 1.3	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 2.1	ND 1.2	0.0	0.0000		ND 3.3	ND 1.2	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 2.0	ND 1.2	0.0	0.0000		ND 3.1	ND 1.2	0.0	0.0000	
1234678-HpCDD	0.01	0.05	J 12.4	ND 2.5	12.4	0.0062		ND 6.3	ND 2.5	0.0	0.0000	
12346789-OCDD	0.001	0.01	J,B 67.3	ND 4.6	67.3	0.0007		J,B 46.9	ND 4.6	46.9	0.0005	
2378-TCDF	0.1	0.8	ND 4.9	ND 0.6	0.0	0.0000		ND 1.3	ND 0.6	0.0	0.0000	
12378-PeCDF	0.05	0.2	ND 1.0	ND 0.6	0.0	0.0000		ND 1.5	ND 0.6	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 1.0	ND 0.6	0.0	0.0000		ND 1.5	ND 0.6	0.0	0.0000	
123478-HxCDF	0.1	0.08	J 3.7	ND 0.8	3.7	0.0296		J,B 3.6	ND 0.8	3.6	0.0288	
123678-HxCDF	0.1	0.2	ND 1.2	ND 0.7	0.0	0.0000		ND 2.0	ND 0.7	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 1.4	ND 0.8	0.0	0.0000		ND 2.2	ND 0.8	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 1.8	ND 1.1	0.0	0.0000		ND 2.6	ND 1.1	0.0	0.0000	
1234678-HpCDF	0.01	0.01	J 7.1	ND 1.3	7.1	0.0007		ND 3.4	ND 1.3	0.0	0.0000	
1234789-HpCDF	0.01	0.4	ND 3.6	ND 2.1	0.0	0.0000		ND 5.3	ND 2.1	0.0	0.0000	
12346789-OCDF	0.001	0.02	J 14.4	ND 3.8	14.4	0.0003		ND 9.9	ND 3.8	0.0	0.0000	
					Σ TEC =	0.0375	HCV = 0.0086			Σ TEC =	0.0293	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 14.2 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).

			Cass River (730024)			Sample Dated 11/15/2002		Flint River (730285)			Sample Dated 11/15/2002	
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 2.2	ND 0.7	0.0	0.0000	WV = 0.0031	ND 1.5	ND 0.7	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 2.4	ND 1.0	0.0	0.0000		ND 2.3	ND 1.0	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 1.7	ND 1.3	0.0	0.0000		ND 3.1	ND 1.3	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 1.9	ND 1.2	0.0	0.0000		ND 3.0	ND 1.2	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 1.8	ND 1.2	0.0	0.0000		ND 2.9	ND 1.2	0.0	0.0000	
1234678-HpCDD	0.01	0.05	ND 3.1	ND 2.5	0.0	0.0000		J 12.0	ND 2.5	12.0	0.0060	
12346789-OCDD	0.001	0.01	ND 17.1	ND 4.6	0.0	0.0000		ND 40.1	ND 4.6	0.0	0.0000	
2378-TCDF	0.1	0.8	ND 1.6	ND 0.6	0.0	0.0000		ND 1.3	ND 0.6	0.0	0.0000	
12378-PeCDF	0.05	0.2	ND 1.5	ND 0.6	0.0	0.0000		ND 1.4	ND 0.6	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 1.3	ND 0.6	0.0	0.0000		ND 1.3	ND 0.6	0.0	0.0000	
123478-HxCDF	0.1	0.08	J,B 3.2	ND 0.8	3.2	0.0256		ND 1.7	ND 0.8	0.0	0.0000	
123678-HxCDF	0.1	0.2	ND 1.3	ND 0.7	0.0	0.0000		ND 1.9	ND 0.7	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 1.2	ND 0.8	0.0	0.0000		ND 2.0	ND 0.8	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 1.6	ND 1.1	0.0	0.0000		J 3.2	ND 1.1	3.2	0.1920	
1234678-HpCDF	0.01	0.01	ND 4.0	ND 1.3	0.0	0.0000		ND 6.7	ND 1.3	0.0	0.0000	
1234789-HpCDF	0.01	0.4	ND 2.4	ND 2.1	0.0	0.0000		ND 44.0	ND 2.1	0.0	0.0000	
12346789-OCDF	0.001	0.02	J,B 16.7	ND 3.8	16.7	0.0003		ND 8.9	ND 3.8	0.0	0.0000	
					Σ TEC =	0.0259	HCV = 0.0086			Σ TEC =	0.1980	HCV = 0.0086

			Shiawassee River (730023)			Sample Dated 11/15/2002		West Branch Tittabawassee River (260068)			Sample Dated 11/15/2002	
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 1.0	ND 0.7	0.0	0.0000	WV = 0.0031	ND 1.3	ND 0.7	0.0	0.0000	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 1.1	ND 1.0	0.0	0.0000		ND 1.4	ND 1.0	0.0	0.0000	
123478-HxCDD	0.1	0.3	ND 1.0	ND 1.3	0.0	0.0000		ND 1.2	ND 1.3	0.0	0.0000	
123678-HxCDD	0.1	0.1	ND 1.2	ND 1.2	0.0	0.0000		ND 1.3	ND 1.2	0.0	0.0000	
123789-HxCDD	0.1	0.1	ND 1.1	ND 1.2	0.0	0.0000		ND 1.3	ND 1.2	0.0	0.0000	
1234678-HpCDD	0.01	0.05	ND 2.1	ND 2.5	0.0	0.0000		ND 2.3	ND 2.5	0.0	0.0000	
12346789-OCDD	0.001	0.01	ND 3.7	ND 4.6	0.0	0.0000		ND 4.0	ND 4.6	0.0	0.0000	
2378-TCDF	0.1	0.8	ND 0.8	ND 0.6	0.0	0.0000		ND 1.0	ND 0.6	0.0	0.0000	
12378-PeCDF	0.05	0.2	ND 0.9	ND 0.6	0.0	0.0000		ND 1.0	ND 0.6	0.0	0.0000	
23478-PeCDF	0.5	1.6	ND 0.7	ND 0.6	0.0	0.0000		ND 0.8	ND 0.6	0.0	0.0000	
123478-HxCDF	0.1	0.08	ND 0.7	ND 0.8	0.0	0.0000		ND 0.8	ND 0.8	0.0	0.0000	
123678-HxCDF	0.1	0.2	ND 0.7	ND 0.7	0.0	0.0000		ND 0.7	ND 0.7	0.0	0.0000	
234678-HxCDF	0.1	0.7	ND 0.9	ND 0.8	0.0	0.0000		ND 0.8	ND 0.8	0.0	0.0000	
123789-HxCDF	0.1	0.6	ND 1.0	ND 1.1	0.0	0.0000		ND 1.1	ND 1.1	0.0	0.0000	
1234678-HpCDF	0.01	0.01	ND 0.9	ND 1.3	0.0	0.0000		ND 1.1	ND 1.3	0.0	0.0000	
1234789-HpCDF	0.01	0.4	ND 1.4	ND 2.1	0.0	0.0000		ND 1.6	ND 2.1	0.0	0.0000	
12346789-OCDF	0.001	0.02	ND 2.7	ND 3.8	0.0	0.0000		ND 3.0	ND 3.8	0.0	0.0000	
					Σ TEC =	0.0000	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.

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.

Figure 1. Year 2002 monitoring watersheds (Basin Year 1).

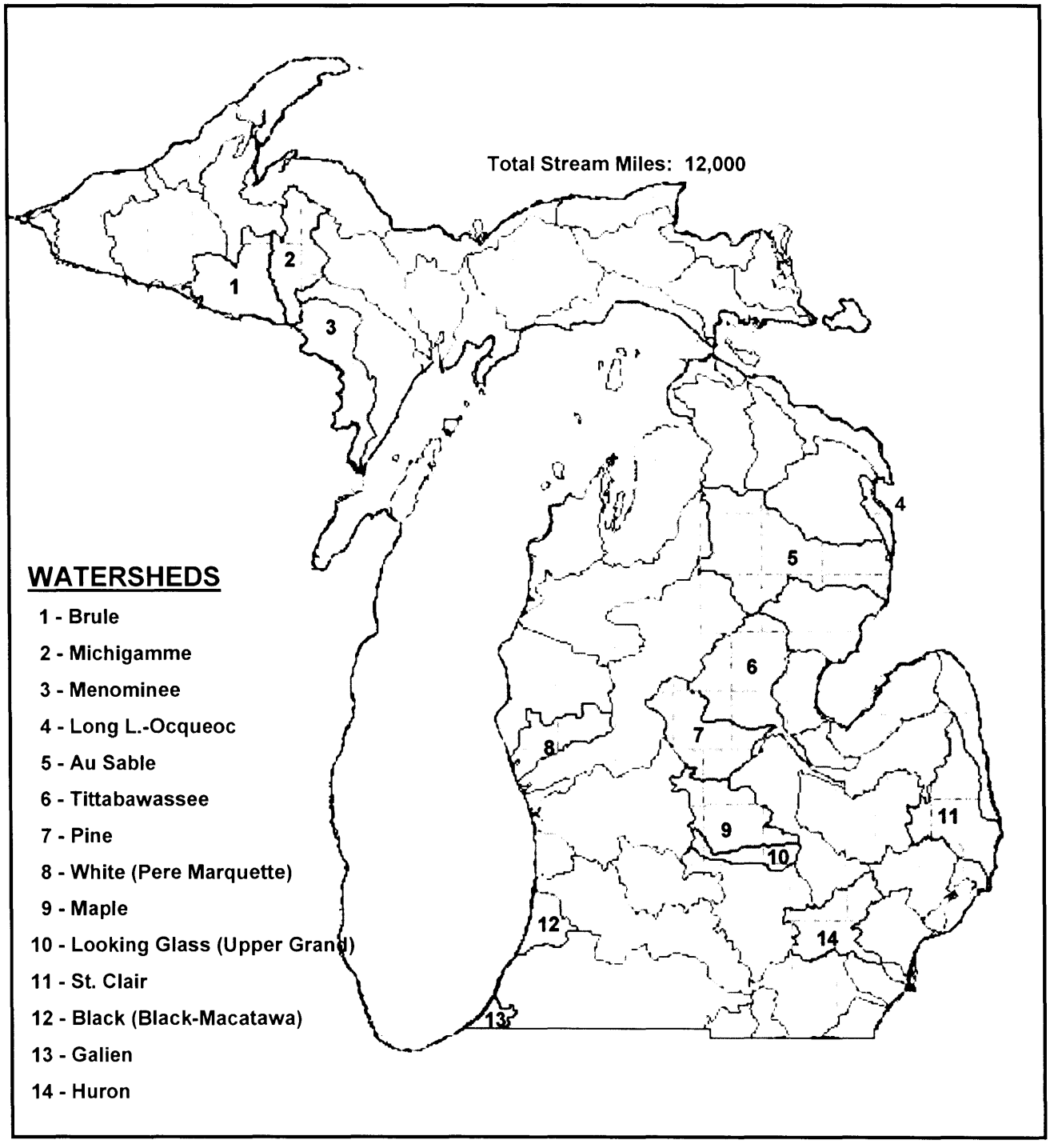


Figure 2. Year 2003 and Year 2004 monitoring watersheds.

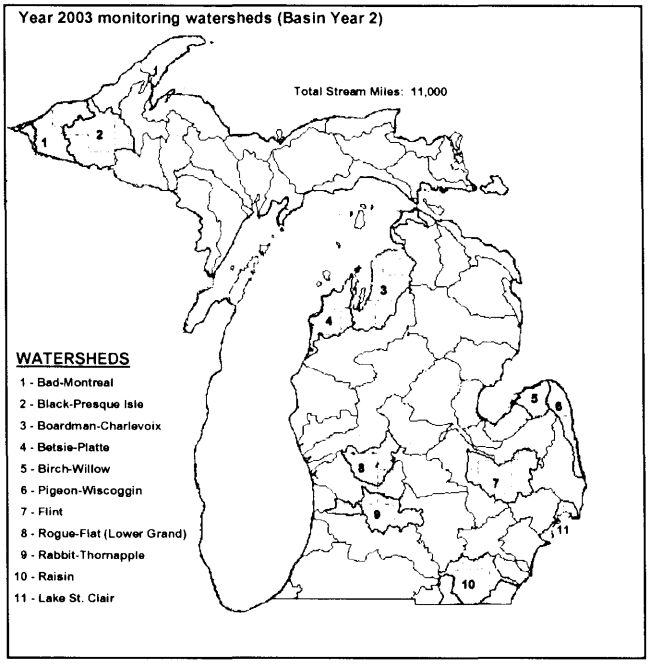


Figure 3. Year 2005 and Year 2006 monitoring watersheds.

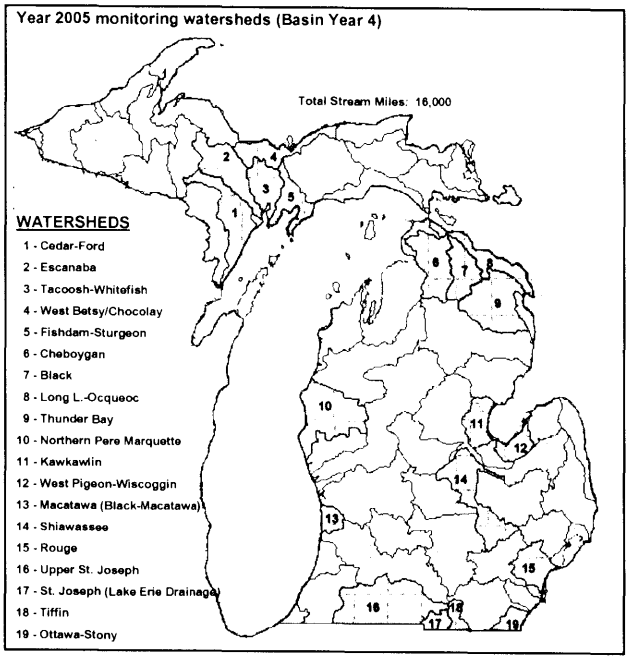


Figure 4. Intensive water chemistry trend monitoring locations and associated watersheds.

Figure 5. Integrator water chemistry trend monitoring locations and associated watersheds.

Figure 6. Diagram of a box plot.

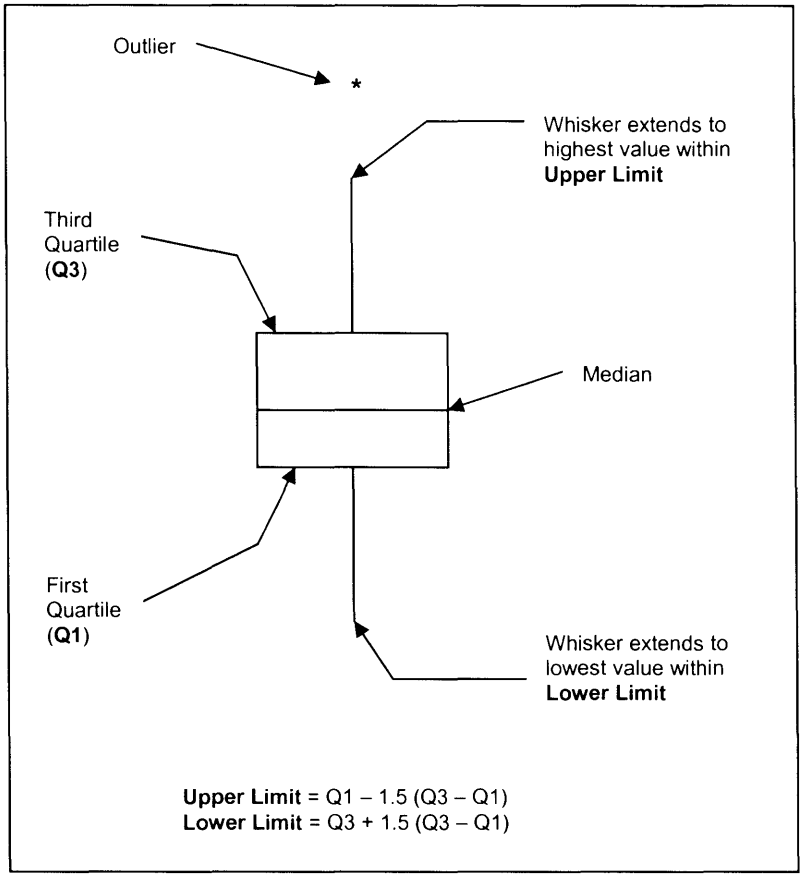


Figure 7. Comparison of total phosphorus among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

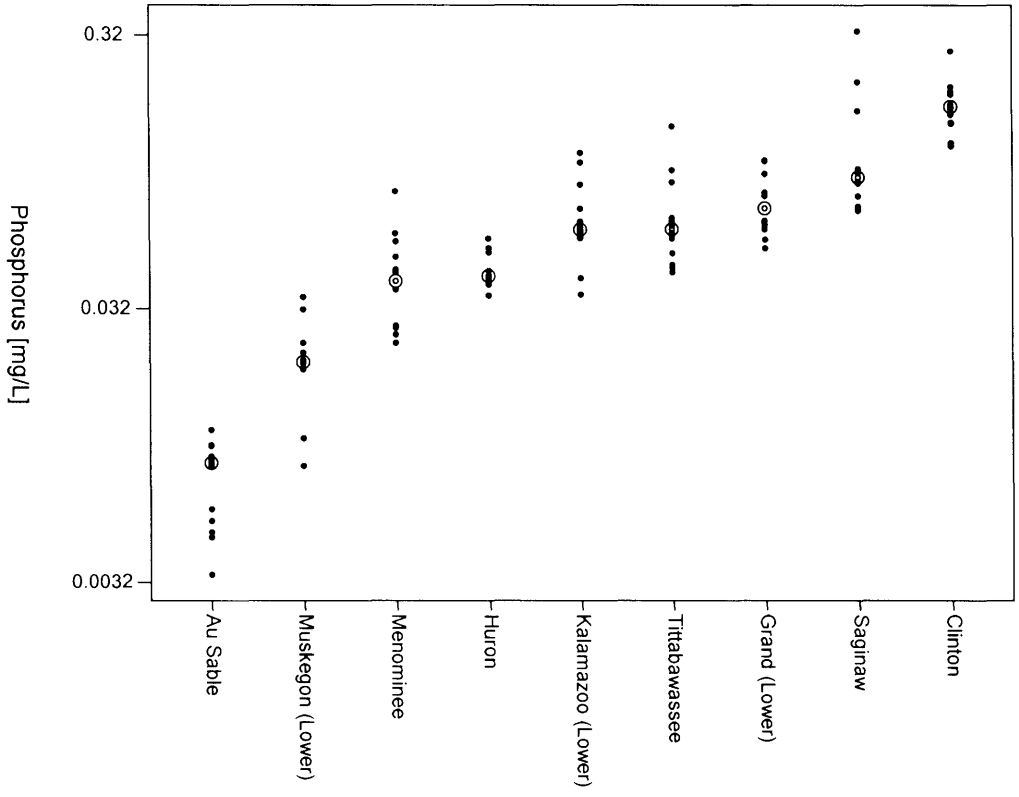


Figure 8. Comparison of total chloride among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

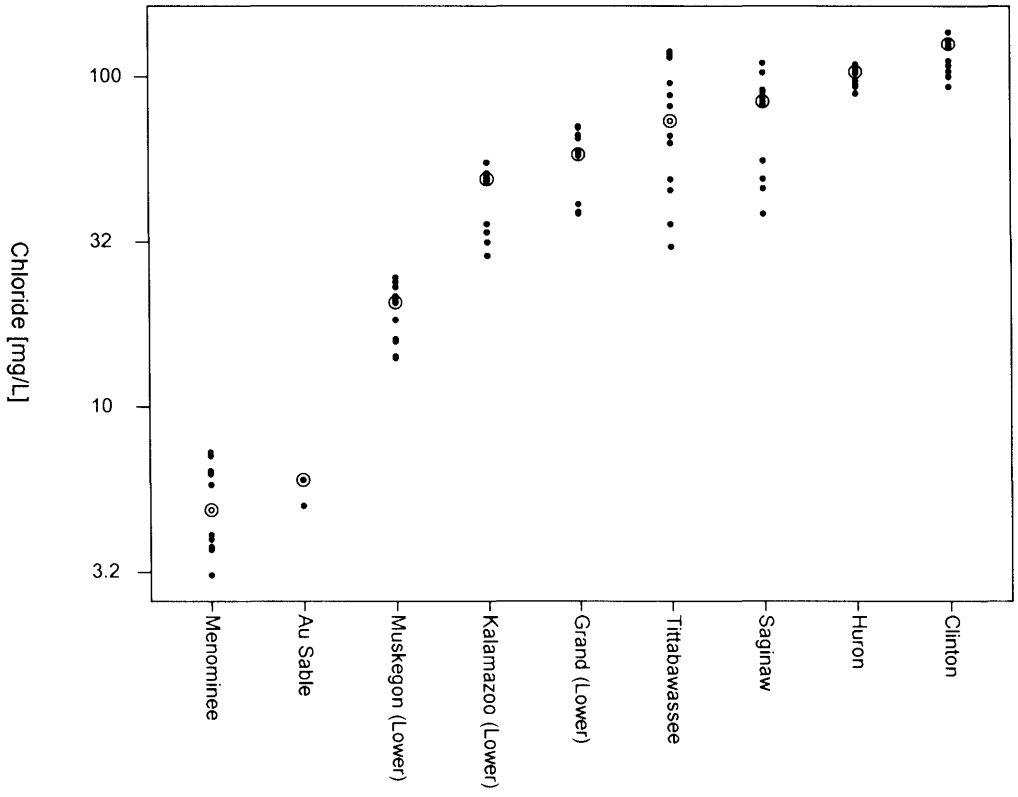


Figure 9. Comparison of total suspended solids among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

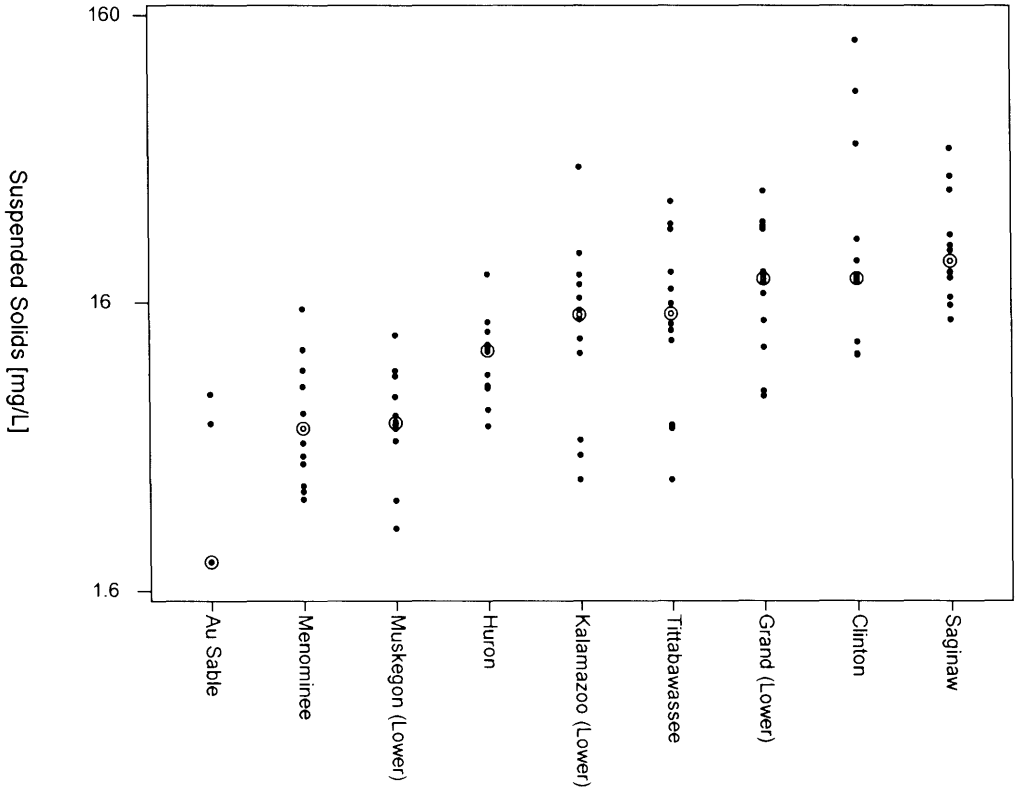


Figure 10. Comparison of total mercury among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

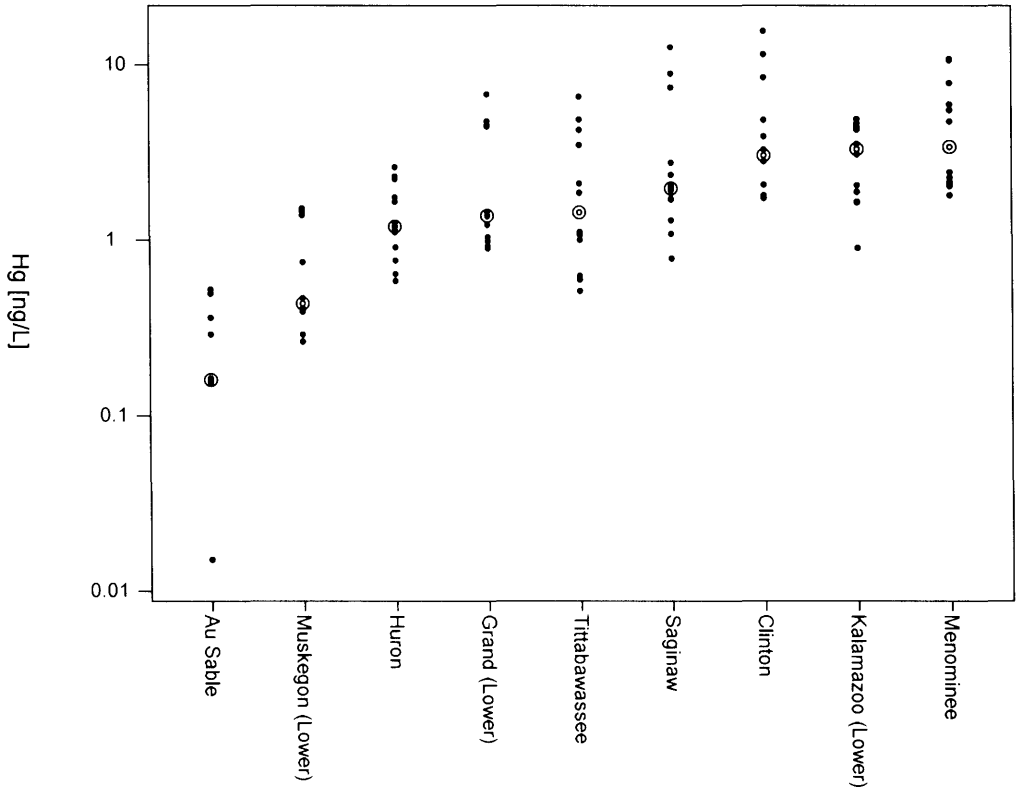


Figure 11. Comparison of total chromium among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

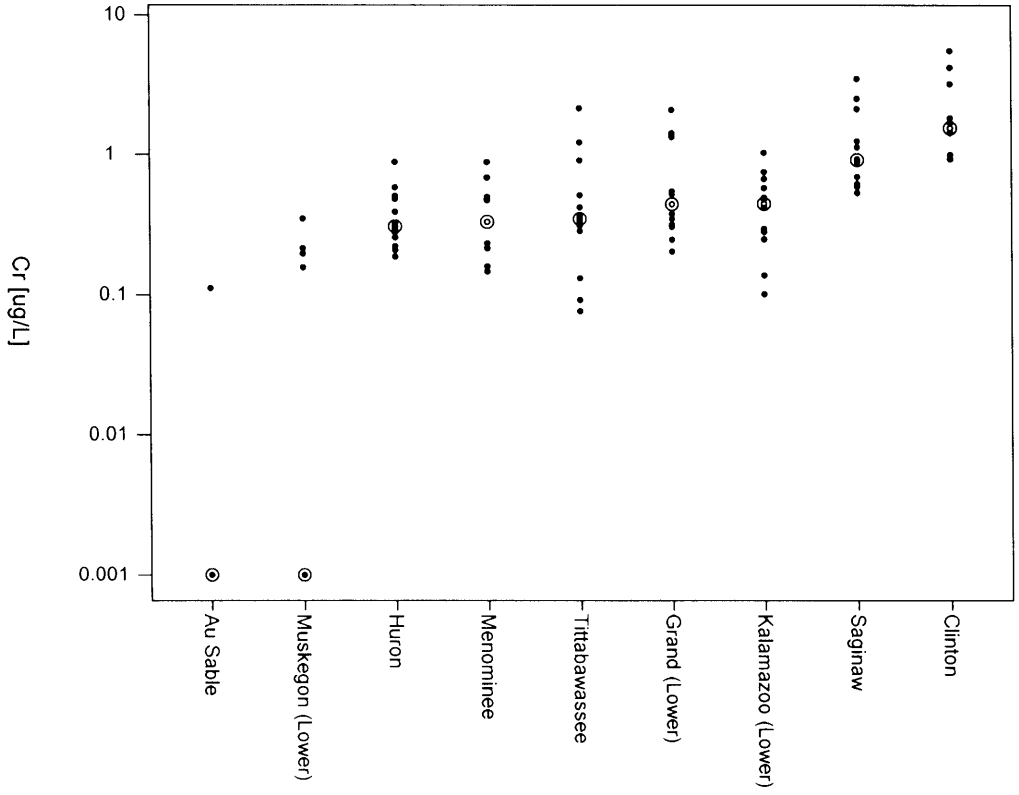


Figure 12. Comparison of total copper among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

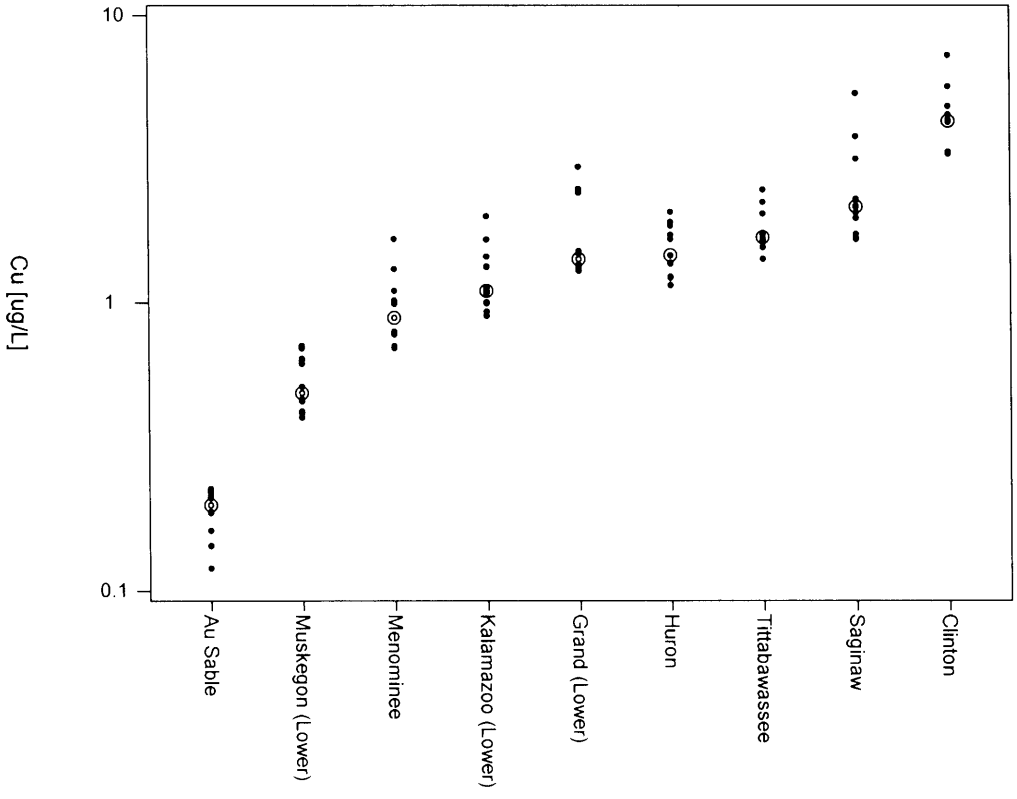


Figure 13. Comparison of total lead among intensively monitored sites. Double circle designates the median. Graph represents concentrations normalized to stream discharge.

