MI/DEQ/WD-03/085

MICHIGAN WATER CHEMISTRY MONITORING
2001 Report

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SECTION 1.0

HIGHLIGHTS

- The Michigan Water Chemistry Monitoring Project (WCMP) was initiated in 1998. Results obtained from tributary monitoring efforts undertaken between June 1998 and September 1999 are summarized in the February 2002 report (MI/DEQ/SWQ-02/025). Results obtained from tributary monitoring efforts undertaken between July and November 2000 are summarized in the June 2002 report (MI//DEQ/SWQ-02/092).

- 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 MDEQ water quality programs and evaluate their effectiveness; and
    4. Detect new and emerging water quality problems.

- Samples were collected at 36 stations in 31 tributary watersheds in 2001. 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.

- Eleven of 36 stations were sampled intensively (12 times) during periods of high flow and base/low flow, with an emphasis on the former. The remaining 25 stations were sampled non-intensively (4 times) without respect to stream flow conditions.

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

- Contaminants of interest at selected stations included dioxins and furans at the Tittabawassee River, and perfluorooctane sulfonate (PFOS) at 28 of 36 monitoring stations. Dioxins and furans were sampled in support of a separate project designed to provide a baseline characterization of Saginaw Bay Watershed sediments. PFOS represents a potential emerging water quality issue, and was sampled to provide baseline data on concentrations of this contaminant in surface waters throughout Michigan. PFOS data were not available at the time this report was written and will be published in a future report.

- 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 are collected.

- Total PCB concentrations were lowest in the sample collected at the Tahquamenon River (0.13 nanograms per liter [ng/L]), and highest in the sample collected at the Saginaw River (30 ng/L).

- Among intensively monitored stations, median normalized total mercury concentrations were lowest at the Au Sable River (0.19 ng/L), and highest at the Clinton River (7.9 ng/L).

- Among non-intensively monitored stations, median actual total mercury concentrations were lowest at the Cheboygan River (0.47 ng/L), and highest at the Upper Kalamazoo River (5.7 ng/L).

- Among intensively monitored stations, median normalized total phosphorus was lowest at the Au Sable (0.01 milligrams per liter [mg/L]); chloride was lowest at the Sturgeon River (2.3 mg/L); and total suspended solids (TSS) was lowest at the Au Sable and Sturgeon Rivers (< 4 mg/L). Median normalized concentrations of these contaminants were highest at the Clinton River (total phosphorus = 0.20 mg/L; chloride = 123 mg/L; TSS = 28 mg/L).

- Among non-intensively monitored stations, median actual total phosphorus was lowest at the Cheboygan and Boardman Rivers (0.01 mg/L); chloride was lowest at the Tioga River (0.15 mg/L); and TSS was less than the quantification level of 4.0 mg/L at the Cheboygan, Thunder Bay, Tioga, and Escanaba Rivers, and Evergreen Creek. Median actual total phosphorus was highest at the Flint River (0.23 mg/L); chloride was highest at the Flint and Huron Rivers (96 mg/L and 93 mg/L, respectively); and TSS was highest at the Pine and Flint Rivers (42 mg/L and 41 mg/L, respectively).

- Among minimally impacted sites and downstream, potentially impacted sites, concentrations of most contaminants were generally lower at minimally impacted sites. Exceptions included the Tioga River, which exhibited higher concentrations of Hg and trace metals, and similar concentrations of total phosphorus, compared with its downstream, potentially impacted site, the Sturgeon River. Likewise, although Bigelow Creek exhibited lower concentrations of total Hg and Pb compared with the Upper Muskegon River, concentrations of these contaminants at Bigelow Creek were similar to those found at the Lower Muskegon River.

- 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 issues. 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 and lead met Michigan Rule 57 water quality values. One sample analyzed for total copper exceeded the Rule 57 water quality value of 6.4 ug/L; this sample was collected at the Ontonagon River, and had a copper concentration of 7.2 ug/L.

- Of the 36 stations sampled for mercury, 3 (the Cheboygan and Thunder Bay Rivers, and Evergreen Creek) showed no exceedances of the Michigan Rule 57 water quality value for

mercury (1.3 ng/L). All mercury samples from 12 of 36 stations exceeded the mercury Rule 57 water quality value. The remaining 21 stations showed at least one exceedance of the mercury 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 36 stations.

- Adjusted concentrations of 2,3,7,8-TCDD (dioxin) ranged from zero picograms per liter [pg/L] to 21 pg/L in samples analyzed from the Tittabawassee River. Of the 8 samples analyzed, 3 exceeded the Michigan Rule 57 water quality value of 0.0031 pg/L; these sample concentrations ranged from 8 pg/L to 21 pg/L. The total 2,3,7,8-TCDD toxicity equivalence concentration (TEC) exceeded the Michigan Rule 57 water quality value of 0.0086 pg/L, applicable to total TEC, in all 8 samples analyzed. Total TECs ranged from 0.1 pg/L to 182 pg/L.

SECTION 2.0

INTRODUCTION

In June 1998, the Michigan Department of Environmental Quality-Water Division (MDEQ-WD) initiated its Water Chemistry Monitoring Project (WCMP) using part of a $500,000 appropriation by the state legislature to the MDEQ-WD. 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 the MDEQ-WD 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 the 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 implementation of that portion of the WCMP which targets tributary watersheds, and presents and discusses results from monitoring efforts undertaken February through November 2001 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).

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 tributary monitoring efforts undertaken July through November 2000 are summarized in the June 2002 WCMP report (MI/DEQ/SWQ-02/092). Results obtained from monitoring efforts undertaken in 1998 and 1999 at Saginaw and Grand Traverse Bays are presented and discussed with previously unpublished results in the January 2001 report entitled, "Water Quality Monitoring of Saginaw Bay and Grand Traverse Bay" (MI/DEQ/SWQ-01/017); results obtained at these bay stations in 2000 are presented and

discussed with previously published results in the March 2003 report by the same name (MI/DEQ/WD-03/060). Results obtained from monitoring efforts undertaken between June 1998 and November 2000 on Great Lakes connecting waters will be presented and discussed with previously unpublished results in a report currently being written. These reports are, or will be, 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 2001, these included the United States Geological Survey (USGS), MDEQ-Environmental Science and Services Division-Laboratory Section, MDEQ-Waste and Hazardous Materials Division (WHMD), Michigan State University (MSU), the Wisconsin State Laboratory of Hygiene (WSLH), the Grand Traverse Band of Chippewa and Ottawa Indians, 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 36 stations in 31 tributary watersheds were monitored between February and November 2001 as part of the WCMP. This report includes all available analytical results from samples collected during this period. PFOS data were not available at the time this report was written, and will be presented and discussed in a future report. Mercury and trace metal samples collected at the Clinton River on August 7, 2001 were lost in shipment to the laboratory, and as a result could not be analyzed.

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 5, which coincides with 2001. Figures 2 and 3 show the watershed units allocated to basin years 1, 2, 3 and 4, which coincide with 2002, 2003, 2004 and 2005, respectively.

Of the 45 watershed units recognized, 31 have been 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 avoidance of stream reaches subject to flow reversals (although this objective was not achievable on the Saginaw River), surrounding land use, availability of historical water quality data, proximity to USGS stream flow gauging stations, and accessibility. These 31 monitoring stations have been 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.

In 2001, the WCMP incorporated monitoring at minimally impacted sites as called for in the project study design. 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 have been 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 during the period beginning with the first significant snowmelt or spring rain event and continuing through autumn. Of these 12 samples, approximately 75 percent (%) are to be collected at each site during high flow events and the remaining 25% are to be collected during base/low flow. A high flow event is defined by one or more of the following conditions: stream flow at or above the 20% exceedance flow; an increase in stream flow of approximately 100% above the preceding base flow condition; or an increase in stream flow following a lengthy period of discharge at base flow and considered likely to produce a measurable change in the concentration of sampled constituents. This monitoring schedule was adopted specifically for those contaminants for which loading rate estimates would be calculated, based on its application in the Lake Michigan Mass Balance Project (USEPA 1997a; USEPA 1997b); 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 have been 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 5 (2001) watersheds included the Muskegon, Cass, Upper Grand, Lower St. Joseph, and Sturgeon River Watersheds. The minimally impacted sites selected to represent each of these in-basin year watersheds included Bigelow Creek, Evergreen Creek, the headwaters of the Grand River, Pokagon Creek, and the Tioga River, respectively. These sites are believed to represent the best water quality that can be expected within each 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, Total 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 Surveyor II™ (Model SRV2) or a YSI™ water quality monitoring sonde (Model 600XL).

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, e-mail communication). The information indicated that winter and spring runoff from stored piles of road salt may contain ferrocyanide, 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. Monitoring for total CN took place at a rate of 1-2 samples at each site 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 2001 at a rate of one sample per monitoring 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 standard MDEQ procedures outlined in the January 2001 revision of the WCMP field reference entitled, "Sample Collection and Handling Procedures for Selected Parameters," (available upon request). Samples were analyzed by the MDEQ Environmental Laboratory.

3.2.2 Total 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 1631B (USEPA 1999). 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 project. Data will then be used to develop a more complete understanding of the distribution of dioxins and furans within the Saginaw Bay Watershed.

One dioxin/furan sample, replicate, and blank were collected at the Tittabawassee River during each sampling event using the sample collection and handling protocol specified by MDEQ-WHMD and outlined in the January 2001 revision of the WCMP field reference entitled, "Sample Collection and Handling Procedures for Selected Parameters," (available upon request). 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).

3.2.5 Perfluorooctane Sulfonate

A statewide study of PFOS was incorporated into the WCMP in 2001 as the result of a cooperative effort between the MDEQ and MSU. PFOS is the breakdown product of perfluorooctanesulfonyl fluoride, which was once widely used in surfactants and surface protectors in carpets, leather, paper and packaging products. Growing concern over the environmental persistence, bioaccumulation, potential health effects, and global distribution of PFOS (Giesy and Kannan 2001; 2002) led to initiation of the study, for which 28 WCMP monitoring stations were sampled 3 times (first run, mid-summer and fall). The selected stations represent a wide range of land use types and expected PFOS concentrations.

Samples were collected from a single point in the flow of the stream at approximately 0.3 – 1.0m depth in accordance with a sample collection and handling protocol specified by MSU and outlined in the January 2001 revision of the WCMP field reference entitled, "Sample Collection and Handling Procedures for Selected Parameters," (available upon request). Samples were analyzed by MSU using the method described by Hansen et al. (2002).

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, Total Cyanide, Base/Neutral Organics, MTBE, and BTEX

In many cases, the MDEQ Environmental Laboratory censors (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 average of a data set containing censored data. In such cases, average concentrations were calculated using half the quantification level in place of censored values. Calculated averages 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 Total 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 (MDEQ 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).

3.3.1.5 Perfluorooctane Sulfonate

PFOS data were unavailable at the time this report was written. These data will be presented and discussed in a future report.

3.3.2 Measures of Central Tendency

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

3.3.3 Spatial Comparisons

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

The WCMP did not use a randomized sampling design. 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 feasibility and value of incorporating a randomized sampling design component into future implementations of the WCMP are currently being evaluated.

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 (MDEQ 1999b).

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. 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 lowest 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. 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 lowest Rule 57 water quality value differs among the 27 of 49 chemicals in this category for which these values have been developed; this will be addressed fully in Section 4.4.2. Base/neutral organics for which Rule 57 water quality values have been developed are listed in Table 3 (Groups 1 and 2).

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). Loading rates used to evaluate temporal trends will be calculated with the Stratified Beale Ratio Estimator from contaminant concentrations normalized to stream discharge using LOWESS.

SECTION 4.0

RESULTS, SUMMARY STATISTICS, AND DISCUSSION

Field staff collected a total of 232 water samples between February and November 2001. Table 8 lists all existing monitoring stations, along with year(s) sampled since the WCMP was initiated in 1998.

4.1 BASIC STATISTICS

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. 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 2001, 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 11 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 Total Phosphorus, Total Chloride, and Total Suspended Solids

The graphs presented in Figures 7 - 9 show intensively monitored sites ranked lowest to highest according to median normalized total phosphorus, chloride and TSS concentration. Among intensively monitored sites, median total phosphorus (Figure 7) was lowest at the Au Sable (0.01 mg/L); chloride (Figure 8) was lowest at the Sturgeon River (2.3 mg/L); and TSS (Figure 9) was lowest at the Au Sable and Sturgeon Rivers (< 4 mg/L). Median concentrations of all contaminants were highest at the Clinton River (total phosphorus = 0.20 mg/L; chloride = 123 mg/L; TSS = 28 mg/L).

4.2.1.2 Total 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 Hg = 0.19 ng/L; Cr = 0.07 ug/L; Cu = 0.16 ug/L; Pb = 0.05 ug/L), and the Clinton River ranked highest (median Hg = 7.9 ng/L; Cr = 2.9 ug/L; Cu = 4.7 ug/L; Pb = 3.7 ug/L).

4.2.2 Spatial Comparisons Among Non-Intensively Monitored Sites

Monitoring for total phosphorus, chloride, TSS, Hg, Cr, Cu, and Pb took place at 17 non-intensively monitored 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 Total Phosphorus, Total Chloride, and Total Suspended Solids

The graphs presented in Figures 14 - 16 show non-intensively monitored sites ranked lowest to highest according to median actual total phosphorus, chloride and TSS concentration. Among non-intensively monitored sites, median total phosphorus (Figure 14) was lowest at the Cheboygan and Boardman Rivers (0.01 mg/L); chloride (Figure 15) was lowest at the Tioga River (0.15 mg/L); and TSS (Figure 16) was less than the quantification level of 4.0 mg/L at the Cheboygan, Thunder Bay, Tioga, and Escanaba Rivers, and Evergreen Creek. Median total phosphorus was highest at the Flint River (0.23 mg/L); chloride was highest at the Flint and Huron Rivers (96 mg/L and 93 mg/L, respectively); and TSS was highest at the Pine and Flint Rivers (42 mg/L and 41 mg/L, respectively).

4.2.2.2 Total Mercury and Trace Metals

The graphs presented in Figures 17 - 20 show non-intensively monitored sites ranked lowest to highest according to median actual total Hg, Cr, Cu, and Pb concentration. Among non-intensively monitored sites, the Cheboygan River ranked lowest in total Hg and Pb (0.47 ng/L and 0.044 ug/L, respectively); the Upper St. Joseph River ranked lowest in total Cr (0.048 ug/L); and Bigelow Creek ranked lowest in total Cu (0.18 ug/L). Median total Hg (Figure 17) was highest at the Upper Kalamazoo River (5.7 ng/L); Cr (Figure 18) was highest at the Pine, Rouge, Flint and Upper Kalamazoo Rivers (1.6 ug/L, 1.48 ug/L, 1.48 ug/L, and 1.43 ug/L, respectively); Cu (Figure 19) was highest at the Ontonagon River (3.7 ug/L); and Pb (Figure 20) was highest at the River Rouge (2.2 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 2001. 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 minimally impacted sites compared with associated downstream, potentially impacted sites. Exceptions included the Tioga River, which exhibited higher concentrations of Hg and trace metals (Figures 22 and 23.5, respectively), and similar concentrations of total phosphorus (Figure 21.5), compared with its associated downstream, potentially impacted site, the Sturgeon River. Likewise, although Bigelow Creek exhibited lower concentrations of total Hg and Pb compared with the Upper Muskegon River, concentrations of these contaminants at Bigelow Creek and the Lower Muskegon River were similar (Figures 22 and 23.1, respectively).

4.2.4 Polychlorinated Biphenyls

Total PCB was sampled once at each station monitored in 2001. The graph presented in Figure 24 shows all stations ranked lowest to highest according to total PCB concentration. The lowest concentration of total PCB was found in the sample collected at the Tahquamenon River (0.13 ng/L), and the highest concentration was found in the sample collected at the Saginaw River (30 ng/L).

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 loading rate estimates. For each contaminant, stations are shown in the tables ranked from highest to lowest estimated loading rate. Additionally, hydrographs of stream discharge are provided for each station for which contaminant loading rates were estimated (Figures 25 - 35).

4.3.1 Total Phosphorus, Total Chloride, and Total 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 and chloride loadings to the Great Lakes was the Sturgeon River (6 metric tons per year [mt/year] and 460 mt/year, respectively); and the least significant contributor of TSS loadings was the Au Sable River (2,300 mt/year). The most significant contributor of total chloride and TSS loadings was the Saginaw River (220,000 mt/year and 203,000 mt/year, respectively); and the most significant contributor of total phosphorus loadings was the Lower Grand River (660 mt/year).

4.3.2 Total 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, and Pb was the Au Sable River (0.36 kilograms per year [kg/year], 39 kg/year, and 60 kg/year, respectively); and the least significant contributor of total Cu was the Sturgeon River (120 kg/year). The most significant contributor of total Hg and Pb was the Lower St. Joseph River (29 kg/year and 8,900 kg/year, respectively); the most significant contributor of total Cr was the Saginaw River (7,200 kg/year); and the most significant contributor of total Cu was the Lower Grand River (12,000 kg/year).

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 calculated mean concentration of each analyte were compared with their applicable lowest non-drinking water 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 Total 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 (carbazole, dibenzofuran, hexachlorobutadiene, and hexachlorocyclopentadiene) 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) at 7 sites, shown here with sample concentrations: Black River (11 ug/L), Lower Grand River (5.3 ug/L), Upper Grand River (3.6 ug/L), Pokagon Creek (2 ug/L), Upper St. Joseph River (4 ug/L), and Sturgeon River (17 ug/L). All of these samples met 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 2001 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). Likewise, all BTEX contaminants were below analytical quantification (QL range: 1.0 – 2.0 ug/L), and were therefore well below applicable Rule 57 water quality values (Rule 57 water quality value range: 18 – 200 ug/L).

4.4.3 Total 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.

No exceedances were found in any samples analyzed for total Cr or Pb. One sample analyzed for total Cu exceeded the Cu Rule 57 water quality value of 6.4 ug/L; this sample was collected at the Ontonagon River, and had a Cu concentration of 7.2 ug/L. All samples collected for total Hg at 3 of 36 monitoring stations met the Hg Rule 57 water quality value of 1.3 ng/L; specifically, the Cheboygan and Thunder Bay Rivers, and Evergreen Creek (all non-intensively monitored sites). At 12 of 36 sites, representing a total of 72 samples, total Hg exceeded 1.3 ng/L in all samples collected. These sites are (with their range of Hg concentrations): Lower Grand River (1.6 – 15 ng/L), Upper Grand River (1.4 – 52 ng/L), Lower Kalamazoo River (2.7 – 14 ng/L), Escanaba River (1.5 – 5.1 ng/L), Flint River (1.4 – 6.6 ng/L), Upper Kalamazoo River (3.4 – 6.0 ng/L), Manistique River (2.2 – 3.4 ng/L), Menominee River (1.7 – 5.0 ng/L), Pere Marquette River (1.31 – 3.0 ng/L), Pine River (1.8 – 6.0 ng/L), Shiawassee River (1.32 – 4.1 ng/L), and

River (3.2 – 7.0 ng/L). The remaining 21 monitoring stations showed at least 1 sample in exceedance of the Hg Rule 57 water quality value (Table 12).

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 Tahquamenon River (0.13 ng/L), and the highest concentration was found in the sample collected at the Saginaw River (30 ng/L).

4.4.5 Dioxins and Furans

Adjusted concentrations of 2,3,7,8-TCDD (dioxin) ranged from zero pg/L to 21 pg/L in samples analyzed from the Tittabawassee River. Of the 8 samples analyzed, 3 exceeded the Michigan Rule 57 water quality value of 0.0031 pg/L; these sample concentrations ranged from 8 pg/L to 21 pg/L. The total 2,3,7,8-TCDD TEC exceeded the Michigan Rule 57 water quality value of 0.0086 pg/L, applicable to total TEC, in all 8 samples analyzed. Total TECs ranged from 0.1 pg/L to 182 pg/L.

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July 31, 2003

SECTION 5.0

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Table 1. 2001 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 2001 Intensively Monitored				
Cass	M-13 bridge, Spaulding Twp., Sec. 12	Saginaw	730024	43.36500 °N, - 83.95473 °W
Grand (Upper)	M-66 bridge, Ionia Twp. Sec. 30	Ionia	340025	42.97195 °N, - 85.07000 °W
Muskegon (Upper)	Hersey Rd. bridge, Hersey Twp.	Osceola	670008	43.84722 °N, - 85.43231 °W
St. Joseph (Lower)	River Pk. off Zollar Dr.	Berrien	110628	42.06333 °N, - 86.44889 °W
Sturgeon	Co Rd. 499, Nahma Twp., Sec. 20	Delta	210032	45.83417 °N, - 86.66862 °W
Integrator Sites - Year 2001 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
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
Huron	2000' DS of Rockwood WWTP, Berlin Twp.	Monroe	580364	42.04528 °N, - 83.21417 °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
Menominee	26th St. bridge, city of Menominee	Menominee	550038	45.10625 °N, - 87.63556 °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 (Upper)	Rt. 12 Bridge, city of Mottville	St. Joseph	750273	41.80003 °N, - 85.75694 °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
Tittabawassee	Central Rd. bridge, Spaulding Twp.	Saginaw	730025	43.39278 °N, - 84.01111 °W
Minimally Impacted Sites - Year 2001 (Non-Intensively Monitored)				
Bigelow Creek[1]	S. Basswood Dr off Basswood Dr.	Newaygo	630291	43.42778 °N, - 85.76784 °W
Evergreen Creek[2]	Waterman Rd.	Tuscola	790157	43.39439 °N, - 83.47607 °W
Grand (Headwaters)[3]	Reed Rd., Columbia Twp, Sec. 7	Jackson	380083	42.13889 °N, - 84.35306 °W
Pokagon Creek[4]	Pokagon Hwy, Pokagon Twp.	Cass	140126	41.91254 °N, - 86.17220 °W
Tioga River[5]	State Roadside Park, US-41	Baraga	070070	46.57527 °N, - 88.34066 °W

[1]Muskegon River watershed
[2]Cass River watershed
[3]Upper Grand River watershed
[4]Lower St. Joseph River watershed
[5]Sturgeon River watershed

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

	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	0.40^

* = 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 quantitation levels and Michigan Rule 57 water quality values.

	Quantification Level (ug/L)	R. 57 Water Quality Value (ug/L)
	Group 1	
1,2,4-Trichlorobenzene	2.0	FCV = 30
1,2-Dichlorobenzene	1.0	FCV = 16
1,3-Dichlorobenzene	1.0	FCV = 38
1,4-Dichlorobenzene	1.0	FCV = 16
2-Methylnaphthalene	5.0	FCV = 4.8
Acenaphthene	1.0	FCV = 19
Acenaphthylene	1.0	FCV = 7.2
Anthracene	1.0	FCV = 2.8
Benzo(a)anthracene	1.0	FCV = 2.6
Bis(2-chloroisopropyl)ether	1.0	HCV = 290
Bis(2-ethylhexyl)phthalate	2.0	HCV = 32
Butyl benzyl phthalate	1.0	FCV = 14
Chrysene	1.0	HCV = 1.5
Diethyl phthalate	1.0	FCV = 110
Di-n-butyl phthalate	1.0	FCV = 9.7
Di-n-octyl phthalate	2.0	HNV = 300
Fluoranthene	1.0	FCV = 1.6
Fluorene	1.0	FCV = 12
Hexachloroethane	1.0	HCV = 6.7
Isophorone	1.0	FCV = 570
Naphthalene	1.0	FCV = 13
Nitrobenzene	2.0	HCV = 180
Phenanthrene	1.0	FCV = 2.4
Pyrene	1.0	FCV = 2.5
	Group 2	
Carbazole	10	FCV = 4
Dibenzofuran	5.0	FCV = 4
Hexachlorobutadiene	2.0	WV = 0.053
Hexachlorocyclopentadiene	10	FCV = 0.07
	Group 3	
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)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	*
Bis(2-chloroethyl)ether	1.0	*
Dibenz(a,h)anthracene	2.0	*
Dimethyl 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.
* = Michigan Rule 57 water quality value has not been developed for this analyte.

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

	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.

	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	0.30	ug/L
Zn	0.04	0.13	ug/L

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

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

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

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 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.
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
Au Sable	350061	X		X	X
Bigelow Creek*	630291				X
Black	740385			X	X
Boardman	280014				X
Cass	730024			X	X
Cheboygan	160073			X	X
Clinton	500233	X		X	X
Escanaba	210102		X	X	X
Evergreen Creek*	790157				X
Flint	730285			X	X
Grand (Headwaters)*	380083				X
Grand (Lower)	700123		X	X	X
Grand (Upper)	340025			X	X
Huron	580364	X		X	X
Kalamazoo (Lower)	030077		X	X	X
Kalamazoo (Upper)	390057			X	X
Manistee	510088			X	X
Manistique	770073		X	X	X
Menominee	550038			X	X
Muskegon (Lower)	610273		X	X	X
Muskegon (Upper)	670008			X	X
Ontonagon	660038			X	X
Pere Marquette	530027		X	X	X
Pine	490006			X	X
Pokagon Creek*	140126				X
Raisin	580046	X		X	X
Rouge	820070	X		X	X
Saginaw	090177	X			X
Shiawassee	730023	X		X	X
St. Joseph (Lower)	110628		X	X	X
St. Joseph (Upper)	750273			X	X
Sturgeon	210032			X	X
Tahquamenon	170141		X	X	X
Thunder Bay	040123	X		X	X
Tioga River*	070070				X
Tittabawassee	730025	X		X	X

* = Basin Year 5 minimally impacted site.

Table 9.1 2001 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	216,646	25%	70.08	4,440
	Grand River (Lower)	200,509	10%	45.92	5,270
	St. Joseph River (Lower)	117,084	7%	26.83	5,000
	Kalamazoo River (Lower)	93,663	7%	36.42	2,780
	Grand River (Upper)	91,545	15%	47.58	2,700
	Clinton River	71,844	12%	132.25	758
	Cass River	38,313	58%	48.17	682
	Muskegon River (Lower)	31,280	8%	16.00	2,250
	Muskegon River (Upper)	17,884	14%	13.75	1,515
	Au Sable River	6,803	3%	6.00	1,280
	Sturgeon River	464	8%	2.33	247
Tot Phosphorus		metric tons/year	(+/-)	mg/L	cfs
	Grand River (Lower)	657	12%	0.14	5,270
	Saginaw River	642	29%	0.16	4,440
	St. Joseph River (Lower)	593	33%	0.14	5,000
	Grand River (Upper)	359	23%	0.14	2,700
	Kalamazoo River (Lower)	273	19%	0.10	2,780
	Clinton River	164	18%	0.22	758
	Cass River	92	48%	0.09	682
	Muskegon River (Lower)	65	38%	0.04	2,250
	Muskegon River (Upper)	61	25%	0.06	1,515
	Au Sable River	10	15%	0.01	1,280
	Sturgeon River	6	11%	0.02	247

+ = 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 9.2 2001 loading rate estimates for total chloride, phosphorus and suspended solids.

Parameter	Station	Loading Rate+	95% C.I.	Mean Concentration+	Mean Flow +*
TSS		metric tons/year	(+/-)	mg/L	cfs
	Saginaw River	202,957	36%	46.92	4,440
	Grand River (Upper)	187,123	170%	88.67	2,700
	St. Joseph River (Lower)	152,719	32%	35.25	5,000
	Grand River (Lower)	148,498	43%	34.17	5,270
	Clinton River	57,457	40%	55.08	758
	Kalamazoo River (Lower)	51,900	14%	20.58	2,780
	Muskegon River (Lower)	31,089	50%	21.08	2,250
	Cass River	25,305	71%	27.08	682
	Muskegon River (Upper)	17,429	40%	21.42	1,515
	Sturgeon River	4,815	104%	10.50	247
	Au Sable River	2,274	0%	4.00	1,280

+ = 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. 2001 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	7,204	22%	1.83	4,440
	Grand River (Lower)	5,720	28%	1.38	5,270
	Grand River (Upper)	5,012	109%	2.09	2,700
	St. Joseph River (Lower)	4,884	35%	1.15	5,000
	Clinton River	2,810	46%	3.26	758
	Kalamazoo River (Lower)	1,907	11%	0.76	2,780
	Cass River	876	57%	0.92	682
	Muskegon River (Upper)	444	31%	0.43	1,515
	Muskegon River (Lower)	401	53%	0.30	2,250
	Sturgeon River	96	23%	0.33	247
	Au Sable River	39	31%	0.04	1,280
Copper		kg/year	(+/-)	ug/L	cfs
	Grand River (Lower)	11,943	13%	2.55	5,270
	Saginaw River	11,538	18%	2.97	4,440
	St. Joseph River (Lower)	10,442	25%	2.37	5,000
	Grand River (Upper)	7,808	43%	3.38	2,700
	Kalamazoo River (Lower)	4,745	11%	1.76	2,780
	Clinton River	4,234	30%	5.27	758
	Cass River	1,496	29%	1.85	682
	Muskegon River (Lower)	1,106	22%	0.71	2,250
	Muskegon River (Upper)	837	14%	0.77	1,515
	Au Sable River	219	16%	0.19	1,280
	Sturgeon River	121	11%	0.44	247
Lead		kg/year	(+/-)	ug/L	cfs
	St. Joseph River (Lower)	8,886	28%	2.01	5,000
	Saginaw River	7,816	36%	2.03	4,440
	Grand River (Lower)	6,886	31%	1.67	5,270
	Grand River (Upper)	6,191	104%	2.64	2,700
	Clinton River	4,017	52%	4.49	758
	Kalamazoo River (Lower)	3,678	9%	1.53	2,780
	Cass River	730	57%	0.79	682
	Muskegon River (Lower)	496	51%	0.37	2,250
	Muskegon River (Upper)	459	40%	0.51	1,515
	Sturgeon River	63	34%	0.22	247
	Au Sable River	60	12%	0.06	1,280
Mercury		kg/year	(+/-)	ng/L	cfs
	St. Joseph River (Lower)	29	27%	6.29	5,000
	Saginaw River	18	29%	4.67	4,440
	Grand River (Lower)	16	26%	4.08	5,270
	Grand River (Upper)	14	120%	7.32	2,700
	Kalamazoo River (Lower)	13	19%	5.87	2,780
	Clinton River	6	40%	7.41	758
	Muskegon River (Upper)	3	40%	3.17	1,515
	Cass River	2	85%	2.08	682
	Muskegon River (Lower)	2	55%	1.80	2,250
	Sturgeon River	1	20%	2.78	247
	Au Sable River	0.36	140%	0.42	1,280

+ = 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	Watershed	Bis(2-ethylhexyl) phthalate (ug/L)
740385	**Black River**	
	R.57 Water Quality Value	32.0
	Sample Concentration	11
700123	**Grand River (Lower)**	
	R.57 Water Quality Value	32.0
	Sample Concentration	5.3
340025	**Grand River (Upper)**	
	R.57 Water Quality Value	32.0
	Sample Concentration	3.6
140126	**Pokagon Creek**	
	R.57 Water Quality Value	32.0
	Sample Concentration	2
750273	**St. Joseph River (Upper)**	
	R.57 Water Quality Value	32.0
	Sample Concentration	4
210032	**Sturgeon River**	
	R.57 Water Quality Value	32.0
	Sample Concentration	17

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	102.0	12.0	16.0
Mean Concentration+		0.423	0.037	0.190	0.058
Range of Concentrations		0 - 2.54	0 - 0.11	0.106 - 0.338	0.029 - 0.121
Exceedance Rate*		1 / 12	0 / 12	0 / 12	0 / 12
630291	**Bigelow Creek**				
R.57 Water Quality Value@		1.3	110.0	14.0	18.0
Mean Concentration+		1.155	0.112	0.207	0.212
Range of Concentrations		0.62 - 2.03	0.079 - 0.18	0.11 - 0.35	0.096 - 0.345
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
740385	**Black River**				
R.57 Water Quality Value@		1.3	130.0	17.0	22.0
Mean Concentration+		2.520	0.778	1.928	0.652
Range of Concentrations		0.28 - 6.52	0.45 - 1.25	1.4 - 2.3	0.47 - 0.944
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
280014	**Boardman River**				
R.57 Water Quality Value@		1.3	110.0	14.0	17.0
Mean Concentration+		0.848	0.075	0.211	0.088
Range of Concentrations		0.48 - 1.55	0 - 0.11	0.146 - 0.25	0.063 - 0.137
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
730024	**Cass River**				
R.57 Water Quality Value@		1.3	180.0	22.0	32.0
Mean Concentration+		2.083	0.923	1.851	0.791
Range of Concentrations		1.06 - 5.74	0.39 - 1.97	1.15 - 2.94	0.438 - 1.67
Exceedance Rate*		11 / 12	0 / 12	0 / 12	0 / 12
160073	**Cheboygan River**				
R.57 Water Quality Value@		1.3	107.0	13.0	17.0
Mean Concentration+		0.445	0.091	0.469	0.070
Range of Concentrations		0.14 - 0.69	0 - 0.24	0.27 - 0.576	0.038 - 0.152
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
500233	**Clinton River**				
R.57 Water Quality Value@		1.3	140.0	18.0	24.0
Mean Concentration+		7.410	3.262	5.266	4.490
Range of Concentrations		0.89 - 19.29	0.68 - 10	1.93 - 11.3	0.734 - 15.3
Exceedance Rate*		10 / 11	0 / 11	0 / 11	0 / 11
210102	**Escanaba River**				
R.57 Water Quality Value@		1.3	74.0	9.0	10.0
Mean Concentration+		2.753	0.591	1.055	0.325
Range of Concentrations		1.54 - 5.11	0.42 - 0.86	0.56 - 1.69	0.153 - 0.765
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 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)
790157	**Evergreen Creek**				
R.57 Water Quality Value@		1.3	150.0	19.0	27.0
Mean Concentration+		0.703	0.070	0.686	0.182
Range of Concentrations		0.63 - 0.84	0 - 0.17	0.563 - 0.96	0.112 - 0.279
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
730285	**Flint River**				
R.57 Water Quality Value@		1.3	160.0	19.0	27.0
Mean Concentration+		3.290	1.523	2.900	1.995
Range of Concentrations		1.43 - 6.55	0.66 - 2.42	2.05 - 3.56	1.13 - 3.49
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
380083	**Grand River (Headwaters)**				
R.57 Water Quality Value@		1.3	160.0	20.0	28.0
Mean Concentration+		1.813	0.253	0.616	0.502
Range of Concentrations		0.95 - 3.02	0.07 - 0.78	0.291 - 0.9	0.072 - 0.857
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
700123	**Grand River (Lower)**				
R.57 Water Quality Value@		1.3	150.0	19.0	26.0
Mean Concentration+		4.078	1.379	2.549	1.671
Range of Concentrations		1.61 - 14.61	0.529 - 4.73	1.32 - 4.8	0.758 - 5.35
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
340025	**Grand River (Upper)**				
R.57 Water Quality Value@		1.3	160.0	20.0	29.0
Mean Concentration+		7.317	2.095	3.378	2.636
Range of Concentrations		1.4 - 52.23	0.17 - 15.1	1.71 - 12.4	0.462 - 18
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
580364	**Huron River**				
R.57 Water Quality Value@		1.3	160.0	20.0	28.0
Mean Concentration+		1.065	0.685	1.808	1.703
Range of Concentrations		0.95 - 1.31	0.22 - 1.34	1.19 - 2.37	1.43 - 1.96
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
030077	**Kalamazoo River (Lower)**				
R.57 Water Quality Value@		1.3	150.0	18.0	26.0
Mean Concentration+		5.869	0.758	1.760	1.534
Range of Concentrations		2.72 - 14.2	0.28 - 1.27	0.951 - 2.74	0.956 - 2.51
Exceedance Rate*		12 / 12	0 / 12	0 / 12	0 / 12
390057	**Kalamazoo River (Upper)**				
R.57 Water Quality Value@		1.3	160.0	19.0	27.0
Mean Concentration+		5.208	1.405	1.583	1.850
Range of Concentrations		3.39 - 5.95	0.55 - 2.07	1.32 - 1.95	1.02 - 2.6
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 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)
510088	**Manistee River**				
R.57 Water Quality Value@		1.3	108.0	13.0	17.0
Mean Concentration+		1.070	0.203	0.368	0.189
Range of Concentrations		0.76 - 1.84	0.04 - 0.29	0.317 - 0.47	0.164 - 0.25
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
770073	**Manistique River**				
R.57 Water Quality Value@		1.3	62.0	7.5	8.2
Mean Concentration+		2.728	0.458	0.365	0.292
Range of Concentrations		2.16 - 3.45	0.233 - 0.79	0.056 - 0.59	0.173 - 0.407
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
550038	**Menominee River**				
R.57 Water Quality Value@		1.3	79.0	9.6	11.0
Mean Concentration+		3.178	0.331	0.875	0.200
Range of Concentrations		1.7 - 5.05	0.14 - 0.56	0.657 - 1.11	0.122 - 0.29
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
610273	**Muskegon River (Lower)**				
R.57 Water Quality Value@		1.3	109.0	13.0	17.0
Mean Concentration+		1.803	0.299	0.709	0.365
Range of Concentrations		0.55 - 10.13	0 - 1.88	0.436 - 1.98	0.096 - 2.18
Exceedance Rate*		4 / 12	0 / 12	0 / 12	0 / 12
670008	**Muskegon River (Upper)**				
R.57 Water Quality Value@		1.3	102.0	12.0	16.0
Mean Concentration+		3.170	0.434	0.766	0.509
Range of Concentrations		0.82 - 13.71	0 - 1.75	0.414 - 2.23	0.115 - 2.55
Exceedance Rate*		8 / 12	0 / 12	0 / 12	0 / 12
660038	**Ontonagon River**				
R.57 Water Quality Value@		1.3	53.0	6.4	6.6
Mean Concentration+		3.295	1.474	3.943	0.445
Range of Concentrations		0.71 - 8.35	0.54 - 3.54	1.12 - 7.17	0.082 - 1.16
Exceedance Rate*		3 / 4	0 / 4	1 / 4	0 / 4
530027	**Pere Marquette River**				
R.57 Water Quality Value@		1.3	107.0	13.0	17.0
Mean Concentration+		1.925	0.233	0.446	0.224
Range of Concentrations		1.31 - 2.99	0.15 - 0.33	0.37 - 0.53	0.147 - 0.299
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
490006	**Pine River**				
R.57 Water Quality Value@		1.3	70.0	8.4	9.5
Mean Concentration+		3.690	1.733	1.553	0.765
Range of Concentrations		1.77 - 6.05	1.23 - 2.4	0.86 - 2.3	0.453 - 1.05
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 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)
140126	**Pokagon Creek**				
R.57 Water Quality Value@		1.3	160.0	20.0	28.0
Mean Concentration+		1.378	0.175	0.512	0.371
Range of Concentrations		0.6 - 2.45	0.032 - 0.32	0.213 - 0.73	0.165 - 0.719
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4
580046	**River Raisin**				
R.57 Water Quality Value@		1.3	140.0	17.0	24.0
Mean Concentration+		2.598	1.125	2.830	0.941
Range of Concentrations		1.14 - 6.34	0.22 - 2.47	2.16 - 4	0.42 - 2.24
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
820070	**River Rouge**				
R.57 Water Quality Value@		1.3	94.0	11.0	14.0
Mean Concentration+		2.950	1.488	2.575	1.996
Range of Concentrations		0.74 - 4.72	0.97 - 1.96	1.72 - 3.16	0.673 - 2.85
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
090177	**Saginaw River**				
R.57 Water Quality Value@		1.3	150.0	18.0	26.0
Mean Concentration+		4.668	1.827	2.965	2.032
Range of Concentrations		1.15 - 13.96	0.78 - 5.95	1.62 - 8.14	0.857 - 7.42
Exceedance Rate*		11 / 12	0 / 12	0 / 12	0 / 12
730023	**Shiawassee River**				
R.57 Water Quality Value@		1.3	150.0	19.0	26.0
Mean Concentration+		2.135	0.918	1.870	0.964
Range of Concentrations		1.32 - 4.09	0.58 - 1.66	1.66 - 2.26	0.679 - 1.68
Exceedance Rate*		4 / 4	0 / 4	0 / 4	0 / 4
110628	**St. Joseph River (Lower)**				
R.57 Water Quality Value@		1.3	160.0	20.0	27.0
Mean Concentration+		6.290	1.150	2.369	2.007
Range of Concentrations		1.15 - 15.82	0.23 - 3.87	1.1 - 4.92	0.483 - 5.2
Exceedance Rate*		11 / 12	0 / 12	0 / 12	0 / 12
750273	**St. Joseph River (Upper)**				
R.57 Water Quality Value@		1.3	150.0	18.0	26.0
Mean Concentration+		2.733	0.148	0.693	0.445
Range of Concentrations		0.61 - 7.89	0.014 - 0.47	0.322 - 1.24	0.162 - 0.89
Exceedance Rate*		1 / 4	0 / 4	0 / 4	0 / 4
210032	**Sturgeon River**				
R.57 Water Quality Value@		1.3	76.0	9.3	11.0
Mean Concentration+		2.781	0.332	0.443	0.225
Range of Concentrations		0.88 - 5.14	0.092 - 0.74	0.206 - 0.8	0.045 - 0.551
Exceedance Rate*		8 / 12	0 / 12	0 / 12	0 / 12