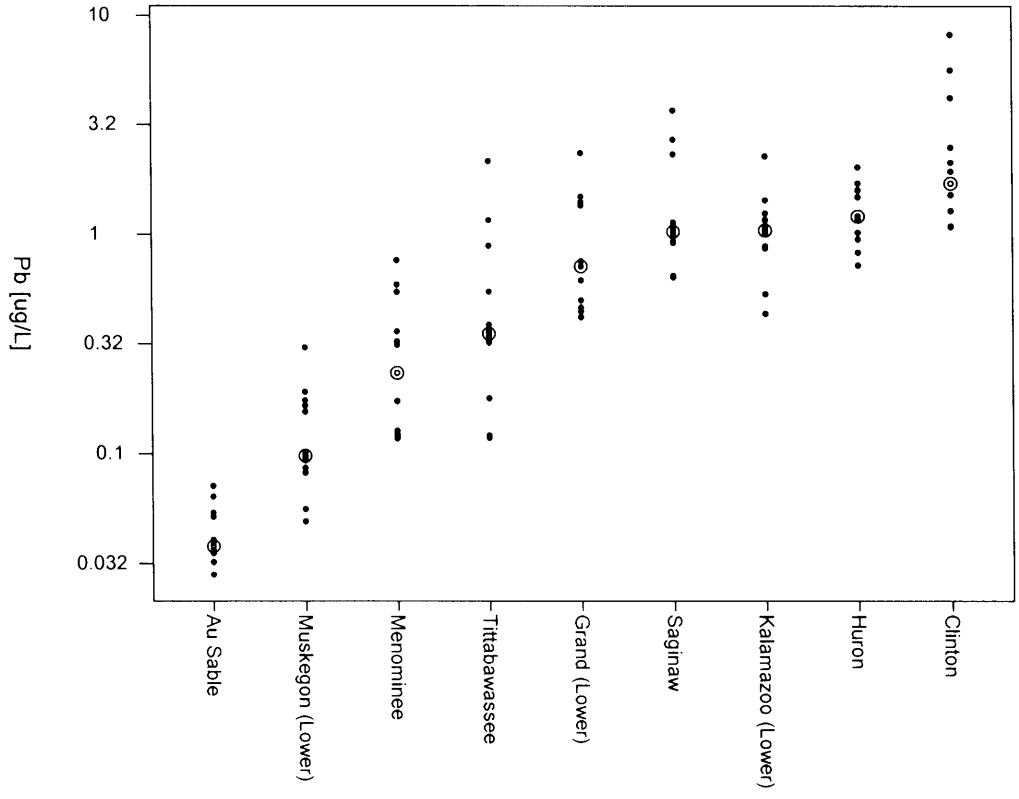


Figure 14. Comparison of total phosphorus among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

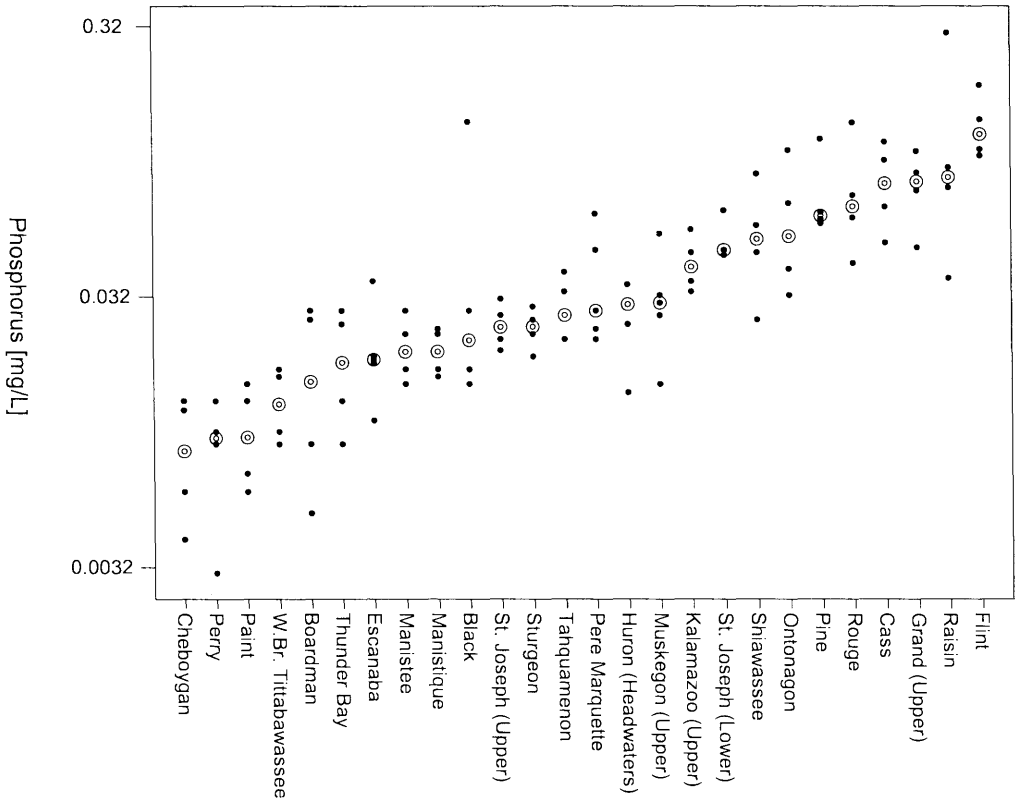


Figure 15. Comparison of total chloride among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

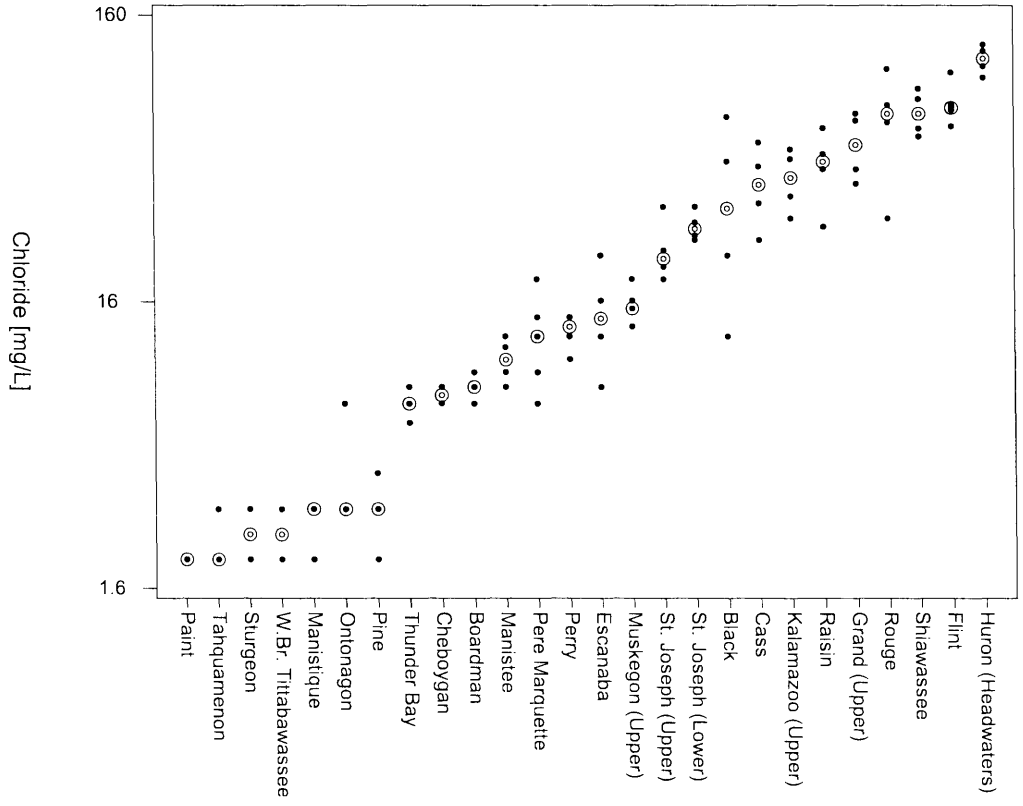


Figure 16. Comparison of total suspended solids among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

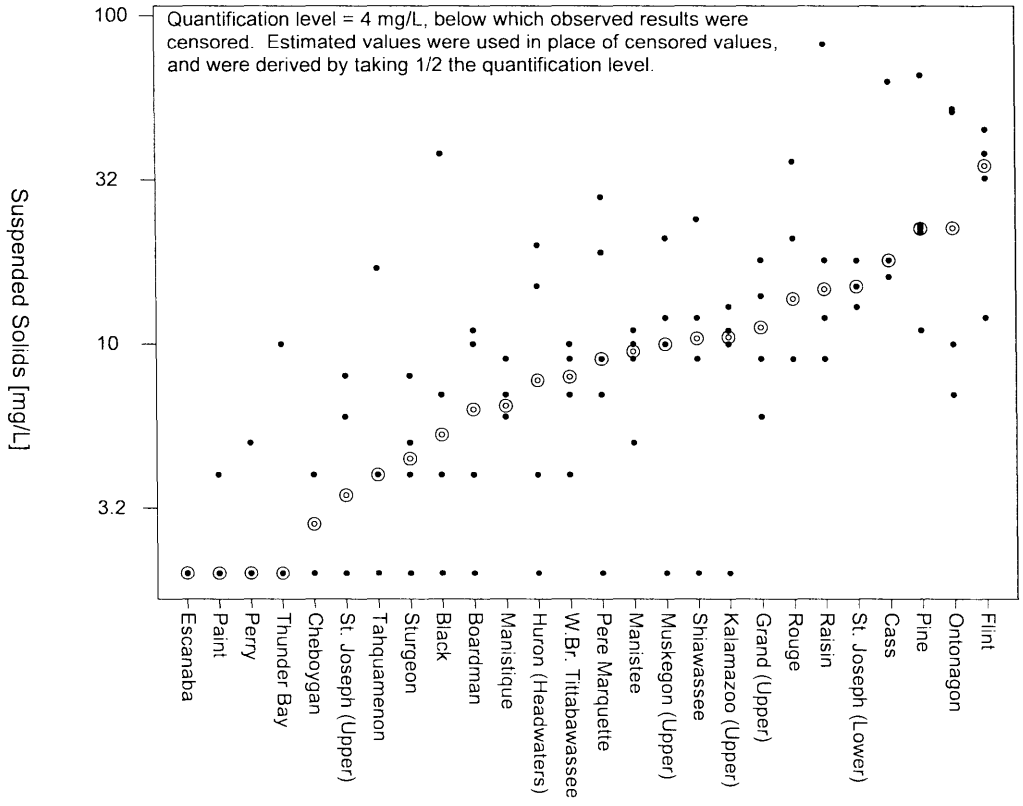


Figure 17. Comparison of total mercury among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

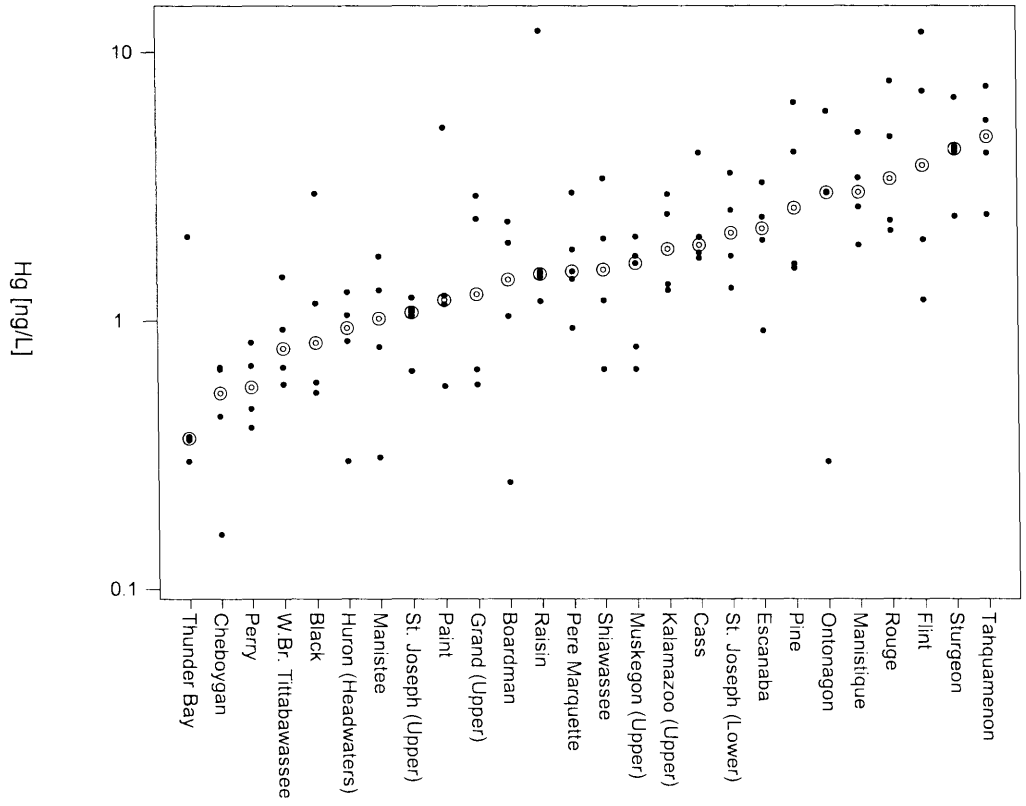


Figure 18. Comparison of total chromium among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

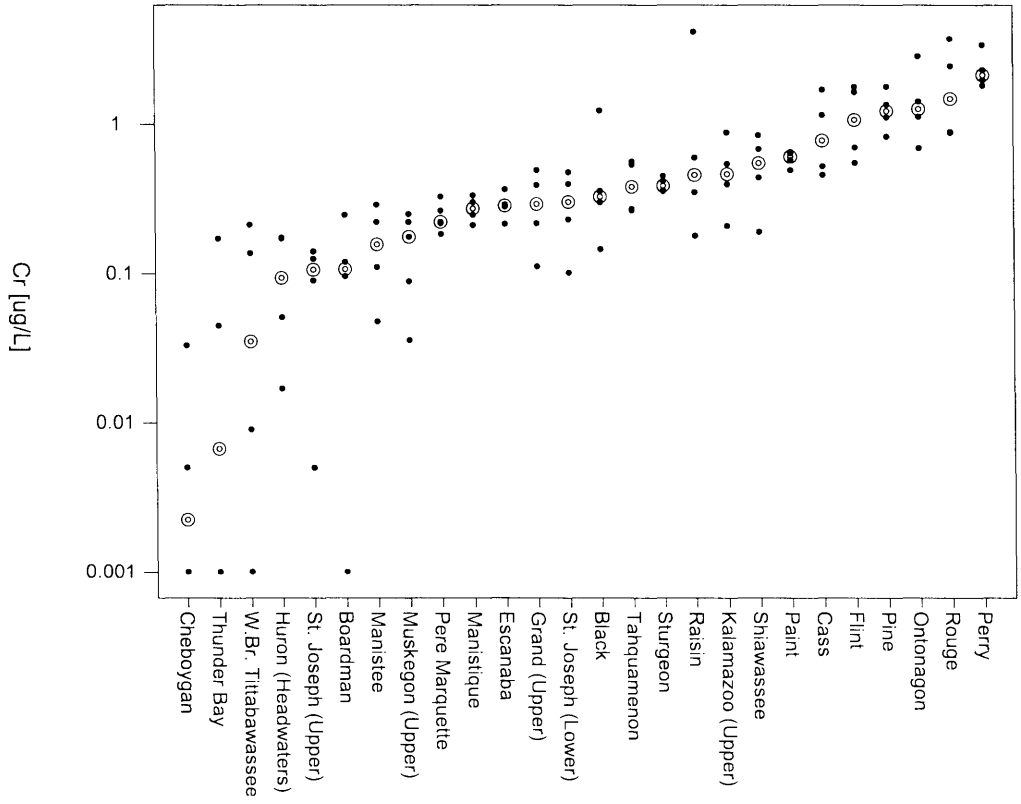


Figure 19. Comparison of total copper among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

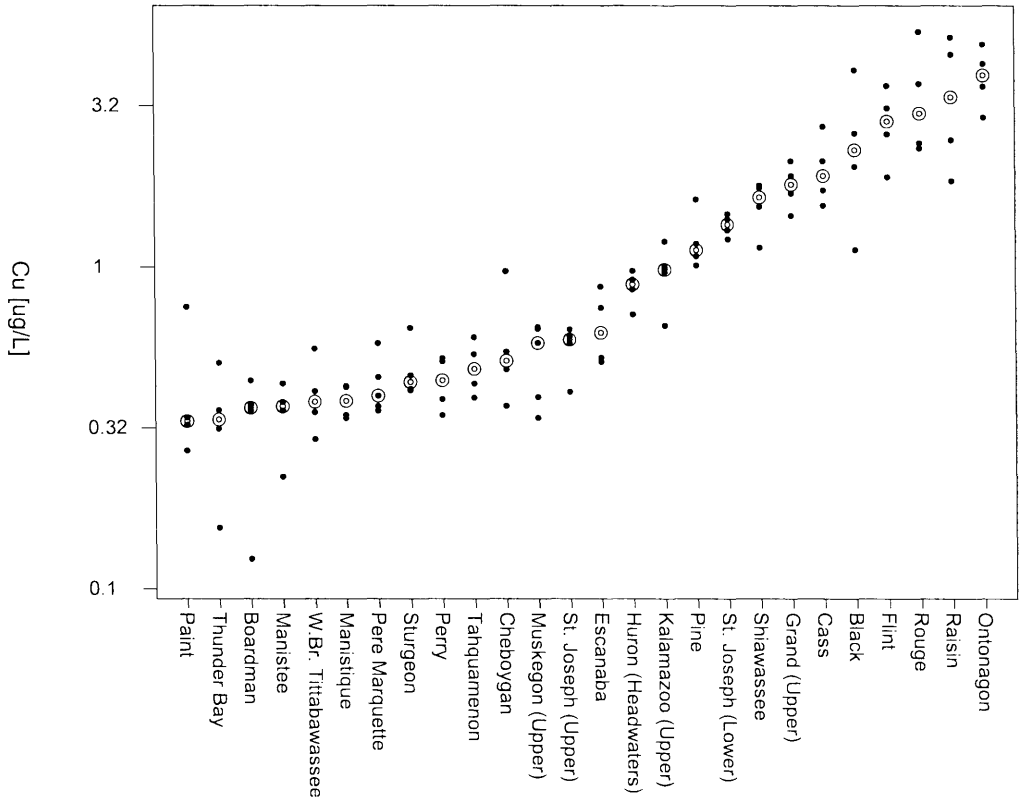


Figure 20. Comparison of total lead among non-intensively monitored sites. Double circle designates median. All sites sampled at least 4 times in 2002; fewer than 4 data points indicates identical results obtained for multiple samples.

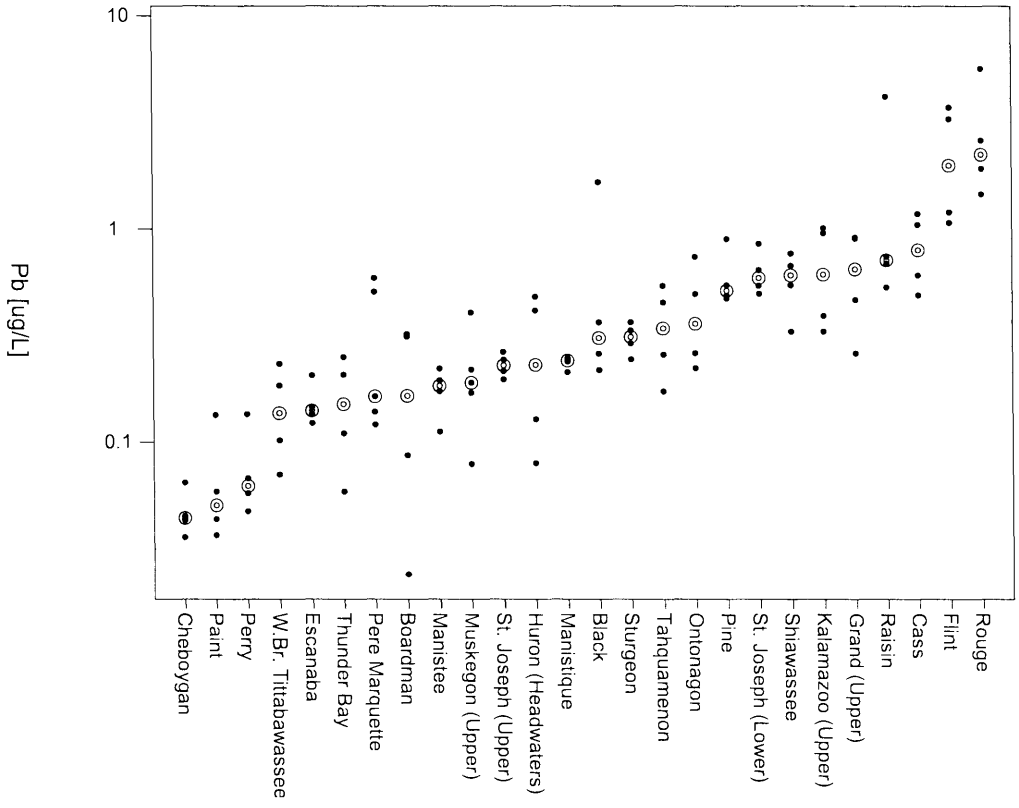


Figure 21. Total phosphorus, chloride and suspended solids concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2002.

Fig 21.1

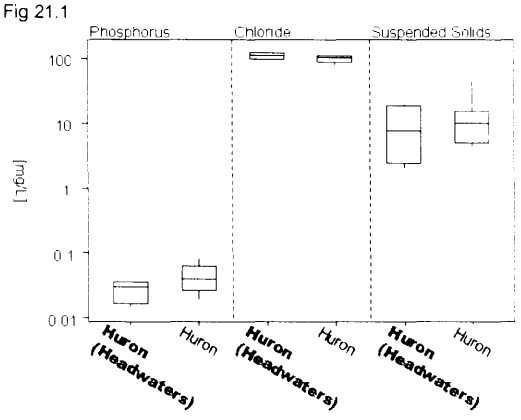


Fig 21.2

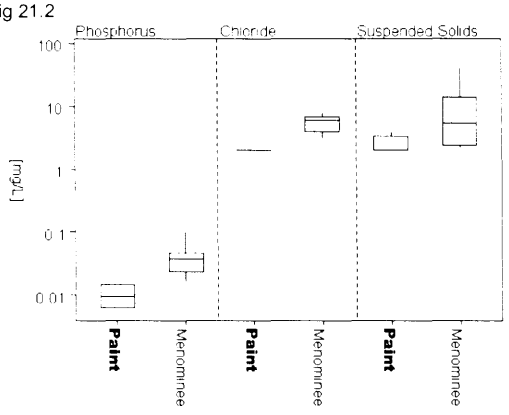


Fig 21.3

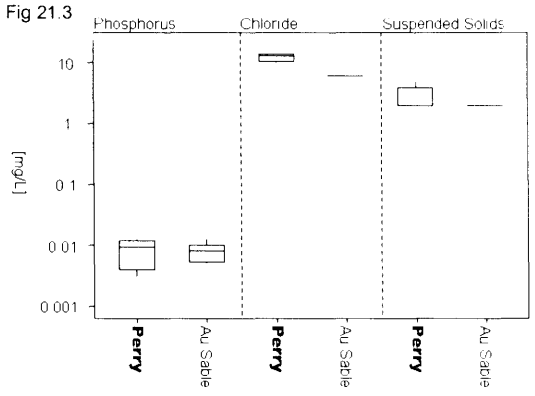


Fig 21.4

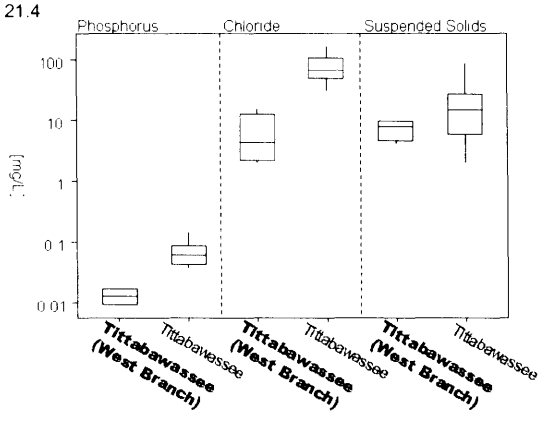


Figure 22. Total mercury concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2002.

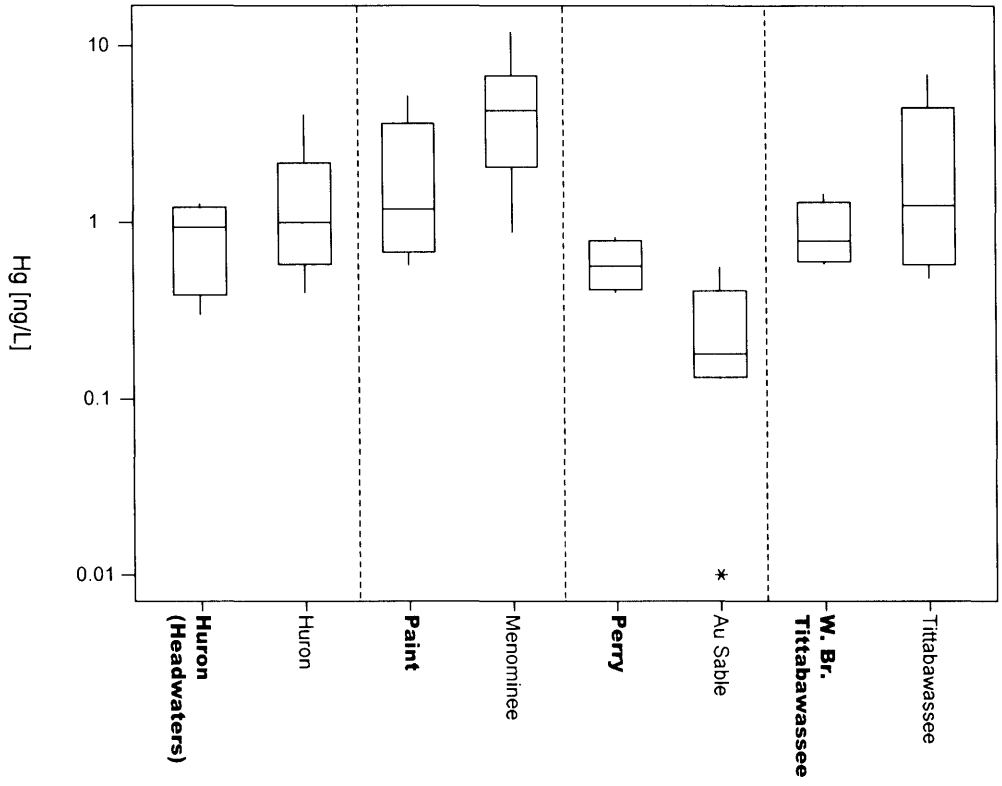


Figure 23. Total chromium, copper and lead concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. Data shown are from 2002.

Fig 23.1

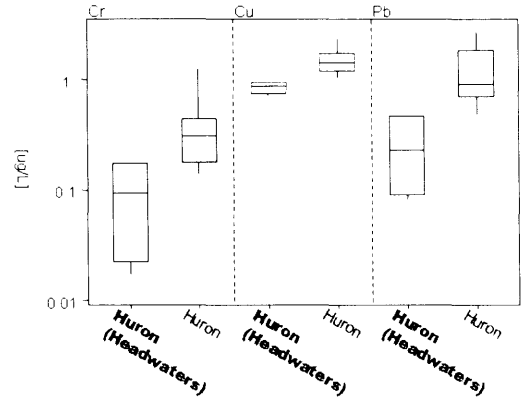


Fig 23.2

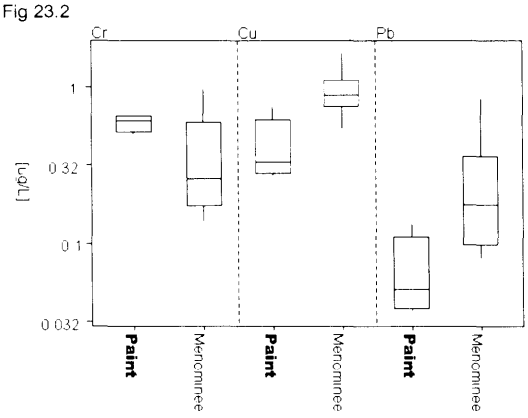


Fig 23.3

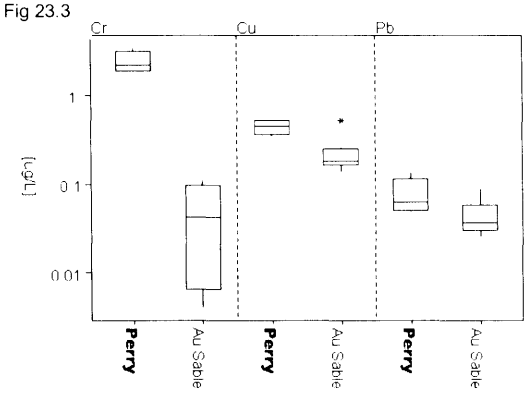


Fig 23.4

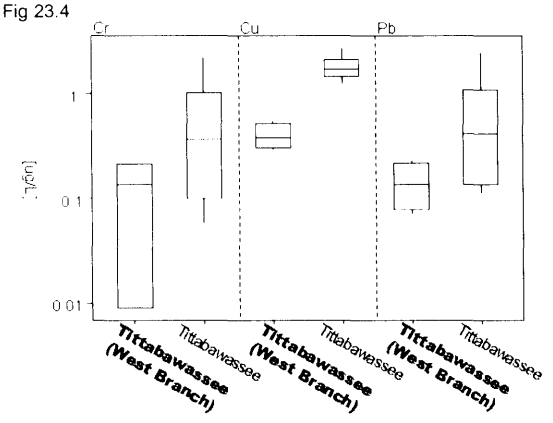
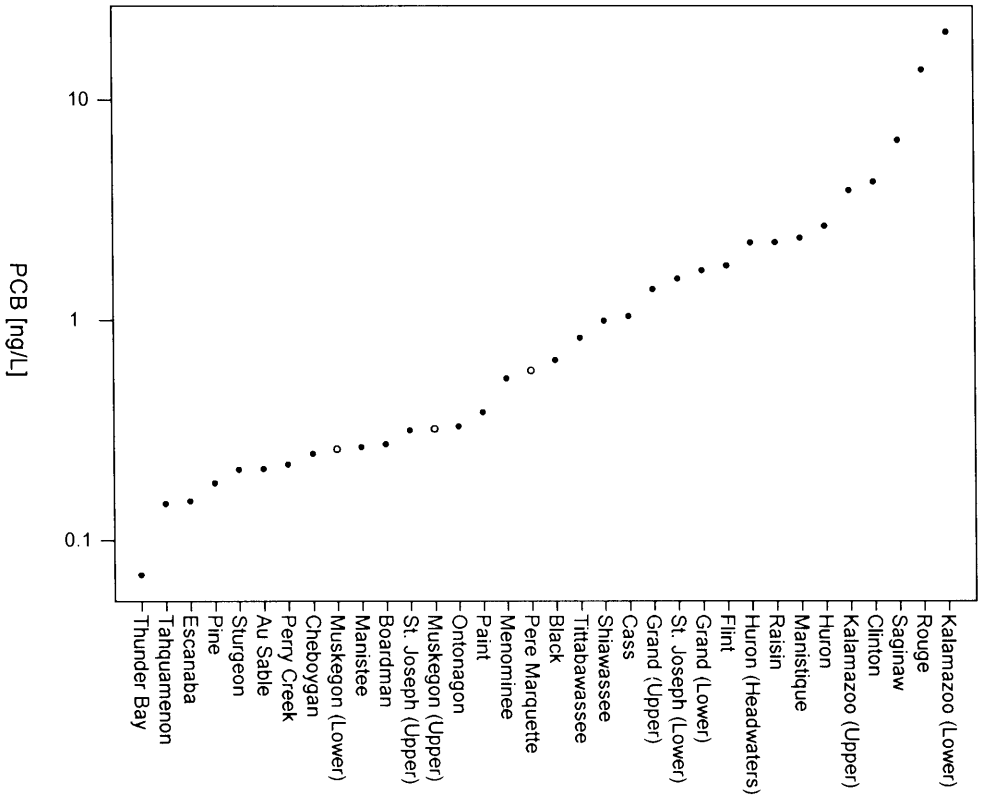


Figure 24. Comparison of total PCB concentrations among all stations sampled in 2002. Open circles designate values representing the mean of two or more determinations. PCB Rule 57 water quality value = 0.026 ng/L.