@ = With the exception of mercury, Rule 57 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)
170141	**Tahquamenon River**				
R.57 Water Quality Value@		1.3	54.0	6.4	6.8
Mean Concentration+		3.770	0.290	0.395	0.233
Range of Concentrations		1.2 - 6.04	0.098 - 0.4	0.23 - 0.6	0.077 - 0.298
Exceedance Rate*		3 / 4	0 / 4	0 / 4	0 / 4
040123	**Thunder Bay River**				
R.57 Water Quality Value@		1.3	120.0	14.0	18.0
Mean Concentration+		0.585	0.058	0.254	0.110
Range of Concentrations		0.34 - 0.98	0 - 0.14	0 - 0.4	0.063 - 0.146
Exceedance Rate*		0 / 4	0 / 4	0 / 4	0 / 4
070070	**Tioga River**				
R.57 Water Quality Value@		1.3	24.0	2.8	2.3
Mean Concentration+		5.033	0.385	0.484	0.284
Range of Concentrations		3.16 - 7.02	0.19 - 0.55	0.325 - 0.83	0.157 - 0.492
Exceedance Rate*		4 / 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+		1.885	0.610	1.820	0.675
Range of Concentrations		1.05 - 3.07	0.26 - 1.33	1.48 - 2.32	0.252 - 1.43
Exceedance Rate*		2 / 4	0 / 4	0 / 4	0 / 4

@ = With the exception of mercury, Rule 57 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	Total PCB+ (ng/L)
350061	Au Sable River	
7/11/2001		0.186
630291	Bigelow Creek	
6/19/2001		0.609
740385	Black River	
6/27/2001		0.767
280014	Boardman River	
5/30/2001		0.447
730024	Cass River	
7/10/2001		0.884
160073	Cheboygan River	
6/19/2001		0.174
500233	Clinton River	
6/26/2001		6.670
210102	Escanaba River	
6/4/2001		0.222
790157	Evergreen Creek	
7/18/2001		0.218
730285	Flint River	
5/8/2001		2.517
380083	Grand River (Headwaters)	
5/3/2001		0.457
700123	Grand River (Lower)	
11/13/2001		0.992
340025	Grand River (Upper)	
4/24/2001		2.608
580364	Huron River	
7/26/2001		1.763
030077	Kalamazoo River (Lower)	
8/9/2001		17.853
390057	Kalamazoo River (Upper)	
4/30/2001		6.372
510088	Manistee River	
5/29/2001		0.312
770073	Manistique River	
5/30/2001		1.236

+ = 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	Total PCB+ (ng/L)
550038	Menominee River	
10/9/2001		0.342
610273	Muskegon River (Lower)	
6/20/2001		0.677
670008	Muskegon River (Upper)	
11/14/2001		0.268
660038	Ontonagon River	
8/13/2001		0.266
530027	Pere Marquette River	
7/30/2001		0.551
490006	Pine River	
10/23/2001		0.648
140126	Pokagon Creek	
6/14/2001		0.636
580046	River Raisin	
5/2/2001		1.602
820070	River Rouge	
6/11/2001		8.618
090177	Saginaw River	
8/15/2001		30.444
730023	Shiawassee River	
9/5/2001		0.650
110628	St. Joseph River (Lower)	
4/25/2001		3.822
750273	St. Joseph River (Upper)	
6/13/2001		0.861
210032	Sturgeon River	
11/19/2001		0.146
170141	Tahquamenon River	
6/11/2001		0.131
040123	Thunder Bay River	
8/28/2001		0.338
070070	Tioga River	
6/13/2001		0.141
730025	Tittabawassee River	
5/9/2001		1.412

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

Table 14.1 Dioxin and furan concentrations measured at the Tittabawassee River. Shown are the raw results for each sample, replicate, and blank; the adjusted results; the congener-specific and total TEC for each sample and replicate; and the applicable Rule 57 water quality values. All concentrations are in pg/L (ppq).

			Sample 1 (2/10/01)					Replicate 1 (2/10/01)				
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 3.9	ND 3.0	0.0	0.0	WV = 0.0031	J 8.1	ND 3.0	8.1	8.1	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 5.2	ND 3.8	0.0	0.0		J 17.1	ND 3.8	17.1	7.7	
123478-HxCDD	0.1	0.3	ND 5.7	ND 4.4	0.0	0.0		J 12.1	ND 4.4	12.1	0.4	
123678-HxCDD	0.1	0.1	ND 5.4	ND 4.3	0.0	0.0		J 20.9	ND 4.3	20.9	0.2	
123789-HxCDD	0.1	0.1	ND 5.3	ND 4.2	0.0	0.0		ND,J 22.3	ND 4.2	0.0	0.0	
1234678-HpCDD	0.01	0.05	ND,J 26.7	ND 6.4	0.0	0.0		52.4	ND 6.4	52.4	0.0	
12346789-OCDD	0.001	0.01	B 260.0	J,B 29.3	230.7	0.0		B 306.0	J,B 29.3	276.7	0.0	
2378-TCDF	0.1	0.8	16.7	ND 2.1	16.7	1.3		30.3	ND 2.1	30.3	2.4	
12378-PeCDF	0.05	0.2	J 14.7	ND 2.7	14.7	0.1		J 36.6	ND 2.7	36.6	0.4	
23478-PeCDF	0.5	1.6	J 7.5	ND 2.7	7.5	6.0		J 28.7	ND 2.7	28.7	23.0	
123478-HxCDF	0.1	0.08	J 10.2	ND 3.0	10.2	0.1		J 49.0	ND 3.0	49.0	0.4	
123678-HxCDF	0.1	0.2	J 3.9	ND 2.7	3.9	0.1		J 26.2	ND 2.7	26.2	0.5	
234678-HxCDF	0.1	0.7	ND 3.8	ND 2.9	0.0	0.0		J 17.3	ND 2.9	17.3	1.2	
123789-HxCDF	0.1	0.6	ND 4.5	ND 3.6	0.0	0.0		J 26.9	ND 3.6	26.9	1.6	
1234678-HpCDF	0.01	0.01	J 29.6	ND 3.9	29.6	0.0		89.6	ND 3.9	89.6	0.0	
1234789-HpCDF	0.01	0.4	ND 7.8	ND 6.4	0.0	0.0		J 28.6	ND 6.4	28.6	0.1	
12346789-OCDF	0.001	0.02	J 41.2	ND 7.4	41.2	0.0		J 81.0	ND 7.4	81.0	0.0	
					Σ TEC =	7.6	HCV = 0.0086			Σ TEC =	46.0	HCV = 0.0086

			Sample 2 (5/9/01)					Replicate 2 (5/9/01)				
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	16.9	J 2.7	14.2	14.2	WV = 0.0031	24.1	J 2.7	21.4	21.4	WV = 0.0031
12378-PeCDD	0.5	0.9	J 36.0	ND 1.3	36.0	16.2		53.9	ND 1.3	53.9	24.3	
123478-HxCDD	0.1	0.3	J 50.6	ND 1.7	50.6	1.5		74.7	ND 1.7	74.7	2.2	
123678-HxCDD	0.1	0.1	J 52.0	ND 1.7	52.0	0.5		71.3	ND 1.7	71.3	0.7	
123789-HxCDD	0.1	0.1	J 42.6	ND 1.6	42.6	0.4		J 84.0	ND 1.6	84.0	0.8	
1234678-HpCDD	0.01	0.05	53.9	ND 2.4	53.9	0.0		94.5	ND 2.4	94.5	0.0	
12346789-OCDD	0.001	0.01	230.0	J,B 9.4	220.6	0.0		262.0	J,B 9.4	252.6	0.0	
2378-TCDF	0.1	0.8	44.0	ND 0.9	44.0	3.5		223.0	ND 0.9	223.0	17.8	
12378-PeCDF	0.05	0.2	68.0	ND,J 3.0	68.0	0.7		177.0	ND,J 3.0	177.0	1.8	
23478-PeCDF	0.5	1.6	55.8	ND 0.8	55.8	44.6		123.0	ND 0.8	123.0	98.4	
123478-HxCDF	0.1	0.08	70.8	J 2.5	68.3	0.5		139.0	J 2.5	136.5	1.1	
123678-HxCDF	0.1	0.2	51.1	ND,J 2.6	51.1	1.0		83.1	ND,J 2.6	83.1	1.7	
234678-HxCDF	0.1	0.7	61.3	ND 1.1	61.3	4.3		91.7	ND 1.1	91.7	6.4	
123789-HxCDF	0.1	0.6	J 42.3	ND 1.4	42.3	2.5		85.8	ND 1.4	85.8	5.1	
1234678-HpCDF	0.01	0.01	67.0	J,B 2.7	64.3	0.0		102.0	J,B 2.7	99.3	0.0	
1234789-HpCDF	0.01	0.4	40.8	ND 1.9	40.8	0.2		77.2	ND 1.9	77.2	0.3	
12346789-OCDF	0.001	0.02	101.0	ND,J 4.6	101.0	0.0		166.0	ND,J 4.6	166.0	0.0	
					Σ TEC =	90.3	HCV = 0.0086			Σ TEC =	182.2	HCV = 0.0086

Adjusted = Sample concentrations below analytical detection were adjusted to zero; sample concentrations above analytical detection were blank corrected IF blank was also 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 the Tittabawassee River. Shown are the raw results for each sample, replicate, and blank; the adjusted results; the congener-specific and total TEC for each sample and replicate; and the applicable Rule 57 water quality values. All concentrations are in pg/L (ppq).

			Sample 3 (7/19/01)					Replicate 3 (7/19/01)				
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 4.4	ND 7.3	0.0	0.0	WV = 0.0031	ND 8.8	ND 7.3	0.0	0.0	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 4.8	ND 7.9	0.0	0.0		ND 9.4	ND 7.9	0.0	0.0	
123478-HxCDD	0.1	0.3	ND 4.8	ND 8.8	0.0	0.0		ND 8.0	ND 8.8	0.0	0.0	
123678-HxCDD	0.1	0.1	ND 5.5	ND 9.4	0.0	0.0		ND 8.4	ND 9.4	0.0	0.0	
123789-HxCDD	0.1	0.1	ND 4.9	ND 8.7	0.0	0.0		ND 7.8	ND 8.7	0.0	0.0	
1234678-HpCDD	0.01	0.05	J 16.4	ND 12.1	4.3	0.0		ND 10.6	ND 12.1	0.0	0.0	
12346789-OCDD	0.001	0.01	104.0	121.0	0.0	0.0		129.0	121.0	8.0	0.0	
2378-TCDF	0.1	0.8	15.7	ND 6.6	15.7	1.3		ND 6.3	ND 6.6	0.0	0.0	
12378-PeCDF	0.05	0.2	J 9.3	ND 7.0	9.3	0.1		ND 9.0	ND 7.0	0.0	0.0	
23478-PeCDF	0.5	1.6	J 5.7	ND 5.6	5.7	4.6		ND 5.8	ND 5.6	0.0	0.0	
123478-HxCDF	0.1	0.08	ND 8.1	ND 5.1	0.0	0.0		9.0	ND 5.1	9.0	0.1	
123678-HxCDF	0.1	0.2	ND 3.5	ND 5.8	0.0	0.0		ND 5.6	ND 5.8	0.0	0.0	
234678-HxCDF	0.1	0.7	ND 3.3	ND 5.8	0.0	0.0		ND 5.3	ND 5.8	0.0	0.0	
123789-HxCDF	0.1	0.6	ND 5.0	ND 7.7	0.0	0.0		ND 6.9	ND 7.7	0.0	0.0	
1234678-HpCDF	0.01	0.01	J 11.1	ND 6.9	11.1	0.0		ND 15.4	ND 6.9	0.0	0.0	
1234789-HpCDF	0.01	0.4	ND 6.2	ND 10.4	0.0	0.0		ND 9.4	ND 10.4	0.0	0.0	
12346789-OCDF	0.001	0.02	J,B 35.7	ND 41.5	35.7	0.0		58.1	ND 41.5	58.1	0.0	
					Σ TEC =	5.9	HCV = 0.0086			Σ TEC =	0.1	HCV = 0.0086

			Sample 4 (9/6/01)					Replicate 4 (9/6/01)				
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 1.9	ND 2.2	0.0	0.0	WV = 0.0031	ND 2.3	ND 2.2	0.0	0.0	WV = 0.0031
12378-PeCDD	0.5	0.9	ND 2.5	ND,J 5.3	0.0	0.0		ND 2.6	ND,J 5.3	0.0	0.0	
123478-HxCDD	0.1	0.3	ND 3.0	ND 1.9	0.0	0.0		ND 2.0	ND 1.9	0.0	0.0	
123678-HxCDD	0.1	0.1	ND 3.2	ND 2.1	0.0	0.0		ND 1.9	ND 2.1	0.0	0.0	
123789-HxCDD	0.1	0.1	ND 3.1	ND 2.0	0.0	0.0		ND 2.0	ND 2.0	0.0	0.0	
1234678-HpCDD	0.01	0.05	J 8.5	J 9.2	0.0	0.0		J 10.1	J 9.2	0.9	0.0	
12346789-OCDD	0.001	0.01	J,B 64.8	J,B 65.7	0.0	0.0		B 112.0	JB 65.7	46.3	0.0	
2378-TCDF	0.1	0.8	J 9.8	J 8.7	1.1	0.1		J 9.3	J 8.7	0.6	0.0	
12378-PeCDF	0.05	0.2	J 5.2	ND 8.2	5.2	0.1		ND,J 5.6	ND 8.2	0.0	0.0	
23478-PeCDF	0.5	1.6	ND 1.5	ND,J 4.1	0.0	0.0		J 4.2	ND,J 4.1	4.2	3.4	
123478-HxCDF	0.1	0.08	J 5.3	J 5.2	0.1	0.0		J 4.3	J 5.2	0.0	0.0	
123678-HxCDF	0.1	0.2	ND 2.0	ND,J 2.5	0.0	0.0		J 1.7	ND,J 2.5	1.7	0.0	
234678-HxCDF	0.1	0.7	ND 2.1	ND 1.3	0.0	0.0		ND 1.2	ND 1.3	0.0	0.0	
123789-HxCDF	0.1	0.6	ND 2.6	J 4.7	0.0	0.0		ND,J 1.9	J 4.7	0.0	0.0	
1234678-HpCDF	0.01	0.01	J 12.5	J 12.4	0.1	0.0		ND,J 12.4	J 12.4	0.0	0.0	
1234789-HpCDF	0.01	0.4	ND 3.8	ND,J 2.7	0.0	0.0		ND 2.2	ND,J 2.7	0.0	0.0	
12346789-OCDF	0.001	0.02	J 22.9	ND,J 21.8	22.9	0.0		ND 3.6	ND,J 21.8	0.0	0.0	
					Σ TEC =	0.1	HCV = 0.0086			Σ TEC =	3.4	HCV = 0.0086

Adjusted = Sample concentrations below analytical detection were adjusted to zero; sample concentrations above analytical detection were blank corrected IF blank was also 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 2001 monitoring watersheds (Basin Year 5)

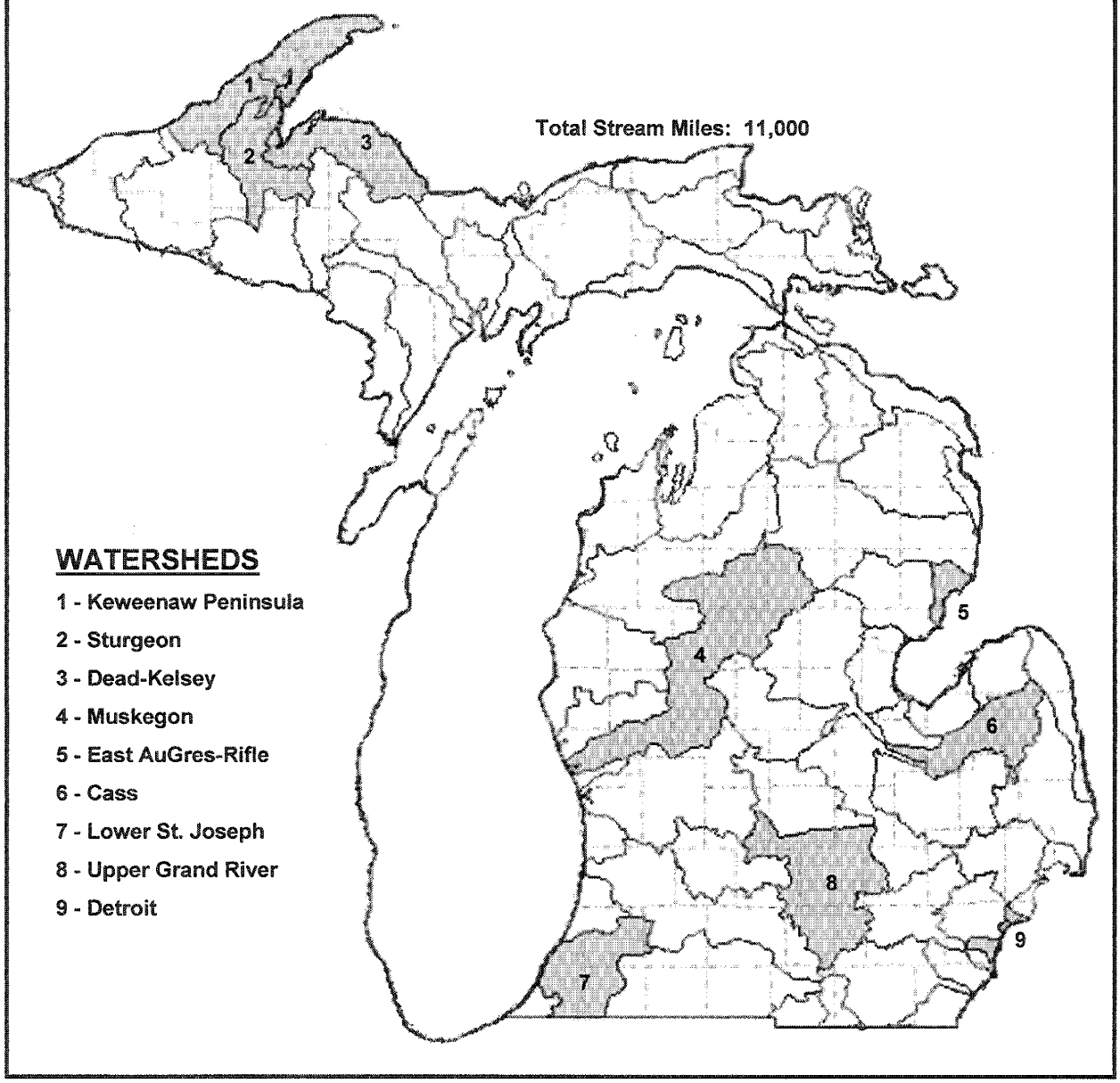


Figure 2. Year 2002 and Year 2003 monitoring watersheds.

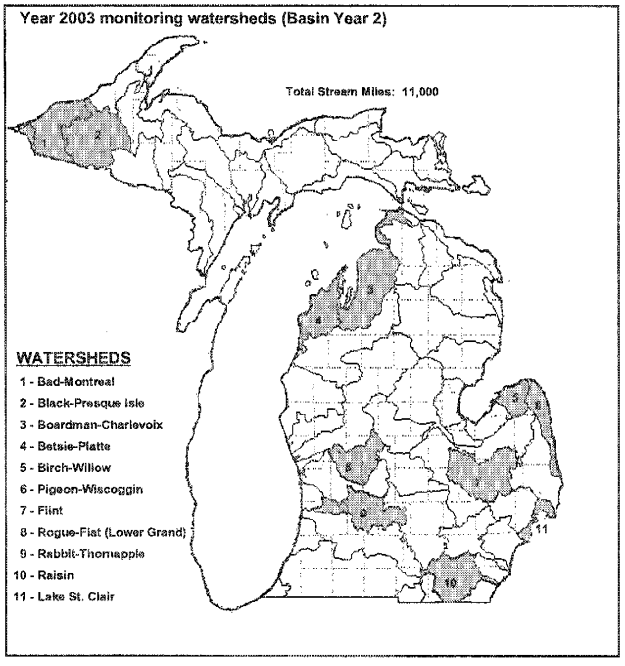


Figure 3. Year 2004 and Year 2005 monitoring watersheds.

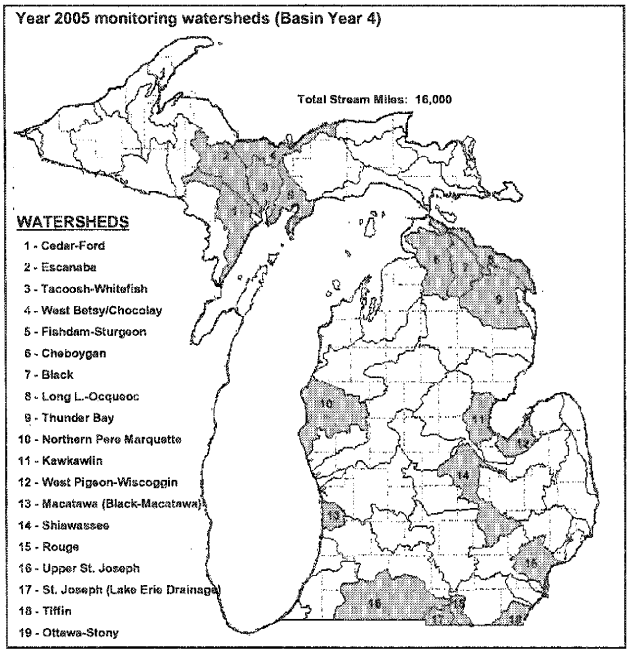


Figure 4. Intensive water chemistry trend monitoring locations and associated watersheds.

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

Figure 6. Diagram of a typical box plot.

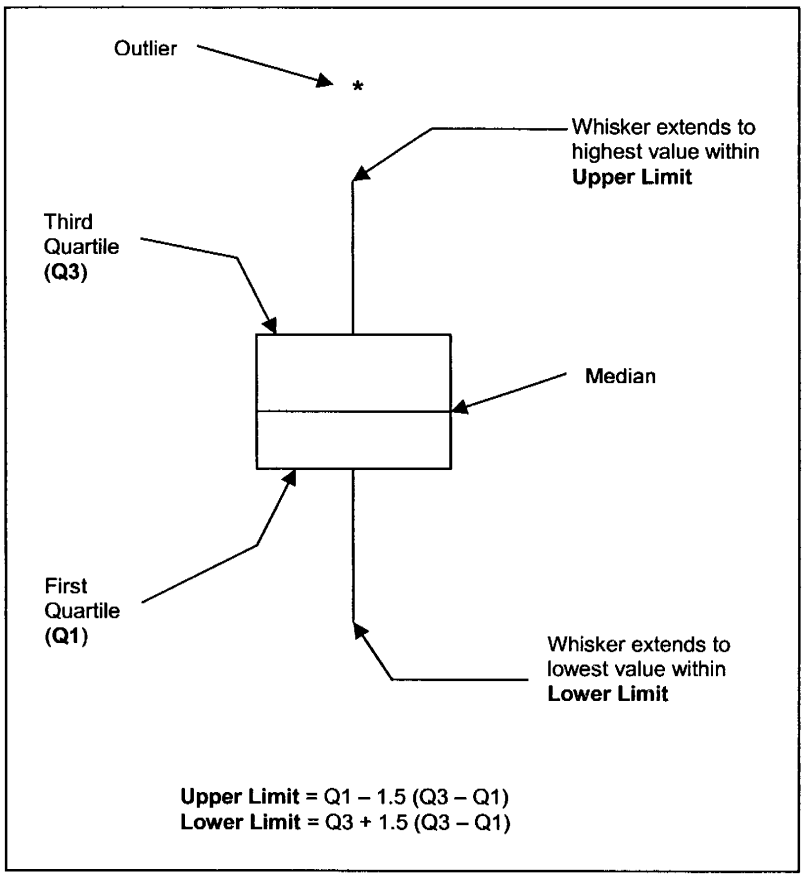


Figure 7. Comparison of total phosphorus among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

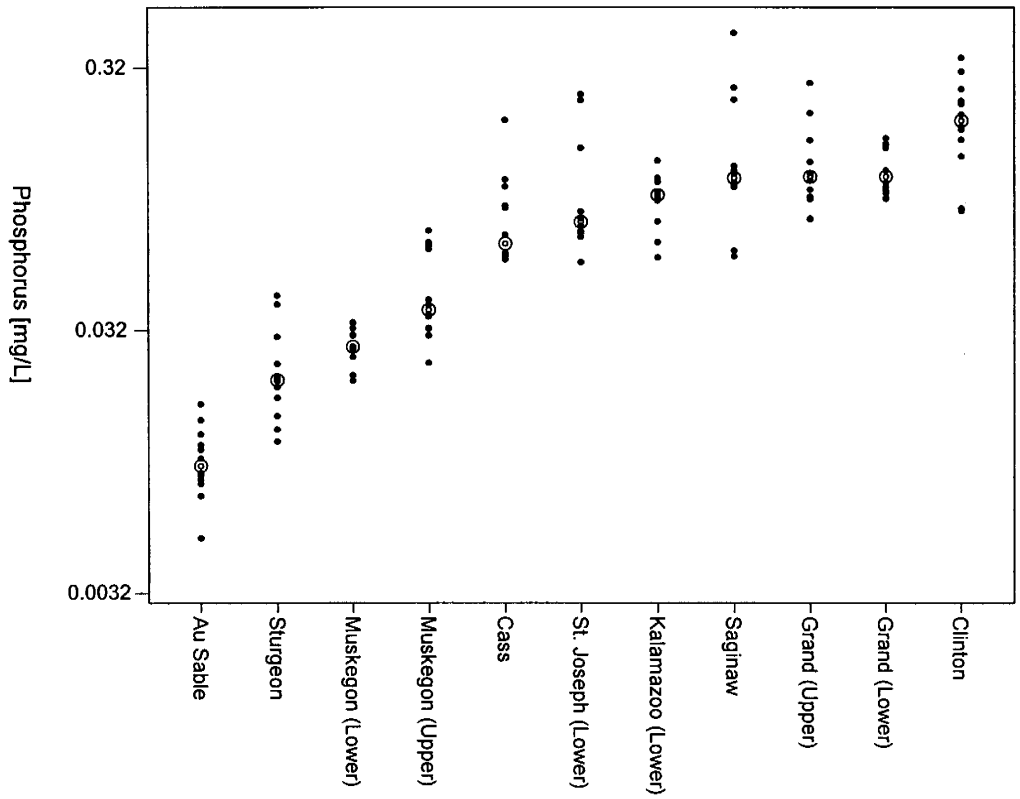


Figure 8. Comparison of total chloride among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

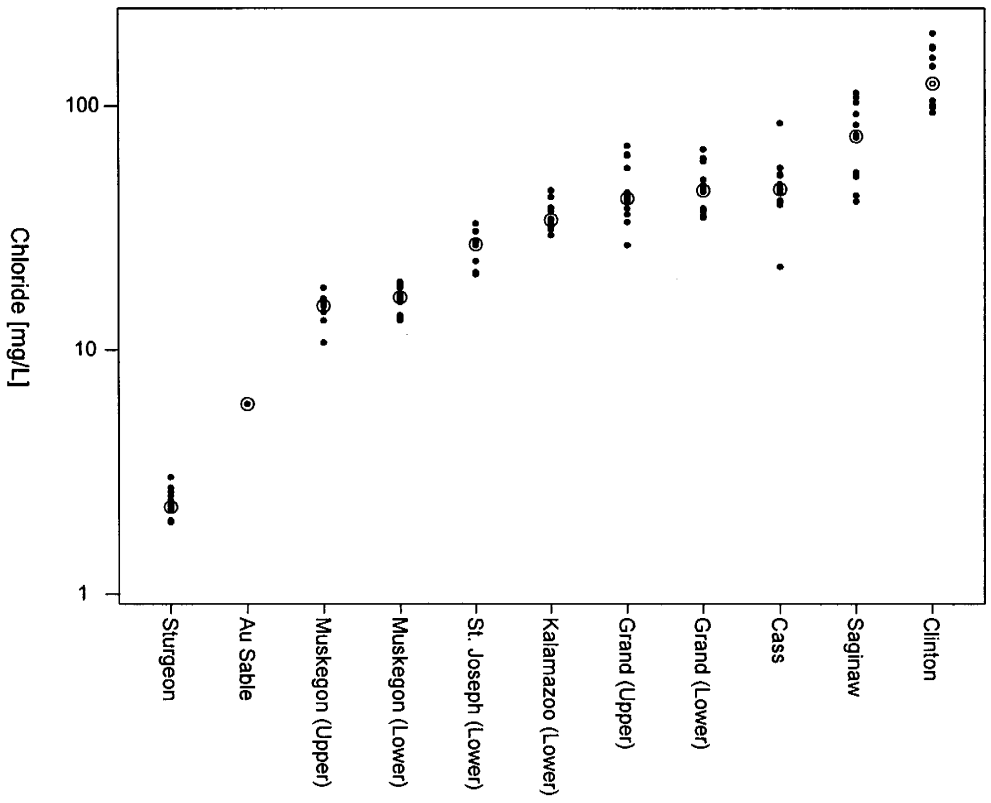


Figure 9. Comparison of total suspended solids among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

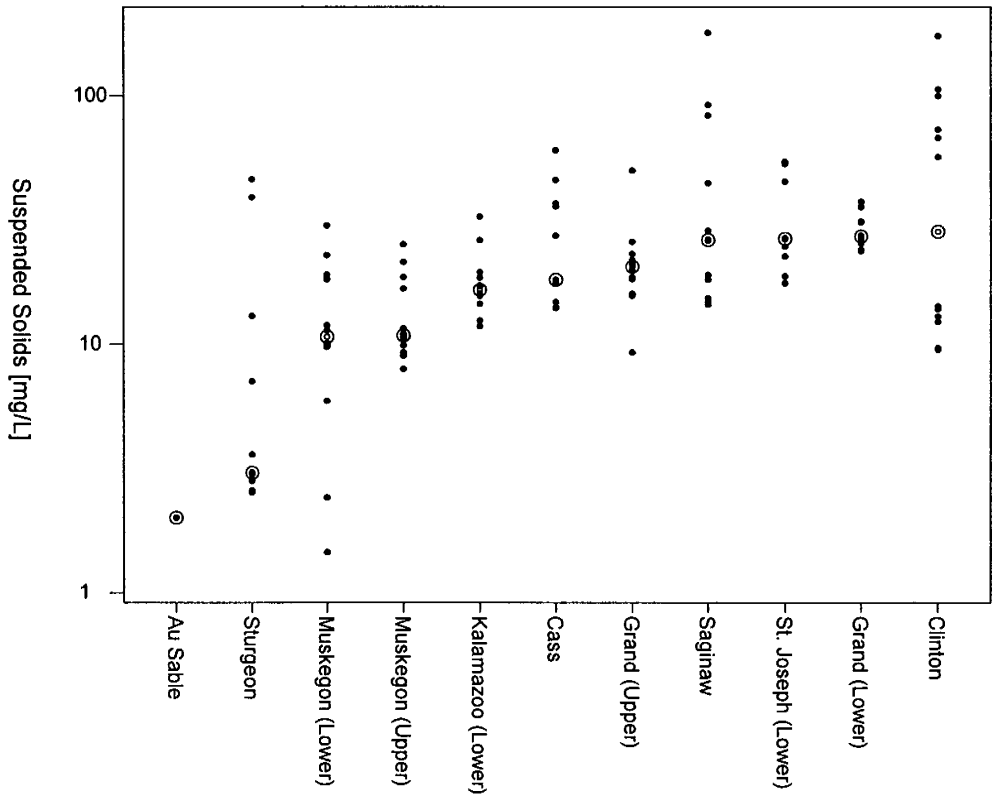


Figure 10. Comparison of total mercury among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