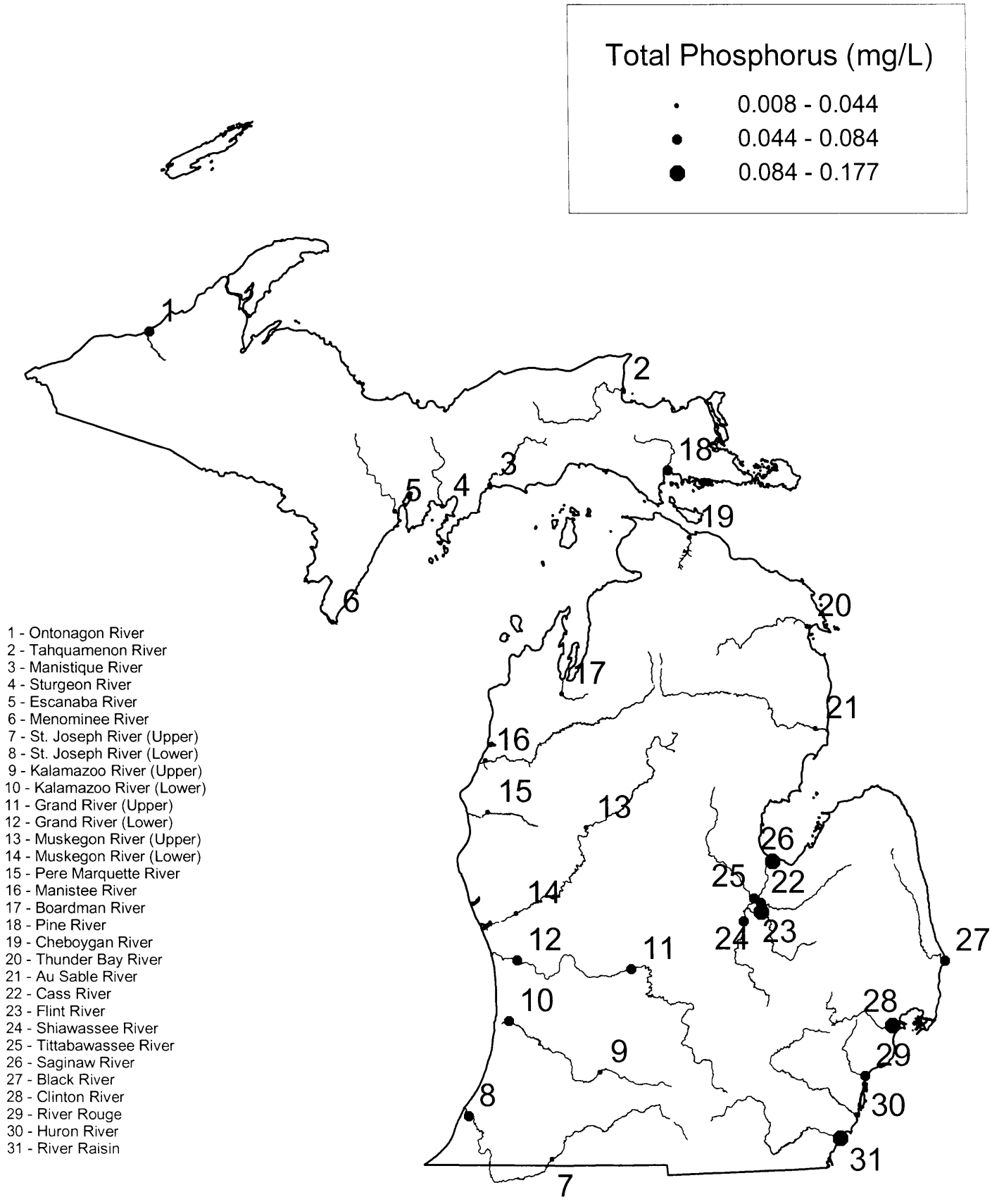


Figure 25. Mean total phosphorus concentrations at integrator and intensive sites, WCMP 2002.

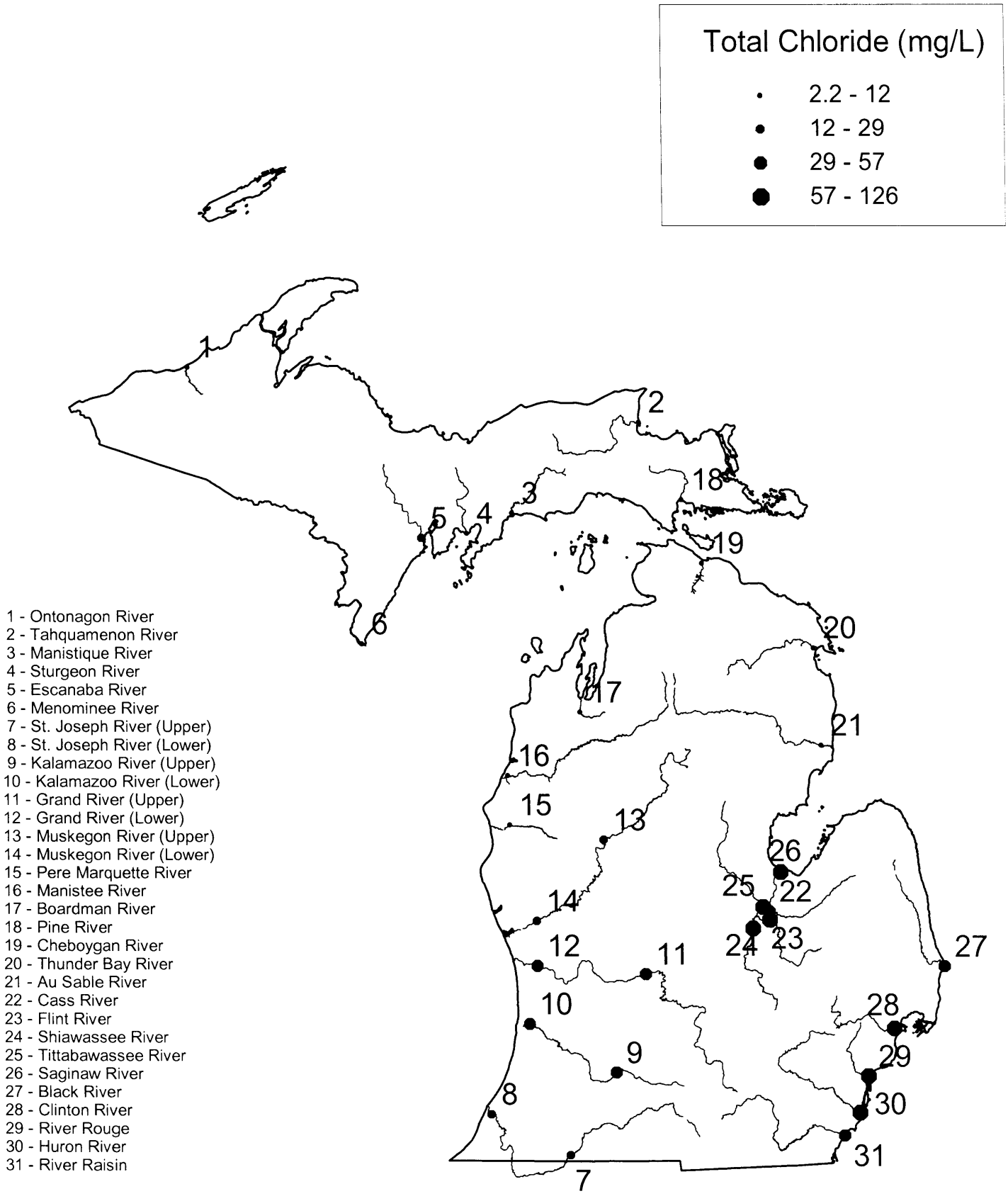


Figure 26. Mean total chloride concentrations at integrator and intensive sites, WCMP 2002.

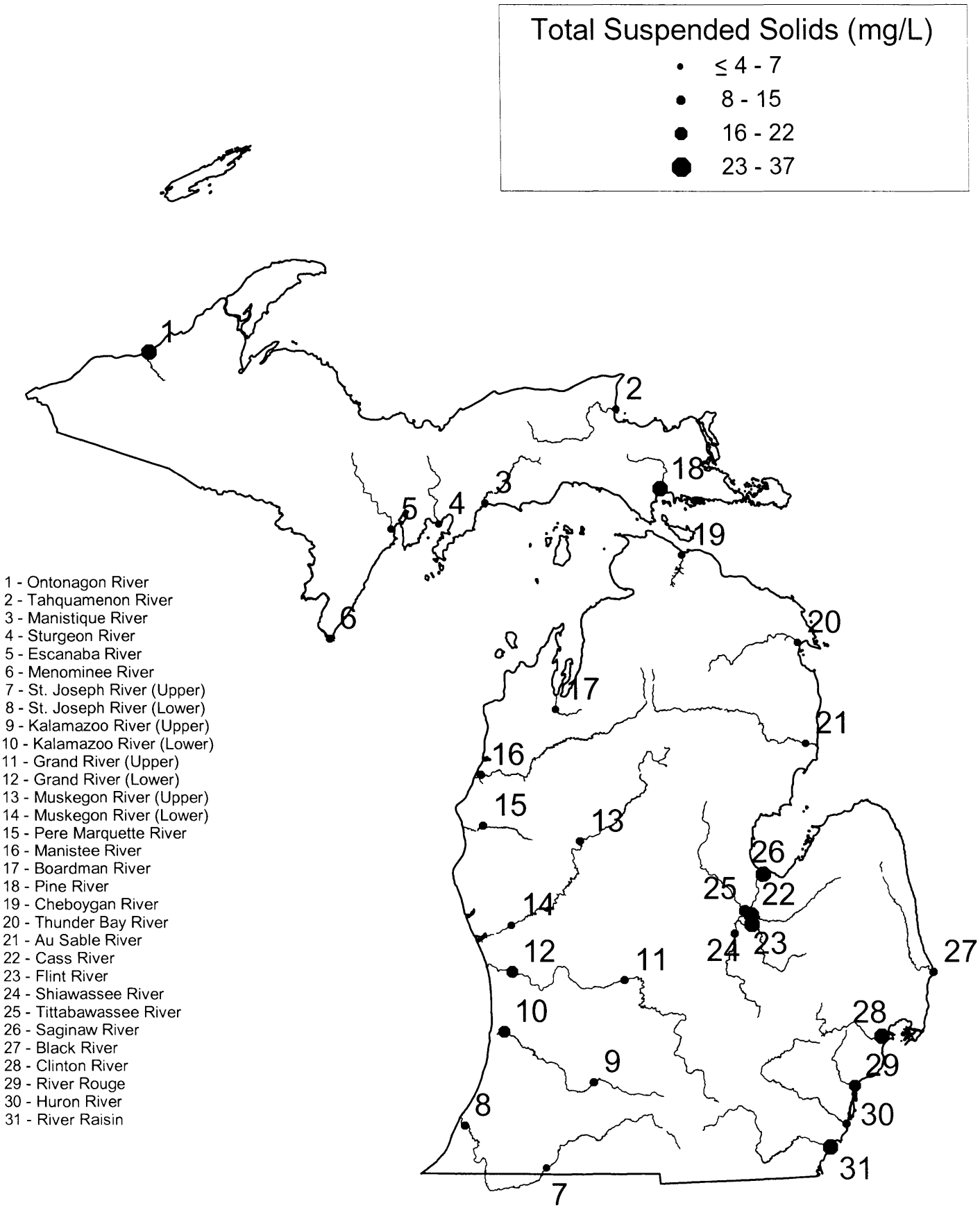


Figure 27. Mean total suspended solids concentrations at integrator and intensive sites, WCMP 2002.

Figure 28. Au Sable River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

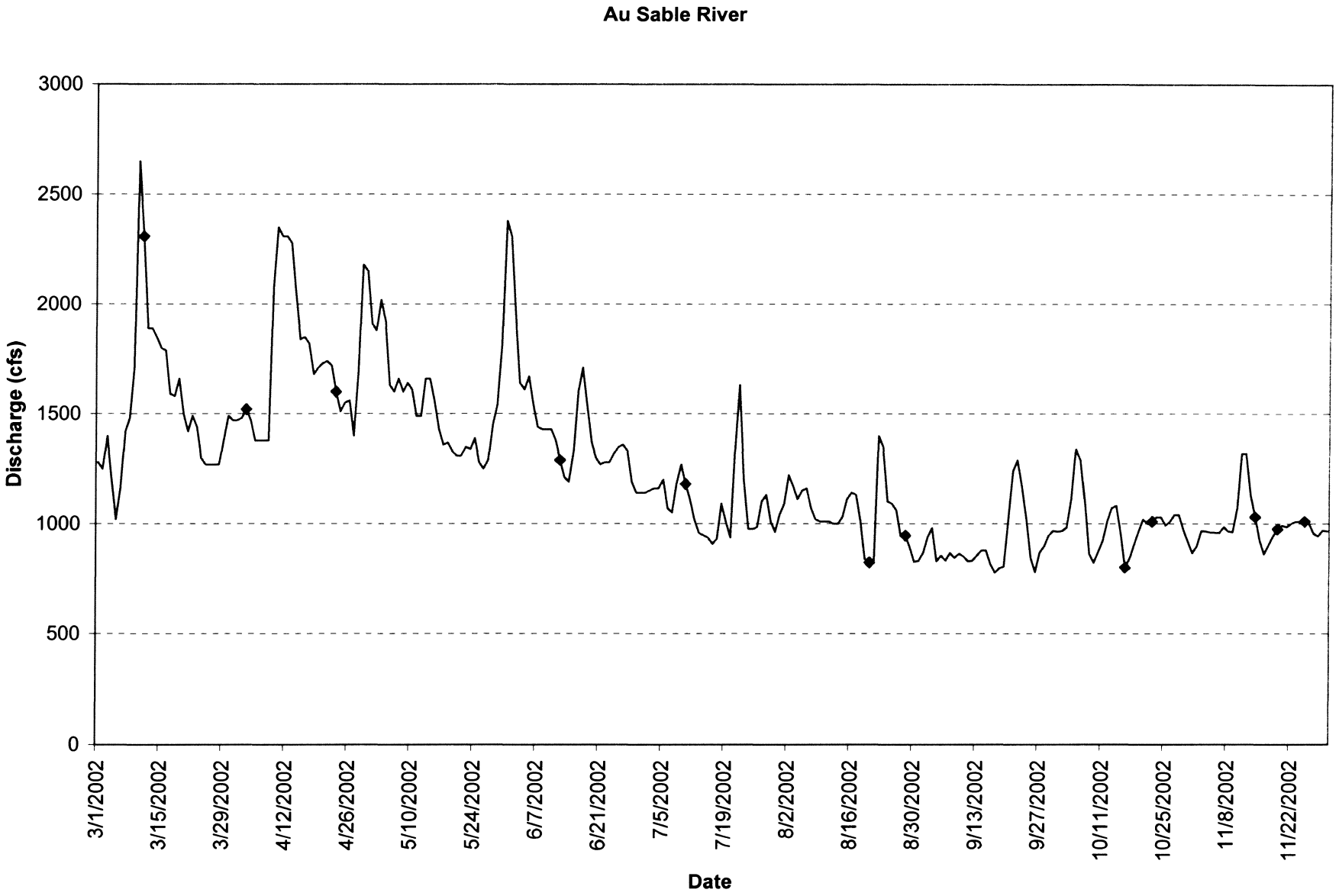


Figure 29. Clinton River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

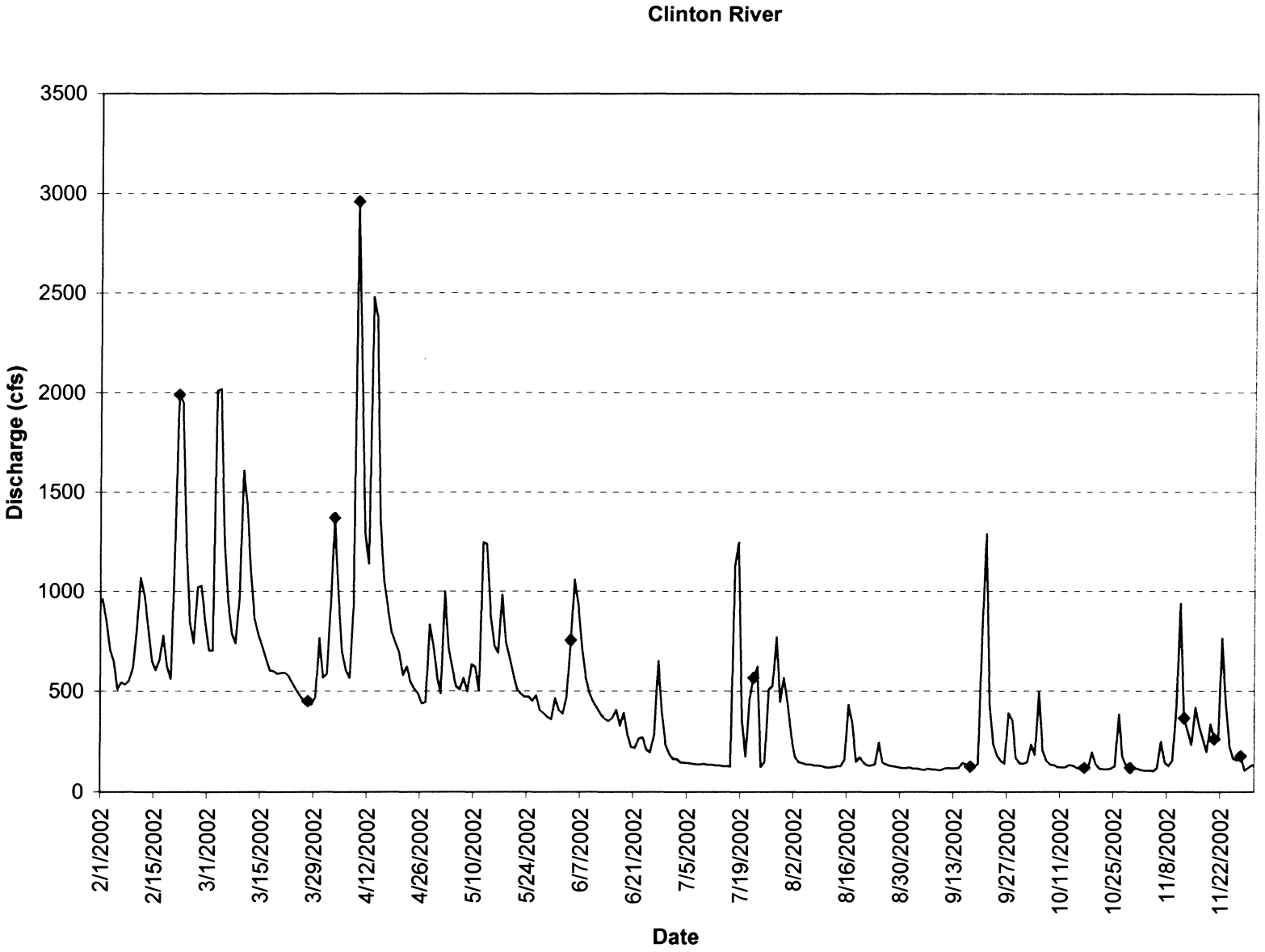


Figure 30. Lower Grand River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

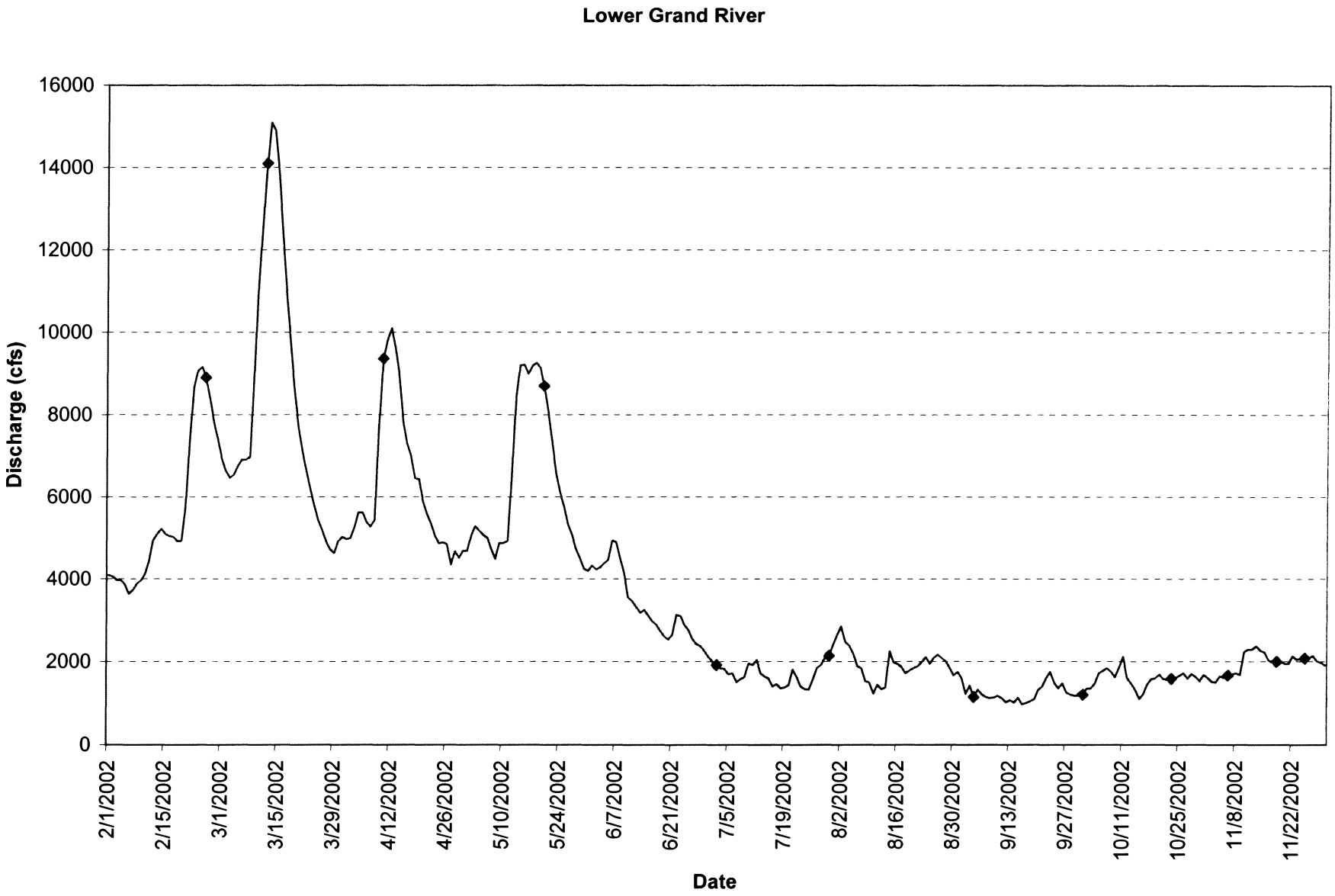


Figure 31. Huron River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

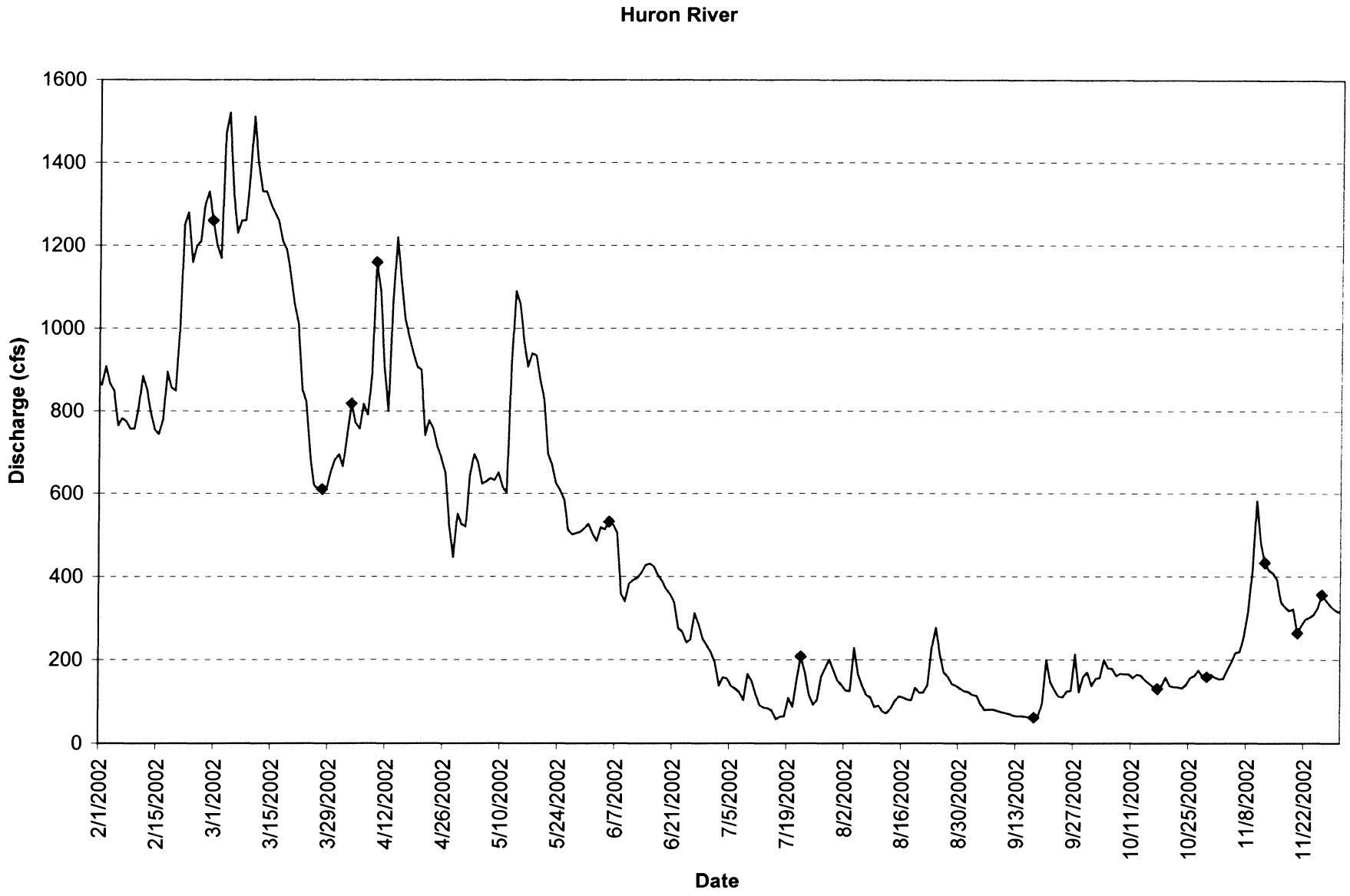


Figure 32. Lower Kalamazoo River. Solid diamonds indicate points on hydrograph at which samples were collected.

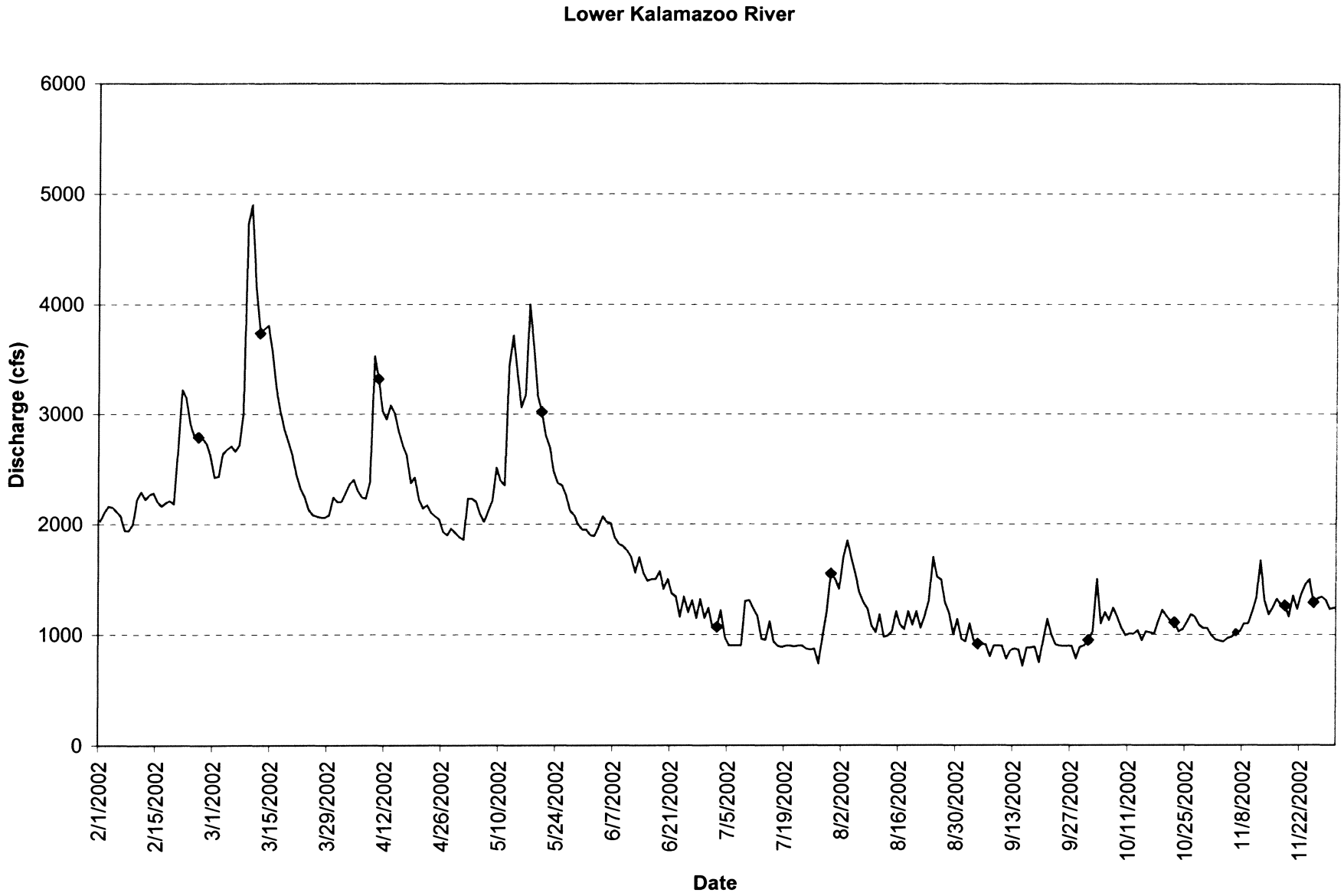


Figure 33. Menominee River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

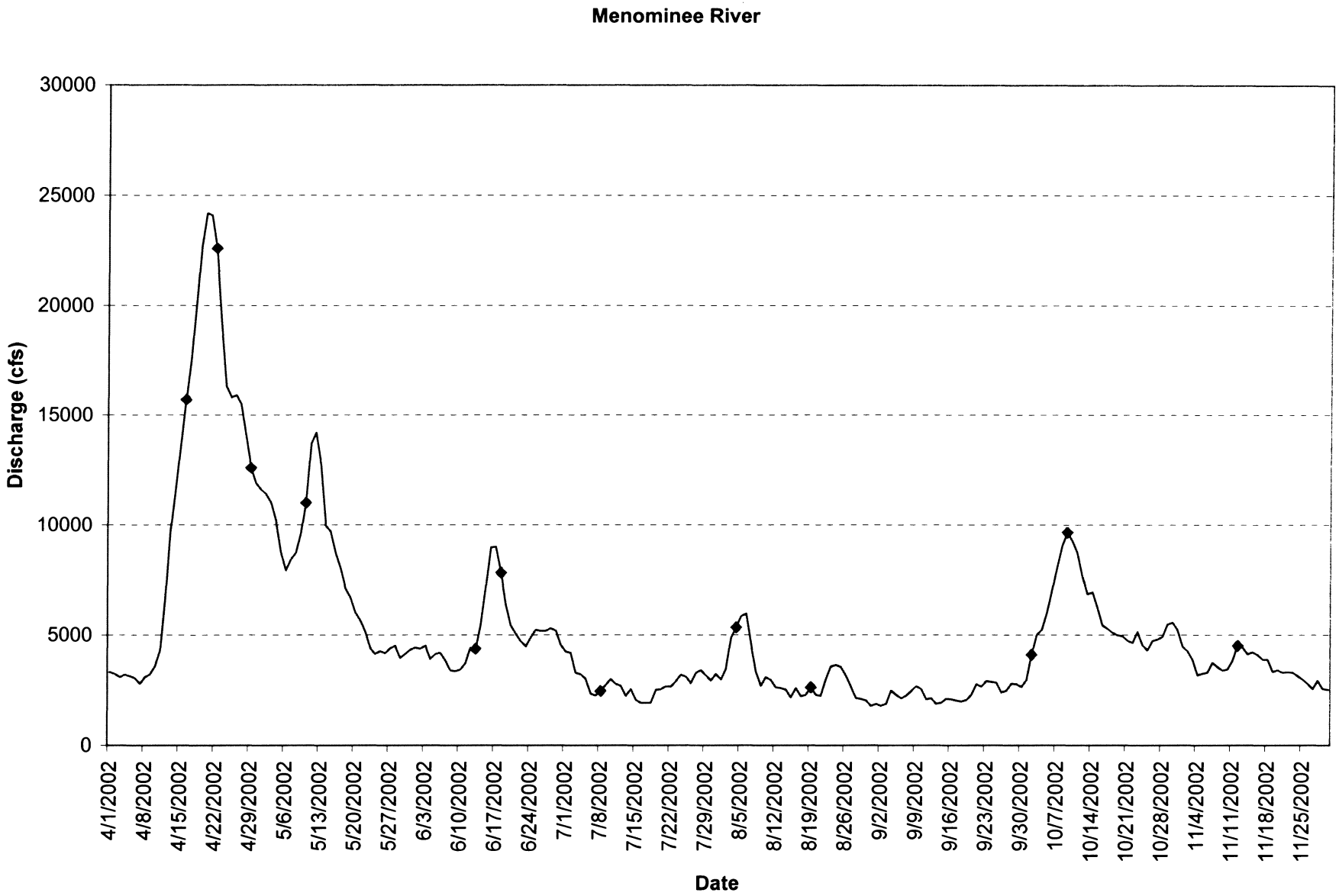


Figure 34. Lower Muskegon River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

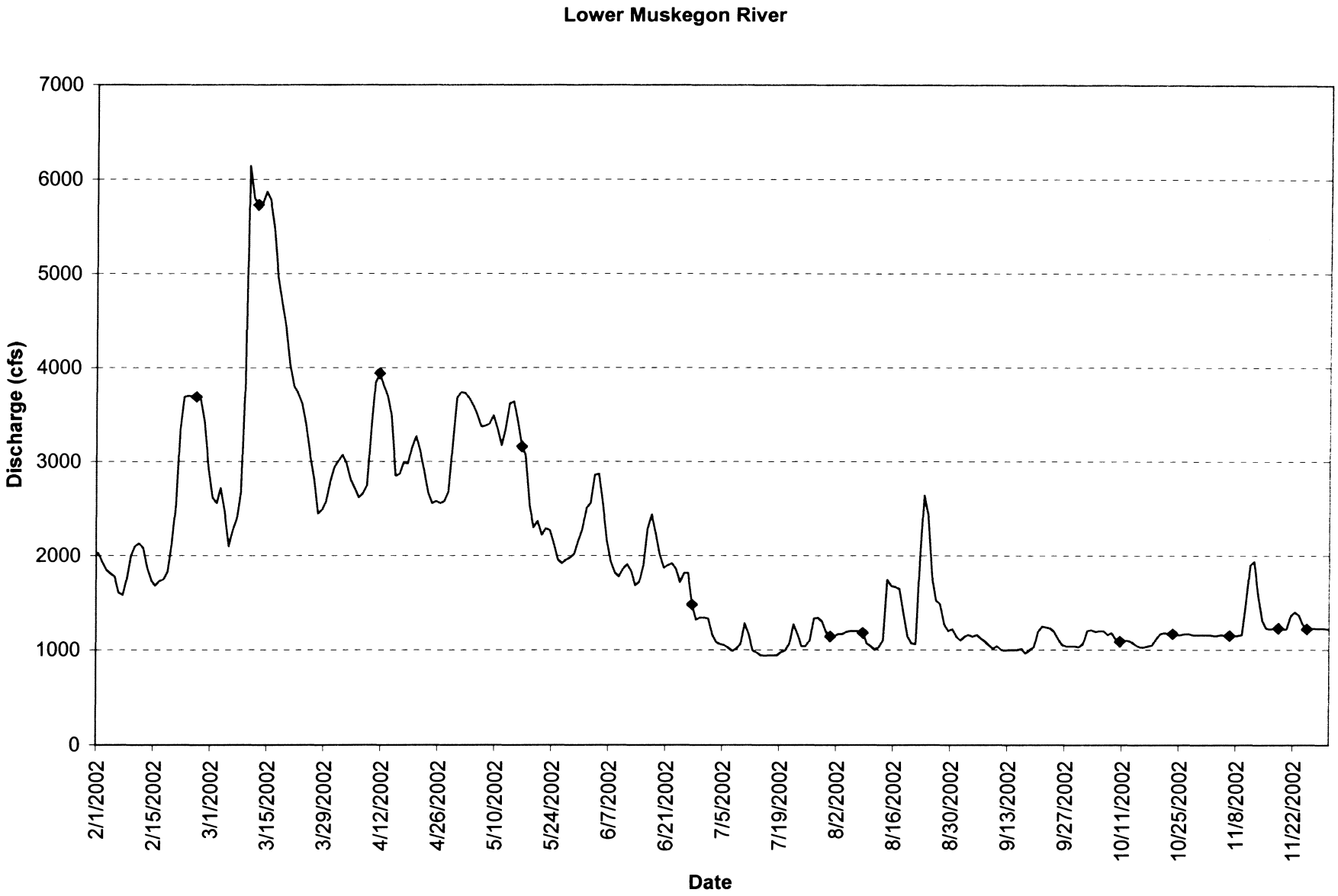


Figure 35. Saginaw River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

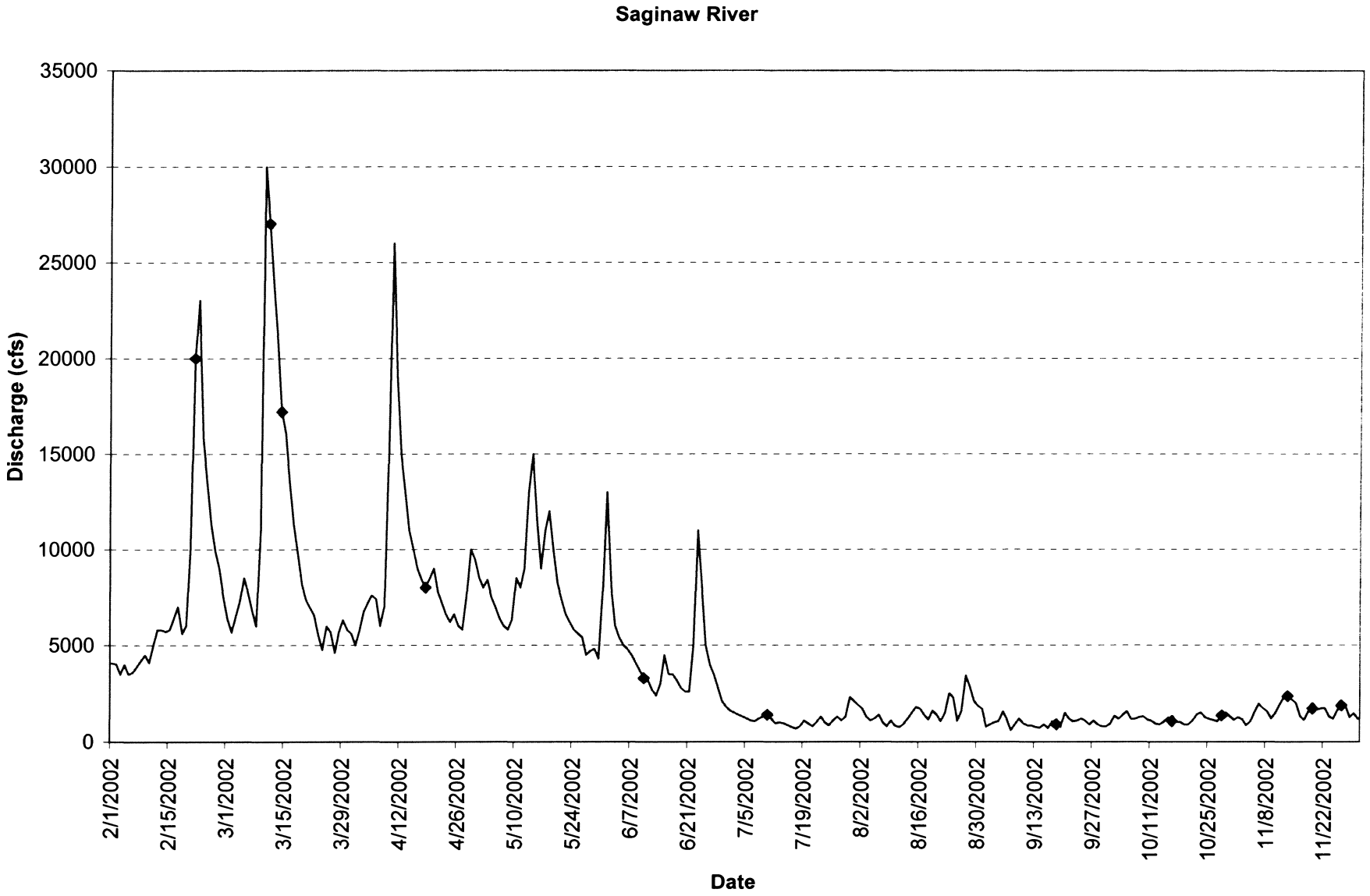
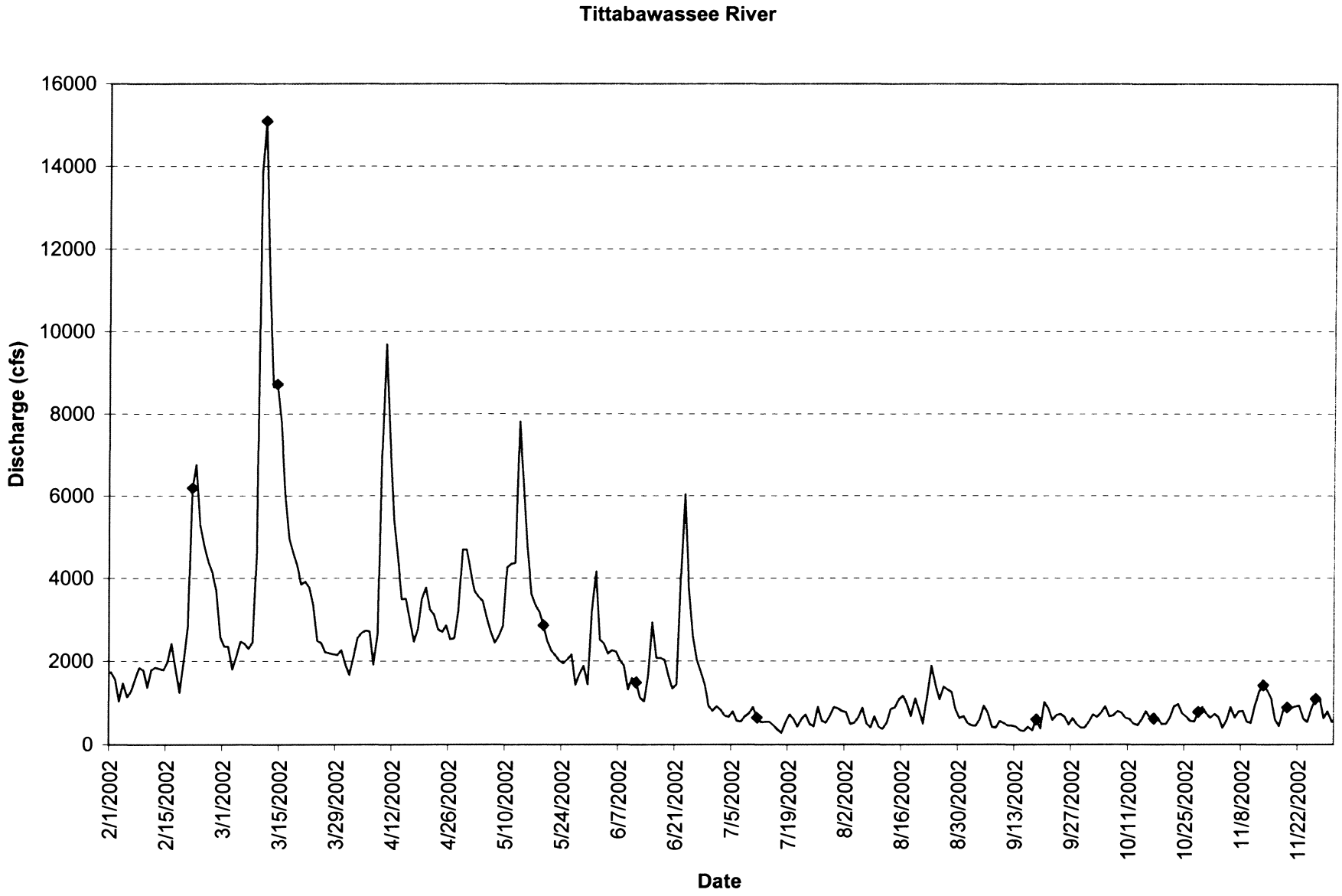


Figure 36. Tittabawassee River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.



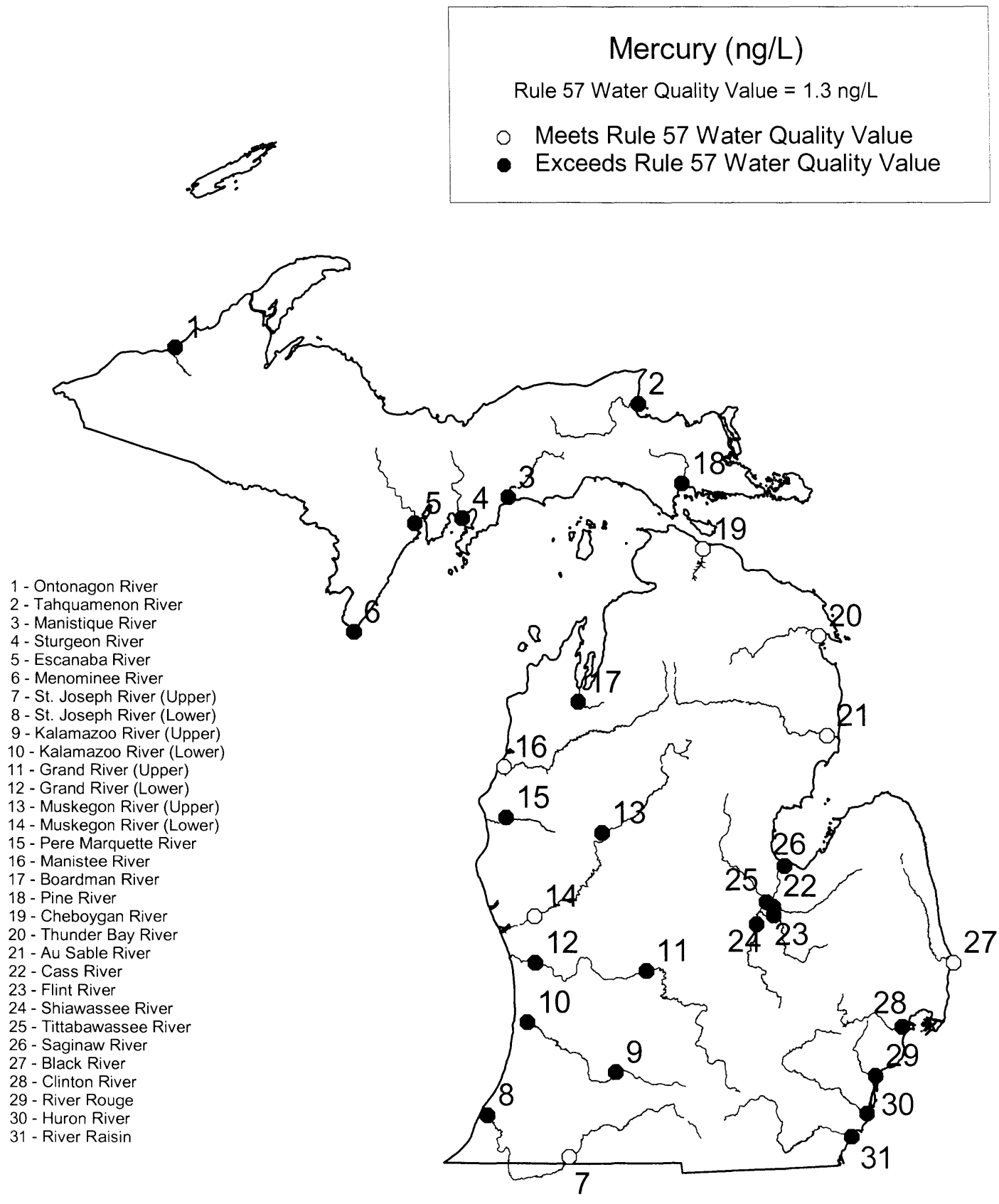


Figure 37. The occurrence of mercury Rule 57 water quality value exceedances at integrator and intensive sites, WCMP 2002. Mean mercury concentration was used to determine exceedance.

APPENDIX A

Water Chemistry Data Summarized in the 2002 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										
3/11/2002	0.012	C 0.095	T 0.001	0.120	0.006	0.005	8.0	0.5	6.0	5.5
4/4/2002	0.011	C 0.130	0.002	0.160	0.005	0.004	7.0	0.6	6.0	3.4
4/24/2002	0.013	C 0.054	0.002	0.170	0.005	W 0.001	8.0	0.5	6.0	4.4
6/12/2002	0.018	C 0.025	0.003	0.240	0.008	0.003	4.0	0.5	6.0	5.2
7/10/2002	0.023	C 0.009	0.003	0.230	0.011	0.004	6.0	0.4	5.0	4.2
8/20/2002	0.011	C T 0.002	T 0.001	HT 0.180	HT 0.008	0.006	6.0	0.3	6.0	5.6
8/28/2002	0.011	C T 0.003	T 0.001	HT 0.190	HT 0.013	HT 0.009	7.0	0.3	6.0	4.8
10/16/2002	T 0.007	C T 0.003	W 0.001	T 0.010	T 0.001	HT 0.003	6.0	0.6	6.0	5.9
10/22/2002	T 0.009	C T 0.006	0.002	0.140	0.008	0.003	6.0	0.6	6.0	4.5
11/14/2002	0.020	C 0.012	T 0.001	0.140	0.012	0.008	4.0	0.8	16.0	5.7
11/19/2002	0.016	C 0.012	T 0.001	0.130	0.007	0.004	9.0	0.7	6.0	4.7
11/25/2002	0.016	C 0.012	T 0.001	0.130	0.008	RB 0.006	9.0	0.6	6.0	5.3
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.014	0.030	0.002	0.153	0.008	0.005	6.7	0.5	6.8	4.9
Median+:	0.013	0.012	0.001	0.150	0.008	0.004	6.5	0.6	6.0	5.0
740385 Black River										
3/27/2002	K DL 0.050	C 3.500	0.011	0.680	0.028	0.015	86.0	3.1	49.0	20.1
6/4/2002	DL 0.170	C 5.300	0.116	1.140	0.140	HT 0.044	31.0	4.5	23.0	8.7
9/9/2002	0.024	C 0.250	0.004	0.200	0.017	0.007	83.0	1.2	12.0	6.0
10/28/2002	0.063	C 0.026	0.004	0.420	0.015	HT 0.009	74.0	4.6	70.0	38.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.071	2.269	0.034	0.610	0.050	0.019	68.5	3.4	38.5	18.3
Median+:	0.057	1.875	0.008	0.550	0.023	0.012	78.5	3.8	36.0	14.4

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes a concentration(s) below quantification, which was assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
C = Value calculated from other independent parameters.
DL = Sample analyzed using a dilution(s).
DM = Dilution required due to matrix problems.
HT = Recommended laboratory holding time was exceeded before analysis.
INT = Interference encountered during analysis resulted in no obtainable value.
K = Concentration below the quantification level shown.
NAV = Requested analysis not available.
NH = Non-homogenous sample made analysis of a representative sample questionable.
PI = Possible interference may have affected the accuracy of the laboratory result.
QC = Quality control problems exist.
RB = Concentration of reagent blank has been subtracted from analyte value.
ST = Recommended sample collection/preservation technique not used.
T = Value reported is less than the quantification level.
W = Observed result was below the lowest normally reportable value shown.

STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
350061	Au Sable River										
3/11/2002		K 4.0	210.0	2.5	297	13.1	7.5	1.0	145	K 1.0	139.00
4/4/2002		K 4.0	190.0	4.1	259	12.1	7.5	2.6	137	K 1.0	121.00
4/24/2002		K 4.0	190.0	4.7	279	11.1	7.9	9.6	136	K 1.0	118.00
6/12/2002		K 4.0	190.0	5.1	265	8.6	7.7	18.2	145	K 1.0	130.00
7/10/2002		K 4.0	190.0	4.8	297	8.0	8.0	25.0	147	K 1.0	131.00
8/20/2002		K 4.0	190.0	3.4	267	7.5	8.2	24.5	139	K 1.0	120.00
8/28/2002		20.0	190.0	3.1	291	8.0	8.2	23.3	137	K 1.0	123.00
10/16/2002		11.0	190.0	2.9	272	9.3	8.0	14.6	143	K 1.0	130.00
10/22/2002		K 4.0	200.0	2.4	290	9.5	8.7	12.0	143	K 1.0	130.00
11/14/2002		K 4.0	210.0	2.3	338	11.8	8.1	4.9	154	K 1.0	137.00
11/19/2002		K 4.0	210.0	2.8	293	11.7	8.1	5.0	153	K 1.0	141.00
11/25/2002		K 4.0	210.0	HT 2.0	294	12.1	8.1	3.8	156	K HT 1.0	145.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		* 4.3	197.5	3.3	287	10.2	8.0	12.0	145	* 0.5	130.42
Median+:		4.0	190.0	3.0	291	10.3	8.1	10.8	144	1.0	130.00
740385	Black River										
3/27/2002		4.0	500.0	9.7	740	13.0	7.9	1.6	348	6.6	235.00
6/4/2002		38.0	300.0	4.3	438	7.9	7.4	15.9	205	46.0	150.00
9/9/2002		7.0	170.0	2.1	251	7.2	8.1	24.0	117	5.8	82.00
10/28/2002		K 4.0	520.0	4.2	714	9.7	8.0	8.6	298	4.1	202.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 12.8	372.5	5.1	536	9.5	7.9	12.5	242	15.6	167.25
Median+:		5.5	400.0	4.3	576	8.8	8.0	12.3	252	6.2	176.00

+ = Calculated value; not rounded to the appropriate number of significant figures.
* = Mean includes a concentration(s) below quantification, which was assigned a value equal to 1/2 the quantification level.
A = Value reported is the mean of two or more determinations.
C = Value calculated from other independent parameters.
DL = Sample analyzed using a dilution(s).
DM = Dilution required due to matrix problems.
HT = Recommended laboratory holding time was exceeded before analysis.
INT = Interference encountered during analysis resulted in no obtainable value.
K = Concentration below the quantification level shown.
NAV = Requested analysis not available.
NH = Non-homogenous sample made analysis of a representative sample questionable.
PI = Possible interference may have affected the accuracy of the laboratory result.
QC = Quality control problems exist.
RB = Concentration of reagent blank has been subtracted from analyte value.
ST = Recommended sample collection/preservation technique not used.
T = Value reported is less than the quantification level.
W = Observed result was below the lowest normally reportable value shown.