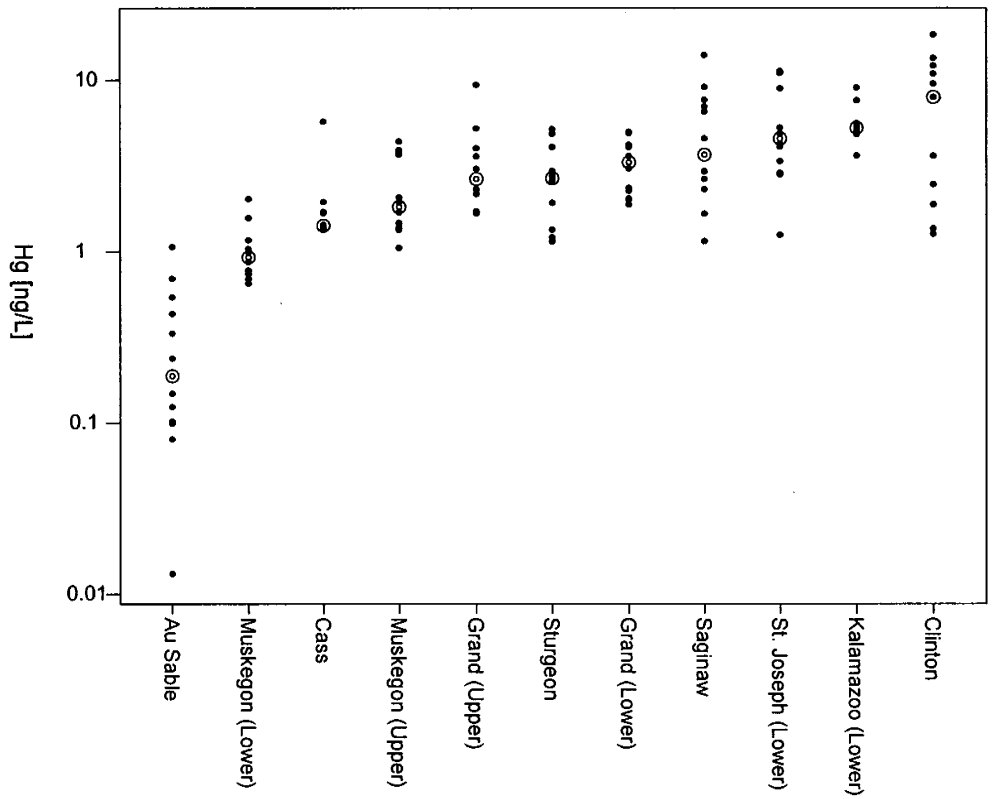


Figure 11. Comparison of total chromium among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

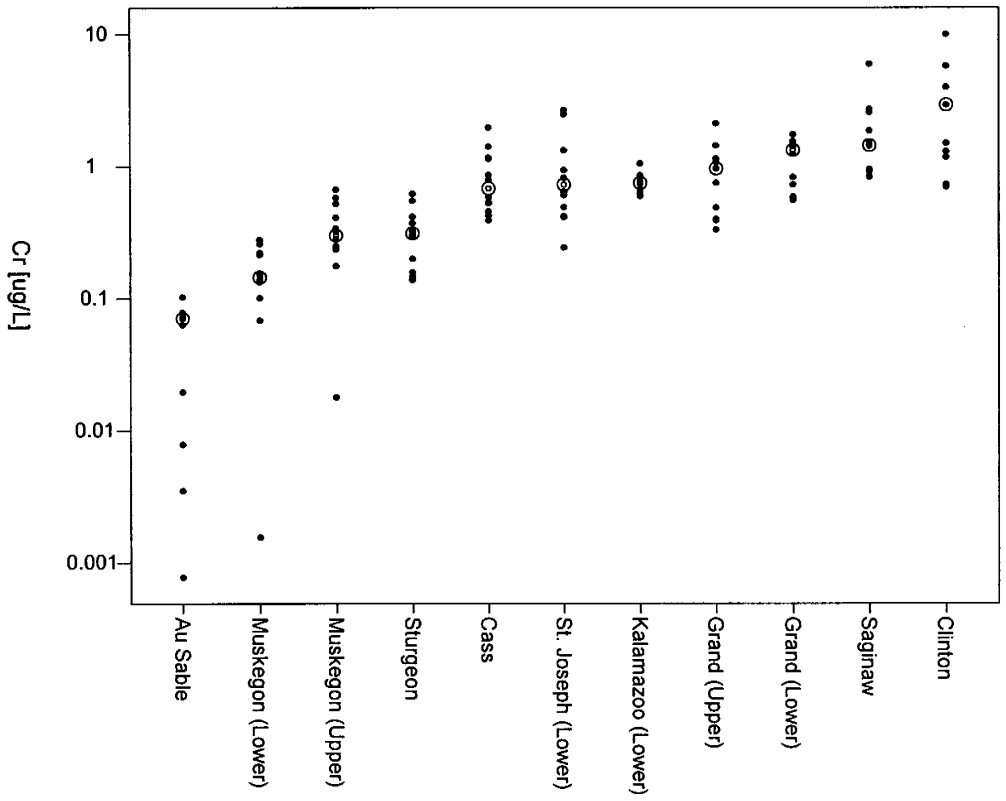


Figure 12. Comparison of total copper among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

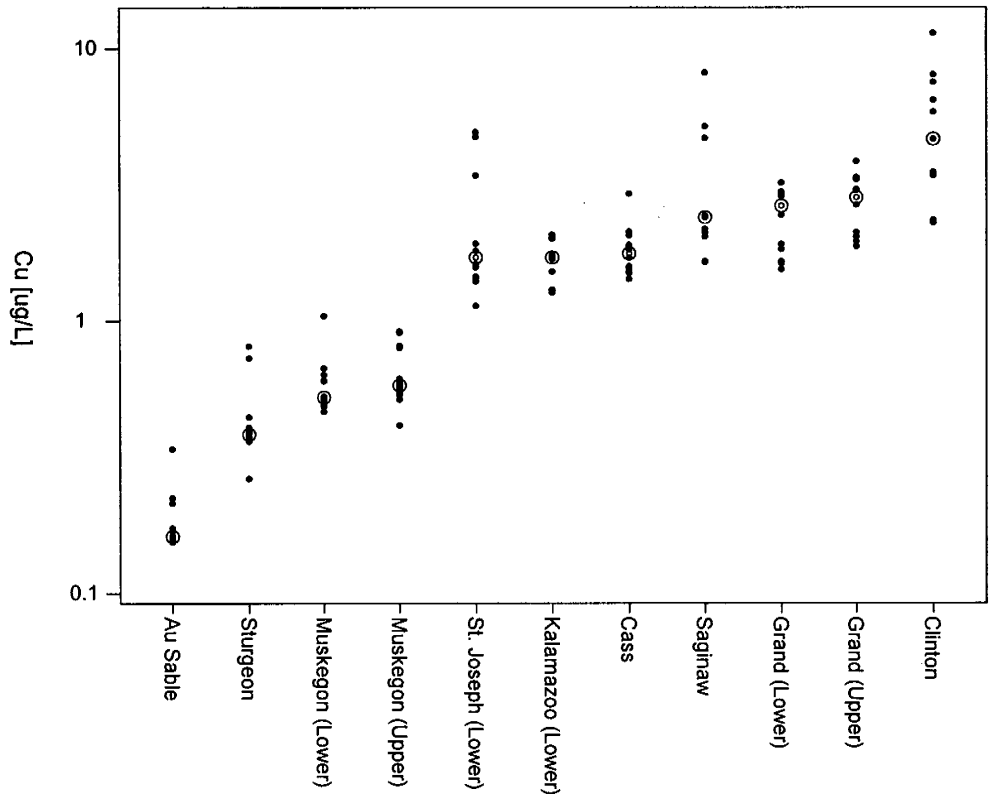


Figure 13. Comparison of total lead among intensively monitored sites. Double circle designates the median. Box plots represent concentrations normalized to stream discharge.

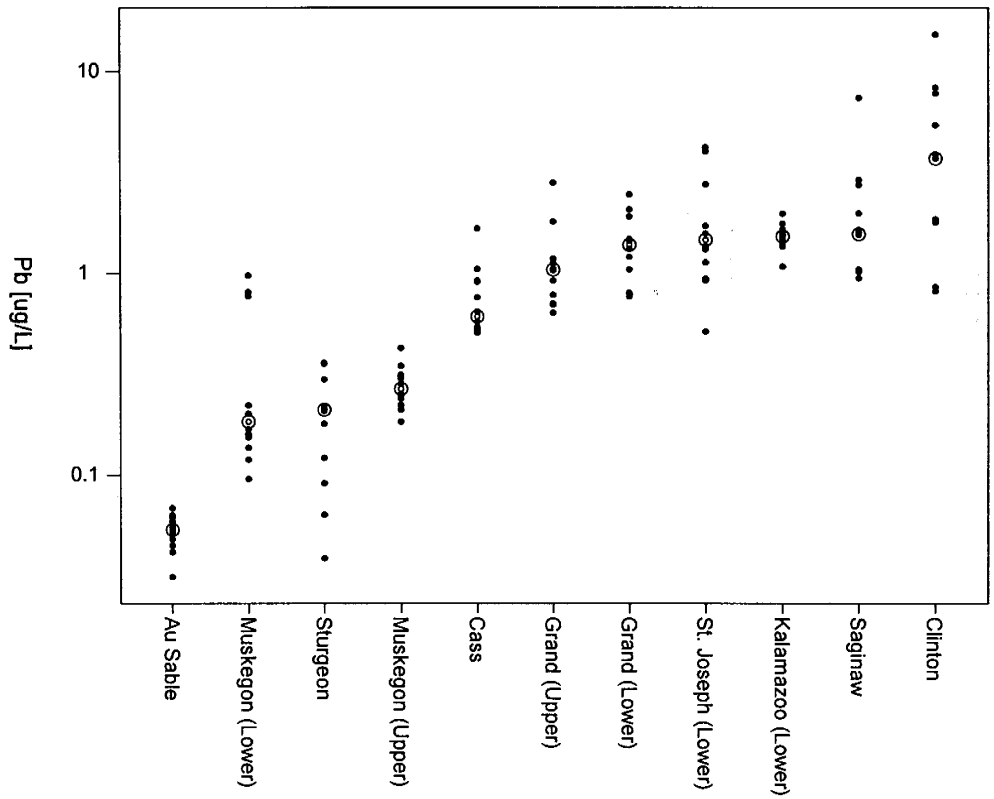


Figure 14. Comparison of total phosphorus among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points identical results obtained for multiple samples.

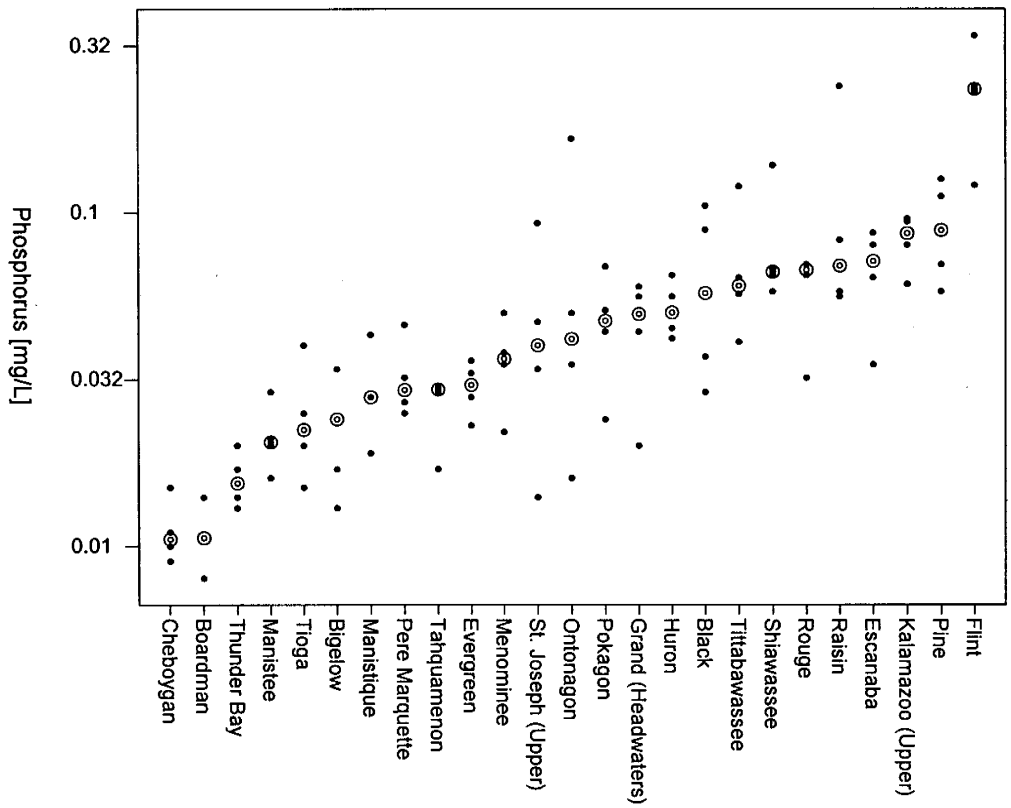


Figure 15. Comparison of total chloride among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points indicates identical results obtained for multiple samples.

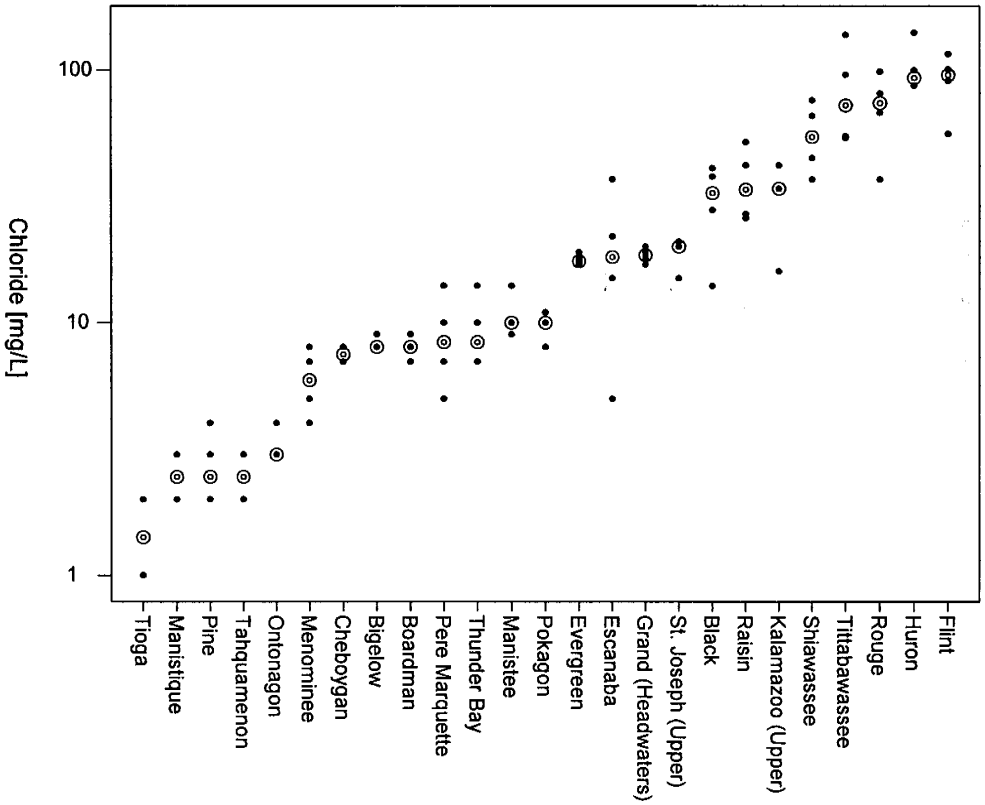


Figure 16. Comparison of TSS among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points indicates identical results obtained for multiple samples.

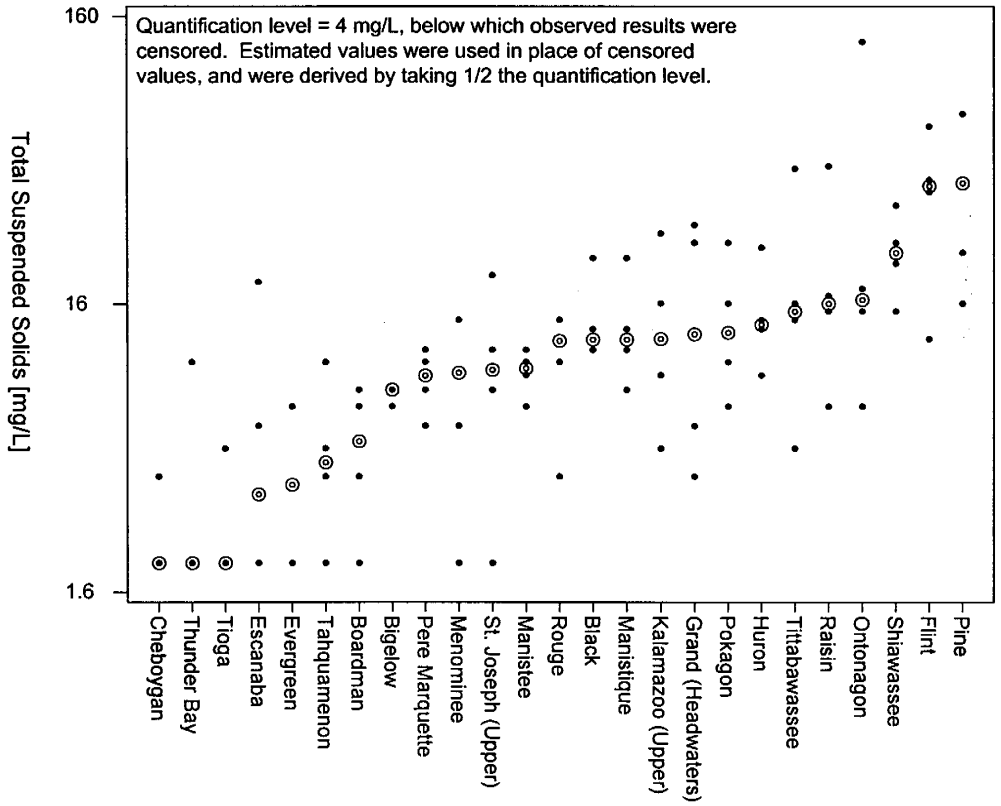


Figure 17. Comparison of total mercury among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points indicates identical results obtained for multiple samples.

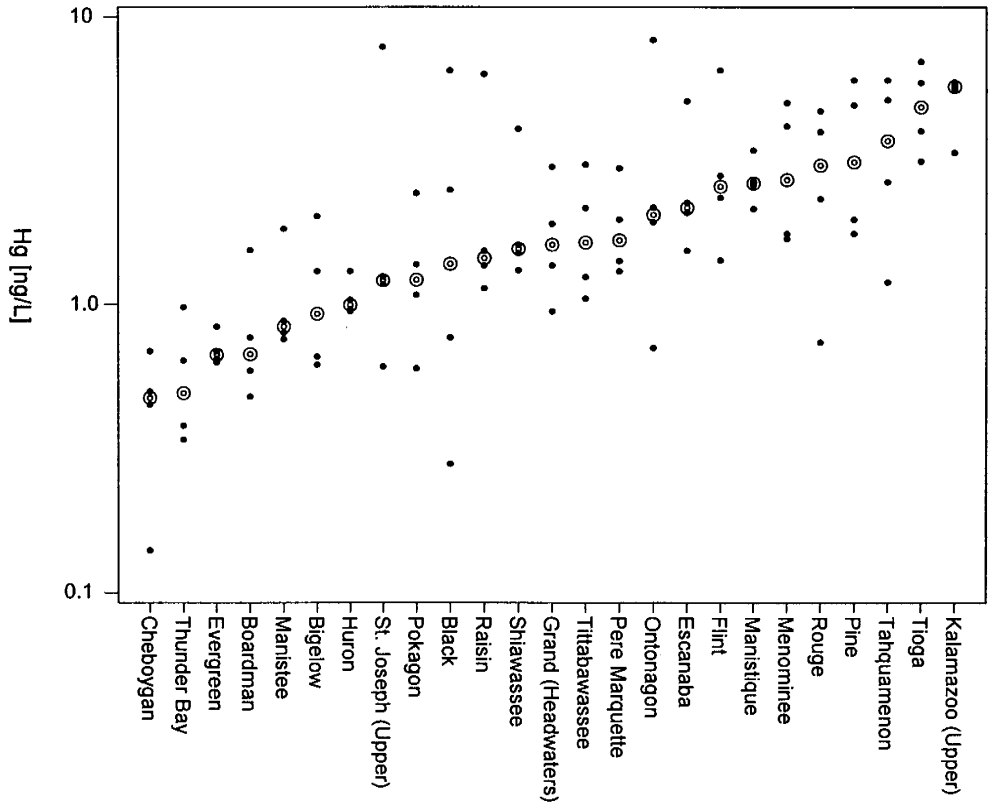


Figure 18. Comparison of total chromium among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points indicates identical results obtained for multiple samples.

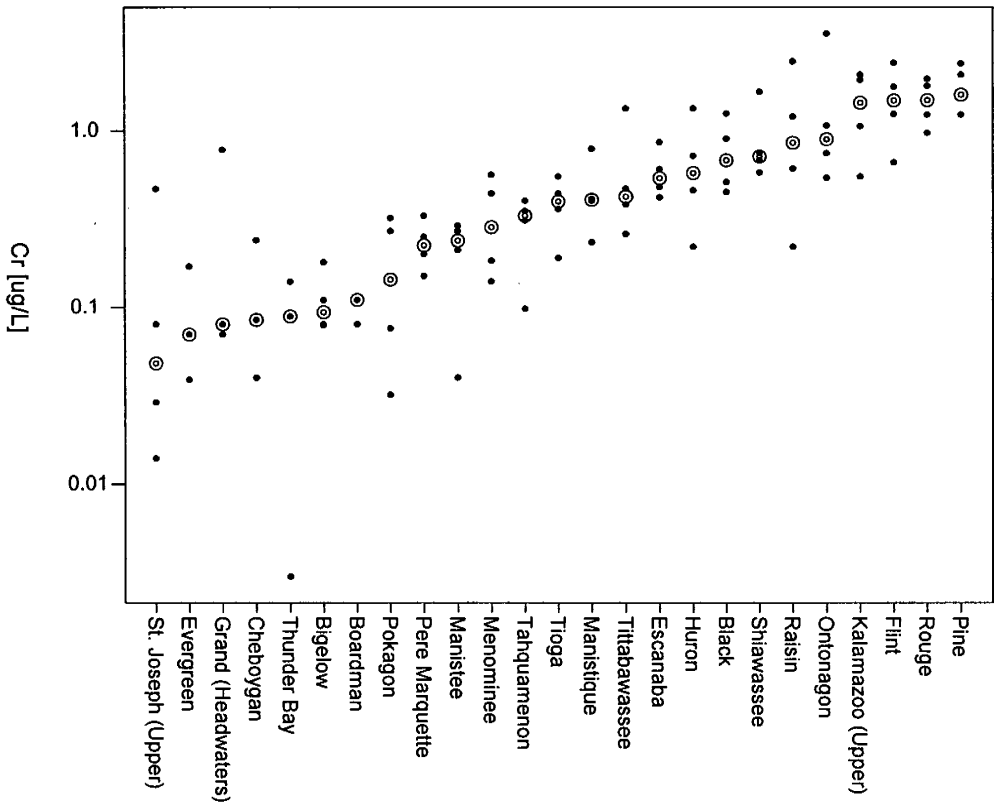


Figure 19. Comparison of total copper among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points indicates identical results obtained for multiple samples.

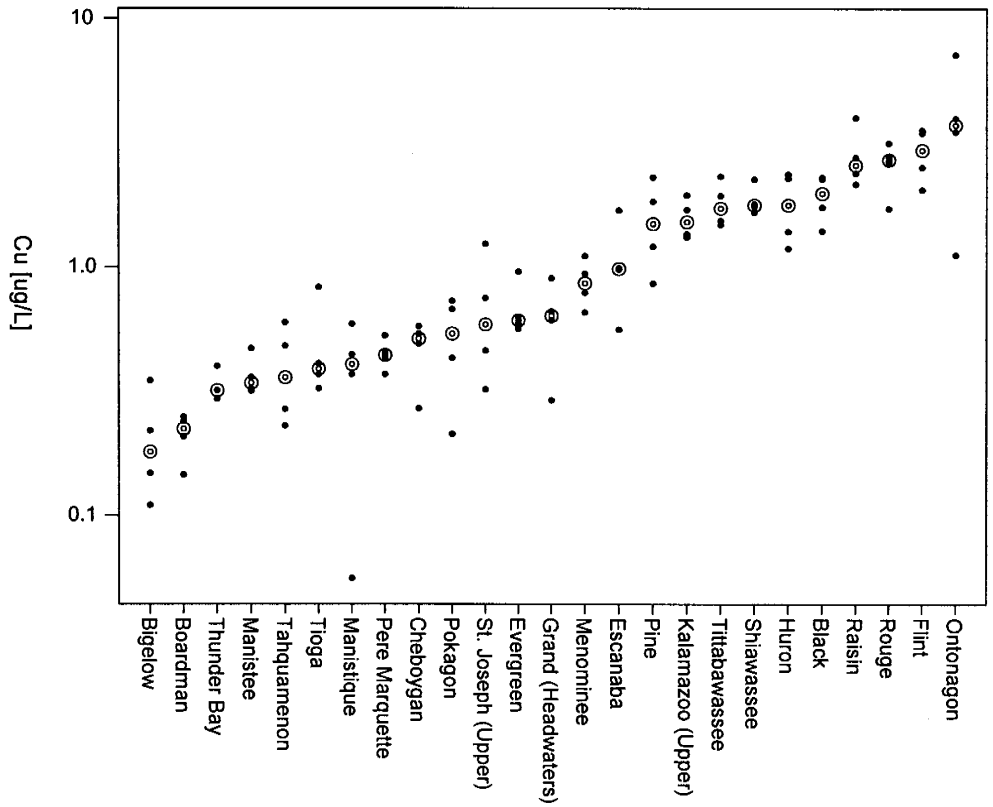


Figure 20. Comparison of total lead among non-intensively monitored sites. Double circle designates median. All sites sampled 4 times in 2001; fewer than 4 data points indicates identical results obtained for multiple samples.

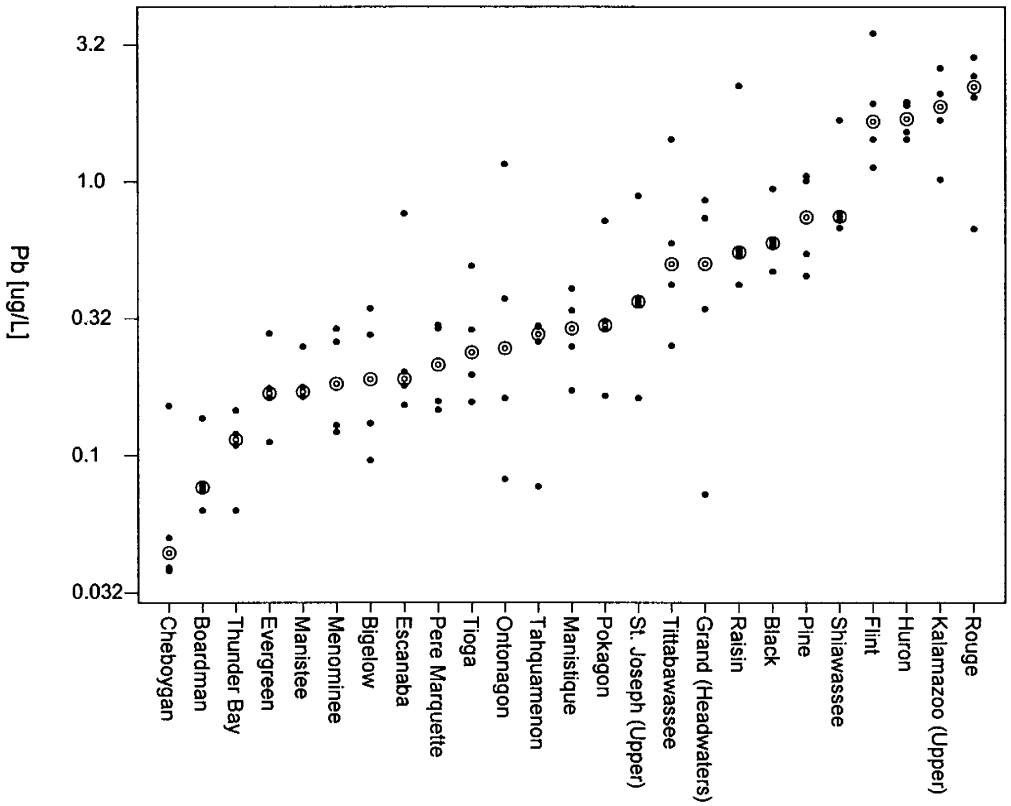


Figure 21. Total phosphorus, chloride and suspended solids concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. All data are from 2001.

Fig 21.1

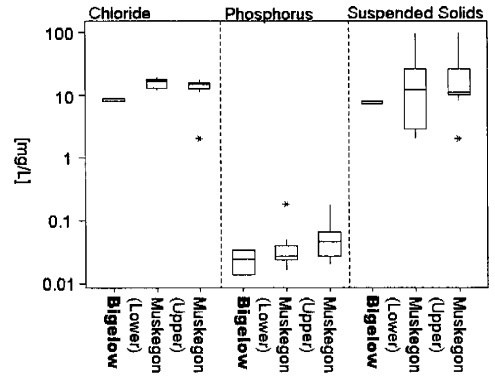


Fig 21.2

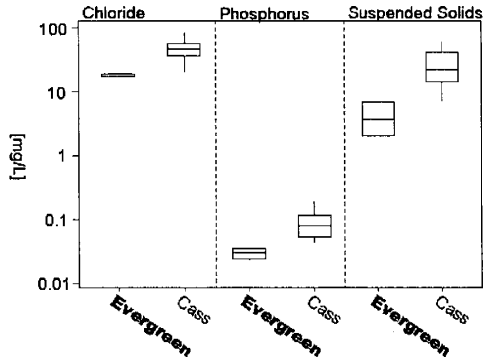


Fig 21.3

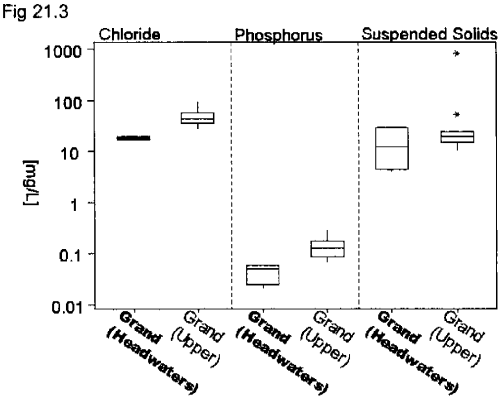


Fig 21.4

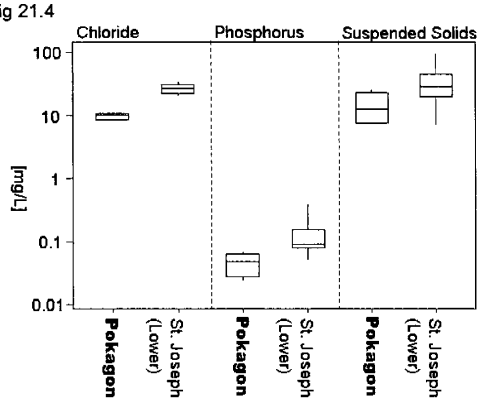


Fig 21.5

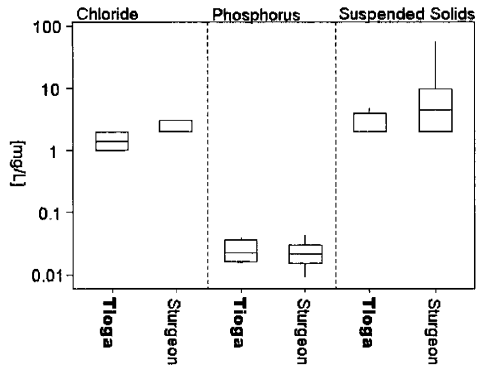


Figure 22. Total mercury concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. All data are from 2001.

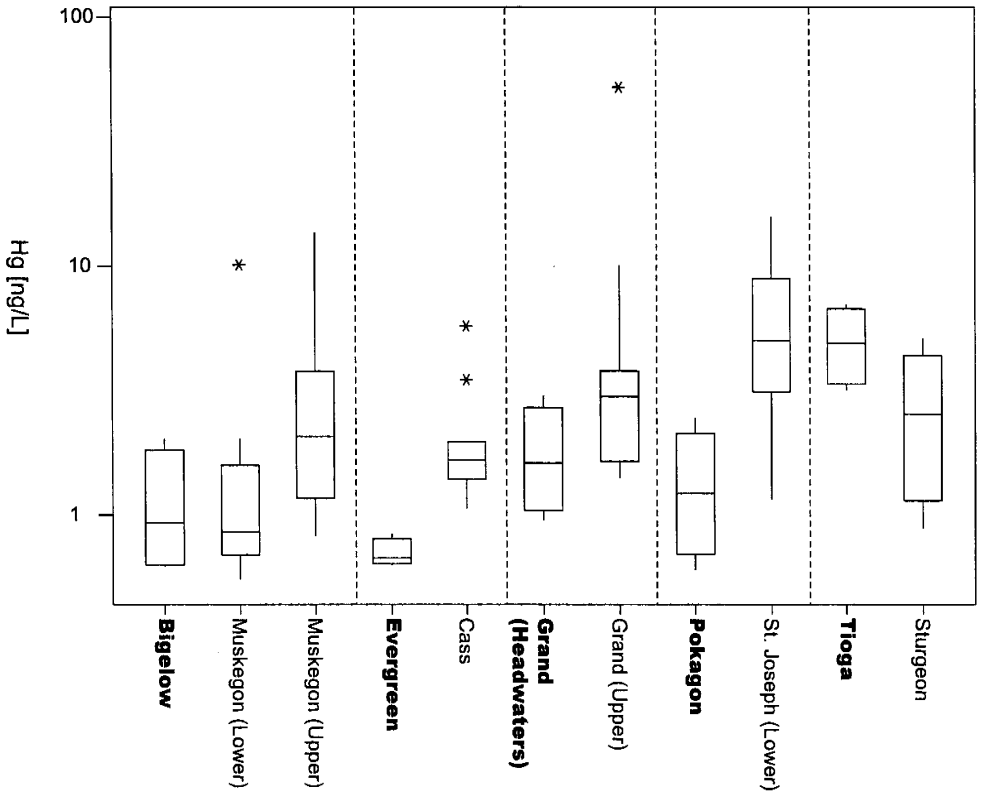


Figure 23. Total chromium, copper and lead concentrations at minimally impacted sites compared with potentially impacted sites. Minimally impacted sites are identified in bold. All data are from 2001.