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										
3/19/2002	0.013	C 0.290	0.002	0.200	0.009	0.004	7.0	0.7	9.0	3.2
5/30/2002	0.011	C 0.176	0.002	0.360	0.026	0.003	6.0	0.7	7.0	4.5
8/14/2002	0.012	C 0.162	0.003	0.350	0.028	0.009	6.0	0.8	8.0	4.5
10/24/2002	T 0.006	C 0.230	0.002	0.110	0.005	0.003	6.0	0.7	8.0	4.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.011	0.215	0.002	0.255	0.017	0.005	6.3	0.7	8.0	4.3
Median+:	0.012	0.203	0.002	0.275	0.018	0.004	6.0	0.7	8.0	4.5
730024 Cass River										
3/14/2002	K DL 0.050	C 5.300	0.021	0.860	0.101	0.035	44.0	4.0	26.0	9.5
5/8/2002	0.013	C 1.860	0.012	0.770	0.050	0.007	58.0	2.8	35.0	16.1
8/21/2002	0.025	C 0.190	0.011	1.110	0.118	0.012	51.0	5.2	47.0	25.0
11/13/2002	0.039	C 1.120	0.025	0.700	0.068	0.026	48.0	5.1	57.0	30.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.026	2.118	0.017	0.860	0.084	0.020	50.3	4.3	41.3	20.4
Median+:	0.032	1.490	0.017	0.815	0.085	0.019	49.5	4.6	41.0	20.6
160073 Cheboygan River										
4/23/2002	0.015	C PI 0.066	PI 0.002	0.250	0.006	W PI 0.001	9.0	0.7	7.0	3.8
7/9/2002	0.035	C 0.034	0.004	0.300	0.012	0.003	7.0	0.9	7.0	5.8
8/27/2002	0.020	C 0.023	0.002	HT 0.320	HT 0.013	HT 0.009	8.0	0.8	8.0	5.0
10/23/2002	0.025	C 0.056	0.002	0.240	T 0.004	T 0.002	8.0	0.8	8.0	6.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.024	0.045	0.003	0.278	0.009	0.004	8.0	0.8	7.5	5.2
Median+:	0.023	0.045	0.002	0.275	0.009	0.003	8.0	0.8	7.5	5.4

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)		Turbidity (NTU)	Alkalinity (mg CaCO3/L)
280014	Boardman River											
3/19/2002		4.0	200.0	4.0	280	11.8	7.9	5.6	146		1.6	126.00
5/30/2002		10.0	200.0	5.1	289	9.3	7.6	14.5	152		4.8	132.00
8/14/2002		11.0	220.0	4.8	277	7.8	7.9	18.0	164		5.5	140.00
10/24/2002	K	4.0	230.0	2.2	307	11.6	7.9	5.8	168	K	1.0	154.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:	*	6.8	212.5	4.0	288	10.1	7.8	11.0	158	*	3.1	138.00
Median+:		7.0	210.0	4.4	285	10.5	7.9	10.2	158		3.2	136.00
730024	Cass River											
3/14/2002		18.0	340.0	8.7	512	12.0	7.8	3.7	227		37.0	145.00
5/8/2002		18.0	430.0	9.7	633	9.2	8.0	15.1	325		12.0	235.00
8/21/2002		63.0	380.0	DM 9.7	563	9.9	8.4	23.4	248		62.0	179.00
11/13/2002		16.0	440.0	6.6	646	6.5	7.6	7.3	282		19.0	210.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:		28.8	397.5	8.7	589	9.4	8.0	12.4	271		32.5	192.25
Median+:		18.0	405.0	9.2	598	9.6	7.9	11.2	265		28.0	194.50
160073	Cheboygan River											
4/23/2002	K	4.0	200.0	5.7	299	12.7	7.9	6.9	157	K	1.0	129.00
7/9/2002		4.0	210.0	5.9	316	7.4	8.2	25.0	157		1.6	138.00
8/27/2002	K	4.0	200.0	6.0	310	8.5	8.1	22.3	149	K HT	1.0	137.00
10/23/2002		4.0	210.0	4.6	311	10.7		8.5	153	K	1.0	138.00
No. of Samples:		4	4	4	4	4	3	4	4		4	4
Mean+:	*	3.0	205.0	5.6	309	9.8	8.1	15.7	154	*	0.8	135.50
Median+:		4.0	205.0	5.8	311	9.6	8.1	15.4	155		1.0	137.50

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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)
500233 Clinton River										
2/21/2002	0.120	C 1.320	0.024	1.170	0.194	0.040	41.0	5.0	171.0	91.8
3/27/2002	0.081	C 1.760	0.012	0.690	0.100	0.066	44.0	3.8	164.0	90.5
4/3/2002	0.230	C 1.160	0.023	1.250	0.165	0.036	35.0	3.5	135.0	76.0
4/9/2002	0.250	C HT 0.980	HT 0.027	1.680	0.280	HT 0.053	30.0	3.7	104.0	62.9
6/4/2002	0.178	C 1.570	0.057	1.010	0.151	HT 0.075	30.0	4.3	118.0	66.2
7/22/2002	0.240	C 1.160	0.072	1.370	0.210	0.073	25.0	5.1	83.0	50.4
9/17/2002	DL 0.140	C 3.000	0.044	1.140	0.210	0.148	33.0	7.3	137.0	80.5
10/17/2002	DL 0.090	C 2.700	0.023	0.890	0.350	HT 0.280	38.0	6.2	137.0	80.2
10/29/2002	DL 0.070	C 2.900	0.022	0.760	0.101	0.054	35.0	5.7	114.0	65.1
11/12/2002	0.027	C 1.600	0.021	0.860	0.143	0.063	34.0	5.2	95.0	50.2
11/20/2002	0.075	C 1.390	0.021	0.830	0.124	0.056	39.0	5.0	129.0	71.6
11/26/2002	0.092	C 1.770	0.016	0.710	0.098	0.056	46.0	4.9	126.0	71.8
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.133	1.776	0.030	1.030	0.177	0.083	35.8	5.0	126.1	71.4
Median+:	0.106	1.585	0.023	0.950	0.158	0.060	35.0	5.0	127.5	71.7
210102 Escanaba River										
5/7/2002	0.024	C 0.187	0.004	0.500	0.018	0.003	14.0	1.2	8.0	13.3
7/16/2002	0.067	C 0.128	0.019	0.630	0.036	0.009	41.0	2.5	23.0	45.2
9/25/2002	ST 0.040	C ST 0.120	0.010	ST 0.450	ST 0.019	0.009	36.0	2.3	16.0	37.7
11/5/2002	0.046	C 0.179	0.007	0.500	0.011	0.010	27.0	1.6	12.0	22.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.044	0.154	0.010	0.520	0.021	0.008	29.5	1.9	14.8	29.6
Median+:	0.043	0.154	0.009	0.500	0.019	0.009	31.5	2.0	14.0	30.0

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
500233 Clinton River											
2/21/2002	A NH	86.0	590.0	DM 9.1	874	11.4	7.7	4.3	235	81.0	143.00
3/27/2002		4.0	670.0	5.8	991	14.2	7.9	2.5	318	2.7	226.00
4/3/2002		59.0	520.0	DM 8.5	787	1.0	7.8	4.7	211	59.0	143.00
4/9/2002		130.0	440.0	DM 8.7	621	9.8	7.7	8.6	183	97.0	124.00
6/4/2002		22.0	500.0	7.4	722	6.7	7.4	14.8	225	18.0	169.00
7/22/2002		44.0	360.0	9.0	572	4.1	7.3	23.6	141	45.0	107.00
9/17/2002		9.0	550.0	7.8	818	6.9	7.8	19.6	244	12.0	156.00
10/17/2002		17.0	580.0	6.4	844	9.3	8.0	9.0	255	12.0	166.00
10/29/2002		8.0	480.0	5.7	764	9.8	7.7	8.0	247	8.5	165.00
11/12/2002		19.0	430.0	7.4	641	6.8	7.5	10.3	200	20.0	135.00
11/20/2002		10.0	530.0	8.2	775	10.5	7.5	5.8	229	12.0	151.00
11/26/2002		11.0	550.0	HT 6.0	802	11.2	7.8	5.4	248	HT 5.3	185.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		34.9	516.7	7.5	768	8.5	7.7	9.7	228	31.0	155.83
Median+:		18.0	525.0	7.6	781	9.6	7.7	8.3	232	15.0	153.50
210102 Escanaba River											
5/7/2002	K	4.0	140.0	14.0	199	11.1	7.7	9.1	79	3.1	71.00
7/16/2002	K	4.0	280.0	18.0	437	6.1	8.0	26.7	119	4.8	131.00
9/25/2002	K	4.0	240.0	ST 44.0					102	5.1	109.00
11/5/2002	K	4.0	180.0	17.0	276	12.5	8.0	2.3	95	2.6	81.00
No. of Samples:		4	4	4	3	3	3	3	4	4	4
Mean+:	*	2.0	210.0	23.3	304	9.9	7.9	12.7	99	3.9	98.00
Median+:	K	4.0	210.0	17.5	276	11.1	8.0	9.1	99	4.0	95.00

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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										
4/18/2002	0.030	C 1.400	0.016	0.910	0.111	0.017	45.0	3.2	65.0	29.7
6/11/2002	DL 0.070	C 2.400	0.032	1.130	0.191	0.062	35.0	3.6	77.0	42.0
7/11/2002	K DL 0.050	C 3.800	0.031	1.110	0.143	HT 0.061	41.0	4.9	100.0	60.7
11/13/2002	K DL 0.050	C 2.300	0.009	0.900	0.105	0.050	32.0	4.8	74.0	41.7
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.038	2.475	0.022	1.013	0.138	0.048	38.3	4.1	79.0	43.5
Median+:	0.050	2.350	0.024	1.010	0.127	0.056	38.0	4.2	75.5	41.9
700123 Grand River (Lower)										
2/25/2002	DL 0.140	C 3.400	0.026	0.880	0.103	0.033	42.0	3.3	42.0	20.1
3/12/2002	DL 0.160	C 2.900	0.019	0.640	0.097	0.049	27.0	3.4	41.0	19.6
4/10/2002	0.109	C 1.540	0.016	0.930	0.126	0.019	32.0	2.6	39.0	18.8
5/20/2002	DL 0.080	C 2.600	0.029	0.940	0.105	0.030	33.0	2.7	35.0	18.3
7/2/2002	0.011	C HT 1.060	HT 0.025	1.050	0.080	HT 0.006	50.0	2.8	57.0	29.2
7/30/2002	0.015	C 0.460	0.033	1.300	0.107	0.007	48.0	2.9	59.0	31.8
9/4/2002	0.051	C 1.190	0.059	1.010	0.081	0.025	47.0	3.3	69.0	36.8
10/1/2002	0.016	C 1.360	HT 0.063	1.000	0.086	HT 0.009	51.0	3.4	72.0	41.2
10/23/2002	0.380	C 1.350	0.059	0.940	0.055	0.009	55.0	3.7	66.0	37.5
11/6/2002	0.390	C 1.430	0.046	0.890	0.073	0.026	54.0	3.5	66.0	36.2
11/18/2002	0.240	C 1.380	0.037	0.740	0.033	0.012	61.0	3.8	61.0	37.8
11/25/2002	0.240	C 1.310	0.030	0.730	0.043	0.015	55.0	3.4	55.0	30.9
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.153	1.665	0.037	0.921	0.082	0.020	46.3	3.2	55.2	29.9
Median+:	0.125	1.370	0.032	0.935	0.084	0.017	49.0	3.4	58.0	31.4

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730285	Flint River										
4/18/2002		38.0	430.0	8.2	627	8.3	8.0	17.8	276	18.0	199.00
6/11/2002		45.0	490.0	9.2	733	7.2	7.9	23.5	295	24.0	225.00
7/11/2002		32.0	530.0	8.6	760	8.0	8.7	23.9	269	20.0	200.00
11/13/2002		12.0	410.0	8.0	603	9.7	7.8	7.4	223	8.4	157.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		31.8	465.0	8.5	681	8.3	8.1	18.2	266	17.6	195.25
Median+:		35.0	460.0	8.4	680	8.2	8.0	20.7	273	19.0	199.50
700123	Grand River (Lower)										
2/25/2002		27.0	390.0	7.6	555	12.3	8.0	3.8	259	22.0	176.00
3/12/2002		38.0	340.0 DM	7.5	441	12.7	7.7	1.7	196	56.0	144.00
4/10/2002		41.0	360.0 DM	8.4	494	11.2	8.2	7.5	236	34.0	179.00
5/20/2002		24.0	380.0	8.2	559	9.9	7.7	11.6	265	15.0	201.00
7/2/2002		18.0	430.0	6.7	629	10.3	7.9	27.4	273	7.9	204.00
7/30/2002		33.0	400.0	6.7	568	11.4	8.5	26.3	234	QC 15.0	160.00
9/4/2002		20.0	440.0	6.4	662	7.8	8.2	22.9	261	11.0	175.00
10/1/2002		19.0	470.0	5.4	690	10.0	8.3	20.0	283	9.0	202.00
10/23/2002		9.0	480.0	5.5	701	10.2	8.1	8.6	293	4.7	220.00
11/6/2002		4.0	510.0	5.0	686	11.2	8.1	5.2	293	2.2	220.00
11/18/2002		K 4.0	470.0	5.8	680	12.0	8.0	3.9	297	2.5	221.00
11/25/2002		8.0	450.0 HT	5.2	652	12.4	8.0	3.6	278	HT 2.4	223.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		* 20.3	426.7	6.5	610	11.0	8.1	11.9	264	15.1	193.75
Median+:		19.5	435.0	6.6	641	11.2	8.1	8.1	269	10.0	201.50

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340025 Grand River (Upper)										
4/23/2002	0.054	C 1.590	0.018	1.000	0.091	0.020	45.0	2.9	41.0	20.4
6/19/2002	0.013	C PI 1.820	PI 0.017	0.910	0.109	PI 0.032	43.0	2.7	46.0	23.3
9/5/2002	0.013	C 0.780	0.017	0.940	0.078	0.022	50.0	4.1	68.0	39.5
11/7/2002	T 0.006	C 1.920	0.011	0.550	0.048	0.022	56.0	4.8	72.0	40.7
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.022	1.528	0.016	0.850	0.082	0.024	48.5	3.6	56.8	31.0
Median+:	0.013	1.705	0.017	0.925	0.085	0.022	47.5	3.5	57.0	31.4
580364 Huron River										
2/28/2002	0.015	C 1.110	0.009	0.580	0.026	0.005	69.0	3.2	103.0	54.5
3/27/2002	0.027	C 0.800	0.005	0.540	0.018	0.004	103.0	2.8	98.0	54.9
4/3/2002	0.050	C 0.750	0.009	0.680	0.063	0.011	78.0	2.8	88.0	43.7
4/9/2002	0.047	C HT 0.700	HT 0.009	0.790	0.082	HT 0.011	68.0	3.0	83.0	44.9
6/5/2002	0.062	C 0.490	0.010	0.650	0.042	0.009	116.0	2.8	78.0	42.0
7/22/2002	0.087	C 0.250	0.012	0.680	0.064	0.025	170.0	3.4	88.0	48.6
9/17/2002	0.065	C 0.062	0.006	0.700	0.054	0.028	177.0	3.9	104.0	61.0
10/17/2002	0.061	C 0.148	0.009	0.620	0.026	HT 0.011	242.0	4.0	107.0	58.3
10/29/2002	0.070	C 0.200	0.015	0.680	0.030	0.011	84.0	5.1	113.0	61.6
11/12/2002	0.043	C 0.280	0.015	0.910	0.059	0.010	75.0	4.2	113.0	59.7
11/20/2002	0.064	C 0.600	0.017	0.800	0.035	0.009	130.0	4.4	110.0	60.2
11/26/2002	0.080	C 0.840	0.023	0.700	0.027	0.011	133.0	4.4	108.0	64.6
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.056	0.519	0.012	0.694	0.044	0.012	120.4	3.7	99.4	54.5
Median+:	0.062	0.545	0.010	0.680	0.039	0.011	109.5	3.7	103.5	56.6

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DL = Sample analyzed using a dilution(s).
DM = Dilution required due to matrix problems.
HT = Recommended laboratory holding time was exceeded before analysis.
INT = Interference encountered during analysis resulted in no obtainable value.
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NAV = Requested analysis not available.
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PI = Possible interference may have affected the accuracy of the laboratory result.
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RB = Concentration of reagent blank has been subtracted from analyte value.
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STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)		Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)		Turbidity (NTU)	Alkalinity (mg CaCO3/L)
340025 Grand River (Upper)												
4/23/2002	14.0	420.0		9.8	553	9.8	7.9	11.0	292		9.1	233.00
6/19/2002	9.0	450.0		7.9	665	8.0	7.9	21.1	215		12.0	252.00
9/5/2002	18.0	450.0		6.0	664	8.0	8.3	20.8	261		8.0	180.00
11/7/2002	6.0	500.0		5.4	717	11.4	7.9	4.0	300		2.7	224.00
No. of Samples:	4	4		4	4	4	4	4	4		4	4
Mean+:	11.8	455.0		7.3	650	9.3	8.0	14.2	267		8.0	222.25
Median+:	11.5	450.0		7.0	665	8.9	7.9	15.9	277		8.6	228.50
580364 Huron River												
2/28/2002	10.0	560.0		6.5	826	13.3	8.3	2.2	311		5.2	210.00
3/27/2002	5.0	580.0		6.6	840	13.7	7.8	2.4	344		3.3	204.00
4/3/2002	21.0	520.0		6.9	759	12.1	7.9	4.6	298		26.0	184.00
4/9/2002	45.0	490.0	DM	7.8	684	11.1	7.7	7.3	274		37.0	181.00
6/5/2002	16.0	550.0		6.7	822	7.6	8.1	18.5	355		12.0	204.00
7/22/2002	10.0	620.0		6.7	905	4.4	7.7	25.5	364		7.2	169.00
9/17/2002	13.0	650.0		6.6	974	6.4	7.7	19.5	374		12.0	160.00
10/17/2002	8.0	700.0		6.6	997	8.8	7.9	10.5	425		3.4	147.00
10/29/2002	4.0	520.0		6.3	770	9.5	7.9	8.6	255		4.4	129.00
11/12/2002	14.0	520.0		7.0	802	10.9	7.9	8.5	254		11.0	139.00
11/20/2002	5.0	580.0		7.2	918	10.9	8.0	6.5	300		3.9	140.00
11/26/2002	4.0	600.0	HT	5.7	884	13.4	8.0	4.1	307	HT	3.3	155.00
No. of Samples:	12	12		12	12	12	12	12	12		12	12
Mean+:	12.9	574.2		6.7	848	10.2	7.9	9.9	322		10.7	168.50
Median+:	10.0	570.0		6.7	833	10.9	7.9	7.9	309		6.2	164.50

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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)
470521 Huron River (Headwaters)										
2/28/2002	0.015	C 0.380	0.005	0.530	0.025	0.005	41.0	3.0	96.0	47.2
6/5/2002	0.063	C 0.082	0.005	0.780	0.035	0.005	28.0	2.4	105.0	56.2
8/28/2002	0.057	C 0.146	0.006	0.780	0.035	0.010	33.0	2.9	125.0	65.7
10/29/2002	0.057	C 0.145	0.005	0.600	0.014	0.009	29.0	3.5	119.0	65.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.048	0.188	0.005	0.673	0.027	0.007	32.8	3.0	111.3	58.5
Median+:	0.057	0.146	0.005	0.690	0.030	0.007	31.0	3.0	112.0	60.6
030077 Kalamazoo River (Lower)										
2/25/2002	0.016	C 1.710	0.009	0.550	0.052	0.014	35.0	2.5	34.0	17.3
3/12/2002	0.080	C 1.800	0.017	0.770	0.127	0.050	21.0	3.4	28.0	13.7
4/10/2002	0.041	C 1.260	0.013	0.680	0.081	0.013	29.0	2.5	36.0	17.4
5/20/2002	0.024	C 1.340	0.017	0.720	0.069	0.016	26.0	2.4	26.0	14.6
7/2/2002	0.097	C HT 0.840	HT 0.043	0.980	0.094	HT 0.004	37.0	2.5	48.0	27.6
7/30/2002	0.021	C 0.620	0.021	1.110	0.109	0.006	34.0	2.6	55.0	30.9
9/4/2002	0.055	C 0.740	0.016	0.700	0.068	0.008	26.0	2.6	46.0	26.1
10/1/2002	0.033	C 0.830	HT 0.016	0.660	0.057	HT 0.007	32.0	2.7	56.0	33.2
10/23/2002	0.083	C 1.180	0.015	0.560	0.041	0.006	37.0	3.1	53.0	30.6
11/6/2002	0.051	C 1.240	0.014	0.480	0.024	0.009	38.0	2.8	52.0	30.2
11/18/2002	0.092	C 1.380	0.015	0.630	0.040	0.010	45.0	3.0	50.0	32.2
11/25/2002	0.071	C 1.380	0.014	0.500	0.037	0.022	45.0	2.8	47.0	27.2
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.055	1.193	0.018	0.695	0.067	0.014	33.8	2.7	44.3	25.1
Median+:	0.053	1.250	0.016	0.670	0.063	0.010	34.5	2.7	47.5	27.4

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
470521	Huron River (Headwaters)										
2/28/2002		4.0	510.0	6.5	755	12.6	7.7	0.7	274	2.2	212.00
6/5/2002		20.0	510.0	DM 6.7	744	6.7	7.9	19.0	272	8.0	209.00
8/28/2002		15.0	510.0	5.4	767	6.8	7.8	20.9	236	6.0	171.00
10/29/2002	K	4.0	510.0	5.3	752	10.0	8.0	6.6	246	K 1.0	157.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:	*	10.3	510.0	6.0	755	9.0	7.9	11.8	257	* 4.2	187.25
Median+:		9.5	510.0	6.0	754	8.4	7.9	12.8	259	4.1	190.00
030077	Kalamazoo River (Lower)										
2/25/2002		16.0	360.0	6.6	516	11.6	8.0	4.8	251	8.2	188.00
3/12/2002		14.0	290.0	6.4	389	12.6	7.7	1.5	174	36.0	132.00
4/10/2002		18.0	360.0	5.8	496	12.2	8.0	7.9	236	15.0	192.00
5/20/2002		9.0	320.0	7.6	473	9.5	7.5	11.1	215	9.3	183.00
7/2/2002		30.0	410.0	5.0	598	7.6	7.7	26.1	259	16.0	210.00
7/30/2002		47.0	400.0	5.3	568	7.4	8.0	24.9	233	QC 20.0	181.00
9/4/2002		22.0	380.0	4.7	557	7.1	8.1	22.2	237	12.0	179.00
10/1/2002		22.0	400.0	4.1	581	8.1	8.0	19.1	242	8.5	195.00
10/23/2002		9.0	430.0	4.4	626	9.9	8.0	8.6	276	4.1	224.00
11/6/2002	K	4.0	430.0	4.1	618	10.8	8.0	5.3	275	2.2	224.00
11/18/2002		4.0	430.0	5.5	623	11.8	7.8	4.9	284	3.6	224.00
11/25/2002		5.0	420.0	HT 4.4	614	11.8	7.6	3.8	277	HT 3.3	233.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:	*	16.5	385.8	5.3	555	10.0	7.9	11.7	247	11.5	197.08
Median+:		15.0	400.0	5.2	575	10.4	8.0	8.3	247	8.9	193.50

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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)										
2/26/2002	0.082	C 1.380	0.009	0.670	0.046	0.010	33.0	1.8	31.0	15.8
4/30/2002	0.107	C 1.070	0.008	0.550	0.033	0.007	32.0	1.6	37.0	18.5
7/17/2002	0.029	C 0.940	0.009	0.480	0.056	0.011	32.0	1.9	54.0	26.0
9/24/2002	0.028	C 1.130	0.011	0.370	0.036	0.012	30.0	2.1	50.0	26.9
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.062	1.130	0.009	0.518	0.043	0.010	31.8	1.9	43.0	21.8
Median+:	0.056	1.100	0.009	0.515	0.041	0.011	32.0	1.9	43.5	22.3
510088 Manistee River										
3/19/2002	0.021	C 0.270	0.003	0.210	0.017	0.007	8.0	0.9	8.0	3.4
5/29/2002	0.016	C 0.159	0.002	0.280	0.023	0.005	9.0	0.6	9.0	5.5
8/14/2002	0.014	C 0.113	0.005	0.230	0.028	0.010	8.0	0.7	12.0	7.1
10/24/2002	0.032	C 0.185	0.005	0.160	0.015	0.007	10.0	0.8	11.0	6.8
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.021	0.182	0.004	0.220	0.021	0.007	8.8	0.8	10.0	5.7
Median+:	0.019	0.172	0.004	0.220	0.020	0.007	8.5	0.8	10.0	6.2
770073 Manistique River										
4/30/2002	0.017	C 0.046	0.004	0.460	0.016	0.008	8.0	0.4	3.0 K	1.0
6/20/2002	0.020	C 0.035	0.004	0.570	0.023	0.003	16.0	0.5	2.0	2.0
8/14/2002	0.036	C 0.061	0.004	HT 0.610	HT 0.024	0.004	16.0	0.7	3.0	2.1
10/17/2002	0.017	C 0.027	0.004	0.610	0.017	T HT 0.001	12.0	0.6	3.0 K	1.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.023	0.042	0.004	0.563	0.020	0.004	13.0	0.6	2.8 *	1.3
Median+:	0.019	0.041	0.004	0.590	0.020	0.004	14.0	0.6	3.0	1.5

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)		Turbidity (NTU)	Alkalinity (mg CaCO3/L)
390057	Kalamazoo River (Upper)											
2/26/2002		A 10.0	360.0	7.2	509	11.3	8.0	4.7	247		6.4	194.00
4/30/2002		13.0	410.0	6.2	575	10.1	7.7	9.2	293	HT	4.8	236.00
7/17/2002		11.0	450.0	3.7	658	6.9	7.6	24.8	292		5.6	235.00
9/24/2002		K 4.0	440.0	3.2	642	9.3	8.1	15.7	290		1.5	237.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:		* 9.0	415.0	5.1	596	9.4	7.9	13.6	281		4.6	225.50
Median+:		10.5	425.0	5.0	609	9.7	7.9	12.5	291		5.2	235.50
510088	Manistee River											
3/19/2002		11.0	190.0	4.1	266	12.5	7.7	0.6	136		6.0	116.00
5/29/2002		10.0	200.0	4.6	293	9.1	7.6	15.3	152		5.3	137.00
8/14/2002		9.0	220.0	2.6	275	7.5	8.2	22.8	156		6.1	132.00
10/24/2002		5.0	230.0	1.9	313	11.0	8.1	8.2	157		2.1	144.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:		8.8	210.0	3.3	287	10.0	7.9	11.7	150		4.9	132.25
Median+:		9.5	210.0	3.4	284	10.1	7.9	11.8	154		5.7	134.50
770073	Manistique River											
4/30/2002		7.0	60.0	12.0	77	10.4	6.8	5.1	44	HT	2.8	32.00
6/20/2002		6.0	110.0	14.0	164	8.1	7.6	18.1	84		5.1	54.00
8/14/2002		9.0	130.0	15.0	191	7.3	7.3	21.2	92		8.0	77.00
10/17/2002		6.0	90.0	18.0	131	10.6	8.0	6.5	66		5.3	44.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:		7.0	97.5	14.8	141	9.1	7.4	12.7	72		5.3	51.75
Median+:		6.5	100.0	14.5	148	9.3	7.5	12.3	75		5.2	49.00

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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										
4/16/2002	0.047	C 0.240	0.005	0.840	0.100	0.012	10.0	1.4	4.0	3.5
4/22/2002	0.042	C 0.180	0.006	0.700	0.048	0.016	7.0	1.0	3.0	1.8
4/29/2002	0.027	C 0.122	0.004	0.570	0.041	0.004	9.0	0.9	3.0	1.8
5/10/2002	0.020	C 0.103	HT 0.005	0.620	0.034	HT 0.008	9.0	0.9	4.0	4.5
6/13/2002	0.020	C 0.070	0.004	0.600	0.031	0.004	12.0	1.2	6.0	7.3
6/18/2002	0.019	C 0.080	0.005	0.700	0.054	PI 0.004	9.0	0.9	4.0	2.8
7/8/2002	0.033	C 0.075	0.005	0.550	0.035	0.009	10.0	1.1	6.0	7.2
8/4/2002	0.011	C 0.052	0.004	0.470	0.041	0.012	13.0	1.3	6.0	8.2
9/19/2002	0.011	C 0.010	0.002	0.370	0.021	0.008	11.0	1.5	8.0	8.7
10/2/2002	0.013	C 0.065	0.003	0.400	0.020	0.005	12.0	1.8	7.0	8.4
10/9/2002	0.019	C 0.108	0.004	0.800	0.044	0.007	7.0	4.0	7.0	4.4
11/12/2002	0.017	C 0.133	0.004	0.450	0.016	0.007	10.0	1.2	6.0	6.4
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.023	0.103	0.004	0.589	0.040	0.008	9.9	1.4	5.3	5.4
Median+:	0.020	0.092	0.004	0.585	0.038	0.008	10.0	1.2	6.0	5.5

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QC = Quality control problems exist.
RB = Concentration of reagent blank has been subtracted from analyte value.
ST = Recommended sample collection/preservation technique not used.
T = Value reported is less than the quantification level.
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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
550038	Menominee River										
4/16/2002		41.0	120.0	DM 12.0	170	12.4	7.2	7.1	84	15.0	74.00
4/22/2002		15.0	70.0	13.0	102	12.0	7.6	7.3	50	7.7	41.00
4/29/2002	K	4.0	100.0	14.0	134	12.9	7.6	4.8	71	HT 2.6	55.00
5/10/2002		8.0	110.0	13.0	159	11.7	7.2	9.3	80	HT 4.1	68.00
6/13/2002		6.0	160.0	12.0	243	8.3	8.0	20.2	120	4.6	108.00
6/18/2002		11.0	140.0	14.0	206	9.6	7.6	18.6	61	7.5	86.00
7/8/2002		4.0	160.0	12.0	245	6.5	7.7	26.0	114	3.8	99.00
8/4/2002		5.0	160.0	10.0	254	7.6	7.9	24.9	109	3.3	91.00
9/19/2002		5.0	170.0	8.9	262	8.7	8.1	20.5	112	2.0	101.00
10/2/2002	K	4.0	170.0	8.8					122	1.8	103.00
10/9/2002		20.0	140.0	16.0	215	10.9	8.1	11.5	104	7.1	81.00
11/12/2002	K	4.0	160.0	12.0	239	12.7	8.3	4.0	114	1.6	91.00
No. of Samples:		12	12	12	11	11	11	11	12	12	12
Mean+:	*	10.1	138.3	12.1	203	10.3	7.8	14.0	95	5.1	83.17
Median+:		5.5	150.0	12.0	215	10.9	7.7	11.5	107	4.0	88.50

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DL = Sample analyzed using a dilution(s).
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HT = Recommended laboratory holding time was exceeded before analysis.
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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)
610273 Muskegon River (Lower)										
2/25/2002	0.019	C 0.500	0.005	0.320	0.019	0.007	16.0	1.1	19.0	10.1
3/12/2002	0.041	C 0.560	0.005	0.380	0.032	0.008	10.0	1.2	18.0	10.5
4/11/2002	0.024	C 0.460	0.006	0.370	0.020	0.006	11.0	1.3	17.0	8.0
5/16/2002	0.018	C 0.270	0.006	0.380	0.021	0.009	7.0	1.1	13.0	7.3
6/27/2002	0.015	C 0.210	0.009	0.400	0.019	0.003	10.0	1.0	14.0	8.6
7/31/2002	0.017	C 0.260	0.007	0.360	0.015	0.005	14.0	1.1	21.0	9.9
8/8/2002	0.014	C 0.210	0.010	0.360	0.018	0.006	13.0	1.0	20.0	10.2
10/10/2002	0.016	C 0.390	0.009	0.320	0.036	0.020	10.0	1.4	23.0	12.0
10/23/2002	0.019	C 0.350	0.007	0.260	0.025	0.014	16.0	1.2	21.0	11.2
11/6/2002	0.013	C 0.380	0.007	0.250	0.018	0.009	18.0	1.2	22.0	12.1
11/18/2002	0.013	C 0.450	0.006	0.250	0.006	0.006	21.0	4.6	26.0	13.0
11/25/2002	0.013	C 0.420	0.006	0.240	0.014	0.008	20.0	1.2	22.0	12.5
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.019	0.372	0.007	0.324	0.020	0.008	13.8	1.5	19.7	10.5
Median+:	0.017	0.385	0.007	0.340	0.019	0.008	13.5	1.2	20.5	10.4
670008 Muskegon River (Upper)										
3/20/2002	0.019	C 0.210	0.004	0.400	0.027	0.007	5.0	1.2	15.0	8.2
5/14/2002	0.018	C 0.183	0.004	0.470	0.030	0.008	4.0	1.0	13.0	8.6
6/25/2002	0.016	C 0.270	0.007	0.610	0.054	0.005	5.0	1.1	16.0	10.8
8/6/2002	0.011	C 0.165	0.004	0.380	0.032	0.005	10.0	1.1	15.0	9.4
10/8/2002	0.011	C 0.290	0.004	0.330	0.015	0.004	7.0	1.4	19.0	10.0
No. of Samples:	5	5	5	5	5	5	5	5	5	5
Mean+:	0.015	0.224	0.005	0.438	0.032	0.006	6.2	1.2	15.6	9.4
Median+:	0.016	0.210	0.004	0.400	0.030	0.005	5.0	1.1	15.0	9.4