Fig 23.1

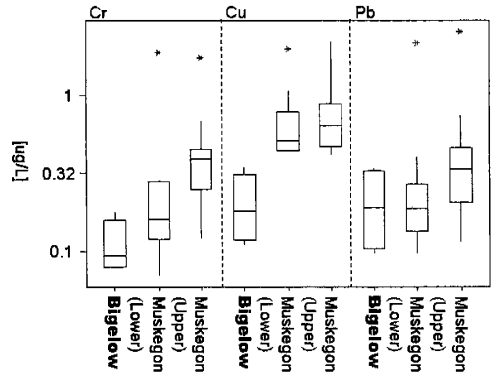


Fig 23.2

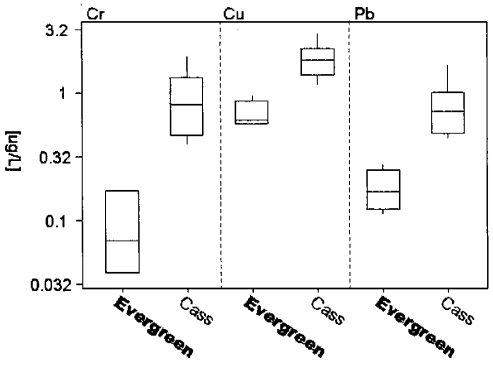


Fig 23.3

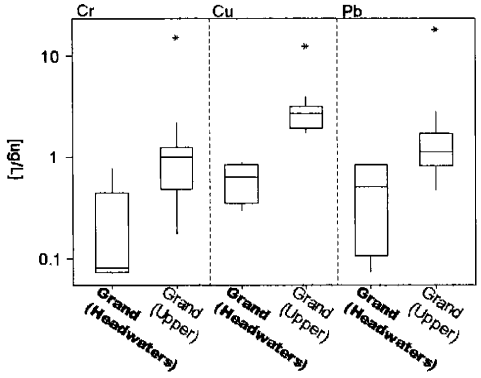


Fig 23.4

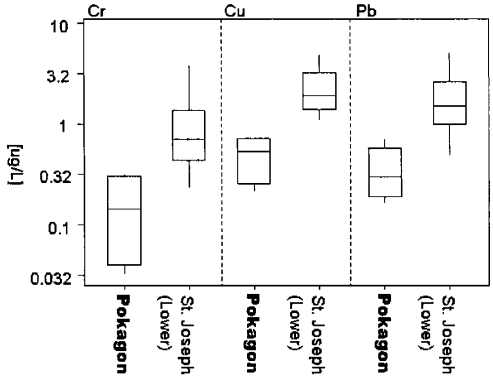


Fig 23.5

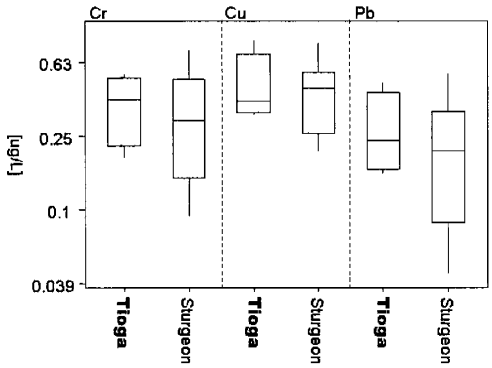


Figure 24. Comparison of total PCB concentrations among all stations sampled in 2001. (PCB Rule 57 water quality value = 0.026 ng/L).

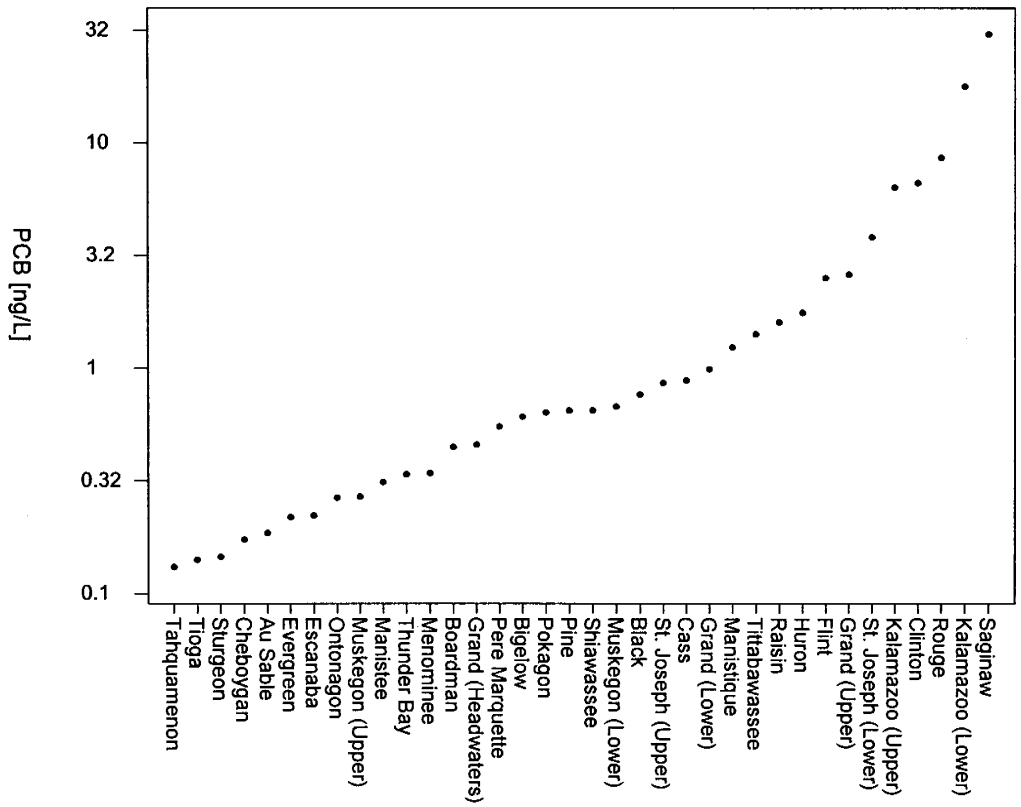


Figure 25. Au Sable River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

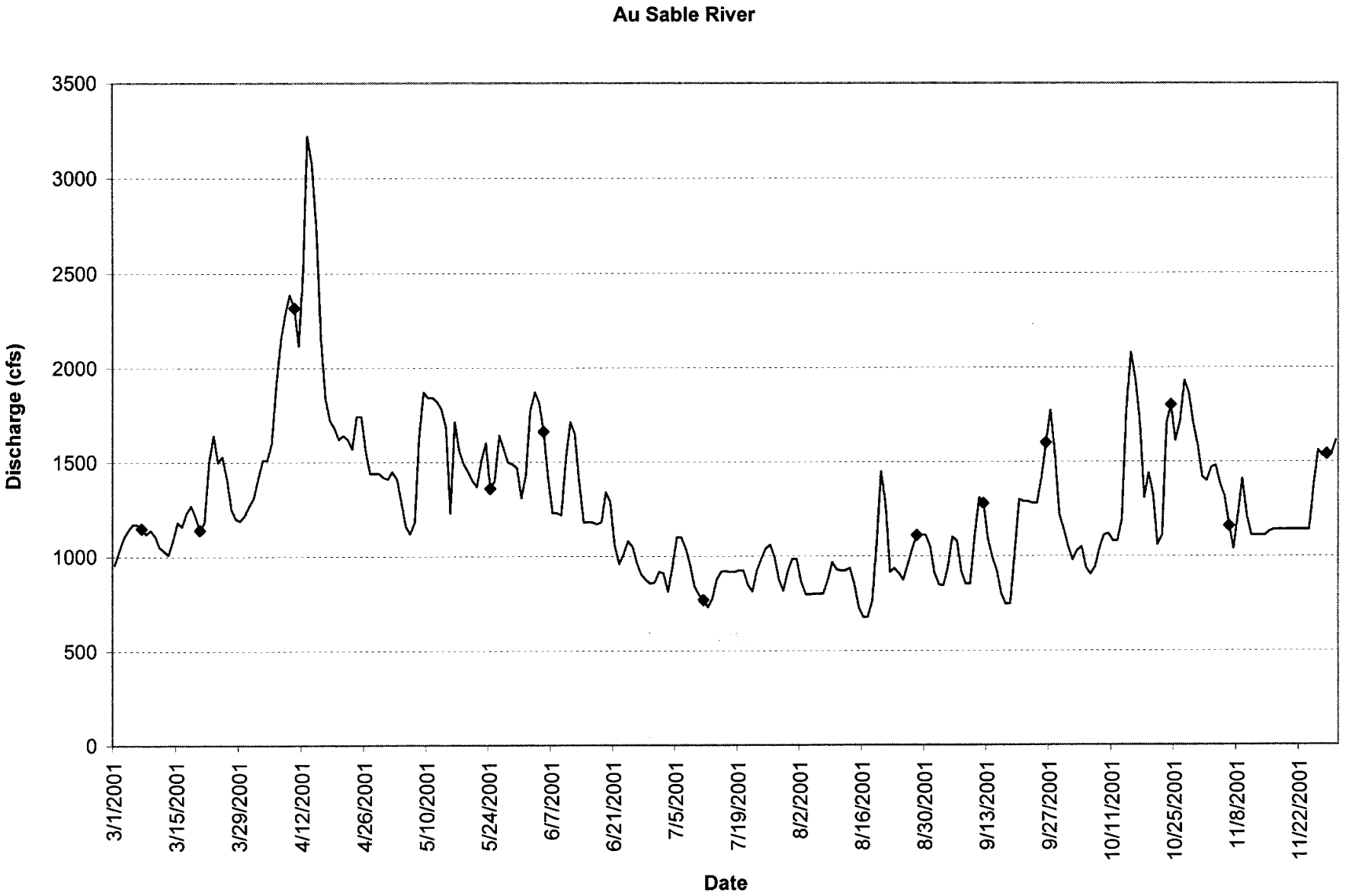


Figure 26. Cass River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

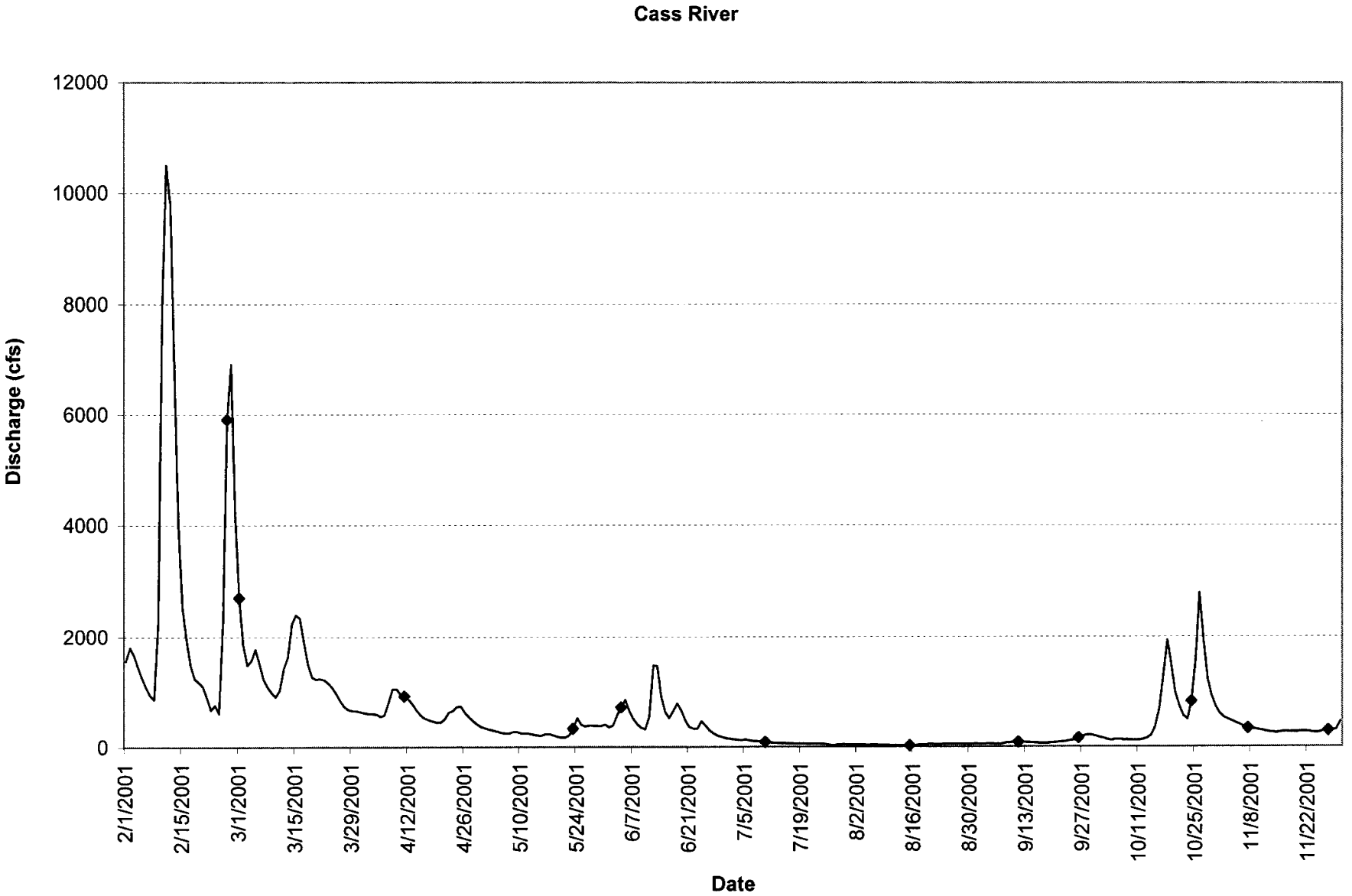


Figure 27. Clinton River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

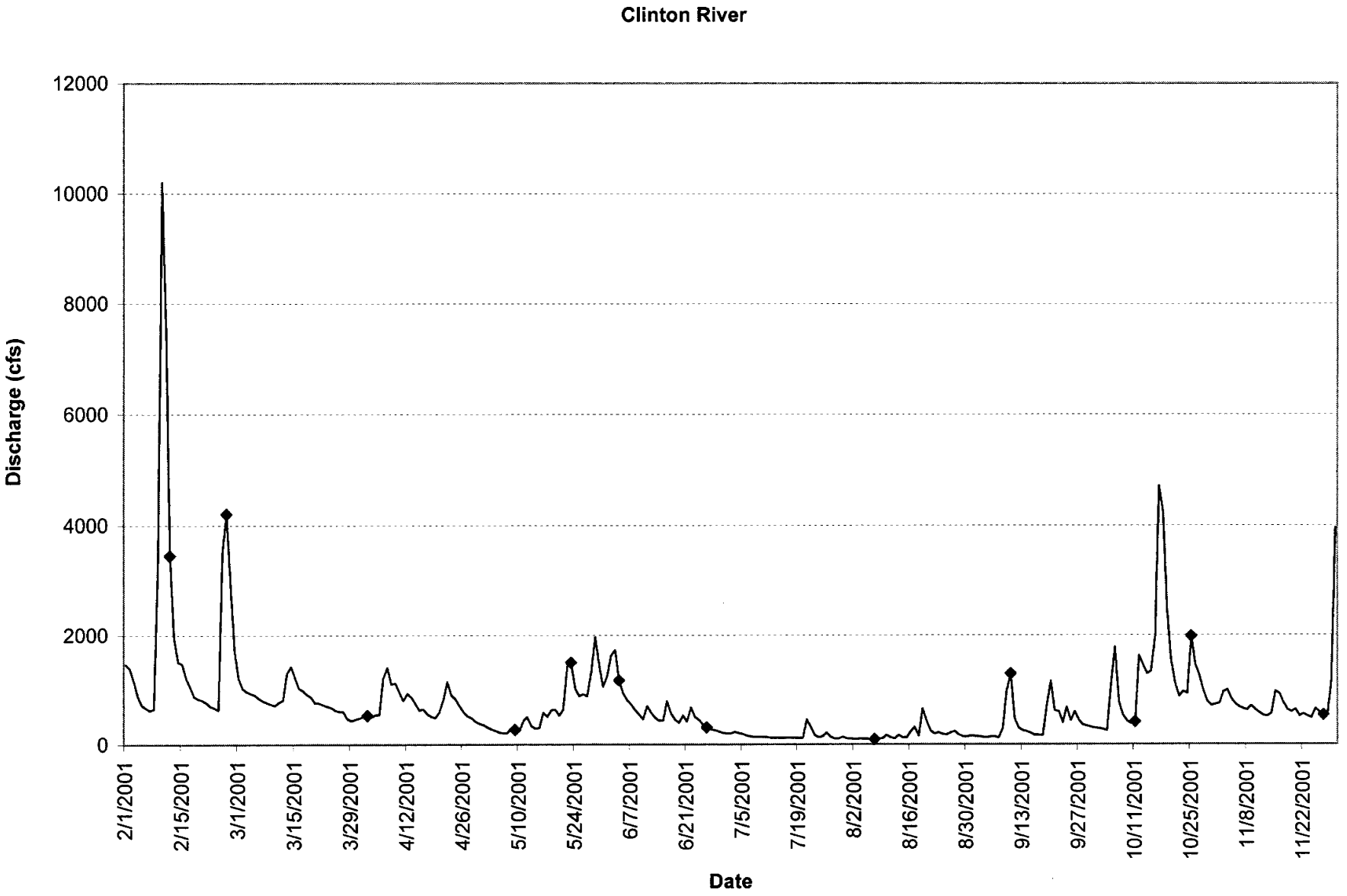


Figure 28. Lower Grand River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

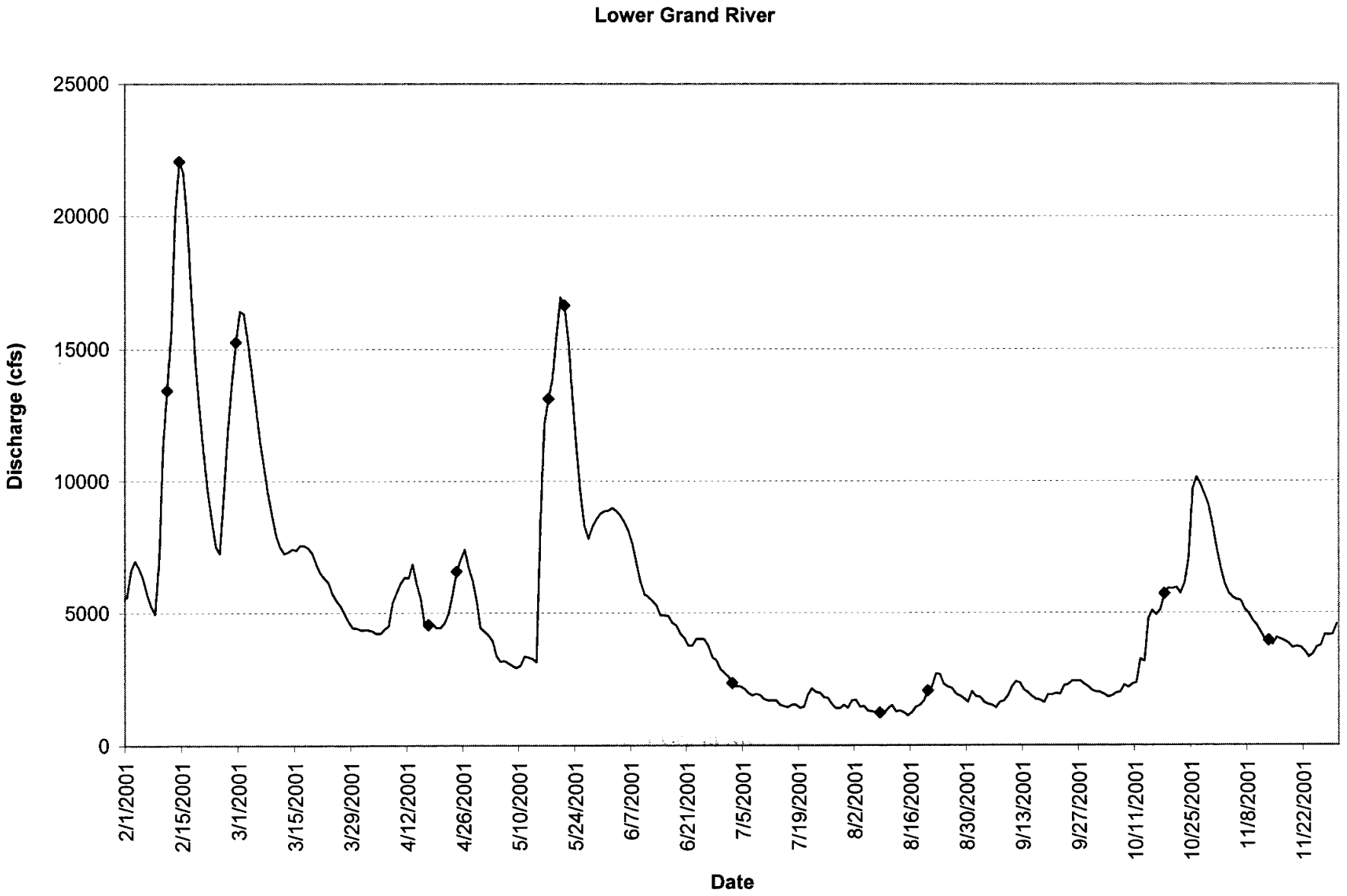


Figure 29. Upper Grand River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

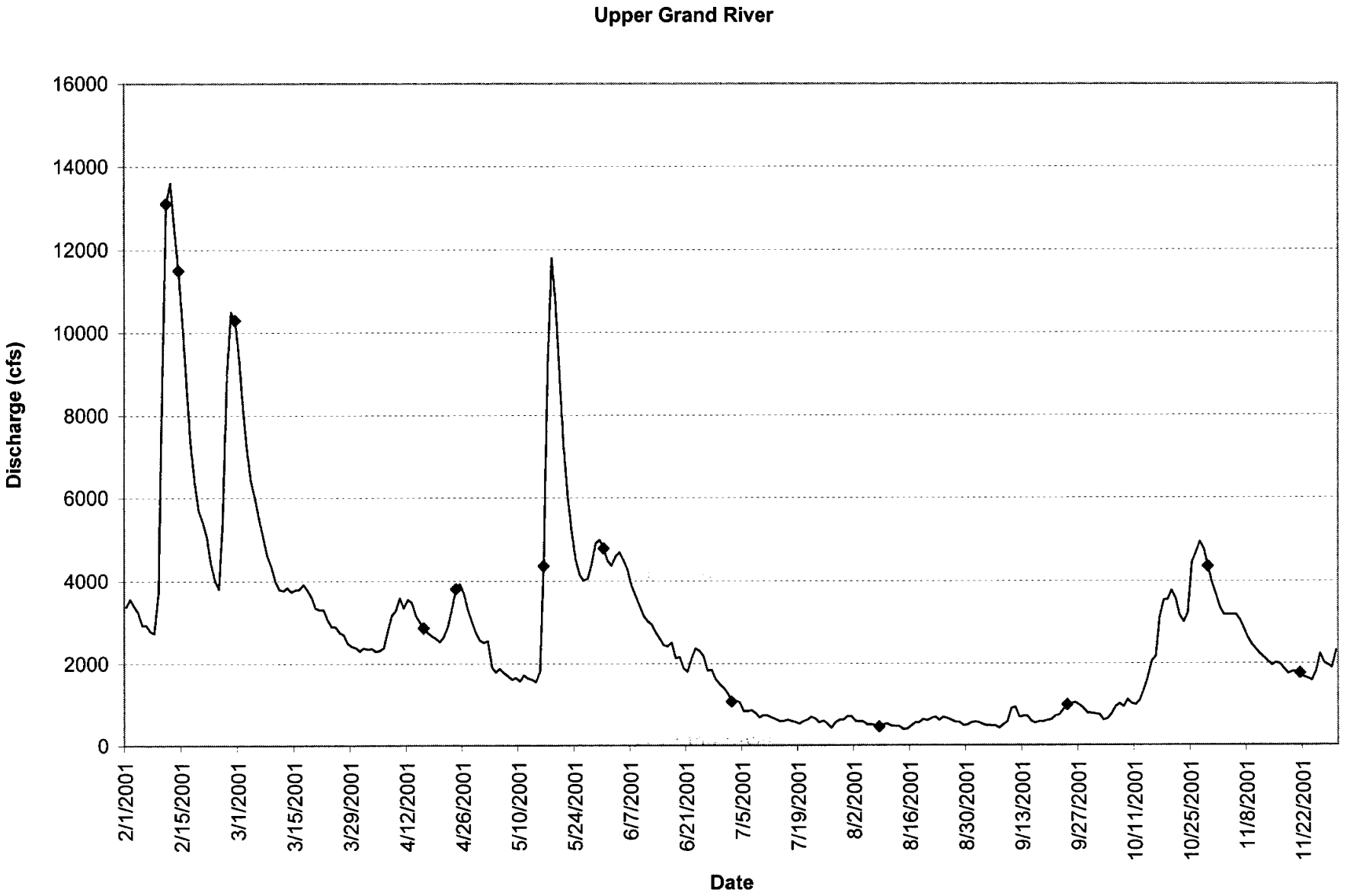


Figure 30. Lower Kalamazoo River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

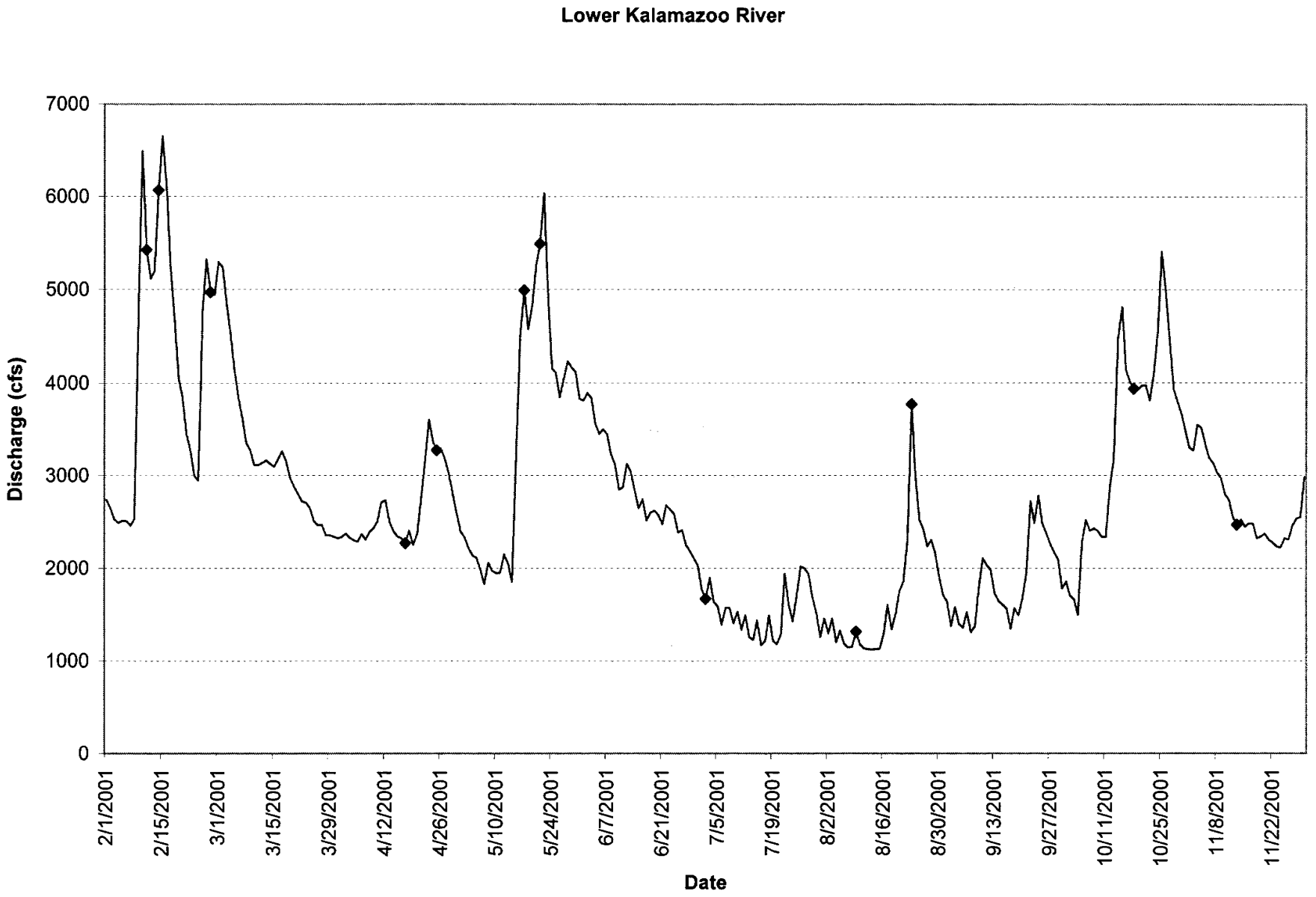


Figure 31. Lower Muskegon River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

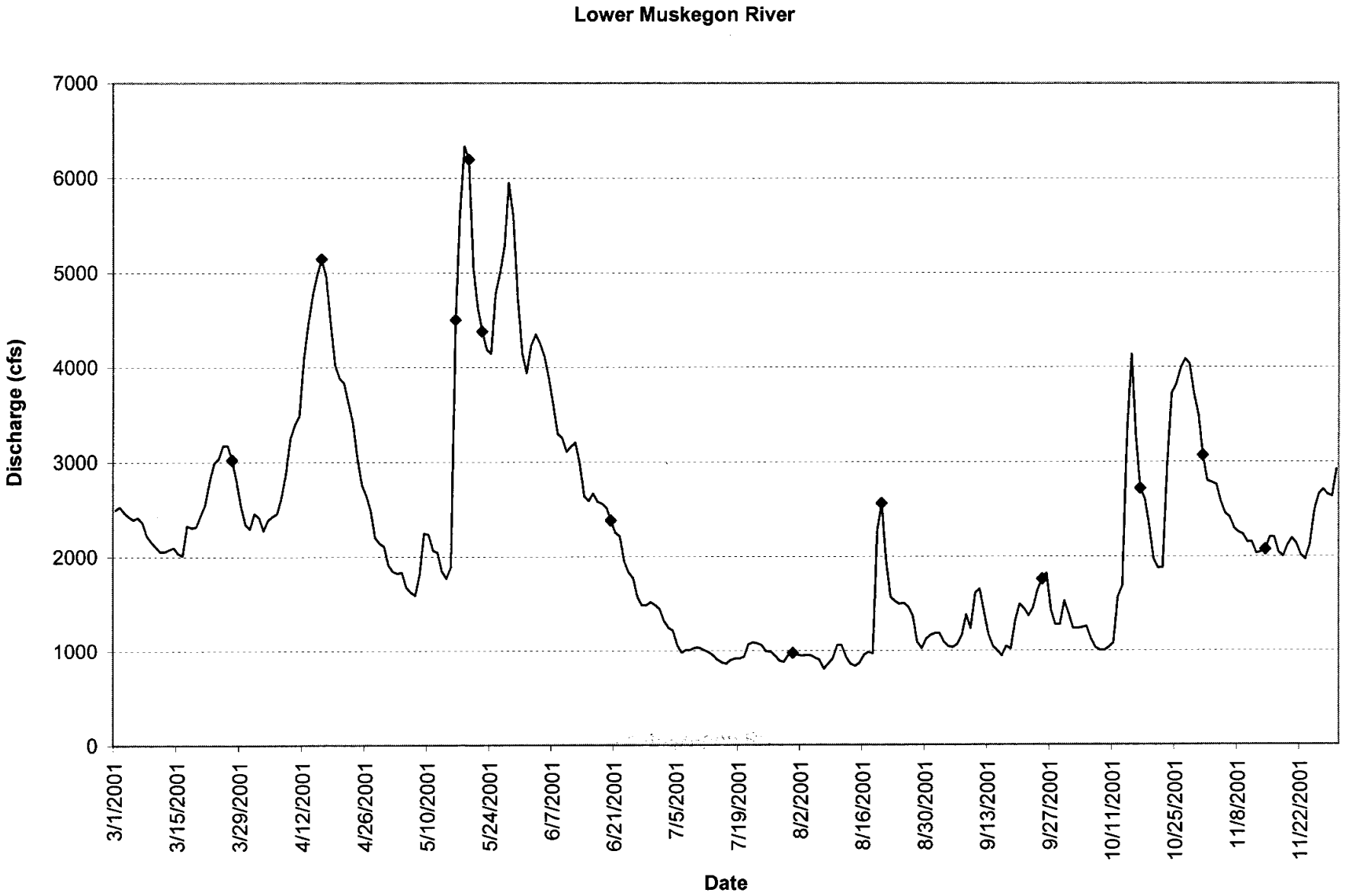


Figure 32. Upper Muskegon River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

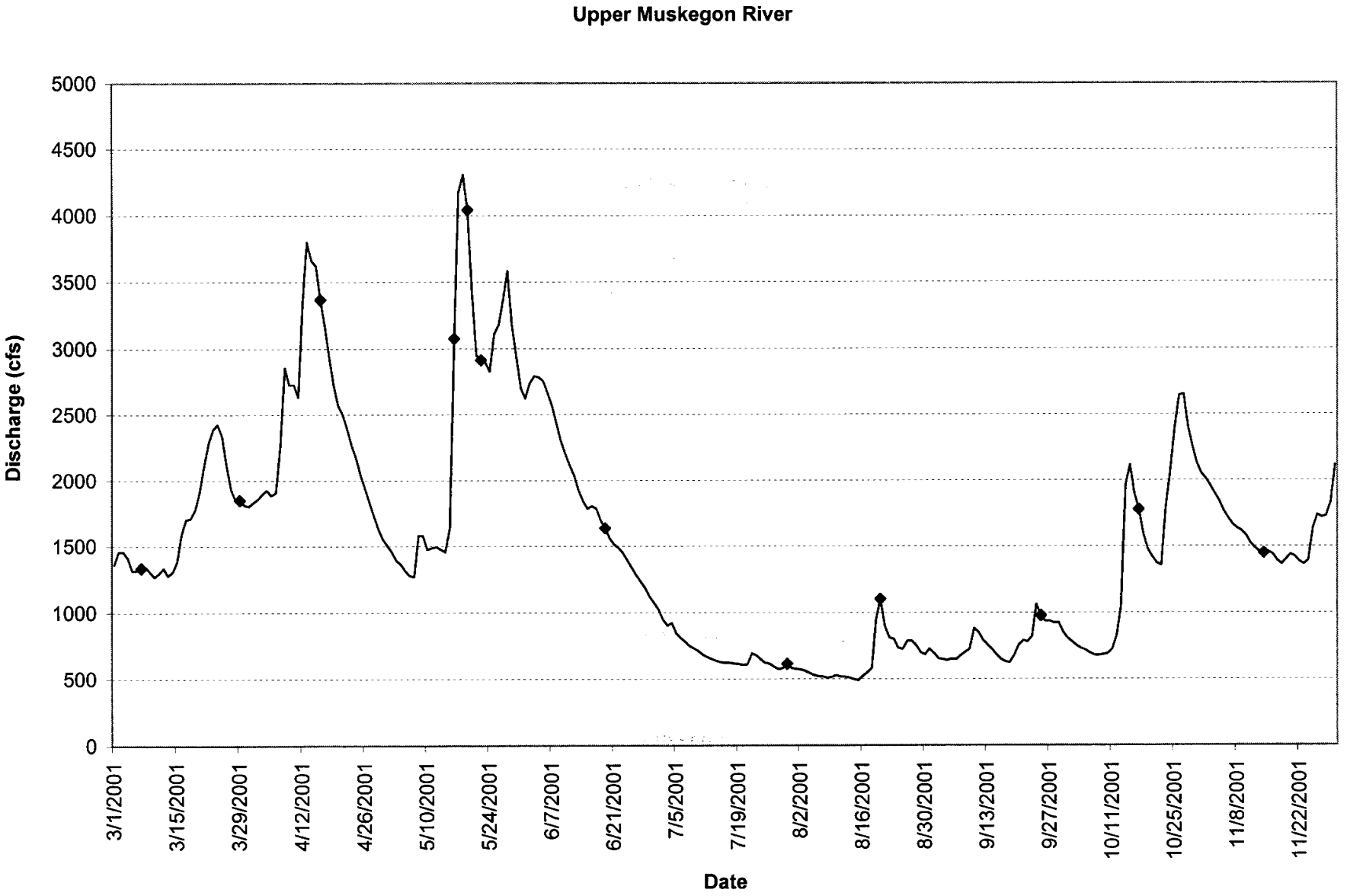


Figure 33. Saginaw River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

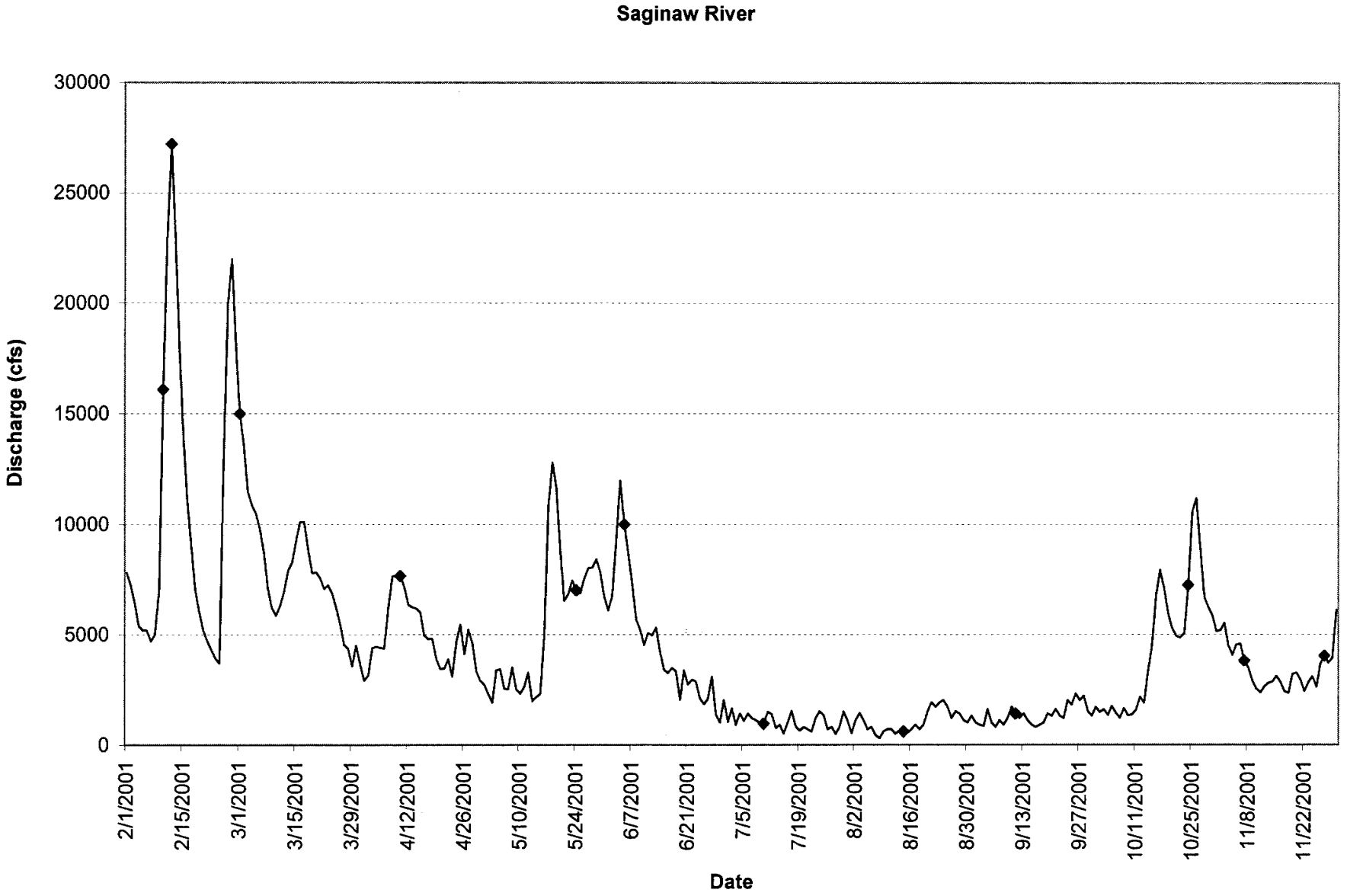


Figure 34. Lower St. Joseph River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.