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
610273	Muskegon River (Lower)										
2/25/2002		14.0	240.0	5.6	342	12.6	7.7	2.4	162	2.6	127.00
3/12/2002		12.0	230.0	5.5	300	13.1	7.6	0.8	151	8.3	126.00
4/11/2002		10.0	200.0	7.2	272	11.8	7.7	4.7	134	3.1	109.00
5/16/2002		7.0	200.0	7.0	275	10.0	7.8	12.0	141	2.6	109.00
6/27/2002		6.0	210.0	6.9	309	9.3	7.8	21.6	148	2.4	120.00
7/31/2002		7.0	250.0	6.1	353	7.6	7.9	23.6	159	QC 2.7	136.00
8/8/2002		6.0	250.0	5.4	353		8.2	22.2	166	2.6	137.00
10/10/2002		5.0	270.0	4.2	393	9.7	8.2	15.8	191	2.1	147.00
10/23/2002		6.0	270.0	4.1	387	10.3	8.2	10.3	188	K 1.0	154.00
11/6/2002		K 4.0	280.0	4.2	389	11.7	8.2	6.7	195	K 1.0	153.00
11/18/2002		K 4.0	280.0	4.6	389	12.8	8.2	4.5	194	K 1.0	159.00
11/25/2002		4.0	270.0	HT 5.5	390	12.7	8.2	4.4	188	K HT 1.0	156.00
No. of Samples:		12	12	12	12	11	12	12	12	12	12
Mean+:		* 6.8	245.8	5.5	346	11.1	8.0	10.8	168	* 2.4	136.08
Median+:		6.0	250.0	5.5	353	11.7	8.1	8.5	164	2.5	136.50
670008	Muskegon River (Upper)										
3/20/2002		10.0	170.0	7.1	238	12.6	7.3	3.1	118	3.7	92.00
5/14/2002		10.0	190.0	8.1	222	10.0	7.6	10.0	130	4.0	108.00
6/25/2002		21.0	230.0	DM 8.5	299	7.7	7.7	21.3	167	10.0	138.00
8/6/2002		12.0	240.0	4.8	323	8.1	7.7	19.2	172	7.0	146.00
10/8/2002		K 4.0	260.0	4.6	362	9.9	8.0	9.7	184	2.0	160.00
No. of Samples:		5	5	5	5	5	5	5	5	5	5
Mean+:		* 11.0	218.0	6.6	289	9.7	7.7	12.7	154	5.3	128.80
Median+:		10.0	230.0	7.1	299	9.9	7.7	10.0	167	4.0	138.00

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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)
660038 Ontonagon River										
5/8/2002	0.010	C 0.068	0.006	0.420	0.070	0.011	3.0	0.9	3.0	2.5
7/17/2002	T 0.008	NAV	0.008	0.440	0.040	0.024	K 2.0	1.9	7.0	1.7
9/25/2002	0.022	C 0.034	0.010	0.690	0.110	0.018	3.0	1.9	3.0	3.1
11/5/2002	0.011	C 0.026	0.011	0.410	0.032	0.032	3.0	1.1	3.0	2.0
No. of Samples:	4	3	4	4	4	4	4	4	4	4
Mean+:	0.013	0.043	0.009	0.490	0.063	0.021	* 2.5	1.5	4.0	2.3
Median+:	0.011	0.034	0.009	0.430	0.055	0.021	3.0	1.5	3.0	2.3
360124 Paint River										
5/8/2002	0.015	C 0.085	0.002	0.390	0.013	0.002	4.0	0.5	2.0	2.1
7/18/2002	T 0.006	0.034	0.002	0.240	0.015	0.005	3.0	0.6	2.0	1.3
9/24/2002	T 0.005	C 0.093	0.003	0.230	0.007	0.006	3.0	0.7	2.0	1.8
11/5/2002	T 0.007	C 0.144	0.003	0.200	0.006	0.008	7.0	0.6	2.0	2.9
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.008	0.089	0.003	0.265	0.010	0.005	4.3	0.6	2.0	2.0
Median+:	0.007	0.089	0.003	0.235	0.010	0.006	3.5	0.6	2.0	2.0
530027 Pere Marquette River										
3/19/2002	0.013	C 0.102	0.003	0.350	0.022	0.008	12.0	0.9	9.0	3.7
5/15/2002	0.014	C 0.042	0.002	0.450	0.028	0.006	7.0	0.7	7.0	5.4
6/26/2002	0.037	C 0.127	0.008	HT 0.610	HT 0.064	0.012	13.0	0.7	12.0	7.9
8/7/2002	0.017	C 0.080	0.003	0.410	0.047	0.010	16.0	0.7	14.0	8.5
10/9/2002	0.031	C 0.156	0.004	0.330	0.024	0.011	12.0	3.2	19.0	8.9
No. of Samples:	5	5	5	5	5	5	5	5	5	5
Mean+:	0.022	0.101	0.004	0.430	0.037	0.009	12.0	1.2	12.2	6.9
Median+:	0.017	0.102	0.003	0.410	0.028	0.010	12.0	0.7	12.0	7.9

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
660038	Ontonagon River										
5/8/2002		51.0	60.0	DM 11.0	89	10.7	7.4	8.7	44	58.0	39.00
7/17/2002		10.0	100.0	9.6	150	6.5	7.7	27.6	66	HT 23.0	66.00
9/25/2002		52.0	90.0	DM 14.0					65	79.0	55.00
11/5/2002		7.0	70.0	10.0	110	12.1	7.9	1.7	52	21.0	40.00
No. of Samples:		4	4	4	3	3	3	3	4	4	4
Mean+:		30.0	80.0	11.2	116	9.8	7.7	12.7	57	45.3	50.00
Median+:		30.5	80.0	10.5	110	10.7	7.7	8.7	59	40.5	47.50
360124	Paint River										
5/8/2002		4.0	50.0	10.0	70	10.7	7.0	6.2	37	1.7	36.00
7/18/2002	K	4.0	100.0	4.6	152	8.5	8.0	20.1	74	K HT 1.0	74.00
9/24/2002	K	4.0	100.0	4.9					69	1.3	61.00
11/5/2002	K	4.0	90.0	6.6	135	12.9	8.1	1.0	65	K 1.0	55.00
No. of Samples:		4	4	4	3	3	3	3	4	4	4
Mean+:	*	2.5	85.0	6.5	119	10.7	7.7	9.1	61	* 1.0	56.50
Median+:	K	4.0	95.0	5.8	135	10.7	8.0	6.2	67	1.2	58.00
530027	Pere Marquette River										
3/19/2002	K	4.0	170.0	6.7	237	12.4	7.4	3.3	123	3.3	102.00
5/15/2002		7.0	190.0	7.7	248	9.6	7.6	11.0	144	3.7	115.00
6/26/2002		28.0	230.0	5.0	328	7.2	7.5	21.9	165	13.0	139.00
8/7/2002		19.0	240.0	3.2	309	8.3	8.1	17.4	171	12.0	140.00
10/9/2002		9.0	240.0	3.7	340	9.7	7.8	10.5	168	4.0	138.00
No. of Samples:		5	5	5	5	5	5	5	5	5	5
Mean+:	*	13.0	214.0	5.3	292	9.4	7.7	12.8	154	7.2	126.80
Median+:		9.0	230.0	5.0	309	9.6	7.6	11.0	165	4.0	138.00

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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)
680056 Perry Creek										
4/4/2002	0.010	C 0.350	0.002	0.230	0.010	0.005	8.0	1.4	14.0	8.5
6/12/2002	0.022	C 0.145	0.004	0.340	0.013	0.004	2.0	1.2	12.0	7.7
8/20/2002	T 0.006	C 0.068	0.002	HT 0.180	HT 0.009	0.004	6.0	1.2	10.0	8.3
11/19/2002	0.015	C 0.300	T 0.001	0.240	T 0.003	0.003	10.0	1.6	14.0	9.1
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.013	0.216	0.002	0.248	0.009	0.004	6.5	1.4	12.5	8.4
Median+:	0.013	0.223	0.002	0.235	0.010	0.004	7.0	1.3	13.0	8.4
490006 Pine River										
4/23/2002	0.016	C PI 0.034	PI 0.007	0.580	0.121	PI 0.015	5.0	0.9	2.0	1.3
7/11/2002	0.023	C 0.062	0.007	0.660	0.065	HT 0.013	2.0	0.8	4.0	1.8
8/27/2002	0.017	C 0.017	0.006	HT 0.560	HT 0.059	HT 0.036	5.0	0.9	3.0	2.7
10/21/2002	0.012	C 0.006	0.012	0.690	0.061	0.032	7.0	1.4	3.0	K 1.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.017	0.030	0.008	0.623	0.077	0.024	4.8	1.0	3.0	* 1.6
Median+:	0.017	0.026	0.007	0.620	0.063	0.024	5.0	0.9	3.0	1.6
580046 River Raisin										
4/17/2002	DL 0.050	C 4.000	0.049	1.240	0.300	0.082	35.0	4.1	29.0	9.9
6/18/2002	0.014	C PI 2.000	PI 0.013	0.700	0.095	PI 0.029	52.0	2.8	46.0	21.9
8/28/2002	0.011	C 0.032	0.008	0.760	0.080	0.017	62.0	3.9	52.0	26.5
11/12/2002	0.019	C 0.610	0.010	0.520	0.037	0.005	72.0	5.3	64.0	31.6
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.024	1.661	0.020	0.805	0.128	0.033	55.3	4.0	47.8	22.5
Median+:	0.017	1.305	0.012	0.730	0.088	0.023	57.0	4.0	49.0	24.2

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STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
680056 Perry Creek										
4/4/2002	K 4.0	250.0	4.6	334	13.1	7.8	1.3	174	1.7	152.00
6/12/2002	5.0	260.0	4.7	373	8.8	8.0	16.0	202	2.8	187.00
8/20/2002	K 4.0	260.0	3.1	370	9.6	8.0	15.1	188	K 1.0	180.00
11/19/2002	K 4.0	270.0	5.1	386	13.0	7.8	2.0	201	1.7	186.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 2.8	260.0	4.4	366	11.1	7.9	8.6	191	* 1.7	176.25
Median+:	4.0	260.0	4.7	372	11.3	7.9	8.6	195	1.7	183.00
490006 Pine River										
4/23/2002	66.0	80.0	DM 15.0	100	11.8	7.4	6.4	62	57.0	47.00
7/11/2002	23.0	140.0	15.0	219	7.3	7.9	20.0	111	27.0	101.00
8/27/2002	22.0	150.0	13.0	231	8.3	7.7	18.8	118	30.0	105.00
10/21/2002	11.0	120.0	18.0	168	12.2	8.5	4.0	87	24.0	69.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	30.5	122.5	15.3	180	9.9	7.9	12.3	95	34.5	80.50
Median+:	22.5	130.0	15.0	194	10.1	7.8	12.6	99	28.5	85.00
580046 River Raisin										
4/17/2002	82.0	320.0	DM 10.0	462	8.7	7.8	17.9	216	150.0	153.00
6/18/2002	12.0	440.0	5.9	656	8.3	7.8	21.2	224	8.3	230.00
8/28/2002	18.0	370.0	4.8	523	9.5	8.4	26.1	214	13.0	139.00
11/12/2002	9.0	490.0	6.0	759	10.7	7.6	8.9	324	10.0	233.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	30.3	405.0	6.7	600	9.3	7.9	18.5	245	45.3	188.75
Median+:	15.0	405.0	6.0	590	9.1	7.8	19.6	220	11.5	191.50

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* = Mean includes a concentration(s) below quantification, which was assigned a value equal to 1/2 the quantification level.
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C = Value calculated from other independent parameters.
DL = Sample analyzed using a dilution(s).
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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)
820070 River Rouge										
4/24/2002	0.128	C PI 0.900	PI 0.018	0.640	0.075	0.011	32.0	2.7	103.0	60.2
6/18/2002	0.156	C PI 0.900	PI 0.027	0.650	0.062	PI 0.025	26.0	2.5	77.0	43.6
8/29/2002	0.053	C 0.470	0.012	0.340	0.042	0.016	21.0	2.7	31.0	18.1
11/12/2002	0.020	C 0.680	0.011	0.790	0.139	0.026	22.0	5.9	67.0	32.6
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.089	0.738	0.017	0.605	0.080	0.020	25.3	3.5	69.5	38.6
Median+:	0.091	0.790	0.015	0.645	0.069	0.021	24.0	2.7	72.0	38.1
090177 Saginaw River										
2/21/2002	DL 0.090	C 4.500	0.018	0.830	0.113	0.027	48.0	3.1	64.0	28.6
3/11/2002	DL 0.120	C 3.200	0.017	1.600	0.340	0.040	26.0	3.8	34.0	15.0
3/14/2002	DL 0.090	C 3.700	0.024	0.960	0.135	0.045	33.0	3.6	37.0	15.9
4/18/2002	DL 0.100	C 2.300	0.029	0.870	0.081	0.015	42.0	3.0	56.0	27.0
6/11/2002	DL 0.150	C 2.300	0.049	1.010	0.103	0.025	31.0	3.0	51.0	23.7
7/10/2002	DL 0.380	C 2.300	0.097	1.410	0.145	HT 0.056	33.0	3.7	88.0	45.2
9/18/2002	0.430	C 1.010	0.101	1.400	0.114	0.069	35.0	5.4	121.0	70.8
10/16/2002	0.300	C 0.980	0.042	0.910	0.078	HT 0.027	31.0	3.6	79.0	43.2
10/28/2002	0.480	C 1.540	0.044	1.230	0.084	HT 0.033	37.0	8.1	103.0	52.1
11/13/2002	0.540	C 1.450	0.022	1.300	0.072	0.036	37.0	4.7	99.0	53.9
11/19/2002	0.440	C 0.700	0.019	1.070	0.059	0.018	39.0	3.5	69.0	37.1
11/26/2002	0.450	C 1.010	0.019	1.170	0.070	0.031	44.0	4.3	87.0	50.5
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.298	2.083	0.040	1.147	0.116	0.035	36.3	4.2	74.0	38.6
Median+:	0.340	1.920	0.027	1.120	0.094	0.032	36.0	3.7	74.0	40.2

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
820070 River Rouge											
4/24/2002		21.0	440.0	4.7	627	8.1	7.3	14.3	186	17.0	127.00
6/18/2002		9.0	350.0	3.3	450	6.5	7.5	21.4	119	9.3	109.00
8/29/2002		9.0	220.0	2.6	307	7.0	8.1	26.0	78	7.9	83.00
11/12/2002		36.0	300.0	6.3	445	4.9	7.3	13.0	137	37.0	94.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		18.8	327.5	4.2	457	6.6	7.6	18.7	130	17.8	103.25
Median+:		15.0	325.0	4.0	448	6.8	7.4	17.9	128	13.2	101.50
090177 Saginaw River											
2/21/2002	A NH	42.0	450.0	DM 8.2	656	12.0	8.1	2.9	275	38.0	179.00
3/11/2002		170.0	280.0	DM 9.6	405	12.9	7.6	0.7	169	150.0	108.00
3/14/2002		40.0	320.0	8.2	466	12.2	7.5	3.1	195	59.0	133.00
4/18/2002		24.0	410.0	8.1	588	8.0	7.9	18.4	259	21.0	184.00
6/11/2002		21.0	410.0	9.1	614	6.0	7.8	22.6	277	22.0	209.00
7/10/2002		35.0	510.0	9.1	735	4.5	7.6	26.2	285	34.0	204.00
9/18/2002		26.0	530.0	7.7	787	4.9	7.7	21.7	246	25.0	156.00
10/16/2002		27.0	390.0	5.8	552	7.7	7.8	13.4	192	17.0	132.00
10/28/2002		20.0	480.0	6.6	702	8.5	7.8	8.3	239	19.0	156.00
11/13/2002		12.0	490.0	6.9	285	11.4	7.7	6.5	252	11.0	179.00
11/19/2002		12.0	410.0	7.3	595	9.6	7.9	4.7	239	13.0	176.00
11/26/2002		17.0	470.0	HT 6.3	677	11.2	7.7	2.6	256	HT 7.6	189.00
No. of Samples:		12	12	12	12	12	12	12	12	12	12
Mean+:		37.2	429.2	7.7	589	9.1	7.8	10.9	240	34.7	167.08
Median+:		25.0	430.0	7.9	605	9.1	7.8	7.4	249	21.5	177.50

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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)
730023 Shiawassee River										
4/3/2002	0.043	C 2.000	0.010	0.660	0.046	0.015	40.0	3.4	64.0	28.0
5/8/2002	0.026	C 0.840	0.010	0.800	0.058	0.007	34.0	2.6	60.0	29.4
7/10/2002	0.059	C 0.450	0.009	0.640	0.090	HT 0.045	36.0	3.6	81.0	44.7
11/13/2002	0.019	C 0.520	0.005	0.560	0.026	0.011	26.0	4.9	88.0	39.9
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.037	0.953	0.009	0.665	0.055	0.020	34.0	3.6	73.3	35.5
Median+:	0.035	0.680	0.010	0.650	0.052	0.013	35.0	3.5	72.5	34.7
110628 St. Joseph River (Lower)										
2/25/2002	K DL 0.050	C 2.500	0.016	0.550	0.047	0.012	41.0	2.2	26.0	10.9
5/1/2002	0.026	C 1.730	0.010	0.570	0.045	PI 0.018	36.0	2.1	27.0	13.9
7/2/2002	T 0.007	C HT 1.590	HT 0.018	0.590	0.066	HT 0.008	39.0	2.2	30.0	14.6
9/4/2002	0.020	C 1.120	0.013	0.560	0.047	0.017	30.0	2.2	34.0	18.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.020	1.735	0.014	0.568	0.051	0.014	36.5	2.2	29.3	14.4
Median+:	0.023	1.660	0.015	0.565	0.047	0.015	37.5	2.2	28.5	14.3
750273 St. Joseph River (Upper)										
2/26/2002	0.023	C 1.850	0.009	0.450	0.020	0.005	34.0	1.6	19.0	6.9
4/30/2002	0.050	C 1.460	0.009	0.490	0.022	PI 0.004	32.0	1.6	21.0	8.5
7/25/2002	0.095	C 1.400	0.032	0.470	0.027	0.014	32.0	1.8	34.0	10.8
9/24/2002	0.071	C 1.570	0.023	0.410	0.031	0.013	32.0	1.8	24.0	11.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.060	1.570	0.018	0.455	0.025	0.009	32.5	1.7	24.5	9.4
Median+:	0.061	1.515	0.016	0.460	0.025	0.009	32.0	1.7	22.5	9.7

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)		Turbidity (NTU)	Alkalinity (mg CaCO3/L)
730023	Shiawassee River											
4/3/2002		9.0	440.0	7.2	656	12.3	8.2	5.5	270		8.2	200.00
5/8/2002		24.0	450.0	8.6	661	9.0	8.0	15.6	305		11.0	233.00
7/10/2002		12.0	490.0	5.9	713	7.8	7.9	24.3	278		17.0	217.00
11/13/2002	K	4.0	450.0	6.6	653	10.5	7.9	6.5	261		3.0	212.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:	*	11.8	457.5	7.1	671	9.9	8.0	13.0	279		9.8	215.50
Median+:		10.5	450.0	6.9	659	9.8	8.0	11.1	274		9.6	214.50
110628	St. Joseph River (Lower)											
2/25/2002		18.0	370.0	5.5	525	12.4	8.2	5.0	275		6.6	200.00
5/1/2002		13.0	370.0	5.7	542	10.3	7.9	11.1	272	HT	6.5	213.00
7/2/2002		15.0	380.0	4.9	553	9.5	8.1	28.0	273		6.6	215.00
9/4/2002	A	15.0	370.0	4.3	557	10.2	8.5	24.7	261		7.4	201.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:		15.3	372.5	5.1	544	10.6	8.2	17.2	270		6.8	207.25
Median+:		15.0	370.0	5.2	548	10.3	8.2	17.9	273		6.6	207.00
750273	St. Joseph River (Upper)											
2/26/2002	K	4.0	330.0	5.5	472	11.9	7.9	4.0	251		2.5	188.00
4/30/2002		8.0	350.0	5.9	490	9.6	7.9	10.2	260	HT	3.1	207.00
7/25/2002		6.0	340.0	4.4	492	5.9	7.7	25.9	254		2.1	185.00
9/24/2002	K	4.0	330.0	3.5	485	7.0	7.7	18.9	244		2.7	182.00
No. of Samples:		4	4	4	4	4	4	4	4		4	4
Mean+:	*	4.5	337.5	4.8	485	8.6	7.8	14.8	252		2.6	190.50
Median+:		5.0	335.0	5.0	488	8.3	7.8	14.6	253		2.6	186.50

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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										
4/30/2002	0.016	C 0.051	0.004	0.550	0.023	0.007	17.0	0.7	2.0	K 1.0
6/20/2002	0.021	C 0.058	0.006	0.750	0.029	0.005	22.0	0.6	2.0	4.0
8/22/2002	0.041	C 0.143	0.008	HT 0.880	HT 0.026	0.008	32.0	0.8	3.0	1.3
10/17/2002	0.022	C 0.044	0.006	0.730	0.019	HT 0.006	26.0	0.6	3.0	K 1.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.025	0.074	0.006	0.728	0.024	0.007	24.3	0.7	2.5	* 1.6
Median+:	0.022	0.055	0.006	0.740	0.025	0.007	24.0	0.7	2.5	1.2
170141 Tahquamenon River										
4/25/2002	0.021	C 0.051	0.004	0.540	0.033	0.004	6.0	0.6	2.0	K 1.0
6/19/2002	0.039	C 0.055	0.011	0.860	0.039	0.008	7.0	0.6	2.0	1.9
8/21/2002	0.023	C 0.100	0.005	0.690	0.022	0.007	6.0	0.5	2.0	1.8
10/16/2002	0.023	C 0.043	0.006	0.710	0.022	HT 0.007	12.0	0.7	3.0	1.1
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.027	0.062	0.007	0.700	0.029	0.007	7.8	0.6	2.3	* 1.3
Median+:	0.023	0.053	0.006	0.700	0.028	0.007	6.5	0.6	2.0	1.5
040123 Thunder Bay River										
4/24/2002	0.027	C 0.016	0.003	0.620	0.025	T 0.002	9.0	1.0	7.0	4.4
7/10/2002	0.054	C 0.059	0.008	0.620	0.028	0.009	4.0	0.9	8.0	5.1
8/28/2002	0.017	C 0.009	0.002	HT 0.420	HT 0.013	0.008	7.0	0.4	6.0	5.0
10/22/2002	0.013	C T 0.004	T 0.001	0.260	0.009	0.004	8.0	1.3	7.0	5.2
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.028	0.022	0.004	0.480	0.019	0.006	7.0	0.9	7.0	4.9
Median+:	0.022	0.013	0.003	0.520	0.019	0.006	7.5	1.0	7.0	5.1

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STORET ID		Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
210032	Sturgeon River										
4/30/2002		4.0	70.0	17.0	94	11.2	6.9	4.9	50	HT 2.4	23.00
6/20/2002		8.0	100.0	DM 23.0	154	7.8	7.4	17.3	80	6.0	49.00
8/22/2002		K 4.0	150.0	DM 26.0	235	7.7	7.4	17.8	115	8.8	71.00
10/17/2002		5.0	100.0	24.0	153	10.7	7.7	5.5	76	4.4	44.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 4.8	105.0	22.5	159	9.4	7.4	11.4	80	5.4	46.75
Median+:		4.5	100.0	23.5	154	9.3	7.4	11.4	78	5.2	46.50
170141	Tahquamenon River										
4/25/2002		17.0	30.0	DM 16.0	50	11.9	6.7	6.8	24	10.0	20.00
6/19/2002		4.0	70.0	DM 24.0	97	9.5	7.3	16.5	55	6.9	39.00
8/21/2002		K 4.0	100.0	19.0	155	7.4	7.4	19.8	78	3.2	72.00
10/16/2002		4.0	80.0	22.0	112	10.8	7.6	8.5	58	4.0	40.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 6.8	70.0	20.3	104	9.9	7.3	12.9	54	6.0	42.75
Median+:		4.0	75.0	20.5	105	10.2	7.4	12.5	57	5.5	39.50
040123	Thunder Bay River										
4/24/2002		10.0	220.0	12.0	327	9.9	7.7	10.8	172	5.8	145.00
7/10/2002		K 4.0	230.0	11.0	349	6.4	7.9	24.5	175	2.1	164.00
8/28/2002		K 4.0	210.0	6.1	324	7.6	8.2	21.9	156	K 1.0	144.00
10/22/2002		K 4.0	240.0	5.8	351	10.4	8.5	7.5	176	K 1.0	165.00
No. of Samples:		4	4	4	4	4	4	4	4	4	4
Mean+:		* 4.0	225.0	8.7	338	8.6	8.1	16.2	170	* 2.2	154.50
Median+:		K 4.0	225.0	8.6	338	8.8	8.1	16.4	174	1.6	154.50

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C = Value calculated from other independent parameters.
DL = Sample analyzed using a dilution(s).
DM = Dilution required due to matrix problems.
HT = Recommended laboratory holding time was exceeded before analysis.
INT = Interference encountered during analysis resulted in no obtainable value.
K = Concentration below the quantification level shown.
NAV = Requested analysis not available.
NH = Non-homogenous sample made analysis of a representative sample questionable.
PI = Possible interference may have affected the accuracy of the laboratory result.
QC = Quality control problems exist.
RB = Concentration of reagent blank has been subtracted from analyte value.
ST = Recommended sample collection/preservation technique not used.
T = Value reported is less than the quantification level.
W = Observed result was below the lowest normally reportable value shown.

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										
2/21/2002	0.089	C 1.460	0.012	0.840	0.122	0.019	39.0	2.3	52.0	24.6
3/11/2002	0.140	C 2.600	0.021	0.910	0.149	0.039	23.0	3.3	32.0	14.9
3/14/2002	DL 0.090	C 2.500	0.019	0.790	0.089	0.025	26.0	2.6	31.0	14.9
5/9/2002	0.035	C 0.740	0.009	0.640	0.045	0.007	26.0	1.8	49.0	24.7
6/11/2002	0.062	C 0.920	0.018	0.810	0.079	0.016	26.0	1.9	68.0	35.1
7/11/2002	0.067	C 0.490	0.027	0.800	0.074	HT 0.026	28.0	2.3	115.0	65.4
9/18/2002	0.108	C 0.890	0.032	0.790	0.079	0.042	32.0	3.1	172.0	97.6
10/17/2002	0.240	C 0.470	0.027	0.780	0.046	HT 0.020	29.0	2.8	115.0	54.5
10/28/2002	0.230	C 1.060	0.029	0.710	0.038	HT 0.018	32.0	4.4	101.0	48.1
11/13/2002	0.128	C 0.290	0.008	0.550	0.035	0.013	33.0	2.2	58.0	31.0
11/19/2002	0.189	C 0.740	0.008	0.600	0.049	0.023	44.0	2.6	77.0	47.3
11/26/2002	0.230	C 0.950	0.012	0.720	0.042	0.023	47.0	3.2	89.0	49.9
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.134	1.093	0.019	0.745	0.071	0.023	32.1	2.7	79.9	42.3
Median+:	0.118	0.905	0.019	0.785	0.062	0.022	30.5	2.6	72.5	41.2
260068 West Branch Tittabawassee										
4/4/2002	0.015	C 0.094	0.002	0.230	0.017	0.005	20.0	0.6	3.0	4.3
6/11/2002	0.010	C 0.038	0.002	0.200	0.016	0.004	15.0	0.6	2.0	4.5
8/20/2002	T 0.004	C T 0.006	T 0.001	HT 0.140	HT 0.009	0.005	17.0	1.4	2.0	5.0
11/14/2002	0.013	C 0.045	T 0.001	0.160	0.010	0.008	16.0	0.7	3.0	5.6
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.011	0.046	0.002	0.183	0.013	0.006	17.0	0.8	2.5	4.9
Median+:	0.012	0.042	0.002	0.180	0.013	0.005	16.5	0.7	2.5	4.8

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DM = Dilution required due to matrix problems.
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STORET ID	Suspended Solids (mg/L)	Dissolved Solids (mg/L)	Organic Carbon (mg/L)	Conductivity (umho/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Temperature (°C)	Hardness (mg/L)	Turbidity (NTU)	Alkalinity (mg CaCO3/L)
730025 Tittabawassee River										
2/21/2002	91.0	360.0	DM 9.4	520	12.3	8.1	2.1	208	45.0	140.00
3/11/2002	28.0	260.0	DM 9.3	377	12.4	7.3	0.3	158	63.0	104.00
3/14/2002	37.0	290.0	8.5	410	12.5	7.7	3.1	168	28.0	120.00
5/9/2002	20.0	340.0	9.8	485	9.1	7.9	13.7	211	6.9	156.00
6/11/2002	25.0	400.0	10.0	590	6.5	7.8	22.4	233	17.0	168.00
7/11/2002	17.0	510.0	8.0	746	7.8	7.8	24.6	240	9.2	160.00
9/18/2002	13.0	610.0	6.8	917	8.3	8.1	20.1	240	7.9	139.00
10/17/2002	10.0	480.0	6.8	704	9.9	8.0	9.9	243	3.0	144.00
10/28/2002	K 4.0	480.0	5.5	707	11.5	8.0	7.1	257	1.9	175.00
11/13/2002	6.0	380.0	6.0	557	10.4	7.6	6.0	228	4.2	178.00
11/19/2002	4.0	440.0	6.9	633	12.6	8.2	3.2	248	2.3	175.00
11/26/2002	6.0	480.0	HT 6.3	692	12.5	8.1	1.9	242	K HT 1.0	185.00
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	* 21.6	419.2	7.8	612	10.5	7.9	9.5	223	* 15.7	153.67
Median+:	15.0	420.0	7.5	612	11.0	8.0	6.6	237	7.4	158.00
260068 West Branch Tittabawassee										
4/4/2002	9.0	230.0	3.9	304	12.8	7.8	2.8	167	5.4	146.00
6/11/2002	10.0	250.0	3.1	367	8.8	8.1	18.0	202	4.8	174.00
8/20/2002	7.0	250.0	2.6	347	9.3	8.3	18.5	186	3.4	168.00
11/14/2002	4.0	240.0	3.1	718	9.4	7.9	6.6	186	3.1	168.00
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	7.5	242.5	3.2	434	10.1	8.0	11.5	185	4.2	164.00
Median+:	8.0	245.0	3.1	357	9.4	8.0	12.3	186	4.1	168.00

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A = Value reported is the mean of two or more determinations.
C = Value calculated from other independent parameters.
DL = Sample analyzed using a dilution(s).
DM = Dilution required due to matrix problems.
HT = Recommended laboratory holding time was exceeded before analysis.
INT = Interference encountered during analysis resulted in no obtainable value.
K = Concentration below the quantification level shown.
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ST = Recommended sample collection/preservation technique not used.
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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							
	3/11/2002	0.010	0.001	0.111	MBQC 0.162	0.672	0.039	0.190
	4/4/2002	0.460	0.000	0.028	0.260	0.397	0.038	1.330
	4/24/2002	0.550	0.000	0.062	0.189	0.464	0.064	LCQC 0.180
	6/12/2002	0.560	0.000	0.004	0.247	0.543	0.044	0.190
	7/10/2002	0.290	0.000	0.000	0.176	0.605	0.034	0.020
	8/20/2002	0.190	0.001	0.000	0.253	0.655	0.035	0.010
	8/28/2002	0.180	0.000	0.000	CCB 0.233	0.525	0.025	0.170
	10/16/2002	0.130	0.000	0.000	0.177	0.576	0.090	0.120
	10/22/2002	0.160	0.000	0.000	0.159	0.790	0.063	0.090
	11/14/2002	0.180	0.000	0.000	0.523	0.484	0.029	0.700
	11/19/2002	0.130	0.000	0.000	0.169	0.461	0.035	0.180
	11/25/2002	0.140	0.000	0.000	0.135	0.691	0.026	0.090
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	0.248	0.000	0.017	0.224	0.572	0.044	0.273
	Median+:	0.180	0.000	0.000	0.183	0.560	0.037	0.175
740385	Black River							
	3/27/2002	1.160	0.017	0.300	2.050	2.150	0.218	2.270
	6/4/2002	2.980	0.048	1.240	4.080	3.040	1.660	15.200
	9/9/2002	MS 0.540	0.002	0.360	CCB 1.130	1.030	0.366	3.250
	10/28/2002	0.590	0.002	0.146	2.600	2.000	0.260	2.540
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.318	0.017	0.512	2.465	2.055	0.626	5.815
	Median+:	0.875	0.010	0.330	2.325	2.075	0.313	2.895