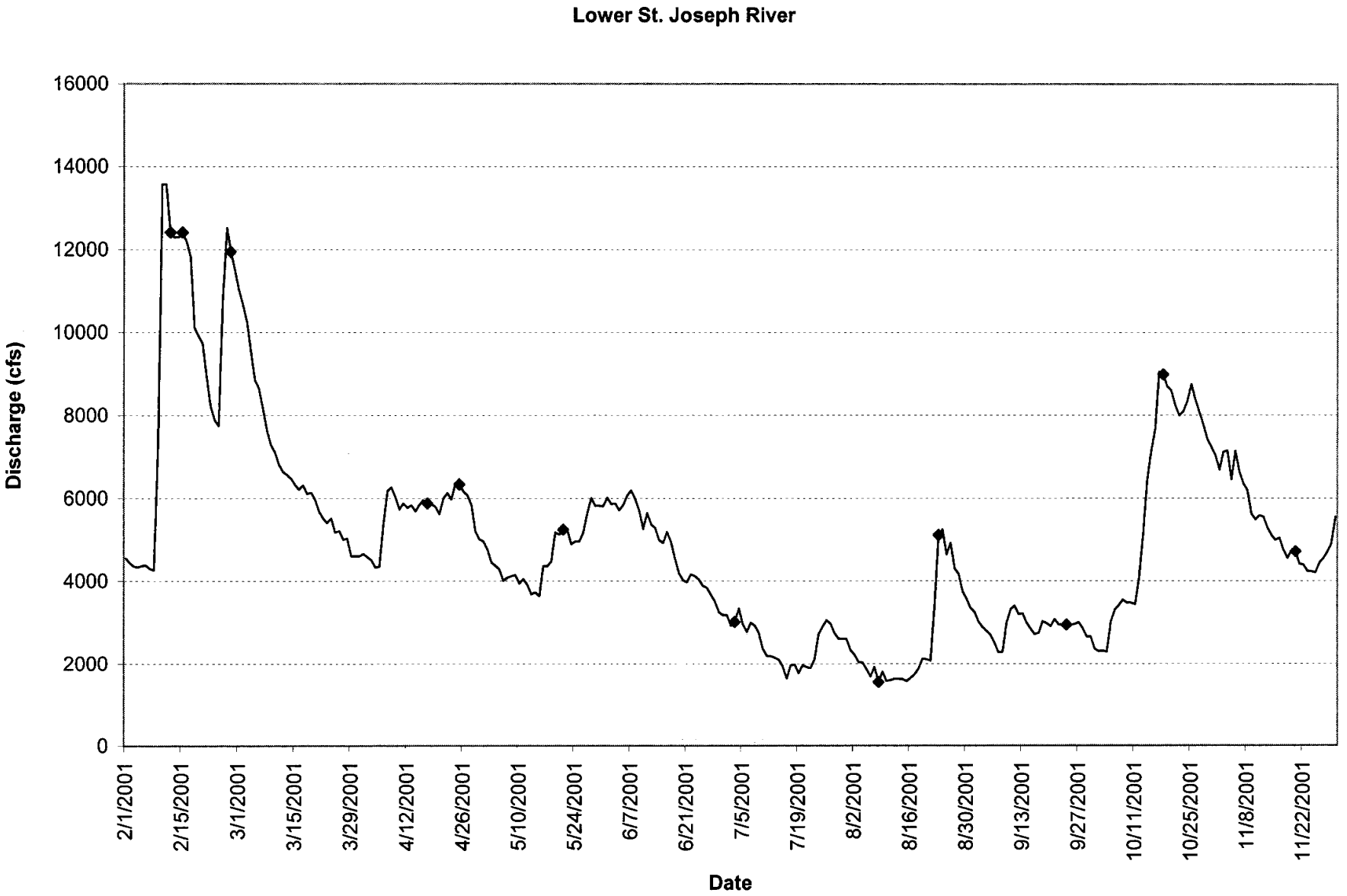
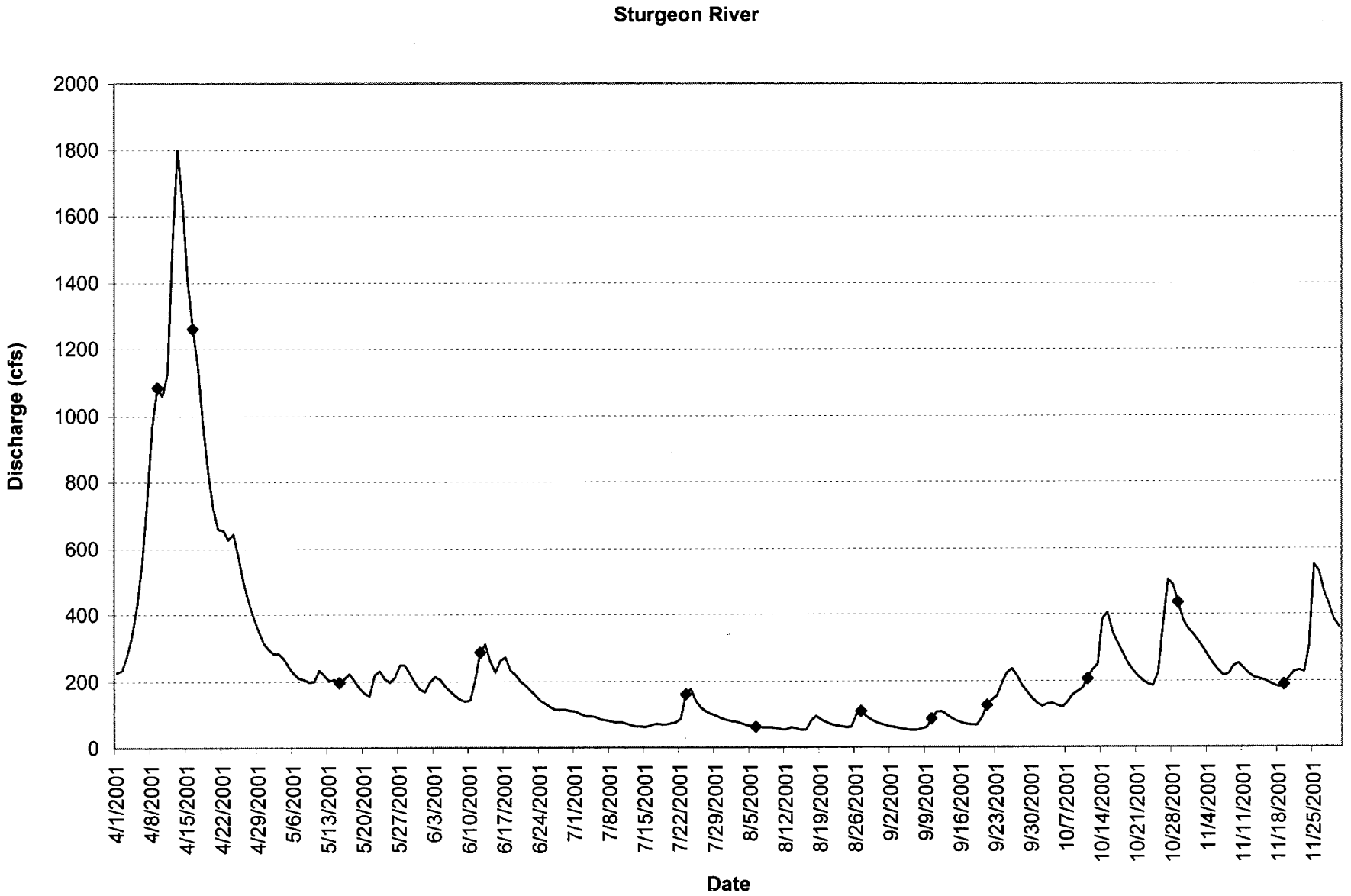


Figure 35. Sturgeon River hydrograph. Solid diamonds indicate points on hydrograph at which samples were collected.



APPENDIX A

Water Chemistry Data Summarized in the 2001 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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
350061 Au Sable River										
3/7/2001	0.015	C 0.123	0.002	T 0.070	0.007	0.004	4.0	7.0	2.3	220.0
3/20/2001	0.011	C 0.126	0.002	0.090	T 0.004	0.009	7.0	6.0	2.4	210.0
4/10/2001	0.012	C 0.077	0.002	0.130	0.005	0.009	7.0	6.0	2.5	200.0
5/24/2001	0.031	C 0.052	0.004	0.290	0.019	W 0.001	6.0	6.0	5.9	180.0
6/5/2001	0.024	C 0.030	0.004	0.220	0.008	0.006	6.0	6.0	4.7	190.0
7/11/2001	0.014	C T 0.002	T 0.001	0.230	0.009	0.006	4.0	6.0	5.1	190.0
8/28/2001	T 0.007	NAV	T HT 0.001	0.200	0.011	HT 0.010	8.0	6.0	3.5	190.0
9/12/2001	T 0.009	NAV	T 0.001	0.150	0.014	0.008	5.0	5.0	2.8	190.0
9/26/2001	0.028	C 0.022	T 0.001	0.170	0.017	0.010	3.0	6.0	2.4	190.0
10/24/2001	T 0.008	C 0.016	0.005	0.150	0.011	0.008	7.0	6.0	2.4	200.0
11/6/2001	0.014	C 0.024	T 0.001	0.150	0.010	0.005	10.0	6.0	3.3	210.0
11/28/2001	0.022	C 0.046	0.002	0.200	0.009	0.005	9.0	6.0	5.1	200.0
No. of Samples:	12	10	12	12	12	12	12	12	12	12
Mean+:	0.016	0.052	0.002	0.171	0.010	0.007	6.3	6.0	3.5	197.5
Median+:	0.014	0.038	0.002	0.160	0.010	0.007	6.5	6.0	3.1	195.0
630291 Bigelow Creek										
3/27/2001	0.029	0.270	HT 0.003	0.220	0.017	HT 0.009	10.0	9.0	2.7	220.0
6/19/2001	0.015	C 0.129	0.003	0.370	0.034	0.008	12.0	8.0	4.5	210.0
8/30/2001	0.019	C 0.108	0.003	0.370	0.034	0.003	16.0	8.0	3.2	220.0
10/31/2001	0.027	C 0.186	0.005	0.260	0.013	0.005	12.0	8.0	5.0	210.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.023	0.173	0.004	0.305	0.025	0.006	12.5	8.3	3.9	215.0
Median+:	0.023	0.158	0.003	0.315	0.026	0.007	12.0	8.0	3.9	215.0

+ = Calculated value; not rounded to the appropriate number of significant figures.
# = Median includes a concentration below quantification, which was assigned a value equal to the quantification level.
* = Mean includes concentrations below quantification, which were 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.
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)		Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)		pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)		Turbidity (NTU)	
350061	Au Sable River													
	3/7/2001	K	4.0	164	335	304	12.0		8.0	7.6	0.7		K	0.4
	3/20/2001	K	4.0	162	327	313	11.9		8.0	8.1	1.2		K	0.4
	4/10/2001	K	4.0	156	313	297	12.4		8.0	7.8	3.8		K	0.4
	5/24/2001	K	4.0	138	281	263	8.8		8.0	7.8	17.2		K	0.4
	6/5/2001	K	4.0	145	299	287	8.0		8.1	8.0	16.5		K	0.4
	7/11/2001	K	4.0	141	295				8.3				K	0.4
	8/28/2001	K	4.0	139	288	282	8.7	HT	8.2	8.1	23.3	K	HT	0.4
	9/12/2001	K	4.0	137	285	282	7.7		8.1	8.0	21.6		K	0.4
	9/26/2001	K	4.0	141	286	253	7.8	HT	8.1	7.6	17.1		HT	0.4
	10/24/2001	K	4.0	152	305	301	9.6		8.1	8.1	11.8		K	0.4
	11/6/2001	K	4.0	157	317	264	10.5	HT	8.1	7.7	8.9		K	0.4
	11/28/2001	K	4.0	154	313	271	11.1		8.0	7.7	6.8			0.4
	No. of Samples:		12	12	12	11	11		12	11	11			12
	Mean+:	*	2.0	149	304	283	9.9		8.1	7.9	11.7		*	0.2
	Median+:	K	4.0	149	302	282	9.6		8.1	7.8	11.8		K	0.4
630291	Bigelow Creek													
	3/27/2001		8.0	173	341	325	12.8		8.1	8.1	2.6		HT	2.0
	6/19/2001		8.0	165	324	296	8.2		8.1	7.8	16.7			5.1
	8/30/2001		8.0	165	334	313	8.4		8.1	7.5	15.3			5.5
	10/31/2001		7.0	154	325	315	10.6		7.9	7.6	7.6			0.6
	No. of Samples:		4	4	4	4	4		4	4	4			4
	Mean+:		7.8	164	331	312	10.0		8.1	7.8	10.6			3.3
	Median+:		8.0	165	330	314	9.5		8.1	7.7	11.5			3.6

+ = Calculated value; not rounded to the appropriate number of significant figures.
# = Median includes a concentration below quantification, which was assigned a value equal to the quantification level.
* = 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.
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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
740385 Black River										
3/19/2001	DL 0.090	C 6.000	0.019	1.020	0.089	0.039	70.0	41.0	10.0	420.0
6/27/2001	DL 0.050	C 5.700	0.051	0.850	0.105	0.034	40.0	28.0	8.2	320.0
8/16/2001	0.036	C 0.190	0.004	0.240	0.029	0.008	21.0	14.0	2.3	190.0
10/11/2001	0.036	C 1.300	0.009	0.590	0.037	0.010	41.0	38.0	6.0	310.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.053	3.298	0.021	0.675	0.065	0.023	43.0	30.3	6.6	310.0
Median+:	0.043	3.500	0.014	0.720	0.063	0.022	40.5	33.0	7.1	315.0
280014 Boardman River										
3/28/2001	T 0.006	0.290	0.003	0.250	0.014	0.005	3.0	9.0	3.1	220.0
5/30/2001	0.011	C 0.182	0.002	0.330	0.014	0.006	4.0	7.0	7.0	210.0
7/31/2001	T 0.006	C 0.156	0.003	0.160	0.008	0.003	5.0	8.0	2.5	220.0
10/30/2001	0.012	C 0.220	0.002	0.220	0.008	0.003	8.0	8.0	5.6	210.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.009	0.212	0.003	0.240	0.011	0.004	5.0	8.0	4.6	215.0
Median+:	0.009	0.201	0.003	0.235	0.011	0.004	4.5	8.0	4.4	215.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
740385	Black River									
3/19/2001		13.0	308	652	639	12.3	7.9	8.0	2.5	HT 21.0
6/27/2001		23.0	224	498	484	7.5	HT 8.1	7.8	21.7	28.0
8/16/2001		11.0	126	286	283	7.3	8.3	7.9	23.2	12.0
10/11/2001		11.0	195	475	462	9.6	HT 8.0	8.0	13.2	12.0
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		14.5	213	478	467	9.2	8.1	7.9	15.2	18.3
Median+:		12.0	210	487	473	8.6	8.0	8.0	17.5	16.5
280014	Boardman River									
3/28/2001		K 4.0	166	337	308	12.5	8.1	8.1	4.7	1.7
5/30/2001		4.0	157	316	283	9.8	8.2	8.0	11.9	2.2
7/31/2001		8.0	173	346	304	8.3	8.2	7.7	17.0	0.5
10/30/2001		7.0	155	324	303	12.0	8.0	8.1	6.6	1.6
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		* 5.3	163	331	300	10.7	8.1	8.0	10.1	1.5
Median+:		5.5	162	331	304	10.9	8.1	8.1	9.3	1.7

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
730024 Cass River										
2/26/2001	DL 0.200	C 3.600	0.020	1.090	0.200	0.063	39.0	86.0	8.4	280.0
3/1/2001	DL 0.150	C 5.100	0.023	1.050	0.119	0.054	39.0	22.0	8.7	290.0
4/11/2001	DL 0.040	C 2.700	0.020	0.890	0.049	0.013	66.0	35.0	9.9	430.0
5/23/2001	0.017	C 1.120	0.017	0.940	0.081	T 0.002	37.0	20.0	8.6	470.0
6/4/2001	K DL 0.020	C 4.600	0.024	0.870	0.054	0.014	63.0	46.0	9.2	480.0
7/10/2001	0.015	C 1.330	0.018	0.950	0.079	0.007	62.0	51.0	DM 9.8	470.0
8/15/2001	0.024	C 0.161	0.012	1.040	0.108	0.012	59.0	42.0	8.0	470.0
9/11/2001	0.015	C 0.430	0.009	0.970	0.123	0.015	66.0	71.0	6.5	380.0
9/26/2001	0.020	C 0.470	0.011	0.630	0.071	PI 0.028	54.0	58.0	5.6	400.0
10/24/2001	K DL 0.500	C 7.100	0.047	1.040	0.088	0.034	53.0	53.0	10.0	480.0
11/7/2001	DL 0.050	C 5.200	0.021	0.760	0.053	0.018	101.0	46.0	8.8	540.0
11/27/2001	K DL 0.050	C 2.300	0.014	0.640	0.042	0.013	93.0	48.0	7.7	520.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	* 0.068	2.843	0.020	0.906	0.089	0.023	61.0	48.2	8.4	434.2
Median+:	0.032	2.500	0.019	0.945	0.080	0.015	60.5	47.0	8.7	470.0
160073 Cheboygan River										
4/24/2001	0.014	C 0.050	0.002	0.290	0.009	T HT 0.001	10.0	7.0	5.0	210.0
6/19/2001	0.026	C 0.017	0.002	0.310	0.010	0.003	7.0	7.0	5.2	210.0
8/27/2001	0.015	NAV	T 0.001	0.270	0.011	0.003	9.0	8.0	3.8	200.0
10/25/2001	0.022	C 0.046	0.002	0.290	0.015	0.010	8.0	8.0	5.5	210.0
No. of Samples:	4	3	4	4	4	4	4	4	4	4
Mean+:	0.019	0.038	0.002	0.290	0.011	0.004	8.5	7.5	4.9	207.5
Median+:	0.019	0.046	0.002	0.290	0.011	0.003	8.5	7.5	5.1	210.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
730024	Cass River									
2/26/2001		61.0	264	710	425	11.8	HT 8.3	7.3	0.1	54.0
3/1/2001		14.0	190	431			8.1			24.0
4/11/2001		13.0	321	654	647	10.0	8.1	8.0	10.2	10.0
5/23/2001		20.0	192	443	710	8.3	7.8	7.9	19.2	21.0
6/4/2001		15.0	342	727	687	9.5	HT 8.2	8.0	14.8	12.0
7/10/2001		28.0	318	716			HT 8.4			34.0
8/15/2001		46.0	342	731	716	6.6	HT 8.2	7.9	23.9	53.0
9/11/2001		45.0	294	720	583	9.3	8.3	7.8	21.2	51.0
9/26/2001		25.0	227	592	546	8.1	8.1	7.8	12.2	HT 25.0
10/24/2001		31.0	242	618	715	8.6	HT 8.1	7.8	11.2	27.0
11/7/2001		7.0	394	837	800	9.7	HT 8.0	8.0	8.1	13.0
11/27/2001		20.0	364	797	763	10.5	HT 8.2	8.2	7.5	11.0
No. of Samples:		12	12	12	10	10	12	10	10	12
Mean+:		27.1	291	665	659	9.2	8.2	7.9	12.8	27.9
Median+:		22.5	306	713	699	9.4	8.2	7.9	11.7	24.5
160073	Cheboygan River									
4/24/2001		K 4.0	153	318	311	10.8	HT 8.2	8.4	9.3	1.8
6/19/2001		K 4.0	155	318	336	8.2	HT 8.3	8.2	22.2	0.4
8/27/2001		K 4.0	143	300	296	8.5	HT 8.3	8.0	22.7	0.4
10/25/2001		4.0	145	320	307	10.2	8.2	8.3	10.0	2.0
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		* 2.5	149	314	313	9.4	8.2	8.2	16.1	1.2
Median+:		K 4.0	149	318	309	9.4	8.2	8.3	16.1	1.1

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
500233 Clinton River										
2/12/2001	DL 0.120	C 2.000	0.020	1.140	0.220	0.054	22.0	104.0	DM 6.2	440.0
2/26/2001	0.280	C 0.890	0.021	1.070	0.250	0.088	16.0	98.0	7.2	360.0
4/2/2001	0.104	C 1.580	0.014	0.740	0.084	0.042	36.0	186.0	6.1	710.0
5/9/2001	0.126	C 2.100	0.066	1.200	0.210	0.126	45.0	209.0	8.3	790.0
5/23/2001	0.149	C 0.700	0.046	1.250	0.220	0.043	25.0	120.0	DM 12.0	480.0
6/4/2001	0.095	C 1.390	0.033	1.080	0.163	0.046	30.0	116.0	8.6	530.0
6/26/2001	0.087	C 1.830	0.034	0.870	0.171	0.104	30.0	149.0	7.0	610.0
8/7/2001	0.016	C 3.000	0.045	0.980	0.310	0.200	41.0	192.0	6.2	690.0
9/10/2001	0.113	C 1.000	0.039	1.140	0.370	0.094	25.0	64.0	DM 8.6	280.0
10/11/2001	DL 0.060	C 2.400	0.018	0.790	0.172	0.090	42.0	137.0	7.1	610.0
10/25/2001	0.055	C 1.120	0.034	1.210	0.350	0.080	29.0	90.0	DM 10.0	400.0
11/27/2001	0.071	C 1.570	0.017	0.650	0.091	0.054	45.0	122.0	6.0	580.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.106	1.632	0.032	1.010	0.218	0.085	32.2	132.3	7.8	540.0
Median+:	0.100	1.575	0.034	1.075	0.215	0.084	30.0	121.0	7.2	555.0
210102 Escanaba River										
4/9/2001	0.039	C 0.420	0.008	0.900	0.087	0.013	10.0	5.0	DM 18.0	110.0
6/4/2001	0.048	C 0.127	0.008	0.520	0.064	0.028	25.0	15.0	17.0	200.0
8/23/2001	0.096	C 0.180	0.033	0.700	0.080	0.056	84.0	37.0	21.0	380.0
10/18/2001	0.059	C 0.082	0.009	0.520	0.035	0.014	48.0	22.0	18.0	280.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.061	0.202	0.015	0.660	0.067	0.028	41.8	19.8	18.5	242.5
Median+:	0.054	0.154	0.009	0.610	0.072	0.021	36.5	18.5	18.0	240.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)		pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
500233	Clinton River										
2/12/2001		43.0	190	682	658	13.4		7.9	7.5	0.7	45.0
2/26/2001		73.0	129	559	546	13.6		8.1	7.1	0.6	76.0
4/2/2001	A	4.0	312	1097	1080	11.0		8.1	7.9	5.2	4.7
5/9/2001		12.0	335	1223	1204	7.0	HT	7.9	7.6	17.3	8.8
5/23/2001		84.0	207	740	720	6.8	HT	7.8	7.5	16.6	79.0
6/4/2001		56.0	254	820	780	8.9	HT	7.9	7.7	14.1	44.0
6/26/2001		12.0	290	943	930	6.6	HT	8.1	7.9	22.2	12.0
8/7/2001		14.0	289	1061	1030	9.0		8.5	8.2	25.2	5.2
9/10/2001		150.0	121	429	414	6.6		7.7	7.4	21.5	110.0
10/11/2001		25.0	283	937	914	8.5	HT	8.0	8.0	14.2	19.0
10/25/2001		177.0	175	612	567	7.0		7.7	7.6	15.0	130.0
11/27/2001		11.0	290	892	855	10.5	HT	8.1	7.8	8.6	6.6
No. of Samples:		12	12	12	12	12		12	12	12	12
Mean+:		55.1	240	833	808	9.1		8.0	7.7	13.4	45.0
Median+:		34.0	269	856	818	8.7		8.0	7.7	14.6	31.5
210102	Escanaba River										
4/9/2001		19.0	62	165	154	13.6	HT	7.6	7.6	2.2	12.0
6/4/2001	K	4.0	95	315	304	10.1		8.2	8.1	12.3	2.8
8/23/2001	K	4.0	122	590	594	7.5		8.1	7.9	22.9	6.0
10/18/2001		6.0	111	421	407	10.8		8.0	8.0	9.1	6.5
No. of Samples:		4	4	4	4	4		4	4	4	4
Mean+:	*	7.3	98	373	365	10.5		8.0	7.9	11.6	6.8
Median+:	#	5.0	103	368	356	10.5		8.0	8.0	10.7	6.3

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
790157 Evergreen Creek										
3/20/2001	0.033	C 0.980	0.017	0.460	0.036	0.017	39.0	17.0	7.1	320.0
5/9/2001	0.034	C 0.270	0.011	0.480	0.023	0.005	34.0	18.0	6.4	350.0
7/18/2001	0.022	C 0.101	0.003	0.420	0.028	0.010	30.0	17.0	5.6	320.0
9/6/2001	0.020	C 0.079	0.002	0.390	0.033	PI 0.009	34.0	19.0	6.6	310.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.027	0.358	0.008	0.438	0.030	0.010	34.3	17.8	6.4	325.0
Median+:	0.028	0.186	0.007	0.440	0.031	0.010	34.0	17.5	6.5	320.0
730285 Flint River										
2/15/2001	DL 0.180	C 2.500	0.024	1.530	0.230	0.045	25.0	56.0	8.5	350.0
5/8/2001	DL 0.120	C 2.300	0.052	1.110	0.121	0.047	45.0	91.0	8.5	530.0
7/19/2001	DL 0.030	C 4.100	0.036	1.420	0.240	0.076	43.0	101.0	8.5	560.0
9/5/2001	DL 0.020	C 4.800	0.024	1.030	0.340	0.270	47.0	116.0	8.3	540.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.088	3.425	0.034	1.273	0.233	0.110	40.0	91.0	8.5	495.0
Median+:	0.075	3.300	0.030	1.265	0.235	0.062	44.0	96.0	8.5	535.0
380083 Grand River (Headwaters)										
2/13/2001	0.065	C 0.820	0.015	0.650	0.044	0.013	12.0	18.0	7.9	260.0
5/3/2001	0.040	C 0.390	0.007	0.840	0.060	T HT 0.002	23.0	19.0	6.4	350.0
7/25/2001	0.071	C 0.270	0.009	0.710	0.056	0.010	22.0	17.0	4.5	340.0
9/18/2001	0.029	C 0.220	0.002	0.470	0.020	0.003	23.0	20.0	4.2	340.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.051	0.425	0.008	0.668	0.045	0.007	20.0	18.5	5.8	322.5
Median+:	0.053	0.330	0.008	0.680	0.050	0.007	22.5	18.5	5.5	340.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)		pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
790157	Evergreen Creek										
	3/20/2001	7.0	249	494	474	12.1		8.1	8.3	3.2	4.4
	5/9/2001	K 4.0	264	543	524	9.7	HT	8.1	8.0	14.1	3.4
	7/18/2001	K 4.0	235	497	492	8.0	HT	8.2	7.7	20.3	4.0
	9/6/2001	7.0	234	477	470	9.2		8.1	7.7	14.5	4.6
	No. of Samples:	4	4	4	4	4		4	4	4	4
	Mean+:	* 4.5	246	503	490	9.8		8.1	7.9	13.0	4.1
	Median+:	# 5.5	242	496	483	9.5		8.1	7.9	14.3	4.2
730285	Flint River										
	2/15/2001	43.0	188	535	511	13.2		7.8	8.3	0.1	41.0
	5/8/2001	12.0	294	810	796	7.6	HT	8.0	7.8	19.1	11.0
	7/19/2001	66.0	272	869	864	8.1	HT	8.5	8.2	25.4	41.0
	9/5/2001	39.0	250	829	821	9.2	HT	8.6	8.3	21.1	31.0
	No. of Samples:	4	4	4	4	4		4	4	4	4
	Mean+:	40.0	251	761	748	9.5		8.3	8.2	16.4	31.0
	Median+:	41.0	261	820	809	8.7		8.3	8.3	20.1	36.0
380083	Grand River (Headwaters)										
	2/13/2001	4.0	188	406	383	10.0		7.6	6.9	0.0	1.9
	5/3/2001	30.0	275	545	523	7.5		8.1	7.8	17.6	14.0
	7/25/2001	26.0	273	524	520	6.8		8.1	8.0	22.4	9.7
	9/18/2001	6.0	277	528	493	8.5		8.1	7.8	15.6	5.3
	No. of Samples:	4	4	4	4	4		4	4	4	4
	Mean+:	16.5	253	501	480	8.2		8.0	7.6	13.9	7.7
	Median+:	16.0	274	526	507	8.0		8.1	7.8	16.6	7.5

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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.
K = Concentration below the quantification level shown.
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NH = Non-homogenous sample made analysis of a representative sample questionable.
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QC = Quality control problems exist.
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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
700123 Grand River (Lower)										
2/11/2001	0.330	C 2.900	0.025	1.190	0.158	0.057	28.0	53.0	DM 7.0	380.0
2/14/2001	0.290	C 3.700	0.029	1.180	0.173	0.076	23.0	38.0	7.4	310.0
2/28/2001	0.380	C 2.700	0.024	1.250	0.170	0.086	26.0	35.0	8.0	300.0
4/17/2001	DL 0.180	C 2.300	0.022	1.140	0.099	0.027	43.0	47.0	7.7	430.0
4/24/2001	0.147	C 1.480	0.022	1.010	0.095	HT 0.007	43.0	45.0	7.7	410.0
5/17/2001	0.178	C 1.430	0.042	1.310	0.310	0.051	23.0	27.0	DM 11.0	260.0
5/21/2001	DL 0.150	C 3.400	0.083	1.220	0.152	0.059	26.0	30.0	9.6	310.0
7/2/2001	0.014	C 0.810	0.016	1.540	0.105	PI 0.013	43.0	54.0	DM 9.2	400.0
8/8/2001	0.015	C 0.440	0.034	1.330	0.142	0.012	58.0	68.0	5.9	430.0
8/20/2001	0.013	C HT 0.780	HT 0.029	0.900	0.104	HT 0.006	50.0	60.0	5.4	420.0
10/18/2001	0.163	C PI 1.410	PI 0.018	1.130	0.131	0.032	46.0	45.0	10.0	400.0
11/13/2001	0.143	C 1.950	0.044	0.890	0.090	0.035	53.0	49.0	9.0	460.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.167	1.942	0.032	1.174	0.144	0.038	38.5	45.9	8.2	375.8
Median+:	0.157	1.715	0.027	1.185	0.137	0.034	43.0	46.0	7.9	400.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
700123	Grand River (Lower)									
2/11/2001		32.0	230	591	554		7.9	8.6	0.6	30.0
2/14/2001		32.0	177	472	451	12.1	7.8	7.3	0.2	31.0
2/28/2001		14.0	185	466	446	13.2	7.8	7.3	0.6	23.0
4/17/2001		25.0	286	656	642	10.8	8.3	7.8	9.9	8.8
4/24/2001		24.0	286	630	609	9.9	HT 8.3	8.0	14.5	13.0
5/17/2001		120.0	163	406	388	8.6	7.9	7.5	16.3	140.0
5/21/2001	NH	17.0	201	479	454	7.5	7.7	7.5	18.7	25.0
7/2/2001		37.0	257	608	603	12.6	8.7	8.4	22.9	14.0
8/8/2001		32.0	260	655	640	9.7	HT 8.7	8.4	28.2	13.0
8/20/2001		17.0	250	643	648	10.6	8.5	8.4	22.2	10.0
10/18/2001		51.0	266	623	585	9.3	7.9	7.8	10.8	27.0
11/13/2001	A	9.0	310	707	662	10.9	HT 8.0	8.0	7.5	10.0
No. of Samples:		12	12	12	12	11	12	12	12	12
Mean+:		34.2	239	578	557	10.5	8.1	7.9	12.7	28.7
Median+:		28.5	254	616	594	10.6	7.9	7.9	12.7	18.5