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CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
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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							
	3/19/2002	1.040	0.001	0.120	0.358	0.541	0.087	0.670
	5/30/2002	2.340	0.014	0.248	0.444	0.731	0.322	LCQC 1.080
	8/14/2002	1.950	0.000	0.096	0.373	0.912	0.313	0.890
	10/24/2002	0.250	0.000	0.000	0.124	0.625	0.024	0.150
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.395	0.004	0.116	0.325	0.702	0.186	0.698
	Median+:	1.495	0.001	0.108	0.366	0.678	0.200	0.780
730024	Cass River							
	3/14/2002	4.220	0.037	1.160	2.130	2.560	1.050	5.350
	5/8/2002	1.790	0.016	0.461	1.550	2.430	0.491	LCQC 3.250
	8/21/2002	2.050	0.026	1.710	2.730	3.340	1.180	5.930
	11/13/2002	1.710	0.000	0.526	1.730	1.940	0.607	4.350
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.443	0.020	0.964	2.035	2.568	0.832	4.720
	Median+:	1.920	0.021	0.843	1.930	2.495	0.829	4.850
160073	Cheboygan River							
	4/23/2002	0.670	0.009	0.033	0.370	0.494	0.043	LCQC 2.270
	7/9/2002	0.440	0.000	0.000	0.480	0.607	0.065	0.190
	8/27/2002	0.660	0.000	0.005	CCB 0.545	0.608	0.045	0.090
	10/23/2002	0.160	0.000	0.000	0.969	0.793	0.036	0.150
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.483	0.002	0.010	0.591	0.626	0.047	0.675
	Median+:	0.550	0.000	0.003	0.513	0.608	0.044	0.170

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CCV = Continuing calibration standard exceeded quality control criteria.
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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)
500233	Clinton River									
	2/21/2002		11.640	0.123	4.180	5.420	4.830	4.900		23.500
	3/27/2002		0.940	0.027	0.565	1.820	2.600	0.522		5.530
	4/3/2002		8.700	0.084	3.400	4.820	3.590	4.730		21.000
	4/9/2002		15.540	0.186	5.450	7.320	5.030	8.380		35.300
	6/4/2002		4.810	0.046	1.710	4.080	3.500	2.350		15.200
	7/22/2002		3.990	0.048	2.060	4.820	3.530	2.660		15.600
	9/17/2002		1.570	0.034	0.916	3.510	5.610	1.130		9.970
	10/17/2002		1.730	0.042	1.120	3.650	6.250	1.230		12.800
	10/29/2002		2.360	0.040	0.965	3.090	5.330	1.260		11.200
	11/12/2002		3.640	0.019	1.440	4.440	3.990	2.070		14.300
	11/20/2002		2.060	0.019	1.010	3.320	3.830	1.270		12.500
	11/26/2002		0.900	0.026	0.450	2.400	3.940	0.519		7.300
	No. of Samples:		12	12	12	12	12	12		12
	Mean+:		4.823	0.058	1.939	4.058	4.336	2.585		15.350
	Median+:		3.000	0.041	1.280	3.865	3.965	1.670		13.550
210102	Escanaba River									
	5/7/2002		3.280	0.013	0.216	0.508	0.469	0.136	LCQC	1.980
	7/16/2002	CCV	0.920	0.039	0.369	0.870	0.870	0.206		4.020
	9/25/2002		2.440	0.027	0.291	0.748	0.765	0.146		3.850
	11/5/2002		2.000	0.000	0.282	0.523	0.698	0.123		3.750
	No. of Samples:		4	4	4	4	4	4		4
	Mean+:		2.160	0.020	0.290	0.662	0.701	0.153		3.400
	Median+:		2.220	0.020	0.287	0.636	0.732	0.141		3.800

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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							
	4/18/2002	11.980	0.044	1.650	3.110	3.500	3.290	LCQC 12.800
	6/11/2002	7.190	0.047	1.790	3.650	4.390	3.720	15.300
	7/11/2002	1.200	0.021	0.703	2.580	4.500	1.200	7.260
	11/13/2002	2.010	0.000	0.556	1.900	3.070	1.070	7.840
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	5.595	0.028	1.175	2.810	3.865	2.320	10.800
	Median+:	4.600	0.033	1.177	2.845	3.945	2.245	10.320
700123	Grand River (Lower)							
	2/25/2002	4.490	0.031	1.450	2.550	2.640	1.360	5.910
	3/12/2002	6.760	0.050	2.080	2.950	2.950	2.330	8.340
	4/10/2002	5.130	0.033	1.370	2.550	2.370	2.140	7.940
	5/20/2002	4.280	0.032	0.861	2.170	2.440	1.250	LCQC 4.530
	7/2/2002	0.940	0.013	0.170	1.430	2.240	0.534	2.610
	7/30/2002	MS 1.600	0.009	0.544	1.490	2.380	1.080	4.100
	9/4/2002	MS 1.290	0.009	0.517	1.500	2.630	0.788	5.030
	10/1/2002	1.570	0.006	0.548	1.500	3.210	0.667	4.480
	10/23/2002	1.130	0.012	0.385	1.200	2.840	0.555	3.530
	11/6/2002	0.660	0.000	0.249	1.380	2.560	0.294	3.700
	11/18/2002	0.910	0.000	0.212	1.180	2.320	0.295	2.800
	11/25/2002	1.010	0.015	0.213	1.230	2.850	0.293	3.810
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	2.481	0.018	0.717	1.761	2.619	0.966	4.732
	Median+:	1.430	0.013	0.531	1.495	2.595	0.728	4.290

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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)
340025	Grand River (Upper)							
	4/23/2002	2.920	0.022	0.495	2.130	2.820	0.905	LCQC 3.460
	6/19/2002	2.400	0.015	0.393	1.920	3.060	0.914	3.260
	9/5/2002	MS 0.660	0.003	0.218	1.440	2.860	0.466	1.550
	11/7/2002	0.580	0.004	0.112	1.690	2.850	0.261	2.710
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.640	0.011	0.305	1.795	2.898	0.637	2.745
	Median+:	1.530	0.010	0.306	1.805	2.855	0.686	2.985
580364	Huron River							
	2/28/2002	1.240	0.042	0.389	1.440	2.190	0.766	4.720
	3/27/2002	0.780	0.027	0.269	1.300	2.030	0.516	2.760
	4/3/2002	2.770	0.049	0.911	2.210	2.470	2.240	9.850
	4/9/2002	4.100	0.066	1.270	2.380	2.660	2.750	10.800
	6/5/2002	1.940	0.029	0.384	1.710	2.950	1.780	6.050
	7/22/2002	0.820	0.004	0.287	1.190	2.640	1.000	3.540
	9/17/2002	2.260	0.026	0.463	1.760	3.840	1.890	6.600
	10/17/2002	0.410	0.001	0.206	1.560	4.270	0.733	4.060
	10/29/2002	0.610	0.014	0.169	1.070	3.500	0.838	4.120
	11/12/2002	1.220	0.000	0.335	1.440	3.000	1.560	5.940
	11/20/2002	0.570	0.000	0.161	1.190	2.750	0.691	3.350
	11/26/2002	0.400	0.017	0.136	1.030	3.400	0.475	2.740
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	1.427	0.023	0.415	1.523	2.975	1.270	5.378
	Median+:	1.020	0.022	0.311	1.440	2.850	0.919	4.420

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470521	Huron River (Headwaters)							
	2/28/2002	0.840	0.000	0.172	0.852	1.850	0.128	1.420
	6/5/2002	1.280	0.000	0.051	0.914	2.170	0.482	1.630
	8/28/2002	1.050	0.002	0.175	0.973	1.850	0.416	1.180
	10/29/2002	0.300	0.003	0.017	0.713	2.010	0.080	0.660
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.868	0.001	0.104	0.863	1.970	0.276	1.223
	Median+:	0.945	0.001	0.112	0.883	1.930	0.272	1.300
030077	Kalamazoo River (Lower)							
	2/25/2002	4.070	0.012	0.501	1.340	1.670	0.772	5.100
	3/12/2002	4.920	0.031	1.210	2.160	2.110	1.550	5.440
	4/10/2002	3.630	0.010	0.503	1.470	1.520	1.060	3.980
	5/20/2002	4.640	0.018	0.460	1.300	1.700	1.280	LCQC 2.480
	7/2/2002	5.410	0.014	0.460	1.230	2.040	1.610	3.200
	7/30/2002	MS 4.920	0.015	0.679	1.340	1.990	2.290	3.720
	9/4/2002	3.160	0.005	0.487	CCB 1.150	1.790	1.170	2.520
	10/1/2002	3.740	0.016	0.506	1.140	2.040	1.000	2.770
	10/23/2002	1.720	0.022	0.133	0.813	1.480	0.599	2.060
	11/6/2002	1.090	0.000	0.077	0.806	1.390	0.387	2.300
	11/18/2002	1.710	0.000	0.134	0.926	1.350	0.546	2.630
	11/25/2002	1.600	0.006	0.106	0.904	1.920	0.437	2.280
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	3.384	0.012	0.438	1.215	1.750	1.058	3.207
	Median+:	3.685	0.013	0.474	1.190	1.745	1.030	2.700

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390057	Kalamazoo River (Upper)									
	2/26/2002		2.960	0.031	0.887	1.200	1.760	0.956		5.150
	4/30/2002		1.370	0.020	0.398	0.657	1.590	0.391	LCQC	2.220
	7/17/2002	CCV	2.500	0.024	0.548	0.999	1.580	1.010		3.840
	9/24/2002		1.300	0.020	0.210	0.963	1.590	0.331		2.530
	No. of Samples:		4	4	4	4	4	4		4
	Mean+:		2.033	0.024	0.511	0.955	1.630	0.672		3.435
	Median+:		1.935	0.022	0.473	0.981	1.590	0.674		3.185
510088	Manistee River									
	3/19/2002		1.740	0.000	0.290	0.434	0.602	0.173		0.670
	5/29/2002		1.300	0.008	0.223	0.381	0.696	0.195	LCQC	0.550
	8/14/2002		0.800	0.000	0.111	0.358	0.836	0.221		0.700
	10/24/2002		0.310	0.006	0.048	0.223	0.615	0.112		0.290
	No. of Samples:		4	4	4	4	4	4		4
	Mean+:		1.038	0.004	0.168	0.349	0.687	0.175		0.553
	Median+:		1.050	0.003	0.167	0.370	0.656	0.184		0.610
770073	Manistique River									
	4/30/2002		5.050	0.009	0.335	0.428	0.306	0.213	LCQC	1.290
	6/20/2002		2.660	0.000	0.212	0.347	0.505	0.244		1.030
	8/14/2002		1.920	0.000	0.248	0.339	0.542	0.239		1.000
	10/17/2002		3.420	0.000	0.302	0.424	0.662	0.247		0.960
	No. of Samples:		4	4	4	4	4	4		4
	Mean+:		3.263	0.002	0.274	0.385	0.504	0.236		1.070
	Median+:		3.040	0.000	0.275	0.386	0.524	0.242		1.015

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550038	Menominee River							
	4/16/2002	12.100	0.022	0.976	1.370	0.835	0.851	4.390
	4/22/2002	9.990	0.019	0.640	1.640	0.951	0.542	LCQC 3.310
	4/29/2002	5.520	0.009	0.243	0.907	0.536	0.165	LCQC 1.620
	5/10/2002	5.060	0.012	0.359	0.884	0.574	0.277	LCQC 1.760
	6/13/2002	3.770	0.004	0.278	0.886	0.688	0.176	1.710
	6/18/2002	4.930	0.006	0.508	1.040	0.784	0.334	1.950
	7/8/2002	2.060	0.000	0.173	0.854	0.883	0.174	0.950
	8/4/2002	MS 0.880	0.001	0.178	0.794	0.755	0.173	0.910
	9/19/2002	2.090	0.000	0.137	0.729	0.880	0.079	7.280
	10/2/2002	1.920	0.000	0.166	0.616	0.812	0.083	0.630
	10/9/2002	7.270	0.002	0.626	1.130	1.000	0.372	2.130
	11/12/2002	2.080	0.000	0.229	0.540	0.753	0.081	0.810
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	4.806	0.006	0.376	0.949	0.788	0.276	2.288
	Median+:	4.350	0.003	0.261	0.885	0.798	0.175	1.735

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610273	Muskegon River (Lower)										
	2/25/2002		0.880	0.008	0.224	MBQC	0.580	0.886	0.136		2.160
	3/12/2002		1.510	0.004	0.348		0.703	0.965	0.309		1.120
	4/11/2002		1.480	0.000	0.156		0.688	0.632	0.182		0.860
	5/16/2002		1.440	0.004	0.156		0.607	0.736	0.170	LCQC	0.670
	6/27/2002		0.750	0.000	0.000		0.692	0.666	0.155		0.550
	7/31/2002	MS	0.360	0.000	0.008		0.459	0.751	0.132		0.450
	8/8/2002	MS	0.510	0.000	0.000		0.429	0.782	0.109		0.430
	10/10/2002		0.480	0.000	0.065		0.502	1.020	0.099		0.370
	10/23/2002		0.310	0.000	0.000		0.338	0.769	0.066		0.250
	11/6/2002		0.420	0.000	0.000		0.507	0.657	0.041		0.620
	11/18/2002		0.300	0.000	0.000		0.455	0.598	0.058		0.230
	11/25/2002		0.230	0.004	0.000		0.364	0.975	0.042		0.190
	No. of Samples:		12	12	12		12	12	12		12
	Mean+:		0.723	0.002	0.080		0.527	0.786	0.125		0.658
	Median+:		0.495	0.000	0.004		0.505	0.760	0.121		0.500
670008	Muskegon River (Upper)										
	3/20/2002		2.060	0.006	0.252		0.652	0.575	0.190		1.260
	5/14/2002		1.640	0.008	0.223		0.581	0.738	0.170	LCQC	1.110
	6/25/2002		1.750	0.006	0.177		0.643	0.884	0.405		1.980
	8/6/2002	MS	0.800	0.001	0.036		0.395	0.697	0.219		1.020
	10/8/2002		0.660	0.000	0.089		0.340	0.815	0.079		0.710
	No. of Samples:		5	5	5		5	5	5		5
	Mean+:		1.382	0.004	0.155		0.522	0.742	0.213		1.216
	Median+:		1.640	0.006	0.177		0.581	0.738	0.190		1.110

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660038	Ontonagon River									
	5/8/2002		3.030	0.015	1.430	3.630	1.490	0.496	LCQC	3.890
	7/17/2002	CCV	0.300	0.000	0.698	4.270	1.100	0.222		1.190
	9/25/2002		6.050	0.003	2.870	4.910	2.890	0.739		5.250
	11/5/2002		3.000	0.000	1.130	2.910	1.220	0.261		2.390
	No. of Samples:		4	4	4	4	4	4		4
	Mean+:		3.095	0.005	1.532	3.930	1.675	0.430		3.180
	Median+:		3.015	0.002	1.280	3.950	1.355	0.379		3.140
360124	Paint River									
	5/8/2002		5.230	0.011	0.577	0.750	0.365	0.134	LCQC	1.850
	7/18/2002	CCV	0.570	0.000	0.496	0.341	0.393	0.059		0.460
	9/24/2002	CCV	1.240	0.000	0.645	0.269	0.658	0.037		0.320
	11/5/2002		1.150	0.000	0.657	0.323	0.400	0.044		0.470
	No. of Samples:		4	4	4	4	4	4		4
	Mean+:		2.048	0.003	0.594	0.421	0.454	0.068		0.775
	Median+:		1.195	0.000	0.611	0.332	0.397	0.051		0.465
530027	Pere Marquette River									
	3/19/2002		1.530	0.000	0.218	0.398	0.522	0.121		0.650
	5/15/2002		1.840	0.009	0.222	0.358	0.647	0.164	LCQC	0.680
	6/26/2002		3.000	0.004	0.328	0.580	0.867	0.590		2.130
	8/7/2002	MS	1.430	0.007	0.264	0.455	0.813	0.508		1.520
	10/9/2002		0.940	0.000	0.184	0.369	0.727	0.139		0.590
	No. of Samples:		5	5	5	5	5	5		5
	Mean+:		1.748	0.004	0.243	0.432	0.715	0.304		1.114
	Median+:		1.530	0.004	0.222	0.398	0.727	0.164		0.680

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680056	Perry Creek							
	4/4/2002	0.680	0.000	1.830	0.520	0.727	0.047	0.510
	6/12/2002	0.830	0.000	1.990	0.509	1.120	0.135	0.540
	8/20/2002	0.470	0.000	2.330	0.388	1.010	0.057	0.190
	11/19/2002	0.400	0.000	3.430	0.346	0.742	0.068	0.330
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.595	0.000	2.395	0.441	0.900	0.077	0.393
	Median+:	0.575	0.000	2.160	0.449	0.876	0.062	0.420
490006	Pine River							
	4/23/2002	6.520	0.018	1.800	1.620	1.660	0.899	LCQC 4.320
	7/11/2002	1.630	0.006	0.831	1.010	1.320	0.487	2.230
	8/27/2002	1.570	0.005	1.120	CCB 1.080	1.300	0.472	2.240
	10/21/2002	4.250	0.000	1.360	1.180	1.480	0.545	3.150
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.493	0.007	1.278	1.223	1.440	0.601	2.985
	Median+:	2.940	0.006	1.240	1.130	1.400	0.516	2.695
580046	River Raisin							
	4/17/2002	12.040	0.110	4.230	5.180	5.920	4.190	LCQC 23.800
	6/18/2002	1.180	0.007	0.180	4.570	2.940	0.532	2.590
	8/28/2002	1.460	0.014	0.601	2.480	2.780	0.744	3.890
	11/12/2002	1.520	0.000	0.352	1.850	2.510	0.689	4.660
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	4.050	0.033	1.341	3.520	3.538	1.539	8.735
	Median+:	1.490	0.011	0.477	3.525	2.860	0.717	4.275

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820070	River Rouge							
	4/24/2002	4.850	0.073	2.470	3.710	3.380	2.610	LCQC 12.700
	6/18/2002	2.370	0.035	0.898	2.430	2.310	1.930	8.390
	8/29/2002	2.170	0.032	0.883	2.340	1.620	1.460	6.120
	11/12/2002	7.830	0.107	3.770	5.390	3.890	5.680	24.300
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	4.305	0.062	2.005	3.468	2.800	2.920	12.878
	Median+:	3.610	0.054	1.684	3.070	2.845	2.270	10.545
090177	Saginaw River							
	2/21/2002	4.100	0.029	1.720	2.720	2.940	1.640	9.170
	3/11/2002	16.850	0.142	5.090	5.510	5.420	7.320	23.100
	3/14/2002	7.430	0.059	2.110	2.840	3.210	2.320	9.690
	4/18/2002	2.750	0.019	0.888	1.960	2.440	1.100	LCQC 5.410
	6/11/2002	2.550	0.003	0.704	2.050	2.690	1.010	4.240
	7/10/2002	1.530	0.020	0.998	2.590	3.220	1.430	7.060
	9/18/2002	2.260	0.025	1.300	2.460	3.390	1.190	6.490
	10/16/2002	1.400	0.011	0.994	1.920	3.110	0.885	4.530
	10/28/2002	2.360	0.020	0.920	2.150	3.340	1.010	5.920
	11/13/2002	0.400	0.000	0.513	1.740	2.530	0.623	4.720
	11/19/2002	1.250	0.000	0.600	1.510	1.940	0.639	3.610
	11/26/2002	1.100	0.010	0.387	1.470	2.770	0.472	4.150
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	3.665	0.028	1.352	2.410	3.083	1.637	7.341
	Median+:	2.310	0.020	0.957	2.100	3.025	1.055	5.665

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730023	Shiawassee River							
	4/3/2002	2.020	0.016	0.850	1.790	1.650	0.546	3.790
	5/8/2002	3.390	0.020	0.685	1.540	2.290	0.770	LCQC 2.810
	7/10/2002	1.190	0.009	0.443	1.760	2.240	0.674	2.740
	11/13/2002	0.660	0.000	0.191	1.150	1.530	0.331	1.690
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.815	0.011	0.542	1.560	1.928	0.580	2.758
	Median+:	1.605	0.013	0.564	1.650	1.945	0.610	2.775
110628	St. Joseph River (Lower)							
	2/25/2002	2.590	0.026	0.401	1.220	1.750	0.542	3.180
	5/1/2002	3.560	0.037	0.481	1.460	2.000	0.854	LCQC 3.080
	7/2/2002	1.750	0.019	0.102	1.410	1.650	0.642	2.400
	9/4/2002	1.330	0.018	0.231	1.300	1.780	0.497	2.290
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.308	0.025	0.304	1.348	1.795	0.634	2.738
	Median+:	2.170	0.023	0.316	1.355	1.765	0.592	2.740
750273	St. Joseph River (Upper)							
	2/26/2002	1.050	0.009	0.141	MBQC 0.640	1.220	0.197	0.680
	4/30/2002	1.100	0.010	0.126	0.580	1.490	0.265	LCQC 0.820
	7/25/2002	MS 0.650	0.000	0.005	0.409	0.954	0.215	0.690
	9/24/2002	1.220	0.015	0.090	0.608	1.260	0.244	1.160
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.005	0.009	0.091	0.559	1.231	0.230	0.838
	Median+:	1.075	0.010	0.108	0.594	1.240	0.230	0.755

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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							
	4/30/2002	6.810	0.008	0.357	0.461	0.395	0.245	LCQC 1.820
	6/20/2002	4.460	0.003	0.361	0.418	0.655	0.334	1.870
	8/22/2002	2.460	0.009	0.453	CCB 0.647	0.687	0.365	2.230
	10/17/2002	4.280	0.000	0.418	0.414	0.715	0.291	1.660
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	4.503	0.005	0.397	0.485	0.613	0.309	1.895
	Median+:	4.370	0.006	0.390	0.440	0.671	0.313	1.845
170141	Tahquamenon River							
	4/25/2002	7.480	0.025	0.565	0.606	0.461	0.453	LCQC 3.640
	6/19/2002	5.580	0.013	0.538	0.536	0.746	0.543	2.930
	8/21/2002	2.490	0.001	0.266	CCB 0.393	0.448	0.173	77.000
	10/16/2002	4.220	0.000	0.273	0.434	0.536	0.258	1.970
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	4.943	0.010	0.411	0.492	0.548	0.357	46.385
	Median+:	4.900	0.007	0.406	0.485	0.499	0.356	3.285
040123	Thunder Bay River							
	4/24/2002	2.060	0.008	0.172	0.504	0.963	0.251	LCQC 0.770
	7/10/2002	0.370	0.000	0.045	0.359	0.894	0.207	0.550
	8/28/2002	0.300	0.000	0.000	CCB 0.315	0.642	0.110	0.850
	10/22/2002	0.360	0.000	0.000	0.155	0.808	0.059	0.230
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.773	0.002	0.054	0.333	0.827	0.157	0.600
	Median+:	0.365	0.000	0.023	0.337	0.851	0.159	0.660

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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							
	2/21/2002	6.950	0.041	2.250	2.750	2.730	2.530	10.900
	3/11/2002	6.570	0.053	2.130	2.480	2.640	2.160	8.720
	3/14/2002	4.860	0.032	1.210	2.140	1.940	1.140	5.270
	5/9/2002	3.470	0.010	0.507	1.410	1.640	0.546	LCQC 2.660
	6/11/2002	3.000	0.011	0.625	1.900	1.990	0.958	4.400
	7/11/2002	0.860	0.005	0.211	1.670	1.730	0.425	2.190
	9/18/2002	1.820	0.017	0.506	1.970	1.810	0.398	3.340
	10/17/2002	0.660	0.003	0.263	1.580	1.770	0.210	2.020
	10/28/2002	0.480	0.000	0.057	1.420	1.290	0.110	1.940
	11/13/2002	0.640	0.000	0.148	1.240	1.060	0.251	1.840
	11/19/2002	0.510	0.000	0.087	1.560	1.070	0.117	1.820
	11/26/2002	0.560	0.016	0.070	1.760	1.700	0.119	1.750
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	2.532	0.016	0.672	1.823	1.781	0.747	3.904
	Median+:	1.340	0.011	0.385	1.715	1.750	0.412	2.425
260068	West Branch Tittabawassee							
	4/4/2002	1.460	0.001	0.213	0.558	0.828	0.233	1.500
	6/11/2002	0.930	0.000	0.009	0.292	1.010	0.184	1.000
	8/20/2002	0.670	0.003	0.137	0.354	1.050	0.102	0.560
	11/14/2002	0.580	0.000	0.000	0.411	0.669	0.071	0.970
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.910	0.001	0.090	0.404	0.889	0.147	1.008
	Median+:	0.800	0.001	0.073	0.383	0.919	0.143	0.985

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350061	Au Sable River												
	7/10/2002	0.002	0.001	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.022	0.000
740385	Black River												
	6/4/2002	0.018	0.016	0.009	0.005	0.019	0.004	0.000	0.000	0.004	NAI	0.018	0.002
280014	Boardman River												
	5/30/2002	0.003	0.002	0.001	0.000	0.002	0.001	0.000	0.000	0.000	NAI	0.015	0.000
730024	Cass River												
	8/21/2002	0.027	0.022	0.015	0.008	0.030	0.005	0.000	0.000	0.004	NAI	0.027	0.004
160073	Cheboygan River												
	7/9/2002	0.003	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.024	0.000
500233	Clinton River												
	9/17/2002	0.129	0.068	0.150	0.039	0.252	0.057	0.020	0.004	0.046	0.055	0.050	0.059
210102	Escanaba River												
	5/7/2002	0.003	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.010	0.000
730285	Flint River												
	7/11/2002	0.050	0.036	0.053	0.021	0.093	0.020	0.008	0.000	0.012	0.022	0.036	0.016
700123	Grand River (Lower)												
	4/10/2002	0.059	0.045	0.039	0.021	0.078	0.014	0.000	0.000	0.011	NAI	0.021	0.011
340025	Grand River (Upper)												
	4/23/2002	0.061	0.054	0.049	0.023	0.100	0.017	0.000	0.001	0.013	0.025	0.015	0.016
580364	Huron River												
	6/5/2002	0.114	0.075	0.049	0.020	0.105	0.018	0.000	0.000	0.014	0.038	0.047	0.017
470521	Huron River (Headwaters)												
	8/28/2002	0.081	0.062	0.020	0.012	0.069	0.007	0.003	0.000	0.007	0.016	0.017	0.006
030077	Kalamazoo River (Lower)												
	7/30/2002	0.555	0.438	0.254	0.107	0.566	0.092	0.039	0.003	0.055	0.125	0.611	0.082

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390057	Kalamazoo River (Upper)												
	7/17/2002	0.204	0.151	0.114	0.055	0.243	0.042	0.014	0.000	0.029	0.041	0.045	0.034
510088	Manistee River												
	5/29/2002	0.011	0.006	0.004	0.002	0.014	0.002	0.000	0.000	0.001	0.008	0.027	0.000
770073	Manistique River												
	8/14/2002	0.061	0.025	0.011	0.001	0.020	0.004	0.000	0.000	0.002	0.002	0.116	0.004
550038	Menominee River												
	6/18/2002	0.022	0.018	0.016	0.006	0.040	0.005	0.003	0.000	0.006	0.010	0.014	0.005
610273	Muskegon River (Lower)												
	4/11/2002	0.016	0.006	0.005	0.002	0.007	0.003	0.000	0.000	0.002	NAI	0.016	0.001
	5/16/2002	0.007	0.004	0.003	0.001	0.007	0.000	0.000	0.000	0.001	0.005	0.010	0.001
	6/27/2002	0.004	0.005	0.003	0.002	0.009	0.001	0.000	0.000	0.001	0.004	0.015	0.001
	8/8/2002	0.004	0.001	0.001	0.001	0.009	0.002	0.000	0.000	0.000	0.000	0.020	0.000
	10/10/2002	0.007	0.004	0.004	0.001	0.007	0.001	0.000	0.000	0.001	NAI	0.009	0.001
670008	Muskegon River (Upper)												
	5/14/2002	0.006	0.002	0.003	0.001	0.004	0.002	0.000	0.000	0.002	NAI	0.022	0.001
	6/25/2002	0.005	0.005	0.003	0.000	0.008	0.001	0.000	0.000	0.001	0.004	0.020	0.000
	8/6/2002	0.003	0.000	0.002	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.013	0.000
660038	Ontonagon River												
	7/17/2002	0.000	0.002	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.030	0.000
360124	Paint River												
	9/24/2002	0.015	0.005	0.002	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.015	0.000
530027	Pere Marquette River												
	5/15/2002	0.009	0.007	0.005	0.003	0.015	0.002	0.000	0.000	0.002	0.007	0.009	0.002
	6/26/2002	0.030	0.037	0.019	0.009	0.066	0.006	0.000	0.000	0.006	0.019	0.012	0.005
	8/7/2002	0.033	0.031	0.018	0.007	0.063	0.006	0.000	0.000	0.005	0.017	0.017	0.004

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680056 Perry Creek												
8/20/2002	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.014	0.000
490006 Pine River												
10/21/2002	0.007	0.007	0.002	0.001	0.002	0.000	0.000	0.000	0.000	NAI	0.010	0.000
580046 River Raisin												
4/17/2002	0.080	0.054	0.051	0.020	0.095	0.018	0.000	0.002	NAI	NAI	0.047	NAI
820070 River Rouge												
6/18/2002	0.239	0.184	0.280	0.046	0.507	0.109	0.022	0.006	0.093	0.092	0.481	0.119
090177 Saginaw River												
4/18/2002	0.099	0.091	0.052	0.023	0.118	0.023	0.000	0.002	0.010	NAI	0.337	0.021
730023 Shiawassee River												
7/10/2002	0.019	0.019	0.007	0.004	0.022	0.003	0.000	0.000	0.002	0.007	0.042	0.002
110628 St. Joseph River (Lower)												
9/4/2002	0.072	0.049	0.049	0.017	0.096	0.018	0.000	0.000	0.013	0.020	0.028	0.017
750273 St. Joseph River (Upper)												
4/30/2002	0.010	0.008	0.005	0.003	0.011	0.002	0.000	0.000	0.002	0.000	0.010	0.002
210032 Sturgeon River												
8/22/2002	0.007	0.003	0.002	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.011	0.001
170141 Tahquamenon River												
10/16/2002	0.003	0.002	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.010	0.000
040123 Thunder Bay River												
10/22/2002	0.004	0.002	0.002	0.000	0.003	0.000	0.000	0.000	0.000	NAI	0.003	0.000
730025 Tittabawassee River												
5/9/2002	0.029	0.025	0.008	0.006	0.029	0.005	0.000	0.000	0.000	NAI	NAI	0.005