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
340025	Grand River (Upper)										
	2/11/2001	0.260	C 4.100	0.031	1.520	0.290	0.104	19.0	44.0	DM 7.7	310.0
	2/14/2001	DL 0.180	C 5.400	0.034	1.180	0.170	0.080	33.0	31.0	8.6	310.0
	2/28/2001	DL 0.260	C 4.000	0.030	1.250	0.178	0.088	26.0	27.0	8.5	280.0
	4/16/2001	K DL 0.020	C 2.900	0.020	0.950	0.078	0.016	44.0	44.0	9.0	430.0
	4/24/2001	0.048	C 1.910	0.024	1.010	0.111	HT 0.022	48.0	47.0	9.1	420.0
	5/16/2001	DL 0.280	C 3.000	0.056	0.950	0.220	0.065	37.0	37.0	DM 16.0	370.0
	5/31/2001	DL 0.040	C 4.000	0.044	1.000	0.137	0.059	33.0	36.0	2.3	400.0
	7/2/2001	0.014	C 1.240	0.016	1.180	0.080	PI 0.009	41.0	94.0	10.0	440.0
	8/8/2001	0.013	C 0.280	0.008	1.040	0.126	0.021	58.0	63.0	6.7	410.0
	9/24/2001	0.029	C 1.530	0.013	0.830	0.116	0.026	53.0	64.0	5.4	460.0
	10/29/2001	DL 0.060	C 3.100	0.035	1.040	0.127	0.065	54.0	38.0	11.0	400.0
	11/21/2001	0.031	C 1.810	0.010	0.740	0.067	0.032	62.0	46.0	8.7	480.0
	No. of Samples:	12	12	12	12	12	12	12	12	12	12
	Mean+:	* 0.102	2.773	0.027	1.058	0.142	0.049	42.3	47.6	8.6	392.5
	Median+:	0.044	2.950	0.027	1.025	0.127	0.046	42.5	44.0	8.7	405.0
580364	Huron River										
	2/14/2001	0.137	C 1.150	0.013	0.840	0.056	0.017	45.0	141.0	6.0	610.0
	5/2/2001	0.052	C 0.610	0.019	0.590	0.042	T HT 0.002	74.0	87.0	7.3	530.0
	7/26/2001	0.120	C 0.210	0.010	0.680	0.065	0.030	144.0	87.0	7.7	590.0
	9/18/2001	0.088	C 0.113	0.006	0.620	0.045	0.013	238.0	100.0	6.4	690.0
	No. of Samples:	4	4	4	4	4	4	4	4	4	4
	Mean+:	0.099	0.521	0.012	0.683	0.052	0.016	125.3	103.8	6.9	605.0
	Median+:	0.104	0.410	0.012	0.650	0.051	0.015	109.0	93.5	6.9	600.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)		pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)		Turbidity (NTU)
340025	Grand River (Upper)											
	2/11/2001	54.0	167	473	442			7.7	7.8	0.1		54.0
	2/14/2001	15.0	194	473	452	12.8		7.8	7.2	0.6		24.0
	2/28/2001	12.0	181	436	420	12.3		7.8	7.1	0.6		23.0
	4/16/2001	15.0	309	669	663	9.8	HT	8.2	7.7	10.9		8.8
	4/24/2001	24.0	303	653	645	8.8	HT	8.1	7.8	14.2		13.0
	5/16/2001	830.0	248	573	530	9.2		8.1	7.7	15.4		620.0
	5/31/2001	24.0	280	621	591	8.3		8.0	7.7	15.1		18.0
	7/2/2001	19.0	299	673	646	8.2		8.3	8.0	22.3		8.0
	8/8/2001	20.0	254	633	621	5.4	HT	8.4	8.0	26.7		11.0
	9/24/2001	22.0	272	704	672	7.8		8.2	7.9	16.0	HT	12.0
	10/29/2001	19.0	282	620	582	9.8		7.8	7.7	7.4		18.0
	11/21/2001	10.0	337	731	685	10.1		8.1	7.8	7.4		7.7
	No. of Samples:	12	12	12	12	11		12	12	12		12
	Mean+:	88.7	261	605	579	9.3		8.0	7.7	11.4		68.1
	Median+:	19.5	276	627	606	9.2		8.1	7.8	12.6		15.5
580364	Huron River											
	2/14/2001	14.0	290	945	966	14.8		8.0	8.2	1.1		12.0
	5/2/2001	25.0	310	808	794	9.2		8.3	8.2	17.7		8.1
	7/26/2001	13.0	379	915	948	5.6		7.9	7.6	23.9		8.8
	9/18/2001	9.0	445	1059	960	7.2		8.0	7.7	18.8		9.6
	No. of Samples:	4	4	4	4	4		4	4	4		4
	Mean+:	15.3	356	932	917	9.2		8.1	7.9	15.4		9.6
	Median+:	13.5	345	930	954	8.2		8.0	8.0	18.3		9.2

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
030077 Kalamazoo River (Lower)										
2/11/2001	0.300	C 2.100	0.029	0.990	0.175	PI 0.118	22.0	31.0	6.7	320.0
2/14/2001	DL 0.150	C 2.200	0.019	0.740	0.078	0.044	26.0	31.0	6.8	310.0
2/27/2001	0.200	C 1.680	0.016	0.810	0.108	0.051	30.0	30.0	6.7	320.0
4/17/2001	T 0.008	C 1.200	0.015	0.470	0.043	0.007	34.0	39.0	5.8	390.0
4/25/2001	0.021	C 1.130	0.020	0.850	0.083	HT 0.005	34.0	36.0	7.0	370.0
5/17/2001	0.086	C 1.660	0.045	1.030	0.170	0.018	33.0	39.0	DM 9.7	390.0
5/21/2001	0.023	C 1.220	0.037	0.890	0.088	0.014	28.0	28.0	8.0	340.0
7/2/2001	0.130	C 0.970	0.029	1.040	0.114	0.020	31.0	40.0	7.0	400.0
8/9/2001	0.076	C 0.580	0.028	1.040	0.120	0.008	37.0	47.0	4.9	370.0
8/23/2001	0.069	C 0.770	0.020	1.050	0.132	0.010	42.0	52.0	5.2	390.0
10/18/2001	0.038	C 1.490	0.019	0.810	0.081	0.040	38.0	29.0	9.8	340.0
11/13/2001	0.044	C 1.420	0.011	0.590	0.043	0.013	33.0	35.0	7.6	400.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.095	1.368	0.024	0.859	0.103	0.029	32.3	36.4	7.1	361.7
Median+:	0.073	1.320	0.020	0.870	0.098	0.016	33.0	35.5	6.9	370.0
390057 Kalamazoo River (Upper)										
2/13/2001	DL 0.120	C 2.200	0.022	0.870	0.094	0.035	17.0	16.0	8.1	230.0
4/30/2001	0.027	C 0.760	0.008	0.790	0.080	HT 0.010	33.0	34.0	8.8	390.0
7/25/2001	0.052	C 0.980	0.013	0.700	0.096	0.027	34.0	42.0	5.0	410.0
9/24/2001	0.041	C 0.910	0.008	0.590	0.061	0.015	25.0	34.0	7.0	370.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.060	1.213	0.013	0.738	0.083	0.022	27.3	31.5	7.2	350.0
Median+:	0.047	0.945	0.011	0.745	0.087	0.021	29.0	34.0	7.6	380.0

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# = Median includes a concentration below quantification, which was assigned a value equal to the quantification level.
* = Mean includes concentrations below quantification, which were assigned a value equal to 1/2 the quantification level.
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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
030077	Kalamazoo River (Lower)									
2/11/2001		15.0	187	493	428		7.7	7.6	0.1	31.0
2/14/2001		10.0	187	477	463	12.3	7.9	7.5	0.5	12.0
2/27/2001		7.0	205	487	470	12.8	8.0	7.5	1.0	23.0
4/17/2001		15.0	264	603	588	10.2	8.3	7.9	9.4	6.9
4/25/2001		19.0	256	567	548	8.8	8.2	7.8	12.9	11.0
5/17/2001		50.0	255	594	566	8.1	8.2	7.7	17.9	34.0
5/21/2001	NH	21.0	230	518	502	6.8	8.0	7.7	19.9	10.0
7/2/2001		32.0	262	609	603	6.2	8.2	7.9	21.6	15.0
8/9/2001		31.0	229	567	573	6.3	8.1	7.7	26.7	15.0
8/23/2001		33.0	230	595	585	7.1	8.1	7.8	21.6	14.0
10/18/2001		10.0	232	523	491	7.5	7.6	7.7	9.8	7.9
11/13/2001	K	4.0	271	609	571	10.7	HT 7.9	7.7	7.0	4.9
No. of Samples:		12	12	12	12	11	12	12	12	12
Mean+:	*	20.4	234	554	532	8.8	8.0	7.7	12.4	15.4
Median+:		17.0	231	567	557	8.1	8.1	7.7	11.4	13.0
390057	Kalamazoo River (Upper)									
2/13/2001		5.0	145	349	330	11.9	7.7	7.2	0.0	14.0
4/30/2001		16.0	287	607	583	8.0	8.1	7.9	15.4	9.1
7/25/2001		28.0	292	638	628	6.2	8.1	7.9	24.2	12.0
9/24/2001		9.0	263	567	517	7.5	8.0	9.1	15.3	HT 6.3
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		14.5	247	540	515	8.4	7.9	8.0	13.7	10.4
Median+:		12.5	275	587	550	7.8	8.0	7.9	15.4	10.6

+ = Calculated value; not rounded to the appropriate number of significant figures.
# = Median includes a concentration below quantification, which was assigned a value equal to the quantification level.
* = 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.
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PI = Possible interference may have affected the accuracy of the laboratory result.
QC = Quality control problems exist.
ST = Recommended sample collection/preservation technique not used.
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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
510088 Manistee River										
3/28/2001	0.027	0.280	0.004	0.230	0.021	0.008	5.0	9.0	3.2	210.0
5/29/2001	0.021	C 0.132	0.004	0.420	0.029	0.010	7.0	10.0	7.8	200.0
7/31/2001	T 0.007	C 0.099	0.002	0.200	0.020	W 0.001	10.0	14.0	2.7	230.0
10/30/2001	0.022	C 0.161	0.004	0.260	0.016	0.007	11.0	10.0	5.5	210.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.019	0.168	0.004	0.278	0.022	0.007	8.3	10.8	4.8	212.5
Median+:	0.022	0.147	0.004	0.245	0.021	0.008	8.5	10.0	4.4	210.0
770073 Manistique River										
4/9/2001	0.048	C 0.300	0.007	0.630	0.043	0.007	9.0	2.0	DM 16.0	70.0
5/30/2001	0.018	C 0.051	0.004	0.600	0.028	0.006	17.0	2.0	14.0	110.0
8/23/2001	0.022	C 0.061	0.004	0.570	0.019	0.007	21.0	3.0	15.0	120.0
10/18/2001	0.018	C 0.042	0.003	0.700	0.028	T 0.001	17.0	3.0	18.0	110.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.027	0.114	0.005	0.625	0.030	0.005	16.0	2.5	15.8	102.5
Median+:	0.020	0.056	0.004	0.615	0.028	0.007	17.0	2.5	15.5	110.0
550038 Menominee River										
4/18/2001	0.022	C 0.270	0.006	0.630	0.038	T HT 0.001	7.0	4.0	DM 15.0	100.0
6/14/2001	0.018	C 0.089	0.004	0.610	0.050	0.009	7.0	5.0	12.0	140.0
8/14/2001	T 0.006	NAV	0.002	0.410	0.035	0.006	16.0	7.0	8.3	170.0
10/9/2001	T 0.008	NAV	T 0.001	0.360	0.022	0.006	17.0	8.0	7.9	190.0
No. of Samples:	4	2	4	4	4	4	4	4	4	4
Mean+:	0.014	0.180	0.003	0.503	0.036	0.006	11.8	6.0	10.8	150.0
Median+:	0.013	0.180	0.003	0.510	0.037	0.006	11.5	6.0	10.2	155.0

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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).
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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)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
510088	Manistee River									
3/28/2001		10.0	161	326	306	12.8	8.2	8.2	2.7	5.2
5/29/2001		11.0	144	304	272	8.4	HT 7.9	7.6	15.3	7.1
7/31/2001		7.0	177	355	312	7.7	8.3	8.1	23.3	3.9
10/30/2001		9.0	157	329	305	10.2	7.9	7.9	7.8	3.7
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		9.3	160	329	299	9.8	8.1	8.0	12.3	5.0
Median+:		9.5	159	328	306	9.3	8.1	8.0	11.6	4.6
770073	Manistique River									
4/9/2001		23.0	47	103	92	11.2	HT 7.0	6.9	2.7	12.0
5/30/2001		11.0	80	173	166	8.8	HT 7.8	7.5	15.0	6.5
8/23/2001		8.0	88	187	185	7.6	7.7	7.4	20.5	5.1
10/18/2001		13.0	80	162	155	10.4	7.3	7.2	7.8	6.9
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		13.8	74	156	150	9.5	7.5	7.3	11.5	7.6
Median+:		12.0	80	168	161	9.6	7.5	7.3	11.4	6.7
550038	Menominee River									
4/18/2001		14.0	74	159	165	12.4	HT 7.6	7.7	5.9	4.8
6/14/2001		14.0	100	221	216	8.3	8.0	7.8	22.3	HT 6.1
8/14/2001		6.0	105	255	263	7.6	8.1	8.0	23.8	3.0
10/9/2001		K 4.0	123	292	281	10.1	8.1	7.8	11.3	2.5
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		* 9.0	101	232	231	9.6	7.9	7.8	15.8	4.1
Median+:		10.0	103	238	240	9.2	8.0	7.8	16.8	3.9

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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.
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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
610273 Muskegon River (Lower)										
3/27/2001	0.041	0.480	HT 0.006	0.320	0.016	HT 0.011	10.0	20.0	5.1	250.0
4/16/2001	0.036	C 0.420	0.006	0.390	0.033	0.010	10.0	17.0	6.2	220.0
5/16/2001	0.041	C 0.340	0.010	0.930	0.186	0.013	11.0	12.0	DM 12.0	180.0
5/19/2001	0.025	C 0.310	0.006	0.540	0.033	T 0.002	11.0	13.0	8.4	190.0
5/22/2001	0.025	C 0.280	0.004	0.510	0.025	0.005	10.0	12.0	8.3	190.0
6/20/2001	0.011	C 0.270	0.006	0.530	0.026	0.008	7.0	13.0	10.0	200.0
7/31/2001	0.014	C 0.220	0.007	0.430	0.023	0.004	13.0	18.0	8.4	230.0
8/20/2001	0.033	C HT 0.210	HT 0.008	0.610	0.051	HT 0.010	13.0	15.0	8.0	210.0
9/25/2001	0.015	C 0.300	0.007	0.400	0.042	0.023	12.0	18.0	5.8	250.0
10/17/2001	0.017	C 0.340	0.008	0.330	0.028	0.011	15.0	19.0	6.9	260.0
10/31/2001	0.025	C 0.290	0.008	0.350	0.024	0.011	13.0	17.0	6.4	250.0
11/14/2001	0.029	C 0.440	0.007	0.370	0.020	0.011	13.0	18.0	6.7	250.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.026	0.325	0.007	0.476	0.042	0.010	11.5	16.0	7.7	223.3
Median+:	0.025	0.305	0.007	0.415	0.027	0.011	11.5	17.0	7.5	225.0

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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.
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K = Concentration below the quantification level shown.
NAV = Requested analysis not available.
NH = Non-homogenous sample made analysis of a representative sample questionable.
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QC = Quality control problems exist.
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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
610273	Muskegon River (Lower)									
3/27/2001		9.0	170	382	366	13.1	8.0	8.0	2.0	HT 1.8
4/16/2001		20.0	147	336	313	11.0	HT 8.0	7.6	7.2	4.4
5/16/2001		97.0	124	284	260	9.2	8.0	7.5	15.5	58.0
5/19/2001		31.0	131	295	272	9.2	HT 7.9	7.7	14.9	HT 5.1
5/22/2001	NH	20.0	133	292	269	8.7	8.0	7.7	14.7	3.7
6/20/2001		14.0	138	312	288	8.2	8.2	8.0	19.6	3.6
7/31/2001	K	4.0	172	357	313	7.8	8.3	8.1	24.9	2.4
8/20/2001		29.0	147	327	332	7.3	8.0	7.9	20.8	6.7
9/25/2001	K	4.0	177	380	336	9.1	HT 8.1	7.7	15.0	HT 3.2
10/17/2001		10.0	177	395	372	9.4	HT 8.0	8.0	12.4	2.1
10/31/2001		11.0	170	378	368	10.3	8.0	8.0	10.0	2.5
11/14/2001	K	4.0	169	377	338	10.5	8.0	7.8	8.3	1.7
No. of Samples:		12	12	12	12	12	12	12	12	12
Mean+:	*	20.6	155	343	319	9.5	8.0	7.8	13.8	7.9
Median+:		12.5	158	347	323	9.2	8.0	7.9	14.8	3.4

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A = Value reported is the mean of two or more determinations.
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DL = Sample analyzed using a dilution(s).
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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
670008 Muskegon River (Upper)										
3/7/2001	0.043	C 0.310	0.004	0.430	0.026	0.008	5.0	16.0	7.1	220.0
3/29/2001	0.011	0.250	0.004	0.500	0.033	0.010	3.0	15.0	7.8	190.0
4/16/2001	0.024	C 0.122	0.005	0.620	0.050	0.015	6.0	12.0	9.7	160.0
5/16/2001	0.089	C 0.240	0.011	1.180	0.183	0.020	5.0	15.0	DM 14.0	180.0
5/19/2001	0.049	C 0.171	0.009	0.840	0.069	0.013	5.0	11.0	DM 15.0	160.0
5/22/2001	0.049	C 0.145	0.008	0.840	0.078	0.011	3.0	15.0	11.0	190.0
6/19/2001	0.013	C 0.189	0.008	0.630	0.053	0.014	5.0	14.0	10.0	210.0
7/30/2001	0.010	C 0.159	0.005	0.280	0.021	0.003	10.0	18.0	4.0	260.0
8/20/2001	0.023	C HT 0.260	HT 0.006	0.590	0.058	HT 0.008	17.0	14.0	6.9	220.0
9/25/2001	0.017	C 0.230	0.007	0.420	0.030	0.011	7.0	17.0	6.6	240.0
10/17/2001	0.023	C 0.200	0.005	0.640	0.042	0.009	10.0	16.0	11.0	210.0
11/14/2001	0.017	C 0.250	0.008	0.400	0.020	0.005	INT	2.0	7.5	220.0
No. of Samples:	12	12	12	12	12	12	11	12	12	12
Mean+:	0.031	0.211	0.007	0.614	0.055	0.011	6.9	13.8	9.2	205.0
Median+:	0.023	0.215	0.007	0.605	0.046	0.011	5.0	15.0	8.8	210.0
660038 Ontonagon River										
4/17/2001	0.018	C 0.210	0.012	0.660	0.167	K DM 0.100	5.0	3.0	DM 15.0	50.0
6/13/2001	0.016	C 0.210	0.004	0.480	0.050	0.013	2.0	4.0	DM 10.0	90.0
8/13/2001	T 0.008	NAV	0.003	0.450	0.035	0.006	3.0	3.0	DM 10.0	100.0
10/10/2001	T 0.007	NAV	T 0.001	0.220	0.016	0.006	K 2.0	3.0	5.1	120.0
No. of Samples:	4	2	4	4	4	4	4	4	4	4
Mean+:	0.012	0.210	0.005	0.453	0.067	* 0.019	* 2.8	3.3	10.0	90.0
Median+:	0.012	0.210	0.004	0.465	0.043	0.010	2.5	3.0	10.0	95.0

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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)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
670008	Muskegon River (Upper)									
3/7/2001		10.0	152	345	314	12.8	8.0	7.8	1.2	3.5
3/29/2001		8.0	135	292	276	13.1	8.0	7.7	2.2	5.2
4/16/2001		10.0	105	243	183	9.3	HT 7.8	7.4	9.5	7.9
5/16/2001		100.0	116	274	260	9.6	7.9	7.5	13.0	49.0
5/19/2001		26.0	111	250	225	8.6	HT 7.8	7.5	17.1	HT 9.2
5/22/2001		NH 29.0	125	292	252	9.2	7.9	7.7	15.3	12.0
6/19/2001		11.0	144	316	290	8.4	8.2	8.0	21.4	8.3
7/30/2001		10.0	192	396	371	7.9	8.3	7.9	20.6	3.9
8/20/2001		26.0	160	338	308	8.1	7.9	7.6	16.5	12.0
9/25/2001		11.0	173	374	332	10.9	HT 8.1	7.8	10.3	HT 4.3
10/17/2001		12.0	149	328	304	10.2	HT 7.8	7.8	8.6	6.4
11/14/2001		K 4.0	147	333	305	11.5	8.0	7.9	6.4	2.9
No. of Samples:		12	12	12	12	12	12	12	12	12
Mean+:		* 21.3	142	315	285	10.0	8.0	7.7	11.8	10.4
Median+:		11.0	146	322	297	9.5	8.0	7.8	11.7	7.2
660038	Ontonagon River									
4/17/2001		130.0	33	71	60	13.0	HT 7.4	7.6	4.0	HT 130.0
6/13/2001		18.0	59	140	129	8.5	HT 7.8	7.5	20.5	HT 21.0
8/13/2001		15.0	73	160	161	7.2	HT 7.8	7.8	22.6	15.0
10/10/2001		7.0	82	181	172	10.4	8.0	8.0	10.8	8.8
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		42.5	62	138	130	9.8	7.7	7.7	14.5	43.7
Median+:		16.5	66	150	145	9.5	7.8	7.7	15.7	18.0

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
530027 Pere Marquette River										
3/27/2001	0.018	0.131	HT 0.003	0.320	0.027	HT 0.010	8.0	10.0	5.9	200.0
5/30/2001	0.028	C 0.070	0.006	0.740	0.046	0.019	6.0	5.0	15.0	160.0
7/30/2001	0.016	C 0.077	0.003	0.280	0.032	0.008	16.0	14.0	2.8	250.0
10/30/2001	0.016	C 0.100	0.003	0.540	0.025	0.011	13.0	7.0	12.0	180.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.020	0.095	0.004	0.470	0.033	0.012	10.8	9.0	8.9	197.5
Median+:	0.017	0.089	0.003	0.430	0.030	0.011	10.5	8.5	9.0	190.0
490006 Pine River										
4/24/2001	0.017	C 0.043	0.009	0.750	0.126	HT 0.020	9.0	3.0	DM 20.0	90.0
6/12/2001	0.039	C 0.032	0.007	0.560	0.070	0.017	4.0	2.0	DM 14.0	120.0
8/27/2001	0.019	C 0.039	0.006	0.420	0.112	0.022	8.0	4.0	DM 9.8	150.0
10/23/2001	0.012	C 0.031	0.011	0.720	0.058	0.015	7.0	2.0	DM 25.0	90.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.022	0.036	0.008	0.613	0.092	0.019	7.0	2.8	17.2	112.5
Median+:	0.018	0.036	0.008	0.640	0.091	0.019	7.5	2.5	17.0	105.0
140126 Pokagon Creek										
2/27/2001	K DL 0.050	C 3.400	0.014	0.690	0.051	0.018	39.0	8.0	7.2	290.0
6/14/2001	DL 0.030	C 2.400	0.013	0.720	0.069	0.022	22.0	10.0	DM 5.8	340.0
8/29/2001	DL 0.030	C 2.400	0.010	0.440	0.044	0.017	33.0	11.0	4.1	350.0
11/20/2001	DL 0.020	C 2.200	0.007	0.380	0.024	0.010	30.0	10.0	4.7	340.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.026	2.600	0.011	0.558	0.047	0.017	31.0	9.8	5.5	330.0
Median+:	0.030	2.400	0.012	0.565	0.048	0.018	31.5	10.0	5.3	340.0

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DM = Dilution required due to matrix problems.
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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)		pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)		Turbidity (NTU)
530027	Pere Marquette River											
	3/27/2001	6.0	147	305	291	13.4		8.0	8.0	1.7	HT	4.1
	5/30/2001	8.0	124	245	220	7.8		7.7	7.6	13.6		5.9
	7/30/2001	11.0	183	378	338	8.3		8.2	7.7	20.9		6.0
	10/30/2001	10.0	132	272	253	9.9		7.5	7.4	6.1		2.9
	No. of Samples:	4	4	4	4	4		4	4	4		4
	Mean+:	8.8	147	300	276	9.9		7.8	7.7	10.6		4.7
	Median+:	9.0	140	289	272	9.1		7.8	7.7	9.9		5.0
490006	Pine River											
	4/24/2001	73.0	67	142			HT	7.7				61.0
	6/12/2001	24.0	95	192	189	8.3		7.9	7.8	17.5	HT	20.0
	8/27/2001	73.0	113	225	221	8.4	HT	8.0	7.8	18.3		85.0
	10/23/2001	16.0	73	139	132	11.2		7.6	7.6	7.2		21.0
	No. of Samples:	4	4	4	3	3		4	3	3		4
	Mean+:	46.5	87	175	181	9.3		7.8	7.7	14.3		46.8
	Median+:	48.5	84	167	189	8.4		7.8	7.8	17.5		41.0
140126	Pokagon Creek											
	2/27/2001	7.0	225	447	428	11.4		7.9	7.4	3.6		6.1
	6/14/2001	26.0	251	530	519	7.6		8.1	7.9	18.7	HT	8.3
	8/29/2001	16.0	272	534	534	8.7	HT	8.1	7.9	15.8		4.8
	11/20/2001	10.0	275	529	476	10.8		8.0	8.0	7.8		3.0
	No. of Samples:	4	4	4	4	4		4	4	4		4
	Mean+:	14.8	256	510	489	9.6		8.0	7.8	11.5		5.6
	Median+:	13.0	262	530	498	9.8		8.1	7.9	11.8		5.5

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DM = Dilution required due to matrix problems.
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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
580046 River Raisin										
2/14/2001	DL 0.170	C 5.800	0.036	1.170	0.240	0.102	23.0	26.0	8.0	260.0
5/2/2001	K DL 0.050	C 2.500	0.019	1.100	0.083	HT 0.005	54.0	42.0	8.2	430.0
7/25/2001	0.047	C 0.133	0.008	0.630	0.058	0.006	63.0	52.0	5.1	400.0
9/18/2001	0.012	C 0.320	0.008	0.540	0.056	0.007	35.0	27.0	3.6	240.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	* 0.064	2.188	0.018	0.860	0.109	0.030	43.8	36.8	6.2	332.5
Median+:	# 0.049	1.410	0.014	0.865	0.071	0.007	44.5	34.5	6.6	330.0
820070 River Rouge										
4/2/2001	0.076	C 0.780	0.009	0.360	0.032	0.014	21.0	81.0	3.6	360.0
6/11/2001	0.146	C 0.780	0.025	0.640	0.070	0.020	27.0	99.0	4.9	430.0
8/16/2001	0.142	C 0.520	0.019	0.400	0.070	0.026	20.0	37.0	2.9	220.0
10/11/2001	0.116	C 0.660	0.009	0.490	0.065	0.019	25.0	68.0	3.8	330.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.120	0.685	0.016	0.473	0.059	0.020	23.3	71.3	3.8	335.0
Median+:	0.129	0.720	0.014	0.445	0.068	0.020	23.0	74.5	3.7	345.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
580046	River Raisin									
2/14/2001		48.0	161	401	384	12.9	7.7	8.2	0.3	70.0
5/2/2001		17.0	308	669	647	9.4	8.4	8.0	17.8	9.1
7/25/2001		15.0	246	610	509	7.1	8.3	8.0	28.1	8.4
9/18/2001		7.0	155	370	367	9.7	8.5	8.1	20.7	7.7
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		21.8	218	513	477	9.8	8.3	8.1	16.7	23.8
Median+:		16.0	204	506	447	9.6	8.4	8.1	19.3	8.8
820070	River Rouge									
4/2/2001		A 4.0	170	547	530	11.8	8.0	8.5	5.8	4.3
6/11/2001		14.0	174	654	620	6.2	7.8	7.4	21.5	13.0
8/16/2001		14.0	110	339	333	5.7	7.9	7.7	27.2	13.0
10/11/2001		10.0	150	500	479	8.1	HT 7.8	7.8	16.1	13.0
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		10.5	151	510	491	8.0	7.9	7.9	17.7	10.8
Median+:		12.0	160	524	505	7.2	7.8	7.8	18.8	13.0

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
090177 Saginaw River										
2/10/2001	0.300	C HT 4.200	HT 0.033	1.440	0.280	HT 0.060	28.0	93.0	DM 7.3	470.0
2/12/2001	0.290	C 3.600	0.033	1.820	0.430	0.061	20.0	39.0	DM 7.6	280.0
3/1/2001	0.220	C 3.300	0.025	1.280	0.210	0.053	25.0	34.0	8.5	280.0
4/10/2001	DL 0.140	C 2.300	0.033	1.100	0.109	0.028	41.0	57.0	DM 12.0	390.0
5/24/2001	DL 0.140	C 2.600	0.051	1.160	0.130	0.029	30.0	46.0	DM 12.0	360.0
6/5/2001	DL 0.100	C 3.100	0.038	1.090	0.126	0.035	24.0	42.0	DM 13.0	350.0
7/10/2001	0.300	C 1.220	0.056	1.230	0.128	0.050	39.0	98.0	8.9	500.0
8/15/2001	0.360	C 0.740	0.062	1.230	0.136	0.061	41.0	120.0	8.4	510.0
9/11/2001	0.330	C 1.020	0.050	1.120	0.110	0.047	37.0	106.0	8.2	460.0
10/24/2001	DL 0.090	C 3.500	0.044	0.940	0.093	0.035	44.0	58.0	9.3	430.0
11/7/2001	DL 0.100	C 2.700	0.024	0.830	0.073	0.010	54.0	62.0	8.3	460.0
11/27/2001	0.153	C 1.750	0.026	1.010	0.051	0.011	51.0	86.0	9.8	510.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.210	2.503	0.040	1.188	0.156	0.040	36.2	70.1	9.4	416.7
Median+:	0.187	2.650	0.036	1.140	0.127	0.041	38.0	60.0	8.7	445.0
730023 Shiawassee River										
2/15/2001	0.130	C 2.500	0.024	1.000	0.139	0.043	78.0	45.0	8.0	320.0
5/8/2001	0.069	C 0.860	0.018	0.900	0.065	0.013	39.0	66.0	8.6	490.0
7/19/2001	0.034	C 0.260	0.006	0.590	0.068	0.025	17.0	37.0	5.8	460.0
9/5/2001	0.022	C 0.181	0.004	0.620	0.058	PI 0.006	39.0	76.0	6.1	460.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.064	0.950	0.013	0.778	0.083	0.022	43.3	56.0	7.1	432.5
Median+:	0.052	0.560	0.012	0.760	0.067	0.019	39.0	55.5	7.1	460.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
090177	Saginaw River									
2/10/2001		120.0	240	724	720	12.2	7.9	9.6	0.2	HT 90.0
2/12/2001		180.0	163	431	410	11.3	7.6	7.0	0.0	150.0
3/1/2001		66.0	171	434			7.8			48.0
4/10/2001		27.0	240	600	583	8.8	7.9	7.8	11.0	38.0
5/24/2001		30.0	230	560	537	6.4	7.9	7.6	17.8	28.0
6/5/2001		45.0	216	539	510	8.2	7.9	7.6	14.8	44.0
7/10/2001		16.0	264	773			HT 8.1			20.0
8/15/2001		16.0	238	788	782	4.2	7.9	7.7	25.8	22.0
9/11/2001		8.0	217	710	701	8.5	7.8	7.7	22.9	15.0
10/24/2001		18.0	269	658	644	7.8	7.8	7.8	11.7	23.0
11/7/2001		17.0	299	713	678	9.2	HT 8.0	7.8	9.0	18.0
11/27/2001		A 20.0	296	777	742	10.1	HT 8.0	8.0	7.4	15.0
No. of Samples:		12	12	12	10	10	12	10	10	12
Mean+:		46.9	237	642	631	8.7	7.9	7.9	12.1	42.6
Median+:		23.5	239	684	661	8.7	7.9	7.8	11.4	25.5
730023	Shiawassee River									
2/15/2001		35.0	347	734	463	13.6	7.9	8.0	0.2	28.0
5/8/2001		15.0	310	749	728	7.9	HT 8.2	8.0	17.6	13.0
7/19/2001		26.0	197	485	703	6.0	7.9	7.9	25.0	15.0
9/5/2001		22.0	246	709	702	8.5	HT 8.3	7.9	19.5	17.0
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		24.5	275	669	649	9.0	8.1	8.0	15.6	18.3
Median+:		24.0	278	722	703	8.2	8.1	8.0	18.6	16.0

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
110628 St. Joseph River (Lower)										
2/12/2001	0.310	C 4.300	0.039	1.670	0.340	PI 0.124	26.0	20.0	DM 8.6	270.0
2/15/2001	DL 0.180	C 3.600	0.026	1.020	0.133	0.043	32.0	22.0	6.9	310.0
2/27/2001	0.220	C 2.900	0.030	1.450	0.400	0.106	31.0	20.0	7.9	290.0
4/17/2001	0.026	C 1.820	0.015	0.730	0.088	0.016	38.0	27.0	5.5	370.0
4/25/2001	0.023	C 1.900	0.015	0.690	0.084	HT 0.012	40.0	27.0	6.0	360.0
5/21/2001	0.019	C 1.680	0.018	0.610	0.093	0.020	39.0	26.0	5.1	380.0
7/3/2001	0.011	C 1.120	0.009	0.830	0.076	0.008	42.0	31.0	5.4	380.0
8/8/2001	T 0.009	C 0.960	0.015	0.680	0.078	0.010	42.0	33.0	4.1	370.0
8/23/2001	0.048	C 1.290	0.017	0.780	0.156	0.037	42.0	35.0	4.2	370.0
9/24/2001	0.037	C 1.520	0.010	0.460	0.079	0.037	35.0	30.0	4.1	370.0
10/18/2001	DL 0.070	C 2.800	0.026	1.090	0.157	0.058	40.0	23.0	8.9	340.0
11/20/2001	0.034	C 1.820	0.010	0.500	0.050	0.019	41.0	28.0	5.4	390.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.082	2.143	0.019	0.876	0.145	0.041	37.3	26.8	6.0	350.0
Median+:	0.036	1.820	0.016	0.755	0.091	0.029	39.5	27.0	5.5	370.0
750273 St. Joseph River (Upper)										
2/12/2001	DL 0.130	C HT 2.400	HT 0.020	0.930	0.093	HT 0.023	25.0	15.0	6.8	260.0
6/13/2001	0.048	C 1.320	0.015	0.640	0.034	0.011	28.0	20.0	7.0	350.0
8/29/2001	0.035	C 1.060	0.015	0.600	0.047	0.005	38.0	20.0	5.6	310.0
11/20/2001	0.041	C 1.710	0.010	0.460	0.014	0.005	36.0	21.0	5.8	360.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.064	1.623	0.015	0.658	0.047	0.011	31.8	19.0	6.3	320.0
Median+:	0.045	1.515	0.015	0.620	0.041	0.008	32.0	20.0	6.3	330.0

+ = Calculated value; not rounded to the appropriate number of significant figures.
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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
110628	St. Joseph River (Lower)									
2/12/2001		61.0	175	415	356		7.9	9.2	1.0	71.0
2/15/2001		29.0	205	471	447	14.9	8.0	7.8	1.7	23.0
2/27/2001		97.0	191	440	422	13.8	8.0	7.5	2.9	120.0
4/17/2001		21.0	267	563	546	10.3	8.2	7.7	11.3	11.0
4/25/2001		25.0	272	558	541	9.3	8.2	7.8	14.5	14.0
5/21/2001	NH	33.0	274	577	556	8.3	8.2	7.7	20.4	13.0
7/3/2001		29.0	272	580	570	8.4	HT 8.4	7.9	23.3	16.0
8/8/2001		19.0	273	571	579	10.5	HT 8.6	8.1	28.8	7.5
8/23/2001		45.0	250	573	562	7.0	8.1	7.6	22.7	19.0
9/24/2001		7.0	263	565	515	7.6	8.1	9.2	17.5	HT 7.8
10/18/2001		45.0	243	520	488	10.1	7.9	7.9	11.6	28.0
11/20/2001		12.0	287	604	545	10.5	8.1	8.0	9.6	7.6
No. of Samples:		12	12	12	12	11	12	12	12	12
Mean+:		35.3	248	536	511	10.1	8.1	8.0	13.8	28.2
Median+:		29.0	265	564	543	10.1	8.1	7.9	13.1	15.0
750273	St. Joseph River (Upper)									
2/12/2001		20.0	185	407	350		7.8	7.8	0.0	HT 16.0
6/13/2001		8.0	238	531	520	6.6	HT 8.0	7.9	23.3	HT 3.2
8/29/2001		11.0	239	478	479	7.0	HT 8.0	7.8	23.8	5.0
11/20/2001	K	4.0	270	554	500	10.6	8.0	7.8	9.1	2.2
No. of Samples:		4	4	4	4	3	4	4	4	4
Mean+:	*	10.3	233	493	462	8.1	8.0	7.8	14.1	6.6
Median+:		9.5	239	505	490	7.0	8.0	7.8	16.2	4.1

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
210032 Sturgeon River										
4/9/2001	0.041	C 0.360	0.008	0.750	0.044	0.010	10.0	2.0	18.0	60.0
4/16/2001	0.020	C 0.167	0.006	0.660	0.040	0.009	15.0	2.0	DM 20.0	50.0
5/15/2001	0.033	C 0.076	0.006	0.560	0.022	0.004	28.0	2.0	DM 20.0	130.0
6/12/2001	0.010	C 0.064	0.005	0.660	0.030	T 0.002	17.0	2.0	DM 18.0	120.0
7/23/2001	0.023	C 0.178	0.004	0.520	0.027	0.008	46.0	3.0	13.0	170.0
8/6/2001	0.019	C 0.057	0.003	0.430	0.015	0.003	45.0	3.0	10.0	190.0
8/27/2001	0.013	C 0.074	0.002	0.290	0.015	0.006	32.0	2.0	8.9	160.0
9/10/2001	0.023	C 0.058	0.003	0.350	0.009	0.005	51.0	3.0	8.8	190.0
9/21/2001	0.014	C HT 0.074	HT 0.003	0.370	0.015	HT 0.005	32.0	2.0	9.6	170.0
10/11/2001	0.012	C 0.051	0.003	0.640	0.021	0.005	27.0	2.0	DM 20.0	130.0
10/29/2001	0.016	C 0.093	0.005	0.740	0.023	0.006	24.0	2.0	DM 26.0	90.0
11/19/2001	0.031	C 0.082	0.003	0.510	0.013	0.006	43.0	3.0	16.0	150.0
No. of Samples:	12	12	12	12	12	12	12	12	12	12
Mean+:	0.021	0.111	0.004	0.540	0.023	0.006	30.8	2.3	15.7	134.2
Median+:	0.020	0.075	0.004	0.540	0.022	0.006	30.0	2.0	17.0	140.0
170141 Tahquamenon River										
4/25/2001	0.012	C 0.033	0.005	0.650	0.029	T HT 0.001	11.0	2.0	DM 22.0	40.0
6/11/2001	0.041	C 0.100	0.008	0.700	0.030	0.005	11.0	3.0	4.4	90.0
8/20/2001	0.015	C HT 0.079	HT 0.004	0.470	0.017	HT 0.005	7.0	2.0	12.0	110.0
10/3/2001	0.032	C 0.040	0.005	1.020	0.030	0.006	13.0	3.0	DM 30.0	80.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.025	0.063	0.006	0.710	0.027	0.004	10.5	2.5	17.1	80.0
Median+:	0.024	0.060	0.005	0.675	0.030	0.005	11.0	2.5	17.0	85.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
210032	Sturgeon River									
4/9/2001		58.0	39	85	74	11.6	HT 6.9	6.7	2.1	16.0
4/16/2001		10.0	38	83	75	10.2	6.9	7.1	5.7	6.7
5/15/2001		K 4.0	93	198	193	9.3	7.6	7.3	12.2	4.9
6/12/2001		7.0	88	180			7.7			HT 6.1
7/23/2001		K 4.0	122	267	264	6.5	7.7	7.3	23.8	7.8
8/6/2001		K 4.0	149	293	298	7.8	HT 7.9	7.8	26.0	3.0
8/27/2001		K 4.0	126	249	245	8.4	HT 7.8	7.6	18.2	4.4
9/10/2001		9.0	142	298	295	8.9	7.9	7.6	16.9	3.2
9/21/2001		4.0	124	257	248	9.1	7.8	7.6	13.9	HT 3.8
10/11/2001		5.0	96	194	184	9.4	HT 7.5	7.4	11.0	5.6
10/29/2001		13.0	66	137	138	10.4	7.3	7.5	4.7	6.7
11/19/2001		K 4.0	107	229	220	11.4	7.6	7.7	6.4	4.4
No. of Samples:		12	12	12	11	11	12	11	11	12
Mean+:		* 9.7	99	206	203	9.4	7.5	7.4	12.8	6.1
Median+:		4.5	102	214	220	9.3	7.7	7.5	12.2	5.3
170141	Tahquamenon River									
4/25/2001		10.0	29	67	58	10.5	6.8	6.8	9.0	5.3
6/11/2001		A 4.0	64	138	133	8.5	HT 7.6	7.4	17.0	HT 2.8
8/20/2001		K 4.0	86	174	176	8.2	HT 7.8	7.8	21.5	2.3
10/3/2001		5.0	65	121	113	9.6	7.1	7.0	12.3	3.7
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		* 5.3	61	125	120	9.2	7.3	7.3	15.0	3.5
Median+:		4.5	65	130	123	9.1	7.4	7.2	14.7	3.3

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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)	Chloride (mg/L)	Organic Carbon (mg/L)	Dissolved Solids (mg/L)
040123 Thunder Bay River										
3/6/2001	0.039	C 0.220	0.003	0.360	0.013	HT 0.003	6.0	14.0	8.3	290.0
6/20/2001	0.040	C 0.033	0.004	0.550	0.017	0.005	5.0	7.0	12.0	240.0
8/28/2001	0.030	C 0.020	0.002	0.330	0.020	0.007	6.0	7.0	5.4	200.0
10/24/2001	0.015	C 0.025	0.006	0.450	0.014	4.000	14.0	10.0	8.3	260.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.031	0.075	0.004	0.423	0.016	1.004	7.8	9.5	8.5	247.5
Median+:	0.035	0.029	0.004	0.405	0.016	0.006	6.0	8.5	8.3	250.0
070070 Tioga River										
4/17/2001	0.019	C 0.164	0.005	0.600	0.020	K DM 0.100	6.0	1.0	DM 22.0	20.0
6/13/2001	0.022	C 0.021	0.006	0.730	0.025	0.014	3.0	2.0	DM 24.0	30.0
8/13/2001	0.050	NAV	K DM 0.100	1.170	0.040	K DM 0.100	7.0	2.0	DM 34.0	40.0
10/10/2001	0.010	C 0.064	0.002	0.550	0.015	0.004	3.0	1.0	15.0	40.0
No. of Samples:	4	3	4	4	4	4	4	4	4	4
Mean+:	0.025	0.083	* 0.016	0.763	0.025	* 0.030	4.8	1.5	23.8	32.5
Median+:	0.021	0.064	0.006	0.665	0.023	# 0.057	4.5	1.5	23.0	35.0
730025 Tittabawassee River										
2/10/2001	0.280	C HT 1.880	HT 0.016	1.020	0.120	HT 0.031	29.0	55.0	DM 6.8	360.0
5/9/2001	0.046	C 0.480	0.015	0.730	0.057	0.009	28.0	54.0	8.8	350.0
7/19/2001	0.104	C 0.280	0.019	0.870	0.041	0.011	32.0	138.0	8.7	560.0
9/5/2001	0.023	C 0.390	0.009	0.640	0.064	PI 0.020	39.0	96.0	9.1	440.0
No. of Samples:	4	4	4	4	4	4	4	4	4	4
Mean+:	0.113	0.758	0.015	0.815	0.071	0.018	32.0	85.8	8.4	427.5
Median+:	0.075	0.435	0.016	0.800	0.061	0.016	30.5	75.5	8.8	400.0

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STORET ID		Suspended Solids (mg/L)	Hardness (Ca2CO3) (mg/L)	Conductivity (Lab) (umho/cm)	Conductivity (Field) (umho/cm)	Dissolved Oxygen (mg/L)	pH (Lab) (S.U.)	pH (Field) (S.U.)	Temperature (°C)	Turbidity (NTU)
040123	Thunder Bay River									
3/6/2001		10.0	207	439	414	10.2	7.6	7.2	0.1	1.8
6/20/2001	K	4.0	185	375	382	7.0	8.2	7.9	22.8	2.1
8/28/2001	K	4.0	155	310	304	7.1	HT 8.1	8.0	22.2	0.8
10/24/2001	K	4.0	199	404	403	9.7	8.0	8.0	10.3	0.6
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:	*	4.0	187	382	376	8.5	8.0	7.8	13.9	1.3
Median+:	K	4.0	192	390	393	8.4	8.0	7.9	16.3	1.3
070070	Tioga River									
4/17/2001		5.0	12	28	21	12.6	HT 5.9	5.9	1.7	HT 0.5
6/13/2001	K	4.0	24	45	39	8.0	HT 7.1	6.7	18.8	HT 0.6
8/13/2001	K	4.0	37	68	65	8.6	HT 7.2	7.1	15.4	2.0
10/10/2001	K	4.0	31	66	59	9.6	7.1	7.0	10.8	0.5
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:	*	2.8	26	52	46	9.7	6.8	6.7	11.7	0.9
Median+:	K	4.0	28	56	49	9.1	7.1	6.9	13.1	0.6
730025	Tittabawassee River									
2/10/2001		47.0	205	554	553	12.6	7.8	8.0	0.0	HT 33.0
5/9/2001		16.0	204	544	524	8.6	HT 8.1	7.8	18.2	10.0
7/19/2001		5.0	235	867	864	6.9	HT 8.2	7.8	26.1	4.5
9/5/2001		14.0	232	674	646	9.7	HT 8.4	8.1	21.8	11.0
No. of Samples:		4	4	4	4	4	4	4	4	4
Mean+:		20.5	219	660	647	9.5	8.1	7.9	16.5	14.6
Median+:		15.0	219	614	600	9.2	8.1	7.9	20.0	10.5

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STORET ID	Watershed	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							
	3/7/2001	0.000	0.003	BSQC 0.080	0.160	0.680	0.029	0.270
	3/20/2001	0.160	ELOD 0.004	0.060	0.150	0.640	0.046	4.610
	4/10/2001	0.100	0.000	0.080	0.170	0.610	0.062	0.380
	5/24/2001	1.070	0.002	0.100	0.310	0.920	0.049	0.300
	6/5/2001	0.250	0.002	0.000	0.160	0.780	0.045	0.260
	7/11/2001	0.240	0.000	0.000	0.338	0.680	0.042	0.115
	8/28/2001	0.000	0.000	MBQC 0.110	0.220	0.560	0.030	0.081
	9/12/2001	0.140	0.000	0.001	0.201	0.800	0.085	0.201
	9/26/2001	0.230	0.000	0.000	0.150	0.720	0.121	0.269
	10/24/2001	0.190	0.000	0.000	0.158	0.640	0.073	0.138
	11/6/2001	0.160	0.000	0.001	0.106	0.530	0.060	0.199
	11/28/2001	2.540	0.000	0.015	0.160	0.570	0.056	0.296
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	0.423	0.001	0.037	0.190	0.678	0.058	0.593
	Median+:	0.175	0.000	0.008	0.160	0.660	0.053	0.265
630291	Bigelow Creek							
	3/27/2001	0.660	ELOD 0.004	0.110	0.220	0.570	0.131	0.620
	6/19/2001	LCQC 2.030	0.010	0.180	0.110	0.710	0.345	0.990
	8/30/2001	1.310	0.000	MBQC 0.079	0.350	0.670	0.276	1.000
	10/31/2001	0.620	0.000	0.080	0.148	0.640	0.096	0.537
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.155	0.004	0.112	0.207	0.648	0.212	0.787
	Median+:	0.985	0.002	0.095	0.184	0.655	0.204	0.805

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

STORET ID	Watershed	Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
740385	Black River							
	3/19/2001	0.280	0.040	0.900	2.270	2.290	0.611	6.470
	6/27/2001	LCQC 2.510	0.030	1.250	2.300	2.620	0.944	5.120
	8/16/2001	0.770	0.006	MBQC 0.511	1.400	1.360	0.584	4.640
	10/11/2001	6.520	0.010	0.450	1.740	1.870	0.470	2.780
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.520	0.022	0.778	1.928	2.035	0.652	4.753
	Median+:	1.640	0.020	0.706	2.005	2.080	0.598	4.880
280014	Boardman River							
	3/28/2001	0.770	ELOD 0.002	0.110	0.240	0.590	0.075	0.480
	5/30/2001	1.550	HT 0.006	HT 0.110	HT 0.250	HT 0.870	HT 0.137	HT 0.580
	7/31/2001	0.480	0.000	0.000	CCB 0.146	0.720	0.063	0.223
	10/30/2001	0.590	0.000	0.080	0.208	0.610	0.078	0.397
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.848	0.002	0.075	0.211	0.698	0.088	0.420
	Median+:	0.680	0.001	0.095	0.224	0.665	0.077	0.439

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BSQC = Batch spike exceeded quality control criteria.
CCB = Continuing calibration blank exceeded detection level.
CCV = Continuing calibration standard exceeded quality control criteria.
ELOD = Matrix problem; elevated detection level reported.
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ICB = Initial calibration blank exceeded level of detection.
ISQC = Internal standard exceeded quality control criteria.
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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	Watershed		Mercury (ng/L)		Cadmium (ug/L)		Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)		Zinc (ug/L)
730024	Cass River											
	2/26/2001	BSQC	5.740		0.050		1.970	2.940	2.120	1.670		11.000
	3/1/2001	MSD	1.940		0.030	BSQC	0.790	2.060	1.810	0.647		4.880
	4/11/2001		1.340	ELOD	0.012		0.390	1.640	1.900	0.438		3.850
	5/23/2001		1.720		0.020		0.700	1.700	3.530	0.670		3.810
	6/4/2001		1.590		0.020		0.460	1.330	2.520	0.484		2.560
	7/10/2001		1.660		0.010		1.080	2.410	3.320	0.756		5.610
	8/15/2001		1.970		0.020		1.370	1.910	3.730	1.030		6.560
	9/11/2001		1.660		0.020		1.360	1.950	3.260	1.120		5.060
	9/26/2001		1.440		0.008		0.820	1.340	2.590	0.758		3.630
	10/24/2001		3.500		0.020		1.200	2.270	3.220	0.972		4.750
	11/7/2001		1.370		0.008		0.490	1.510	2.500	0.457		2.370
	11/27/2001		1.060		0.002		0.440	1.150	2.170	0.492		3.120
	No. of Samples:		12		12		12	12	12	12		12
	Mean+:		2.083		0.018		0.923	1.851	2.723	0.791		4.767
	Median+:		1.660		0.020		0.805	1.805	2.555	0.713		4.300
160073	Cheboygan River											
	4/24/2001		0.500		0.005		0.040	0.490	0.830	0.050	BSQC	0.360
	6/19/2001	LCQC	0.450		0.000		0.000	0.270	0.710	0.039		0.240
	8/27/2001		0.140		0.000	MBQC	0.085	0.538	0.550	0.038		0.213
	10/25/2001		0.690		0.002		0.240	0.576	0.880	0.152		0.766
	No. of Samples:		4		4		4	4	4	4		4
	Mean+:		0.445		0.002		0.091	0.469	0.743	0.070		0.395
	Median+:		0.475		0.001		0.063	0.514	0.770	0.045		0.300

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500233	Clinton River									
	2/12/2001		5.680	0.080		2.300	4.080	2.940	2.530	14.600
	2/26/2001	BSQC	10.840	0.100		3.970	6.460	3.200	3.910	20.700
	4/2/2001	BSQC	0.890	0.060		0.710	2.650	4.400	0.734	10.300
	5/9/2001	BSQC	2.040	0.050		1.210	3.750	6.410	1.820	12.600
	5/23/2001		8.630	0.140		5.180	7.830	6.960	7.260	28.800
	6/4/2001		7.930	0.090		2.920	4.660	4.100	3.710	14.300
	6/26/2001	LCQC	2.230	0.050		1.240	2.930	3.620	1.790	8.600
	8/7/2001									
	9/10/2001		19.290	0.190		6.040	8.660	6.180	9.480	37.500
	10/11/2001	BSQC	4.000	0.050		1.630	3.680	4.530	1.970	10.900
	10/25/2001		18.430	0.290		10.000	11.300	8.260	15.300	53.200
	11/27/2001		1.550	0.030		0.680	1.930	2.830	0.885	6.810
	No. of Samples:		11	11		11	11	11	11	11
	Mean+:		7.410	0.103		3.262	5.266	4.857	4.490	19.846
	Median+:		5.680	0.080		2.300	4.080	4.400	2.530	14.300
210102	Escanaba River									
	4/9/2001		5.110	0.040		0.860	0.990	0.800	0.765	5.840
	6/4/2001		2.270	0.020		0.420	0.560	0.790	0.153	3.270
	8/23/2001		2.090	0.080	MBQC	0.604	1.690	0.850	0.180	7.870
	10/18/2001		1.540	0.050		0.480	0.978	0.750	0.202	4.790
	No. of Samples:		4	4		4	4	4	4	4
	Mean+:		2.753	0.048		0.591	1.055	0.798	0.325	5.443
	Median+:		2.180	0.045		0.542	0.984	0.795	0.191	5.315

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790157	Evergreen Creek							
	3/20/2001	0.840	ELOD 0.013	0.170	0.960	1.190	0.162	1.780
	5/9/2001	BSQC 0.690	ELOD 0.015	0.070	0.590	1.690	0.112	0.830
	7/18/2001	0.630	0.000	0.000	0.563	1.370	0.176	0.732
	9/6/2001	0.650	0.000	MBQC 0.039	0.631	1.180	0.279	0.800
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	0.703	0.007	0.070	0.686	1.358	0.182	1.036
	Median+:	0.670	0.007	0.055	0.611	1.280	0.169	0.815
730285	Flint River							
	2/15/2001	6.550	0.060	2.420	3.560	2.770	3.490	14.400
	5/8/2001	BSQC 2.360	ELOD 0.027	0.660	2.050	3.410	1.430	9.760
	7/19/2001	2.820	0.040	1.770	3.470	6.040	1.930	10.800
	9/5/2001	1.430	0.020	1.240	2.520	6.360	1.130	10.200
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.290	0.037	1.523	2.900	4.645	1.995	11.290
	Median+:	2.590	0.034	1.505	2.995	4.725	1.680	10.500
380083	Grand River (Headwaters)							
	2/13/2001	1.370	0.003	0.080	0.610	0.540	0.072	0.980
	5/3/2001	3.020	ELOD 0.016	BSQC 0.780	0.900	2.050	0.857	2.300
	7/25/2001	1.910	0.009	0.080	0.662	1.300	0.736	2.040
	9/18/2001	0.950	0.004	0.070	0.291	1.390	0.343	1.520
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.813	0.008	0.253	0.616	1.320	0.502	1.710
	Median+:	1.640	0.007	0.080	0.636	1.345	0.540	1.780

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700123	Grand River (Lower)									
	2/11/2001		3.880	0.040		1.560	2.820	2.190	1.490	7.440
	2/14/2001		4.750	0.050		1.780	3.230	2.120	2.090	8.130
	2/28/2001	BSQC	2.750	0.030		1.120	3.000	1.990	1.120	6.450
	4/17/2001		1.710	0.020		0.710	1.640	2.340	0.900	4.500
	4/24/2001		3.360	0.040		1.500	2.850	3.190	2.440	7.880
	5/17/2001		14.610	0.080		4.730	4.800	5.010	5.350	BSQC 19.800
	5/21/2001		5.820	0.040		1.430	2.900	3.240	1.460	6.140
	7/2/2001	LCQC	2.840	0.020		0.610	2.190	2.740	0.758	3.660
	8/8/2001		1.610	0.010		0.580	1.510	3.450	0.795	3.570
	8/20/2001		1.810	0.006	MBQC	0.529	1.320	2.670	0.786	29.900
	10/18/2001		3.610	0.030		1.370	2.550	3.060	1.980	6.750
	11/13/2001		2.180	0.010		0.630	1.780	2.760	0.882	4.160
	No. of Samples:		12	12		12	12	12	12	12
	Mean+:		4.078	0.031		1.379	2.549	2.897	1.671	9.032
	Median+:		3.100	0.030		1.245	2.685	2.750	1.290	6.600

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340025	Grand River (Upper)							
	2/11/2001	10.100	0.080	2.190	4.020	2.340	2.840	12.500
	2/14/2001	BSQC 3.050	0.070	1.270	2.870	1.980	1.750	7.460
	2/28/2001	2.930	0.040	1.000	3.250	1.930	1.070	6.610
	4/16/2001	1.630	0.020	0.690	1.870	2.720	0.871	3.550
	4/24/2001	3.810	0.040	1.200	2.900	3.150	1.500	5.350
	5/16/2001	52.230	0.390	15.100	12.400	16.900	18.000	75.500
	5/31/2001	3.740	HT 0.050	HT 1.120	HT 2.620	HT 3.180	HT 1.530	HT 5.410
	7/2/2001	LCQC 1.660	0.010	0.170	2.310	2.870	0.462	1.790
	8/8/2001	1.400	0.010	MBQC 0.329	2.030	3.140	0.591	2.360
	9/24/2001	2.130	0.030	0.640	1.740	3.230	1.200	3.910
	10/29/2001	3.490	0.040	1.000	2.810	3.010	1.030	4.810
	11/21/2001	1.630	0.020	0.430	1.710	2.600	0.792	3.460
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	7.317	0.067	2.095	3.378	3.921	2.636	11.059
	Median+:	2.990	0.040	1.000	2.715	2.940	1.135	5.080
580364	Huron River							
	2/14/2001	0.950	0.040	0.720	2.370	2.120	1.430	11.500
	5/2/2001	1.310	0.030	BSQC 1.340	2.280	3.430	1.960	8.560
	7/26/2001	1.040	0.010	0.220	1.390	3.440	1.520	5.290
	9/18/2001	0.960	0.020	0.460	1.190	4.410	1.900	6.950
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.065	0.025	0.685	1.808	3.350	1.703	8.075
	Median+:	1.000	0.025	0.590	1.835	3.435	1.710	7.755

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030077	Kalamazoo River (Lower)							
	2/11/2001	4.000	0.040	0.900	2.740	1.550	1.100	6.510
	2/14/2001	2.720	0.060	0.640	2.140	1.320	1.090	5.900
	2/27/2001	BSQC 2.760	0.040	BSQC 0.840	2.140	1.700	1.180	5.340
	4/17/2001	3.940	0.010	0.560	1.330	2.500	1.270	3.080
	4/25/2001	5.640	0.020	0.970	1.630	2.260	1.590	3.310
	5/17/2001	8.340	0.030	1.270	1.900	2.350	2.200	BSQC 6.830
	5/21/2001	8.430	0.030	0.710	1.740	2.480	1.610	3.470
	7/2/2001	LCQC 14.200	0.030	1.030	1.960	2.400	2.510	4.970
	8/9/2001	6.880	0.020	0.700	1.220	2.270	1.640	3.550
	8/23/2001	7.310	0.020	MBQC 0.771	1.600	2.030	2.170	4.130
	10/18/2001	3.230	0.020	0.430	1.770	2.020	1.090	2.690
	11/13/2001	2.980	0.008	0.280	0.951	1.640	0.956	5.910
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	5.869	0.027	0.758	1.760	2.043	1.534	4.641
	Median+:	4.820	0.025	0.741	1.755	2.145	1.430	4.550
390057	Kalamazoo River (Upper)							
	2/13/2001	3.390	0.030	BSQC 0.550	1.360	1.220	1.020	3.970
	4/30/2001	5.950	0.070	1.940	1.700	2.430	2.100	BSQC 7.500
	7/25/2001	5.650	0.080	2.070	1.950	2.090	2.600	8.420
	9/24/2001	5.840	0.040	1.060	1.320	1.880	1.680	8.160
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	5.208	0.055	1.405	1.583	1.905	1.850	7.013
	Median+:	5.745	0.055	1.500	1.530	1.985	1.890	7.830

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510088	Manistee River							
	3/28/2001	0.800	ELOD 0.007	0.270	0.360	0.610	0.164	0.730
	5/29/2001	1.840	HT 0.030	HT 0.290	HT 0.470	HT 0.940	HT 0.250	HT 1.990
	7/31/2001	0.760	0.000	0.040	CCB 0.324	0.830	0.164	0.481
	10/30/2001	0.880	0.000	0.210	0.317	0.750	0.178	0.780
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.070	0.009	0.203	0.368	0.783	0.189	0.995
	Median+:	0.840	0.004	0.240	0.342	0.790	0.171	0.755
770073	Manistique River							
	4/9/2001	2.160	0.020	0.790	0.590	0.560	0.407	2.260
	5/30/2001	3.450	HT 0.009	HT 0.410	HT 0.370	HT 0.670	HT 0.250	HT 1.140
	8/23/2001	2.610	0.000	MBQC 0.233	0.056	0.570	0.173	0.827
	10/18/2001	2.690	0.008	0.400	0.445	0.670	0.338	1.350
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.728	0.009	0.458	0.365	0.618	0.292	1.394
	Median+:	2.650	0.009	0.405	0.408	0.620	0.294	1.245
550038	Menominee River							
	4/18/2001	4.190	0.020	0.560	1.110	0.700	0.260	1.770
	6/14/2001	CCV 5.050	0.009	0.440	0.790	0.800	0.290	1.720
	8/14/2001	1.770	0.004	MBQC 0.183	0.942	0.850	0.129	1.100
	10/9/2001	1.700	0.010	0.140	0.657	0.850	0.122	1.900
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.178	0.011	0.331	0.875	0.800	0.200	1.623
	Median+:	2.980	0.010	0.312	0.866	0.825	0.195	1.745

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610273	Muskegon River (Lower)							
	3/27/2001	0.720	ELOD 0.005	0.160	0.550	0.630	0.127	0.720
	4/16/2001	0.870	0.004	0.260	0.440	0.680	0.254	1.270
	5/16/2001	10.130	0.050	1.880	1.980	2.130	2.180	7.770
	5/19/2001	2.030	0.000	0.280	0.700	0.710	0.274	BSQC 1.060
	5/22/2001	1.560	0.000	0.190	0.680	0.670	0.188	BSQC 1.780
	6/20/2001	LCQC 1.590	0.004	0.140	0.480	0.890	0.220	0.660
	7/31/2001	0.800	0.000	0.000	1.080	0.860	0.096	0.469
	8/20/2001	1.210	0.000	MBQC 0.287	0.814	1.000	0.408	1.660
	9/25/2001	0.680	0.001	0.080	0.436	0.990	0.146	0.774
	10/17/2001	0.550	0.000	0.120	0.464	1.060	0.172	0.687
	10/31/2001	0.660	0.000	0.120	0.440	0.740	0.189	0.806
	11/14/2001	0.840	0.000	0.070	0.441	0.640	0.130	0.787
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	1.803	0.005	0.299	0.709	0.917	0.365	1.537
	Median+:	0.855	0.000	0.150	0.515	0.800	0.189	0.797

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670008	Muskegon River (Upper)							
	3/7/2001	0.820	0.010	BSQC 0.250	0.610	0.640	0.115	1.190
	3/29/2001	1.930	0.004	0.340	0.590	0.870	0.217	1.470
	4/16/2001	3.210	0.008	0.390	0.670	0.720	0.346	1.830
	5/16/2001	13.710	0.060	1.750	2.230	1.830	2.550	BSQC 10.500
	5/19/2001	4.580	0.020	0.450	0.940	0.800	0.426	BSQC 2.890
	5/22/2001	3.990	0.020	0.690	0.970	1.160	0.751	3.300
	6/19/2001	LCQC 2.580	0.010	0.400	0.490	0.990	0.350	1.690
	7/30/2001	0.940	0.000	0.000	0.421	0.820	0.206	1.530
	8/20/2001	2.210	0.007	MBQC 0.402	0.717	1.150	0.478	2.530
	9/25/2001	1.220	0.002	0.140	0.414	1.020	0.205	1.190
	10/17/2001	1.700	0.010	0.270	0.676	1.030	0.325	1.800
	11/14/2001	1.150	0.000	0.120	0.463	0.650	0.141	1.070
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	3.170	0.013	0.434	0.766	0.973	0.509	2.583
	Median+:	2.070	0.009	0.365	0.640	0.930	0.336	1.745
660038	Ontonagon River							
	4/17/2001	8.350	0.050	3.540	7.170	3.250	1.160	6.670
	6/13/2001	2.180	0.010	1.070	3.510	1.200	0.374	2.300
	8/13/2001	1.940	0.003	MBQC 0.746	3.970	1.060	0.162	1.190
	10/10/2001	0.710	0.003	0.540	1.120	0.730	0.082	0.656
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.295	0.017	1.474	3.943	1.560	0.445	2.704
	Median+:	2.060	0.007	0.908	3.740	1.130	0.268	1.745

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STORET ID	Watershed	Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
530027	Pere Marquette River							
	3/27/2001	1.420	ELOD 0.009	0.250	0.370	0.530	0.158	1.090
	5/30/2001	2.990	HT 0.007	HT 0.330	HT 0.530	HT 0.930	HT 0.299	HT 1.450
	7/30/2001	1.310	0.005	0.150	0.434	0.830	0.291	0.996
	10/30/2001	1.980	0.000	0.200	0.451	0.690	0.147	1.320
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.925	0.005	0.233	0.446	0.745	0.224	1.214
	Median+:	1.700	0.006	0.225	0.443	0.760	0.225	1.205
490006	Pine River							
	4/24/2001	6.050	0.020	2.070	2.300	2.210	1.050	BSQC 5.770
	6/12/2001	1.770	0.010	1.230	0.860	1.250	0.453	2.870
	8/27/2001	1.980	0.004	2.400	1.840	2.320	1.010	5.360
	10/23/2001	4.960	0.020	1.230	1.210	1.310	0.546	3.070
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.690	0.014	1.733	1.553	1.773	0.765	4.268
	Median+:	3.470	0.015	1.650	1.525	1.760	0.778	4.215
140126	Pokagon Creek							
	2/27/2001	BSQC 1.380	0.009	CCB 0.270	0.730	0.960	0.310	2.680
	6/14/2001	CCV 2.450	0.020	0.320	0.430	1.440	0.719	2.390
	8/29/2001	1.080	0.000	MBQC 0.076	0.676	1.150	0.289	1.320
	11/20/2001	0.600	0.000	0.032	0.213	0.940	0.165	0.767
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	1.378	0.007	0.175	0.512	1.123	0.371	1.789
	Median+:	1.230	0.005	0.173	0.553	1.055	0.300	1.855

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STORET ID	Watershed	Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
580046	River Raisin							
	2/14/2001	6.340	0.070	2.470	4.000	3.190	2.240	13.000
	5/2/2001	1.370	ELOD 0.015	BSQC 1.200	2.160	3.370	0.420	2.390
	7/25/2001	1.140	0.010	0.220	2.390	2.750	0.566	2.350
	9/18/2001	1.540	0.020	0.610	2.770	2.380	0.539	3.610
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.598	0.029	1.125	2.830	2.923	0.941	5.338
	Median+:	1.455	0.018	0.905	2.580	2.970	0.553	3.000
820070	River Rouge							
	4/2/2001	BSQC 0.740	0.030	0.970	1.720	2.560	0.673	5.180
	6/11/2001	4.000	0.060	1.960	2.640	2.840	2.430	9.950
	8/16/2001	4.720	0.060	1.790	3.160	2.310	2.850	12.700
	10/11/2001	2.340	0.040	1.230	2.780	2.170	2.030	7.560
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.950	0.048	1.488	2.575	2.470	1.996	8.848
	Median+:	3.170	0.050	1.510	2.710	2.435	2.230	8.755

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STORET ID	Watershed	Mercury (ng/L)	Cadmium (ug/L)	Chromium (ug/L)	Copper (ug/L)	Nickel (ug/L)	Lead (ug/L)	Zinc (ug/L)
090177	Saginaw River							
	2/10/2001	8.290	0.080	3.770	5.190	3.450	3.990	19.900
	2/12/2001	13.960	0.170	5.950	8.140	4.260	7.420	34.800
	3/1/2001	BSQC 4.520	0.040	BSQC 1.640	2.940	2.070	1.650	9.150
	4/10/2001	2.160	ELOD 0.027	1.550	2.870	2.420	1.640	8.520
	5/24/2001	3.040	0.040	1.540	2.450	3.050	1.620	6.770
	6/5/2001	5.140	0.040	1.870	2.430	2.970	1.990	7.380
	7/10/2001	1.900	0.020	0.900	2.250	3.300	0.996	4.280
	8/15/2001	1.670	0.010	MBQC 1.050	2.190	3.500	1.090	9.510
	9/11/2001	1.150	0.010	0.820	1.810	3.000	0.996	3.860
	10/24/2001	2.620	0.020	1.160	2.020	2.920	1.100	4.580
	11/7/2001	1.570	0.010	0.890	1.670	2.460	1.040	4.470
	11/27/2001	9.990	0.010	0.780	1.620	0.023	0.857	8.800
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	4.668	0.040	1.827	2.965	2.785	2.032	10.168
	Median+:	2.830	0.024	1.350	2.340	2.985	1.360	7.950
730023	Shiawassee River							
	2/15/2001	4.090	0.040	1.660	2.260	1.680	1.680	6.580
	5/8/2001	BSQC 1.620	ELOD 0.023	0.580	1.760	2.520	0.770	3.880
	7/19/2001	1.510	0.020	0.750	1.800	2.630	0.679	2.710
	9/5/2001	1.320	0.007	MBQC 0.681	1.660	2.280	0.725	2.690
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.135	0.023	0.918	1.870	2.278	0.964	3.965
	Median+:	1.565	0.022	0.716	1.780	2.400	0.748	3.295

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110628	St. Joseph River (Lower)							
	2/12/2001	15.820	0.160	2.660	4.920	2.440	4.220	22.200
	2/15/2001	8.230	0.080	1.370	2.670	1.760	2.290	8.500
	2/27/2001	BSQC 10.990	0.140	BSQC 3.870	4.760	2.580	5.200	BSQC 19.000
	4/17/2001	5.030	0.050	0.680	1.480	1.880	1.390	5.150
	4/25/2001	5.020	0.060	0.980	2.020	2.340	1.770	5.130
	5/21/2001	6.110	0.070	0.720	1.780	1.780	1.530	BSQC 5.840
	7/3/2001	LCQC 3.900	0.050	0.420	1.740	2.170	0.945	3.740
	8/8/2001	1.150	0.020	0.230	1.100	2.100	0.483	1.940
	8/23/2001	4.670	0.030	MBQC 0.662	2.040	2.180	1.480	5.430
	9/24/2001	2.540	0.040	0.460	1.350	2.140	1.030	4.190
	10/18/2001	9.120	0.090	1.320	3.440	2.680	2.760	8.820
	11/20/2001	2.900	0.050	0.430	1.130	1.640	0.981	3.130
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	6.290	0.070	1.150	2.369	2.141	2.007	7.756
	Median+:	5.025	0.055	0.700	1.900	2.155	1.505	5.290
750273	St. Joseph River (Upper)							
	2/12/2001	7.890	0.020	0.470	1.240	0.950	0.890	3.420
	6/13/2001	CCV 1.180	0.007	0.080	0.460	1.440	0.374	1.050
	8/29/2001	1.250	0.000	MBQC 0.029	0.751	1.150	0.355	1.480
	11/20/2001	0.610	0.000	0.014	0.322	1.140	0.162	2.070
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	2.733	0.007	0.148	0.693	1.170	0.445	2.005
	Median+:	1.215	0.004	0.055	0.606	1.145	0.365	1.775

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210032	Sturgeon River							
	4/9/2001	4.480	0.030	0.740	0.740	0.600	0.551	3.790
	4/16/2001	5.120	0.010	0.550	0.800	0.046	0.357	2.810
	5/15/2001	BSQC 2.690	0.007	0.400	0.470	0.600	0.200	2.260
	6/12/2001	4.050	0.008	0.410	0.260	0.660	0.297	1.700
	7/23/2001	2.070	0.008	0.140	0.463	0.690	0.218	1.560
	8/6/2001	1.300	0.001	0.200	0.259	0.860	0.058	0.812
	8/27/2001	1.090	0.000	MBQC 0.106	0.479	0.600	0.079	0.854
	9/10/2001	1.050	0.000	MBQC 0.092	0.586	0.610	0.045	0.675
	9/21/2001	0.880	0.010	0.180	0.206	0.720	0.106	0.941
	10/11/2001	BSQC 3.100	0.006	0.330	0.369	0.660	0.240	1.450
	10/29/2001	5.140	0.010	0.550	0.454	0.580	0.357	1.890
	11/19/2001	2.400	0.002	0.280	0.224	0.520	0.187	1.140
	No. of Samples:	12	12	12	12	12	12	12
	Mean+:	2.781	0.008	0.332	0.443	0.596	0.225	1.657
	Median+:	2.545	0.008	0.305	0.459	0.605	0.209	1.505
170141	Tahquamenon River							
	4/25/2001	5.160	0.030	0.310	0.600	0.410	0.298	BSQC 4.440
	6/11/2001	2.680	0.010	0.350	0.230	0.570	0.261	1.400
	8/20/2001	1.200	0.000	MBQC 0.098	0.268	0.500	0.077	0.528
	10/3/2001	6.040	0.020	0.400	0.482	0.620	0.295	2.860
	No. of Samples:	4	4	4	4	4	4	4
	Mean+:	3.770	0.015	0.290	0.395	0.525	0.233	2.307
	Median+:	3.920	0.015	0.330	0.375	0.535	0.278	2.130