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350061	Au Sable River													
	7/10/2002	0.000	0.019	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.001	0.000	0.000
740385	Black River													
	6/4/2002	0.002	0.020	0.027	0.001	0.006	0.000	0.005	0.004	0.002	0.015	0.008	0.003	0.000
280014	Boardman River													
	5/30/2002	0.000	0.019	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.006	0.003	0.001	0.000
730024	Cass River													
	8/21/2002	0.006	0.025	0.043	0.001	0.008	0.003	0.007	0.005	0.002	0.024	0.014	0.004	0.001
160073	Cheboygan River													
	7/9/2002	0.000	0.019	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.001	0.000	0.000
500233	Clinton River													
	9/17/2002	0.017	0.074	0.277	0.014	0.085	0.021	0.083	0.057	0.026	0.055	0.156	0.046	0.009
210102	Escanaba River													
	5/7/2002	0.000	0.010	0.003	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000
730285	Flint River													
	7/11/2002	0.014	0.041	0.115	0.004	0.023	0.008	0.021	0.015	0.006	0.031	0.037	0.013	0.000
700123	Grand River (Lower)													
	4/10/2002	0.013	0.024	0.106	0.003	0.019	0.005	0.017	0.008	0.006	0.014	0.029	0.009	0.002
340025	Grand River (Upper)													
	4/23/2002	0.017	0.016	0.117	0.005	0.026	0.006	0.023	0.019	0.007	0.009	0.041	0.014	0.002
580364	Huron River													
	6/5/2002	0.017	0.053	0.125	0.005	0.029	0.008	0.023	0.017	0.007	0.038	0.048	0.014	0.002
470521	Huron River (Headwaters)													
	8/28/2002	0.007	0.021	0.066	0.001	0.016	0.003	0.010	0.009	0.004	0.020	0.021	0.005	0.000
030077	Kalamazoo River (Lower)													
	7/30/2002	0.054	0.382	0.586	0.022	0.084	0.023	0.074	0.053	0.027	0.507	0.144	0.042	0.007

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390057	Kalamazoo River (Upper)													
	7/17/2002	0.033	NAI	0.292	0.011	0.041	0.012	0.035	0.025	0.011	0.034	0.067	0.020	0.003
510088	Manistee River													
	5/29/2002	0.001	NAI	0.017	0.000	0.003	0.002	0.001	0.001	0.002	0.010	0.004	0.002	0.000
770073	Manistique River													
	8/14/2002	0.000	0.106	0.013	0.000	0.000	0.000	0.001	0.000	0.000	0.078	0.003	0.000	0.000
550038	Menominee River													
	6/18/2002	0.005	0.014	0.047	0.002	0.011	0.003	0.008	0.006	0.002	0.005	0.017	0.004	0.001
610273	Muskegon River (Lower)													
	4/11/2002	0.000	0.010	NAI	0.000	0.000	0.000	0.002	0.002	0.000	0.010	0.003	0.001	0.000
	5/16/2002	0.000	0.009	0.009	0.000	0.001	0.000	0.001	0.001	0.000	0.006	0.001	0.001	0.000
	6/27/2002	0.000	0.016	0.012	0.000	0.001	0.000	0.001	0.001	0.000	0.010	0.003	0.001	0.000
	8/8/2002	0.000	0.015	0.011	0.000	0.000	0.000	0.001	0.001	0.000	0.007	0.003	0.001	0.000
	10/10/2002	0.000	0.010	0.000	0.000	0.002	0.001	0.002	0.002	0.001	0.005	0.003	0.001	0.000
670008	Muskegon River (Upper)													
	5/14/2002	0.000	0.018	0.006	0.000	0.002	0.000	0.000	0.002	0.001	0.009	0.003	0.000	0.000
	6/25/2002	0.000	0.025	0.009	0.000	0.001	0.000	0.001	0.000	0.000	0.015	0.001	0.000	0.000
	8/6/2002	0.000	0.012	0.006	0.000	0.001	0.000	0.001	0.001	0.000	0.008	0.001	0.000	0.000
660038	Ontonagon River													
	7/17/2002	0.000	0.025	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.002	0.000	0.000
360124	Paint River													
	9/24/2002	0.000	0.018	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.001	0.000	0.000
530027	Pere Marquette River													
	5/15/2002	0.001	0.009	0.018	0.000	0.002	0.000	0.002	0.002	0.001	0.005	0.004	0.002	0.000
	6/26/2002	0.006	NAI	0.076	0.003	0.012	0.006	0.008	0.009	0.006	0.006	0.022	0.007	0.001
	8/7/2002	0.007	NAI	0.068	0.003	0.011	0.005	0.008	0.009	0.005	0.008	0.022	0.007	0.000

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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)
680056	Perry Creek													
	8/20/2002	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.001	0.000	0.000
490006	Pine River													
	10/21/2002	0.000	0.008	0.008	0.000	0.002	0.000	0.002	0.000	0.000	0.004	0.003	0.001	0.000
580046	River Raisin													
	4/17/2002	0.015	0.043	0.126	0.006	0.037	0.009	0.032	0.022	0.010	0.037	0.064	0.019	0.003
820070	River Rouge													
	6/18/2002	0.058	0.853	0.503	0.017	0.194	0.049	0.168	0.111	0.057	0.494	0.324	0.092	0.018
090177	Saginaw River													
	4/18/2002	0.017	0.252	0.128	0.003	0.026	0.006	0.026	0.013	0.006	0.203	0.048	0.015	0.001
730023	Shiawassee River													
	7/10/2002	0.003	0.032	0.025	0.001	0.004	0.000	0.004	0.002	0.001	0.023	0.006	0.002	0.000
110628	St. Joseph River (Lower)													
	9/4/2002	0.000	0.026	0.103	0.004	0.019	0.005	0.020	0.013	0.006	0.022	0.033	0.012	0.002
750273	St. Joseph River (Upper)													
	4/30/2002	0.002	0.009	0.014	0.000	0.002	0.000	0.003	0.002	0.000	0.007	0.004	0.001	0.000
210032	Sturgeon River													
	8/22/2002	0.000	0.015	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000
170141	Tahquamenon River													
	10/16/2002	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000
040123	Thunder Bay River													
	10/22/2002	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000
730025	Tittabawassee River													
	5/9/2002	0.006	0.027	0.037	0.000	0.007	0.000	0.006	NAI	0.000	0.020	0.011	0.005	0.000

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350061	Au Sable River													
	7/10/2002	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
740385	Black River													
	6/4/2002	0.005	0.012	0.000	0.005	0.000	0.000	0.005	0.003	0.008	0.003	0.000	0.002	0.017
280014	Boardman River													
	5/30/2002	0.002	0.007	0.000	0.002	0.000	0.000	0.002	0.001	0.005	0.002	0.000	0.000	0.019
730024	Cass River													
	8/21/2002	0.007	0.006	0.001	0.005	0.000	0.000	0.006	0.003	0.009	0.003	0.000	0.002	0.021
160073	Cheboygan River													
	7/9/2002	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.006
500233	Clinton River													
	9/17/2002	0.073	0.005	0.013	0.040	0.002	0.005	0.070	0.021	0.081	0.018	0.002	0.019	0.046
210102	Escanaba River													
	5/7/2002	0.001	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
730285	Flint River													
	7/11/2002	0.019	0.005	0.004	0.014	0.000	0.001	0.023	0.007	0.027	0.010	0.000	0.007	0.034
700123	Grand River (Lower)													
	4/10/2002	0.016	0.005	0.002	0.011	0.000	0.000	0.019	0.008	0.023	0.012	0.001	0.007	0.009
340025	Grand River (Upper)													
	4/23/2002	0.022	0.005	0.004	0.013	0.000	0.000	0.021	0.009	0.025	0.010	0.000	0.007	0.010
580364	Huron River													
	6/5/2002	0.023	NAI	0.005	0.016	0.000	0.001	0.024	0.008	0.029	0.009	0.000	0.007	0.043
470521	Huron River (Headwaters)													
	8/28/2002	0.011	0.009	0.002	0.005	0.000	0.000	0.009	0.003	0.010	0.003	0.000	0.003	0.021
030077	Kalamazoo River (Lower)													
	7/30/2002	0.078	0.042	0.011	0.041	0.002	0.005	0.078	0.022	0.083	0.027	0.002	0.021	0.279

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390057	Kalamazoo River (Upper)													
	7/17/2002	0.032	0.010	0.005	0.016	0.001	0.002	0.034	0.010	0.036	0.017	0.001	0.011	0.032
510088	Manistee River													
	5/29/2002	0.004	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.003	0.001	0.000	0.000	NAI
770073	Manistique River													
	8/14/2002	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.096
550038	Menominee River													
	6/18/2002	0.009	0.006	0.001	0.005	0.000	0.000	0.008	0.003	0.009	0.003	0.000	0.003	0.006
610273	Muskegon River (Lower)													
	4/11/2002	0.003	0.006	0.000	0.001	0.000	0.000	0.007	0.001	0.004	0.001	0.000	0.001	0.006
	5/16/2002	0.002	0.003	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.003
	6/27/2002	0.003	0.006	0.000	0.001	0.000	0.000	0.002	0.001	0.002	0.001	0.000	0.001	0.005
	8/8/2002	0.003	0.008	0.000	0.001	0.000	0.000	0.002	0.001	0.002	0.001	0.000	0.000	0.005
	10/10/2002	0.003	0.004	0.000	0.001	0.000	0.000	0.002	0.001	0.003	0.001	0.000	0.001	0.004
670008	Muskegon River (Upper)													
	5/14/2002	0.003	0.012	0.000	0.002	0.000	0.000	0.003	0.000	0.004	0.001	0.000	0.000	0.008
	6/25/2002	0.002	0.004	0.000	0.001	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.001	0.011
	8/6/2002	0.001	0.005	0.000	0.001	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.007
660038	Ontonagon River													
	7/17/2002	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
360124	Paint River													
	9/24/2002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
530027	Pere Marquette River													
	5/15/2002	0.004	0.004	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.001	0.000	0.000	0.005
	6/26/2002	0.016	0.004	0.002	0.005	0.000	0.000	0.013	0.004	0.014	0.004	0.000	0.003	NAI
	8/7/2002	0.016	0.009	0.002	0.005	0.000	0.000	0.013	0.004	0.013	0.003	0.000	0.003	0.020

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680056	Perry Creek													
	8/20/2002	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
490006	Pine River													
	10/21/2002	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
580046	River Raisin													
	4/17/2002	0.030	NAI	0.005	0.023	0.001	0.002	0.036	0.011	0.047	0.017	0.002	0.013	0.039
820070	River Rouge													
	6/18/2002	0.151	0.054	0.030	0.085	0.005	0.012	0.136	0.044	0.168	0.032	0.002	0.039	0.211
090177	Saginaw River													
	4/18/2002	0.023	0.024	0.004	0.021	0.000	0.001	0.025	0.012	0.026	0.010	0.000	0.012	0.116
730023	Shiawassee River													
	7/10/2002	0.004	NAI	0.000	0.002	0.000	0.000	0.005	0.002	0.006	0.001	0.000	0.002	0.022
110628	St. Joseph River (Lower)													
	9/4/2002	0.019	0.003	0.002	0.011	0.000	0.001	0.020	0.008	0.021	0.009	0.000	0.006	0.016
750273	St. Joseph River (Upper)													
	4/30/2002	0.003	0.002	0.000	0.002	0.000	0.000	0.003	0.001	0.004	0.002	0.000	0.001	0.005
210032	Sturgeon River													
	8/22/2002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
170141	Tahquamenon River													
	10/16/2002	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
040123	Thunder Bay River													
	10/22/2002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
730025	Tittabawassee River													
	5/9/2002	0.003	0.000	0.000	0.000	0.000	0.000	0.005	0.003	0.000	0.005	0.000	NAI	0.021

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350061	Au Sable River													
	7/10/2002	0.000	0.000	0.000	0.025	0.000	0.005	0.006	0.012	NAI	0.006	0.007	0.002	0.000
740385	Black River													
	6/4/2002	0.003	0.002	0.000	0.037	0.000	0.000	NAI	0.020	NAI	0.021	0.015	0.005	0.003
280014	Boardman River													
	5/30/2002	0.000	0.000	0.000	0.011	0.000	0.005	NAI	0.000	NAI	0.004	0.011	0.000	0.006
730024	Cass River													
	8/21/2002	0.000	0.002	0.003	0.060	0.000	0.013	NAI	0.028	NAI	0.023	0.023	0.006	0.003
160073	Cheboygan River													
	7/9/2002	0.000	0.000	0.000	0.024	0.000	0.003	0.011	0.000	0.000	0.006	0.008	0.002	0.000
500233	Clinton River													
	9/17/2002	0.008	0.002	0.003	0.131	0.000	0.025	NAI	0.000	0.026	0.074	0.078	0.016	0.007
210102	Escanaba River													
	5/7/2002	0.000	0.000	0.000	0.006	0.000	0.003	0.000	0.000	NAI	0.005	0.003	0.000	0.000
730285	Flint River													
	7/11/2002	0.010	0.004	0.007	0.057	0.000	0.011	0.026	0.049	NAI	0.017	0.026	0.007	0.007
700123	Grand River (Lower)													
	4/10/2002	0.000	0.000	0.000	0.034	0.000	0.006	NAI	0.000	NAI	0.020	0.018	0.000	0.000
340025	Grand River (Upper)													
	4/23/2002	0.002	0.000	0.000	0.024	0.000	0.004	0.020	0.011	NAI	0.015	0.018	0.002	0.000
580364	Huron River													
	6/5/2002	0.005	0.006	0.006	0.156	0.000	0.025	0.059	0.045	NAI	0.066	0.071	0.012	0.008
470521	Huron River (Headwaters)													
	8/28/2002	0.004	0.002	0.002	0.105	0.000	0.024	0.059	0.046	0.007	0.067	0.059	0.005	0.002
030077	Kalamazoo River (Lower)													
	7/30/2002	0.059	0.114	0.202	2.033	0.000	0.212	0.594	0.110	0.182	0.712	0.804	0.132	0.080

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390057	Kalamazoo River (Upper)													
	7/17/2002	0.007	0.018	0.020	0.109	0.000	0.020	0.058	0.031	NAI	0.068	0.097	0.006	0.005
510088	Manistee River													
	5/29/2002	NAI	0.000	0.000	NAI	0.000	0.000	0.000	NAI	0.000	0.007	0.005	0.000	0.000
770073	Manistique River													
	8/14/2002	0.007	0.016	0.021	0.313	0.000	0.102	0.064	0.029	0.008	0.053	0.077	0.007	0.004
550038	Menominee River													
	6/18/2002	0.000	0.000	0.000	0.016	0.000	0.000	0.007	0.012	NAI	0.007	0.008	0.000	0.000
610273	Muskegon River (Lower)													
	4/11/2002	0.000	0.000	0.000	0.016	0.000	0.005	NAI	0.000	0.000	0.005	0.000	0.000	0.000
	5/16/2002	0.000	0.000	0.000	0.012	0.000	0.003	0.003	0.000	0.000	0.005	0.006	0.000	0.000
	6/27/2002	0.000	0.000	0.000	0.014	0.000	0.004	0.005	0.021	NAI	0.005	0.005	0.001	0.000
	8/8/2002	0.000	0.000	0.000	0.023	0.000	0.003	0.000	0.032	NAI	0.002	0.004	0.000	0.000
	10/10/2002	0.000	0.000	0.000	0.000	0.000	0.000	NAI	0.000	0.000	0.005	0.005	0.000	0.000
670008	Muskegon River (Upper)													
	5/14/2002	0.000	0.000	0.000	0.032	0.000	0.000	NAI	0.000	NAI	0.007	0.007	0.003	0.003
	6/25/2002	0.001	0.000	0.000	0.017	0.000	0.006	0.009	0.035	NAI	0.006	0.008	0.001	0.002
	8/6/2002	0.000	0.000	0.000	0.012	0.000	0.000	0.005	0.023	0.000	0.003	0.004	0.002	0.000
660038	Ontonagon River													
	7/17/2002	0.000	0.000	0.000	0.033	0.000	0.006	0.013	0.000	0.000	0.009	0.010	0.002	0.002
360124	Paint River													
	9/24/2002	0.000	0.000	0.000	0.041	0.000	0.013	0.014	0.000	0.000	0.012	0.016	0.001	0.000
530027	Pere Marquette River													
	5/15/2002	0.000	0.000	0.000	0.015	0.000	0.003	0.000	0.000	NAI	0.006	0.006	0.001	0.000
	6/26/2002	0.002	0.002	0.000	NAI	0.000	NAI	NAI	0.019	NAI	0.008	0.013	0.000	0.000
	8/7/2002	0.002	0.000	0.000	0.017	0.000	0.000	0.008	0.032	NAI	0.008	0.013	0.000	0.000

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680056	Perry Creek													
	8/20/2002	0.000	0.000	0.000	0.006	0.000	0.002	NAI	0.035	NAI	0.002	0.003	0.000	0.000
490006	Pine River													
	10/21/2002	0.000	0.000	0.000	0.007	0.000	0.000	NAI	0.000	0.000	0.006	0.010	0.000	0.000
580046	River Raisin													
	4/17/2002	0.006	0.000	0.000	0.126	0.000	0.019	NAI	0.037	NAI	0.070	0.052	NAI	NAI
820070	River Rouge													
	6/18/2002	0.060	0.089	0.094	1.190	0.000	0.160	1.049	NAI	0.115	0.366	0.387	0.099	0.046
090177	Saginaw River													
	4/18/2002	0.029	0.140	0.330	0.667	0.000	0.065	0.186	0.129	NAI	0.236	0.248	0.036	0.029
730023	Shiawassee River													
	7/10/2002	0.003	0.006	0.004	0.093	0.000	0.012	0.015	0.050	NAI	0.025	0.022	0.005	0.000
110628	St. Joseph River (Lower)													
	9/4/2002	0.000	0.001	0.002	0.051	0.000	0.009	NAI	0.000	0.000	0.027	0.042	0.004	0.002
750273	St. Joseph River (Upper)													
	4/30/2002	0.001	0.000	0.000	0.018	0.000	0.004	0.007	0.000	0.000	0.008	0.011	0.000	0.000
210032	Sturgeon River													
	8/22/2002	0.000	0.000	0.000	0.013	0.000	0.006	0.007	0.005	0.000	0.005	0.007	0.002	0.000
170141	Tahquamenon River													
	10/16/2002	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.000	0.000	0.004	0.005	0.000	0.000
040123	Thunder Bay River													
	10/22/2002	0.000	0.000	0.000	0.004	0.000	0.002	0.000	0.000	0.000	0.002	0.004	0.000	0.000
730025	Tittabawassee River													
	5/9/2002	0.004	0.000	NAI	0.063	0.000	NAI	NAI	0.000	NAI	0.022	0.023	0.000	0.002

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350061	Au Sable River													
	7/10/2002	0.015	0.008	0.005	0.017	0.000	0.003	0.000	0.000	0.005	0.003	0.008	0.000	0.005
740385	Black River													
	6/4/2002	0.013	0.016	0.003	0.034	0.000	0.015	0.000	0.003	0.020	NAI	0.038	0.008	0.031
280014	Boardman River													
	5/30/2002	0.000	NAI	0.008	0.017	0.000	0.004	0.008	0.000	0.004	NAI	0.006	0.000	0.006
730024	Cass River													
	8/21/2002	0.021	0.018	0.004	0.161	0.000	0.022	0.000	0.000	0.040	0.006	0.033	0.010	0.046
160073	Cheboygan River													
	7/9/2002	0.010	0.008	0.006	0.018	0.000	0.003	0.000	0.000	0.007	0.000	0.005	0.002	0.005
500233	Clinton River													
	9/17/2002	0.037	0.036	0.009	0.578	0.006	0.046	0.000	0.003	0.056	0.000	0.061	0.024	0.209
210102	Escanaba River													
	5/7/2002	0.007	0.005	0.008	0.009	0.000	0.000	0.000	0.000	0.000	0.002	0.013	0.000	0.004
730285	Flint River													
	7/11/2002	0.023	0.030	0.007	0.115	0.000	0.017	NAI	0.003	0.019	NAI	0.033	0.010	0.101
700123	Grand River (Lower)													
	4/10/2002	0.017	NAI	0.000	0.597	0.000	0.017	0.000	0.000	0.015	0.000	NAI	0.007	0.103
340025	Grand River (Upper)													
	4/23/2002	0.009	0.024	0.000	0.112	0.000	0.013	0.000	0.000	0.034	0.005	0.026	0.007	0.089
580364	Huron River													
	6/5/2002	NAI	0.072	0.004	0.158	0.005	0.058	0.017	0.004	0.125	0.020	0.077	0.034	0.155
470521	Huron River (Headwaters)													
	8/28/2002	0.049	0.075	0.002	0.172	0.000	0.088	0.000	0.006	0.254	0.004	0.094	0.057	0.101
030077	Kalamazoo River (Lower)													
	7/30/2002	0.498	0.771	0.036	1.217	0.114	0.421	0.074	0.039	1.347	0.031	0.659	0.260	0.965

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390057	Kalamazoo River (Upper)													
	7/17/2002	0.043	0.079	0.008	0.199	0.009	0.043	NAI	0.004	0.086	0.009	0.085	0.024	0.299
510088	Manistee River													
	5/29/2002	0.000	0.013	NAI	NAI	0.000	0.003	0.012	0.000	0.007	NAI	NAI	0.000	0.012
770073	Manistique River													
	8/14/2002	0.036	0.048	0.004	0.129	0.018	0.030	0.032	0.002	0.057	0.019	0.073	0.024	0.065
550038	Menominee River													
	6/18/2002	0.009	0.008	0.006	0.025	0.000	0.004	0.000	0.000	0.006	0.002	0.017	0.001	0.033
610273	Muskegon River (Lower)													
	4/11/2002	0.013	NAI	0.005	0.036	0.000	0.003	0.000	0.000	0.006	0.000	0.011	0.000	0.018
	5/16/2002	0.006	0.006	0.006	0.028	0.000	0.003	0.000	0.000	0.003	0.000	0.007	0.001	0.009
	6/27/2002	0.010	0.007	0.005	0.018	0.000	0.002	0.000	0.000	0.003	NAI	0.006	0.000	0.009
	8/8/2002	0.014	0.008	0.005	0.018	0.001	0.002	0.010	0.000	0.003	0.003	0.000	0.000	0.009
	10/10/2002	0.009	0.005	0.004	0.014	0.000	0.003	0.000	0.000	0.005	0.004	0.006	0.002	0.009
670008	Muskegon River (Upper)													
	5/14/2002	0.016	0.010	0.004	0.030	0.000	0.005	0.000	0.000	0.007	0.010	0.015	0.000	0.008
	6/25/2002	0.008	0.005	0.004	0.026	0.000	0.002	0.014	0.000	0.005	0.019	0.007	0.000	0.008
	8/6/2002	0.007	0.003	0.003	0.013	0.000	0.002	0.008	0.000	0.000	NAI	0.005	0.000	0.004
660038	Ontonagon River													
	7/17/2002	0.013	0.009	0.007	0.016	0.001	0.003	0.000	0.000	0.007	0.011	0.007	0.002	0.006
360124	Paint River													
	9/24/2002	0.008	0.012	0.000	0.021	0.001	0.012	0.000	0.000	0.017	0.000	0.019	0.005	0.016
530027	Pere Marquette River													
	5/15/2002	0.009	0.006	0.006	0.016	0.000	0.004	0.000	0.000	0.010	0.000	0.010	0.002	0.011
	6/26/2002	0.005	0.005	NAI	NAI	0.000	0.008	0.000	0.002	0.030	0.004	0.024	0.009	0.037
	8/7/2002	0.013	0.007	0.006	NAI	0.000	0.009	0.000	0.000	0.031	NAI	0.024	0.007	0.035

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680056	Perry Creek													
	8/20/2002	0.009	NAI	0.004	0.006	0.000	0.000	0.008	0.000	0.000	0.006	0.008	0.000	0.004
490006	Pine River													
	10/21/2002	0.005	0.007	0.003	0.008	0.000	0.011	0.000	0.000	0.016	0.000	0.011	0.005	0.011
580046	River Raisin													
	4/17/2002	0.026	NAI	0.007	0.187	NAI	0.060	NAI	0.005	0.110	NAI	0.086	0.033	0.134
820070	River Rouge													
	6/18/2002	NAI	0.235	0.036	0.863	0.088	0.207	NAI	0.020	0.356	0.021	0.276	0.119	0.379
090177	Saginaw River													
	4/18/2002	0.148	0.251	0.022	0.568	0.034	0.105	0.130	0.019	0.232	0.021	0.106	NAI	0.219
730023	Shiawassee River													
	7/10/2002	0.024	0.023	0.004	0.065	0.002	0.020	0.013	0.004	0.032	0.018	0.032	0.013	0.036
110628	St. Joseph River (Lower)													
	9/4/2002	0.020	0.029	0.005	0.083	0.006	0.018	0.000	0.003	0.024	0.000	0.035	0.011	0.104
750273	St. Joseph River (Upper)													
	4/30/2002	0.006	0.010	0.000	0.031	0.000	0.005	0.000	0.000	0.013	0.000	0.008	0.002	0.016
210032	Sturgeon River													
	8/22/2002	0.006	0.007	0.000	0.012	0.000	0.003	0.000	0.000	0.005	0.005	0.006	0.002	0.009
170141	Tahquamenon River													
	10/16/2002	0.004	0.005	0.005	0.009	0.000	0.000	0.000	0.000	0.002	0.000	0.003	0.000	0.004
040123	Thunder Bay River													
	10/22/2002	0.002	0.000	0.003	0.009	0.000	0.001	0.000	0.000	0.002	0.000	0.003	0.000	0.005
730025	Tittabawassee River													
	5/9/2002	0.019	0.025	0.003	0.162	0.000	0.022	0.017	0.000	0.044	0.011	0.020	0.012	0.046

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350061	Au Sable River											
	7/10/2002	NAI	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.005	0.001	0.002
740385	Black River											
	6/4/2002	0.062	NAI	0.001	0.008	0.015	NAI	0.006	NAI	0.018	0.008	0.009
280014	Boardman River											
	5/30/2002	0.077	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.004	0.000	0.002
730024	Cass River											
	8/21/2002	0.066	0.004	0.002	0.010	0.018	0.007	0.006	NAI	0.034	0.008	0.015
160073	Cheboygan River											
	7/9/2002	0.041	0.000	0.000	0.000	0.002	0.001	0.000	0.005	0.005	0.000	0.001
500233	Clinton River											
	9/17/2002	0.000	0.018	0.010	0.030	0.057	0.013	0.038	0.130	0.177	0.034	0.045
210102	Escanaba River											
	5/7/2002	0.026	NAI	0.000	0.001	0.003	NAI	0.000	0.000	0.002	0.000	0.001
730285	Flint River											
	7/11/2002	0.128	0.007	0.004	0.013	0.022	NAI	0.018	0.043	0.065	0.015	0.020
700123	Grand River (Lower)											
	4/10/2002	NAI	0.006	0.004	0.018	0.036	NAI	0.013	NAI	0.060	0.017	0.023
340025	Grand River (Upper)											
	4/23/2002	NAI	0.008	0.003	0.016	0.030	0.008	0.011	NAI	0.043	0.017	0.023
580364	Huron River											
	6/5/2002	0.124	0.010	0.006	0.028	0.047	0.031	0.023	NAI	0.092	0.026	0.045
470521	Huron River (Headwaters)											
	8/28/2002	0.106	0.008	0.004	0.038	0.038	0.011	0.010	0.060	0.053	0.014	0.052
030077	Kalamazoo River (Lower)											
	7/30/2002	0.495	0.062	0.065	0.181	0.235	0.000	0.182	0.721	0.663	0.181	0.367

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390057	Kalamazoo River (Upper)											
	7/17/2002	0.058	0.022	0.011	0.049	0.089	0.012	0.045	0.165	0.191	0.053	0.081
510088	Manistee River											
	5/29/2002	0.055	0.000	0.000	0.003	0.004	0.000	0.000	0.000	0.006	0.001	0.005
770073	Manistique River											
	8/14/2002	0.323	0.004	0.002	0.012	0.029	0.005	0.013	0.071	0.072	0.014	0.020
550038	Menominee River											
	6/18/2002	NAI	0.000	0.001	0.007	0.012	NAI	0.004	NAI	0.018	0.006	0.009
610273	Muskegon River (Lower)											
	4/11/2002	NAI	0.000	0.000	0.003	0.007	0.002	0.003	0.000	0.013	0.002	0.005
	5/16/2002	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.006	0.001	0.002
	6/27/2002	0.068	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.005	0.001	0.003
	8/8/2002	0.104	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.004	0.000	0.004
	10/10/2002	0.000	0.000	0.000	0.003	0.004	0.000	0.000	0.000	0.007	0.001	0.003
670008	Muskegon River (Upper)											
	5/14/2002	0.086	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.007	0.000	0.003
	6/25/2002	NAI	0.000	0.000	0.002	0.003	0.000	0.000	0.008	0.008	0.001	0.002
	8/6/2002	0.080	0.000	0.000	0.002	0.003	0.000	0.000	0.000	0.006	0.001	0.000
660038	Ontonagon River											
	7/17/2002	0.062	0.000	0.000	0.000	0.003	0.000	0.000	0.007	0.006	0.000	0.001
360124	Paint River											
	9/24/2002	0.031	0.001	0.000	0.004	0.008	0.001	0.003	0.015	0.017	0.003	0.004
530027	Pere Marquette River											
	5/15/2002	0.000	0.000	0.000	0.004	0.004	0.002	0.000	0.009	0.008	0.002	0.005
	6/26/2002	0.014	0.003	0.001	0.016	0.012	0.004	0.006	NAI	0.014	0.007	0.019
	8/7/2002	0.072	0.000	0.000	0.020	0.013	NAI	0.007	NAI	0.015	0.008	0.020

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680056	Perry Creek											
	8/20/2002	0.075	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.001
490006	Pine River											
	10/21/2002	0.000	0.000	0.000	0.003	0.005	0.000	0.001	0.000	0.004	0.001	0.003
580046	River Raisin											
	4/17/2002	NAI	NAI	0.007	0.032	0.049	0.016	0.022	NAI	0.082	0.027	0.039
820070	River Rouge											
	6/18/2002	0.265	0.047	0.015	0.071	0.122	0.039	0.091	0.218	0.312	0.079	0.102
090177	Saginaw River											
	4/18/2002	0.325	0.016	0.017	0.043	0.063	0.021	0.060	NAI	0.165	0.040	0.062
730023	Shiawassee River											
	7/10/2002	0.132	0.002	0.001	0.011	0.013	NAI	0.006	NAI	0.017	0.006	0.011
110628	St. Joseph River (Lower)											
	9/4/2002	0.057	0.006	0.003	0.016	0.033	0.005	0.015	0.046	0.075	0.019	0.027
750273	St. Joseph River (Upper)											
	4/30/2002	0.025	0.001	0.000	0.002	0.006	0.002	0.003	0.000	0.011	0.002	0.004
210032	Sturgeon River											
	8/22/2002	0.025	0.000	0.000	0.002	0.005	0.000	0.001	0.000	0.008	0.001	0.003
170141	Tahquamenon River											
	10/16/2002	0.032	0.000	0.000	0.000	0.003	0.000	0.000	0.004	0.005	0.000	0.001
040123	Thunder Bay River											
	10/22/2002	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.002
730025	Tittabawassee River											
	5/9/2002	NAI	NAI	0.001	0.012	0.011	NAI	NAI	NAI	0.025	0.007	0.013

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