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040123	Thunder Bay River										
	3/6/2001		0.340		0.008	BSQC	0.140	0.400	0.860	0.063	0.910
	6/20/2001	LCQC	0.980		0.002		0.000	0.000	1.090	0.146	0.540
	8/28/2001		0.380		0.000	MBQC	0.089	0.319	0.570	0.120	0.515
	10/24/2001		0.640		0.000		0.003	0.295	0.970	0.109	0.403
	No. of Samples:		4		4		4	4	4	4	4
	Mean+:		0.585		0.003		0.058	0.254	0.873	0.110	0.592
	Median+:		0.510		0.001		0.046	0.307	0.915	0.115	0.528
070070	Tioga River										
	4/17/2001		7.020		0.020		0.440	0.830	0.310	0.197	3.490
	6/13/2001		4.030		0.020		0.360	0.370	0.510	0.288	2.260
	8/13/2001		5.920		0.007	MBQC	0.550	0.409	0.840	0.492	3.680
	10/10/2001		3.160		0.005		0.190	0.325	0.380	0.157	1.540
	No. of Samples:		4		4		4	4	4	4	4
	Mean+:		5.033		0.013		0.385	0.484	0.510	0.284	2.743
	Median+:		4.975		0.014		0.400	0.390	0.445	0.243	2.875
730025	Tittabawassee River										
	2/10/2001		3.070		0.040		1.330	2.320	1.630	1.430	8.370
	5/9/2001	BSQC	2.170	ELOD	0.010		0.470	1.480	1.740	0.596	3.200
	7/19/2001		1.050		0.007		0.260	1.540	1.860	0.252	1.430
	9/5/2001		1.250		0.000	MBQC	0.381	1.940	1.570	0.420	2.940
	No. of Samples:		4		4		4	4	4	4	4
	Mean+:		1.885		0.014		0.610	1.820	1.700	0.675	3.985
	Median+:		1.710		0.009		0.426	1.740	1.685	0.508	3.070

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STORET ID		Cong. 101 (ng/L)	Cong. 118 (ng/L)	Cong. 123+149 (ng/L)	Cong. 128 (ng/L)	Cong. 132+153+105 (ng/L)	Cong. 135+144 (ng/L)	Cong. 136 (ng/L)	Cong. 137+176 (ng/L)	Cong. 141 (ng/L)	Cong. 146 (ng/L)	Cong. 15+17 (ng/L)	Cong. 151 (ng/L)
350061	Au Sable River												
	7/11/2001	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.017	0.000
630291	Bigelow Creek												
	6/19/2001	0.016	0.013	0.008	0.005	0.026	0.003	0.000	0.000	0.003	NAI	0.026	0.003
740385	Black River												
	6/27/2001	0.016	0.012	0.010	0.004	0.017	0.003	0.000	0.000	0.002	NAI	0.025	0.003
280014	Boardman River												
	5/30/2001	0.007	0.001	0.002	0.000	0.003	0.000	0.000	0.000	0.001	NAI	0.028	0.000
730024	Cass River												
	7/10/2001	0.010	0.016	0.013	0.006	0.033	0.004	0.000	0.000	0.004	0.011	0.029	0.003
160073	Cheboygan River												
	6/19/2001	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.024	0.000
500233	Clinton River												
	6/26/2001	0.164	0.088	0.301	0.057	0.486	0.114	0.041	0.009	0.091	0.104	0.050	0.121
210102	Escanaba River												
	6/4/2001	0.004	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.023	0.000
790157	Evergreen Creek												
	7/18/2001	0.003	0.002	0.002	0.000	0.003	0.000	0.000	0.000	0.000	NAI	0.025	0.000
730285	Flint River												
	5/8/2001	0.091	0.054	0.072	0.034	0.105	0.029	0.011	0.001	0.019	NAI	0.053	0.023
380083	Grand River (Headwaters)												
	5/3/2001	0.013	0.011	0.007	0.002	0.012	0.003	0.000	0.000	0.002	NAI	NAI	0.002
700123	Grand River (Lower)												
	11/13/2001	0.032	0.034	0.025	0.012	0.055	0.009	0.000	0.000	0.007	NAI	NAI	0.008
340025	Grand River (Upper)												
	4/24/2001	0.112	0.099	0.080	0.039	0.178	0.030	0.006	0.002	0.022	0.016	0.039	0.027

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

STORET ID	Cong. 101 (ng/L)	Cong. 118 (ng/L)	Cong. 123+149 (ng/L)	Cong. 128 (ng/L)	Cong. 132+153+105 (ng/L)	Cong. 135+144 (ng/L)	Cong. 136 (ng/L)	Cong. 137+176 (ng/L)	Cong. 141 (ng/L)	Cong. 146 (ng/L)	Cong. 15+17 (ng/L)	Cong. 151 (ng/L)
580364 Huron River												
7/26/2001	0.062	0.052	0.033	0.015	0.057	0.012	0.000	0.000	0.011	NAI	0.040	0.011
030077 Kalamazoo River (Lower)												
8/9/2001	0.565	0.372	0.217	0.088	0.477	0.075	0.041	0.003	0.047	0.100	0.620	0.066
390057 Kalamazoo River (Upper)												
4/30/2001	0.331	0.258	0.191	0.092	0.413	0.075	0.027	0.002	0.048	0.068	NAI	0.062
510088 Manistee River												
5/29/2001	0.007	0.004	0.002	0.002	0.009	0.000	0.000	0.000	0.001	NAI	0.023	0.000
770073 Manistique River												
5/30/2001	0.030	0.005	0.005	0.000	0.009	0.003	0.000	0.000	0.002	NAI	0.076	0.000
550038 Menominee River												
10/9/2001	0.010	0.008	0.008	0.003	0.019	0.003	0.002	0.000	0.003	0.004	0.000	0.003
610273 Muskegon River (Lower)												
6/20/2001	0.024	0.010	0.012	0.004	0.021	0.005	0.000	0.000	0.003	NAI	0.018	0.004
670008 Muskegon River (Upper)												
11/14/2001	0.005	0.002	0.002	0.000	0.002	0.000	0.000	0.000	0.000	NAI	0.014	0.000
660038 Ontonagon River												
8/13/2001	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.033	0.000
530027 Pere Marquette River												
7/30/2001	0.021	0.024	0.013	0.008	0.042	0.005	0.000	0.000	0.005	NAI	0.015	0.004
490006 Pine River												
10/23/2001	0.015	0.003	0.000	0.000	0.007	0.002	0.000	0.000	0.001	0.000	0.030	0.002
140126 Pokagon Creek												
6/14/2001	0.011	0.005	0.005	0.000	0.002	0.000	0.000	0.000	0.002	NAI	0.051	0.000
580046 River Raisin												
5/2/2001	0.046	0.032	0.030	0.008	0.056	0.011	0.002	0.001	0.010	NAI	0.054	0.010

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STORET ID		Cong. 101 (ng/L)	Cong. 118 (ng/L)	Cong. 123+149 (ng/L)	Cong. 128 (ng/L)	Cong. 132+153+105 (ng/L)	Cong. 135+144 (ng/L)	Cong. 136 (ng/L)	Cong. 137+176 (ng/L)	Cong. 141 (ng/L)	Cong. 146 (ng/L)	Cong. 15+17 (ng/L)	Cong. 151 (ng/L)
820070	River Rouge												
	6/11/2001	0.185	0.152	0.256	0.035	0.499	0.103	0.015	0.005	0.080	0.087	0.102	0.116
090177	Saginaw River												
	8/15/2001	0.421	0.340	0.152	0.052	0.346	0.070	0.021	0.003	0.028	NAI	1.845	0.062
730023	Shiawassee River												
	9/5/2001	0.015	0.015	0.007	0.004	0.021	0.000	0.000	0.000	0.003	NAI	0.030	0.002
110628	St. Joseph River (Lower)												
	4/25/2001	0.218	0.176	0.114	0.054	0.225	0.043	0.017	0.002	0.032	NAI	0.040	0.037
750273	St. Joseph River (Upper)												
	6/13/2001	0.017	0.013	0.010	0.004	0.016	0.004	0.000	0.000	0.004	NAI	0.042	0.004
210032	Sturgeon River												
	11/19/2001	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.015	0.000
170141	Tahquamenon River												
	6/11/2001	0.003	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.019	0.000
040123	Thunder Bay River												
	8/28/2001	0.011	0.005	0.004	0.002	0.009	0.002	0.000	0.000	0.001	0.002	0.023	0.001
070070	Tioga River												
	6/13/2001	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.021	0.000
730025	Tittabawassee River												
	5/9/2001	0.047	0.033	0.012	0.006	0.024	0.006	0.000	0.000	0.001	NAI	0.068	0.005

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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)
350061	Au Sable River													
	7/11/2001	0.000	0.014	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
630291	Bigelow Creek													
	6/19/2001	0.008	0.025	0.034	0.000	0.006	0.002	0.003	0.003	0.003	0.017	0.016	0.004	0.000
740385	Black River													
	6/27/2001	0.004	0.023	0.021	0.000	0.006	0.002	0.004	0.000	0.002	0.017	0.020	0.004	0.000
280014	Boardman River													
	5/30/2001	0.000	0.028	0.005	0.000	0.001	0.000	0.001	0.000	0.000	0.018	0.011	0.003	0.000
730024	Cass River													
	7/10/2001	0.010	0.029	0.034	0.000	0.006	0.001	0.004	0.004	0.000	NAI	0.014	0.003	0.000
160073	Cheboygan River													
	6/19/2001	0.000	0.016	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
500233	Clinton River													
	6/26/2001	0.051	0.063	0.486	0.017	0.167	0.045	0.171	0.124	0.055	0.045	0.314	0.095	0.017
210102	Escanaba River													
	6/4/2001	0.000	0.015	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000
790157	Evergreen Creek													
	7/18/2001	0.000	0.021	0.006	0.000	0.001	0.000	0.001	0.000	0.000	0.015	0.000	0.000	0.000
730285	Flint River													
	5/8/2001	0.025	0.058	0.161	0.009	0.036	0.010	0.032	0.023	0.010	0.043	0.039	0.019	0.003
380083	Grand River (Headwaters)													
	5/3/2001	0.000	0.034	0.019	0.000	0.003	0.000	0.002	0.000	0.000	0.021	0.013	0.002	0.000
700123	Grand River (Lower)													
	11/13/2001	0.009	NAI	0.068	0.003	0.014	0.004	0.011	0.008	0.003	0.011	0.020	0.006	0.001
340025	Grand River (Upper)													
	4/24/2001	0.033	0.038	0.206	0.014	0.044	0.012	0.035	0.031	0.013	0.031	0.062	0.025	0.004

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580364	Huron River													
	7/26/2001	0.014	0.062	0.087	0.003	0.018	0.005	0.016	0.011	0.006	0.033	0.029	0.011	0.002
030077	Kalamazoo River (Lower)													
	8/9/2001	0.042	0.354	0.481	0.017	0.068	0.020	0.061	0.052	0.022	0.543	0.127	0.035	0.006
390057	Kalamazoo River (Upper)													
	4/30/2001	0.078	0.060	0.481	0.032	0.072	0.021	0.054	0.044	0.019	0.047	0.106	0.038	0.005
510088	Manistee River													
	5/29/2001	0.000	0.020	0.011	0.000	0.002	0.000	0.001	0.000	0.000	0.014	0.010	0.002	0.000
770073	Manistique River													
	5/30/2001	0.002	0.067	0.008	0.000	0.001	0.000	0.001	0.000	0.000	0.042	0.001	0.000	0.000
550038	Menominee River													
	10/9/2001	0.000	0.000	0.021	0.000	0.005	0.000	0.004	0.003	0.002	0.010	0.009	0.002	0.000
610273	Muskegon River (Lower)													
	6/20/2001	0.004	0.031	0.025	0.000	0.004	0.000	0.004	0.004	0.002	0.023	0.014	0.003	0.000
670008	Muskegon River (Upper)													
	11/14/2001	0.000	NAI	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000
660038	Ontonagon River													
	8/13/2001	0.000	0.025	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.000
530027	Pere Marquette River													
	7/30/2001	0.000	0.014	0.052	0.002	0.009	0.004	0.006	0.006	0.004	0.009	0.014	0.006	0.000
490006	Pine River													
	10/23/2001	0.000	NAI	0.007	0.000	0.000	0.000	0.001	0.000	0.000	0.031	0.003	0.000	0.000
140126	Pokagon Creek													
	6/14/2001	0.000	0.065	0.012	0.000	0.003	0.000	0.002	0.000	0.000	0.029	0.003	0.001	0.000
580046	River Raisin													
	5/2/2001	0.008	0.042	0.060	0.002	0.014	0.000	0.013	0.011	0.004	0.039	0.024	0.008	0.001

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820070	River Rouge													
	6/11/2001	0.048	0.270	0.460	0.020	0.202	0.043	0.165	0.112	0.053	0.191	0.306	0.089	0.017
090177	Saginaw River													
	8/15/2001	0.034	1.335	0.304	0.007	0.067	0.014	0.066	0.057	0.019	1.324	0.142	0.040	0.004
730023	Shiawassee River													
	9/5/2001	0.003	0.024	0.023	0.000	0.005	0.000	0.004	0.003	0.002	0.021	0.007	0.002	0.000
110628	St. Joseph River (Lower)													
	4/25/2001	0.049	0.037	0.290	0.017	0.053	0.015	0.044	0.032	0.014	0.031	0.083	0.029	0.005
750273	St. Joseph River (Upper)													
	6/13/2001	0.008	0.036	0.026	0.000	0.005	0.000	0.004	0.003	0.001	0.030	0.012	0.003	0.000
210032	Sturgeon River													
	11/19/2001	0.000	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000
170141	Tahquamenon River													
	6/11/2001	0.000	0.011	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000
040123	Thunder Bay River													
	8/28/2001	0.000	0.018	0.011	0.000	0.001	0.000	0.002	0.000	0.000	0.012	0.002	0.001	0.000
070070	Tioga River													
	6/13/2001	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000
730025	Tittabawassee River													
	5/9/2001	0.007	0.040	0.045	0.000	0.009	0.000	0.006	NAI	0.000	0.036	0.020	0.007	0.000

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STORET ID		Cong. 187+182 (ng/L)	Cong. 19 (ng/L)	Cong. 193 (ng/L)	Cong. 194 (ng/L)	Cong. 198 (ng/L)	Cong. 199 (ng/L)	Cong. 201 (ng/L)	Cong. 202+171 (ng/L)	Cong. 203+196 (ng/L)	Cong. 206 (ng/L)	Cong. 207 (ng/L)	Cong. 208+195 (ng/L)	Cong. 22 (ng/L)
350061	Au Sable River													
	7/11/2001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
630291	Bigelow Creek													
	6/19/2001	0.008	NAI	0.000	0.002	0.000	0.000	0.005	0.003	0.006	0.002	0.000	0.001	0.010
740385	Black River													
	6/27/2001	0.005	NAI	0.000	0.007	0.000	0.000	0.007	0.006	0.002	0.004	0.000	0.003	0.012
280014	Boardman River													
	5/30/2001	0.001	0.009	0.000	NAI	0.000	0.000	0.001	IFBK	0.000	0.001	0.000	0.000	0.016
730024	Cass River													
	7/10/2001	0.006	0.015	0.000	0.004	0.000	0.000	0.004	0.003	0.001	0.002	0.000	0.002	0.057
160073	Cheboygan River													
	6/19/2001	0.001	NAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
500233	Clinton River													
	6/26/2001	0.153	0.007	0.029	0.081	0.004	0.010	0.136	0.045	0.160	0.029	0.003	0.036	0.026
210102	Escanaba River													
	6/4/2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
790157	Evergreen Creek													
	7/18/2001	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
730285	Flint River													
	5/8/2001	0.028	0.039	0.007	0.023	0.000	0.000	0.026	FBK 0.016	0.040	0.016	0.000	0.010	0.032
380083	Grand River (Headwaters)													
	5/3/2001	0.004	0.012	0.000	0.005	0.000	0.000	0.005	0.000	0.005	0.003	0.000	0.002	0.010
700123	Grand River (Lower)													
	11/13/2001	0.011	NAI	0.002	0.008	0.000	0.000	0.014	0.004	0.014	0.010	0.000	0.005	NAI
340025	Grand River (Upper)													
	4/24/2001	0.037	0.011	0.008	0.020	0.000	0.000	0.039	0.014	0.042	0.015	0.000	0.011	0.017

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580364	Huron River													
	7/26/2001	0.017	NAI	0.003	0.012	0.000	0.000	0.020	0.006	0.025	0.008	0.000	0.005	0.033
030077	Kalamazoo River (Lower)													
	8/9/2001	0.069	0.038	0.009	0.037	NDD	0.004	0.066	0.017	0.071	0.024	NDD	0.019	0.261
390057	Kalamazoo River (Upper)													
	4/30/2001	0.056	0.022	0.011	0.030	0.000	0.003	0.058	0.017	0.062	0.025	0.002	0.016	0.026
510088	Manistee River													
	5/29/2001	0.003	0.016	0.000	0.002	0.000	0.000	0.002	FBK0.000	0.003	0.001	0.000	0.000	0.006
770073	Manistique River													
	5/30/2001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037
550038	Menominee River													
	10/9/2001	0.004	0.000	0.000	0.002	0.000	0.000	0.004	0.002	0.002	0.001	0.000	0.001	0.007
610273	Muskegon River (Lower)													
	6/20/2001	0.006	0.000	0.000	0.004	0.000	0.000	0.004	0.004	0.001	0.002	0.000	0.001	0.017
670008	Muskegon River (Upper)													
	11/14/2001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	NAI
660038	Ontonagon River													
	8/13/2001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
530027	Pere Marquette River													
	7/30/2001	0.012	0.000	0.002	0.006	0.000	0.000	0.011	0.004	0.011	0.002	0.000	0.002	0.000
490006	Pine River													
	10/23/2001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027
140126	Pokagon Creek													
	6/14/2001	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.016
580046	River Raisin													
	5/2/2001	0.013	0.005	0.002	0.007	0.000	0.000	0.015	0.004	0.016	0.005	0.000	0.004	0.023

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820070	River Rouge													
	6/11/2001	0.148	0.018	0.029	0.088	0.004	0.010	0.148	0.045	0.171	0.033	0.002	0.038	0.089
090177	Saginaw River													
	8/15/2001	0.067	0.148	0.007	0.051	NDD	0.004	0.068	0.021	0.067	0.017	NDD	NAI	0.423
730023	Shiawassee River													
	9/5/2001	0.004	NAI	0.000	0.004	0.000	0.000	0.000	0.002	0.006	0.001	0.000	0.002	0.022
110628	St. Joseph River (Lower)													
	4/25/2001	0.043	0.007	0.009	0.025	0.000	0.003	0.039	0.014	0.056	0.021	0.000	0.014	0.012
750273	St. Joseph River (Upper)													
	6/13/2001	0.005	NAI	0.000	0.003	0.000	0.000	0.005	0.004	0.002	0.004	0.000	0.002	0.017
210032	Sturgeon River													
	11/19/2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
170141	Tahquamenon River													
	6/11/2001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
040123	Thunder Bay River													
	8/28/2001	0.002	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.002	0.001	0.000	0.000	0.007
070070	Tioga River													
	6/13/2001	0.000	NAI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
730025	Tittabawassee River													
	5/9/2001	0.004	0.031	0.000	0.005	0.000	0.000	0.006	FBK0.005	0.000	0.006	0.000	0.009	0.034

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350061	Au Sable River													
	7/11/2001	0.000	0.000	0.000	0.018	0.000	0.009	NAI	0.016	0.000	0.005	NAI	0.000	0.000
630291	Bigelow Creek													
	6/19/2001	0.002	0.000	0.000	0.040	0.000	0.020	NAI	0.038	0.000	0.009	NAI	0.000	0.000
740385	Black River													
	6/27/2001	0.003	0.000	0.004	0.054	0.000	0.019	NAI	0.000	NAI	0.020	0.025	0.003	0.007
280014	Boardman River													
	5/30/2001	0.002	0.000	0.004	0.044	0.000	0.010	NAI	0.018	0.000	0.008	0.008	0.003	0.015
730024	Cass River													
	7/10/2001	0.004	0.000	0.006	0.063	0.000	0.022	NAI	0.013	NAI	0.028	0.026	0.004	0.000
160073	Cheboygan River													
	6/19/2001	0.000	0.000	0.000	0.025	0.000	0.008	0.000	0.013	0.000	0.006	0.007	0.000	0.000
500233	Clinton River													
	6/26/2001	0.009	0.000	0.000	0.124	0.000	0.031	0.062	0.032	NAI	0.073	0.061	0.014	0.011
210102	Escanaba River													
	6/4/2001	0.000	0.000	0.000	0.021	0.000	0.006	0.009	0.000	NAI	0.006	0.007	0.000	0.002
790157	Evergreen Creek													
	7/18/2001	0.000	0.000	0.000	0.024	0.000	0.012	NAI	0.024	0.000	0.005	0.006	0.002	0.000
730285	Flint River													
	5/8/2001	0.007	0.000	0.007	0.108	0.000	0.023	NAI	0.045	NAI	0.047	NAI	0.011	0.012
380083	Grand River (Headwaters)													
	5/3/2001	0.003	0.000	0.006	0.026	0.000	0.013	NAI	0.023	NAI	0.007	0.000	0.000	0.002
700123	Grand River (Lower)													
	11/13/2001	0.000	NAI	0.000	0.026	0.000	0.029	NAI	0.000	0.005	0.015	NAI	0.000	0.000
340025	Grand River (Upper)													
	4/24/2001	0.004	0.000	0.000	0.075	0.000	0.019	NAI	0.021	NAI	0.035	0.000	0.005	0.004

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580364	Huron River													
	7/26/2001	0.000	0.000	0.005	0.094	0.000	0.025	NAI	0.043	NAI	0.048	0.036	0.005	0.002
030077	Kalamazoo River (Lower)													
	8/9/2001	0.049	0.105	0.198	1.860	NDD	0.190	0.498	0.080	0.152	0.598	0.696	0.119	0.066
390057	Kalamazoo River (Upper)													
	4/30/2001	0.014	0.020	0.026	0.100	0.000	0.053	0.064	0.029	0.032	0.086	0.143	0.003	0.006
510088	Manistee River													
	5/29/2001	0.002	0.000	0.002	0.022	0.000	0.007	0.000	0.028	NAI	0.006	0.000	0.002	0.000
770073	Manistique River													
	5/30/2001	0.005	0.004	0.009	0.140	0.000	0.037	0.031	0.045	NAI	0.026	0.037	0.004	0.003
550038	Menominee River													
	10/9/2001	0.000	0.000	0.000	0.024	0.000	0.008	0.000	0.000	0.000	0.006	0.008	0.000	0.000
610273	Muskegon River (Lower)													
	6/20/2001	0.000	0.000	0.004	0.064	0.000	0.022	NAI	0.016	NAI	0.017	0.024	0.002	0.003
670008	Muskegon River (Upper)													
	11/14/2001	0.000	0.000	0.000	0.040	0.000	0.007	NAI	0.014	0.000	0.005	NAI	0.000	0.000
660038	Ontonagon River													
	8/13/2001	0.002	0.000	0.003	0.042	0.000	0.007	NAI	0.000	0.000	0.008	NAI	0.002	0.004
530027	Pere Marquette River													
	7/30/2001	0.000	0.000	0.000	0.024	0.000	0.011	NAI	0.010	0.000	0.010	0.009	0.002	0.000
490006	Pine River													
	10/23/2001	0.003	0.003	0.005	0.081	0.000	0.024	NAI	0.022	NAI	0.015	0.025	0.000	0.000
140126	Pokagon Creek													
	6/14/2001	0.003	0.000	0.003	0.065	0.000	0.015	NAI	0.069	NAI	0.018	0.038	0.004	0.000
580046	River Raisin													
	5/2/2001	0.004	0.005	0.011	0.100	NAI	0.014	0.025	0.016	NAI	0.044	0.042	0.009	0.005

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820070	River Rouge													
	6/11/2001	0.021	0.030	0.038	0.455	0.000	0.071	0.188	0.108	0.063	0.216	0.226	0.032	0.018
090177	Saginaw River													
	8/15/2001	0.163	0.810	1.622	3.270	NDD	0.198	0.913	0.578	0.321	1.309	1.423	0.241	0.185
730023	Shiawassee River													
	9/5/2001	0.003	0.000	0.004	0.059	0.000	0.008	NAI	0.029	NAI	0.030	0.015	0.006	0.002
110628	St. Joseph River (Lower)													
	4/25/2001	0.005	NAI	0.005	0.094	0.000	0.012	0.027	0.013	NAI	0.052	0.044	0.006	0.005
750273	St. Joseph River (Upper)													
	6/13/2001	0.005	0.003	0.006	0.073	0.000	0.030	NAI	0.035	NAI	0.024	0.026	0.002	0.002
210032	Sturgeon River													
	11/19/2001	0.000	0.000	0.000	0.014	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.002	0.000
170141	Tahquamenon River													
	6/11/2001	0.000	0.000	0.000	0.018	0.000	0.009	0.000	0.000	0.000	0.004	0.005	0.000	0.000
040123	Thunder Bay River													
	8/28/2001	0.000	0.000	0.000	0.029	0.000	0.008	0.000	0.000	NAI	0.006	0.009	0.000	0.000
070070	Tioga River													
	6/13/2001	0.000	0.000	0.000	0.022	0.000	0.011	0.000	0.000	0.000	0.005	0.006	0.000	0.000
730025	Tittabawassee River													
	5/9/2001	0.007	0.006	NAI	0.111	0.000	0.022	NAI	0.020	NAI	0.041	0.049	0.006	0.004

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350061	Au Sable River													
	7/11/2001	0.003	NAI	0.001	0.013	0.000	0.002	0.004	0.000	0.000	0.000	0.005	0.000	0.004
630291	Bigelow Creek													
	6/19/2001	0.010	NAI	0.004	0.027	0.000	0.007	0.010	0.000	0.017	0.000	0.022	0.004	0.021
740385	Black River													
	6/27/2001	0.017	0.018	0.005	0.109	0.003	0.017	0.007	0.000	0.026	0.003	0.023	0.010	0.028
280014	Boardman River													
	5/30/2001	0.011	NAI	0.004	0.024	0.000	0.003	0.010	0.000	0.007	NAI	0.009	0.003	0.010
730024	Cass River													
	7/10/2001	0.016	NAI	0.005	0.175	0.000	0.016	NAI	0.002	0.021	NAI	0.033	NAI	0.032
160073	Cheboygan River													
	6/19/2001	0.007	0.000	0.011	0.015	0.002	0.000	0.000	0.000	0.003	NAI	0.005	0.000	0.004
500233	Clinton River													
	6/26/2001	0.044	0.045	0.010	0.905	0.013	0.053	0.011	0.000	0.080	NAI	0.060	0.025	0.270
210102	Escanaba River													
	6/4/2001	0.011	NAI	0.008	0.016	0.000	0.003	0.000	0.000	0.003	0.000	NAI	0.000	0.005
790157	Evergreen Creek													
	7/18/2001	0.004	0.000	0.000	0.018	0.000	0.002	0.008	0.000	0.002	NAI	0.000	0.002	0.005
730285	Flint River													
	5/8/2001	0.031	NAI	0.008	0.331	NAI	0.030	0.023	0.003	0.045	NAI	0.057	0.021	0.162
380083	Grand River (Headwaters)													
	5/3/2001	0.017	NAI	0.036	0.043	0.000	0.008	0.009	0.000	0.007	NAI	NAI	0.003	0.021
700123	Grand River (Lower)													
	11/13/2001	0.008	0.018	NAI	0.202	NAI	0.015	0.000	0.000	0.016	0.009	NAI	0.004	0.067
340025	Grand River (Upper)													
	4/24/2001	0.026	0.053	0.006	0.319	NAI	0.032	0.009	0.000	0.057	NAI	0.048	0.019	0.180

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580364	Huron River													
	7/26/2001	0.023	0.035	0.004	0.123	0.002	0.036	0.000	0.002	0.068	0.025	0.066	0.021	0.087
030077	Kalamazoo River (Lower)													
	8/9/2001	0.431	0.650	0.026	1.050	0.098	0.350	0.106	0.047	1.101	0.021	0.665	0.229	0.746
390057	Kalamazoo River (Upper)													
	4/30/2001	0.068	0.152	0.014	0.358	0.023	0.074	0.029	0.010	0.159	NAI	0.130	0.044	0.546
510088	Manistee River													
	5/29/2001	0.007	NAI	0.005	0.026	0.000	0.003	0.011	0.000	0.007	NAI	NAI	0.004	0.012
770073	Manistique River													
	5/30/2001	0.027	NAI	0.013	0.085	0.006	0.011	0.022	0.000	0.014	NAI	0.034	0.006	0.026
550038	Menominee River													
	10/9/2001	0.005	0.011	0.007	0.020	0.002	0.003	0.000	0.000	0.007	0.000	0.009	0.002	0.018
610273	Muskegon River (Lower)													
	6/20/2001	0.014	NAI	0.003	0.054	0.001	0.010	0.000	0.000	0.019	NAI	0.021	0.007	0.031
670008	Muskegon River (Upper)													
	11/14/2001	0.004	0.010	NAI	0.033	0.001	0.003	0.009	0.000	0.004	NAI	0.006	0.002	0.007
660038	Ontonagon River													
	8/13/2001	0.016	0.009	0.018	0.018	0.002	0.003	0.004	0.000	0.004	0.007	0.005	0.002	0.005
530027	Pere Marquette River													
	7/30/2001	0.007	0.000	0.001	0.020	0.000	0.007	0.000	0.000	0.025	NAI	0.018	0.008	0.027
490006	Pine River													
	10/23/2001	0.025	0.016	0.009	0.046	0.006	0.006	0.000	0.002	0.010	NAI	0.013	0.004	0.015
140126	Pokagon Creek													
	6/14/2001	0.025	NAI	0.014	0.054	0.000	0.006	0.017	0.000	0.010	NAI	0.030	0.003	0.012
580046	River Raisin													
	5/2/2001	0.030	0.047	0.016	0.150	0.004	0.035	0.024	0.004	0.054	0.011	0.037	0.022	0.080

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820070	River Rouge													
	6/11/2001	0.148	0.163	0.032	0.474	0.042	0.137	0.028	0.011	0.243	NAI	0.172	0.086	0.266
090177	Saginaw River													
	8/15/2001	0.801	1.417	0.122	2.292	0.305	0.313	0.434	0.098	0.708	0.036	0.446	0.265	0.857
730023	Shiawassee River													
	9/5/2001	0.012	NAI	0.002	0.050	0.000	0.013	NAI	0.002	0.017	NAI	0.059	0.013	0.028
110628	St. Joseph River (Lower)													
	4/25/2001	0.037	0.069	0.008	0.213	0.004	0.048	0.013	0.003	0.085	NAI	0.087	0.031	0.317
750273	St. Joseph River (Upper)													
	6/13/2001	0.023	0.016	0.006	0.067	NAI	0.014	0.013	0.000	0.020	NAI	0.029	0.009	0.031
210032	Sturgeon River													
	11/19/2001	0.005	0.005	0.003	0.025	0.000	0.000	0.000	0.000	0.000	NAI	0.003	0.000	0.003
170141	Tahquamenon River													
	6/11/2001	0.007	0.000	0.009	0.010	0.000	0.000	0.005	0.000	0.003	NAI	0.003	0.000	0.004
040123	Thunder Bay River													
	8/28/2001	0.007	0.010	0.008	0.023	0.000	0.003	0.000	0.000	0.005	0.000	0.007	0.000	0.014
070070	Tioga River													
	6/13/2001	0.007	0.000	0.008	0.011	0.000	0.000	0.000	0.000	0.002	NAI	0.004	0.000	0.003
730025	Tittabawassee River													
	5/9/2001	0.028	NAI	0.006	0.277	NAI	0.033	NAI	0.004	0.065	NAI	0.034	0.022	0.066

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350061	Au Sable River											
	7/11/2001	0.044	0.000	0.000	0.000	0.002	0.000	0.000	0.004	0.004	0.000	0.001
630291	Bigelow Creek											
	6/19/2001	0.068	0.000	0.000	0.008	0.010	0.002	0.003	0.000	0.010	0.004	0.011
740385	Black River											
	6/27/2001	0.057	0.001	0.001	0.008	0.013	0.003	0.005	NAI	0.022	0.007	0.008
280014	Boardman River											
	5/30/2001	0.094	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.009	0.001	0.003
730024	Cass River											
	7/10/2001	NAI	0.008	0.000	0.011	0.022	0.007	0.000	NAI	0.023	0.008	0.012
160073	Cheboygan River											
	6/19/2001	NAI	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
500233	Clinton River											
	6/26/2001	NAI	0.016	0.019	0.034	0.066	0.013	0.046	0.159	0.287	0.039	0.061
210102	Escanaba River											
	6/4/2001	0.045	0.000	0.000	0.000	0.003	0.003	0.000	0.007	0.003	0.000	0.002
790157	Evergreen Creek											
	7/18/2001	NAI	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.005	0.000	0.000
730285	Flint River											
	5/8/2001	NAI	0.008	0.007	0.023	0.041	0.008	0.025	0.071	0.109	0.023	0.035
380083	Grand River (Headwaters)											
	5/3/2001	NAI	0.000	0.000	0.002	0.009	0.005	0.004	NAI	0.014	0.002	0.005
700123	Grand River (Lower)											
	11/13/2001	0.020	0.005	0.003	0.011	0.022	0.009	0.011	0.021	0.044	0.012	0.013
340025	Grand River (Upper)											
	4/24/2001	NAI	0.008	0.004	0.027	0.053	0.013	0.019	NAI	0.089	0.030	0.042

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580364	Huron River											
	7/26/2001	0.104	0.007	0.008	0.017	0.028	0.017	0.014	NAI	0.058	0.016	0.026
030077	Kalamazoo River (Lower)											
	8/9/2001	0.437	0.048	0.050	0.149	0.185	0.015	0.150	0.596	0.547	0.140	0.289
390057	Kalamazoo River (Upper)											
	4/30/2001	0.100	0.032	0.017	0.080	0.145	0.015	0.074	0.260	0.290	0.085	0.134
510088	Manistee River											
	5/29/2001	NAI	0.000	0.000	0.003	0.004	0.003	0.002	0.004	0.008	0.002	0.004
770073	Manistique River											
	5/30/2001	0.227	NAI	0.002	0.005	0.015	0.007	0.008	0.037	0.043	0.006	0.010
550038	Menominee River											
	10/9/2001	0.037	0.000	0.000	0.002	0.006	0.002	0.000	0.000	0.014	0.003	0.005
610273	Muskegon River (Lower)											
	6/20/2001	0.036	0.002	0.002	0.006	0.013	0.003	0.005	NAI	0.027	0.006	0.010
670008	Muskegon River (Upper)											
	11/14/2001	0.066	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.008	0.001	0.002
660038	Ontonagon River											
	8/13/2001	NAI	0.000	0.000	0.000	0.003	0.000	0.000	0.004	0.004	0.001	0.001
530027	Pere Marquette River											
	7/30/2001	0.000	0.001	0.002	0.012	0.010	0.002	0.004	NAI	0.011	0.005	0.012
490006	Pine River											
	10/23/2001	0.144	0.000	0.000	0.003	0.008	0.003	0.000	NAI	0.026	0.003	0.005
140126	Pokagon Creek											
	6/14/2001	NAI	NAI	NAI	0.004	0.006	0.007	0.003	NAI	0.009	0.002	0.004
580046	River Raisin											
	5/2/2001	0.090	0.005	0.003	0.015	0.026	0.000	0.014	NAI	0.045	0.014	0.021

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

STORET ID		Cong. 8+5 (ng/L)	Cong. 82 (ng/L)	Cong. 83 (ng/L)	Cong. 85 (ng/L)	Cong. 87 (ng/L)	Cong. 89 (ng/L)	Cong. 91 (ng/L)	Cong. 92+84 (ng/L)	Cong. 95 (ng/L)	Cong. 97 (ng/L)	Cong. 99 (ng/L)
820070	River Rouge											
	6/11/2001	0.195	0.028	0.008	0.045	0.090	0.020	0.059	0.136	0.225	0.052	0.057
090177	Saginaw River											
	8/15/2001	0.896	0.062	0.075	0.148	0.166	0.039	0.311	0.910	0.732	0.120	0.228
730023	Shiawassee River											
	9/5/2001	NAI	NAI	0.000	0.007	0.011	NAI	0.005	0.013	0.015	0.005	0.009
110628	St. Joseph River (Lower)											
	4/25/2001	0.072	0.018	0.013	0.047	0.104	0.008	0.039	0.143	0.169	0.052	0.075
750273	St. Joseph River (Upper)											
	6/13/2001	0.052	0.003	0.002	0.006	0.013	0.003	0.007	0.017	0.023	0.006	0.010
210032	Sturgeon River											
	11/19/2001	0.027	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.005	0.000	0.000
170141	Tahquamenon River											
	6/11/2001	NAI	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.000	0.000
040123	Thunder Bay River											
	8/28/2001	0.051	0.000	0.000	0.002	0.006	0.001	0.000	0.012	0.010	0.002	0.004
070070	Tioga River											
	6/13/2001	NAI	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.000	0.000
730025	Tittabawassee River											
	5/9/2001	NAI	0.001	0.002	0.012	0.025	0.036	NAI	NAI	0.034	0.011	0.019

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