INTERNATIONAL REFERENCE GROUP ON GREAT LAKES POLLUTION FROM LAND USE ACTIVITIES

INTERNATIONAL JOINT COMMISSION

EXISTING RIVER MOUTH LOADING DATA IN U.S. GREAT LAKES BASIN

EXISTING RIVER MOUTH LOADING DATA IN U.S. GREAT LAKES BASIN

by

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SUMMARY

River mouth loading data from 550 tributaries to the Great Lakes have been identified. These data are related to pollution of the Great Lakes potentially drived from land drainage. Chemicals considered include nutrients, pesticides, heavy metals, and refractory organics (i.e. persistent organics, such as PCBs, not normally classified as pesticides), both in solution and attached to particulate materials. In additiona, water discharge and sediment loading data have been sought.

Water quality and flow data identified were also evaluated in terms of their adequacy for computing tributary loading to the Great Lakes. Adequacy of the data was based on the frequency of sampling, the duration of sampling, and the station location, but not on the analtyical quality of the data. Data have been identified and organized by using a matrix format

Of the 550 tributaries considered for possible river mouth loading data, approximately 30 percent were found to have sufficient water quality data to consider calculating annual loadings. About 14 percent of these tributaries were gauged at a representative river mouth gauging station. Of the 550 tributaries identified, 102 were considered to be major tributaries, the remaining being relatively minor streams that individually are not likely to have a major influence on the Great Lakes (except for possible local effects). Most of the major tributaries identified had sufficient water quality data to consider loading calculations, although a number of major streams did not have gauging stations at strategic river mouth locations. Those few major tributaries that lack water quality data tend to drain undeveloped areas, and it is not recommended that sampling programs be established on these streams as a first priority.

In general, there is a good water quality data record for Great Lakes tributaries from the standpoint of monthly monitoring. Flow data generally lag behind water quality data in terms of the number of tributaries adequately monitored. The information available on many tributaries may lead to an underestimation of total loadings of at least some parameters due to the lack of data during high flow periods, when a large portion of the total annual loading can occur. Very few streams were found to have data available specifically on runoff events.

Few data were found on heavy metals, pesticides, and refractory organics from which loading calculations could be made. Most data on these parameters are based on grab-type samples. A number of tributaries were also found to be deficient in dissolved reactive phosphorus data. In general, however, key loading parameters, such as suspended solids, nitrogen species, total phosphorus, and chloride, have been routinely monitored in most sampling programs.

There are several groups of small tributaries on each of the Great Lakes which are currently both unmonitored and ungauged. These minor tributaries are individually unimportant, but collectively they could account for a significant loading to the lake. In some cases the land area drained by these small watersheds comprise a considerable portion of the total basin. The important groups of these minor tributaries in which there are few loading data are those found draining; the southern Lake Superior Basin, the northern Lake Michigan Basin, the southwestern Lake Huron Basin (thumb area), the eastern Lake Erie Basin, and most parts of the U.S. Lake Ontario Basin.

Because of the large area encompassed by the Great Lakes Basin and the vase amounts of tributary data which have been collected and continue to be collected, there is a need for greater coordination of data collection, storage, and retrieval. There is also a need for collection of consistent data over the long-term period, especially event type data, in order to assess the short-term as well as long-term variability of the hydrologic system.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. Five-hundred and fifty U.S. Great Lakes tributaries in 15 river basin groups and 70 hydrologic areas were identified. Approximately 30 percent were found to have sufficient water quality data to consider calculating annual loadings. However, only about 14 percent of the tributaries examined had continuous-gauge flow information near the river mouth. One-hundred and two of the 550 tributaries butaries investigated were considered to be major tributaries, the remaining being relatively minor streams that individually are not likely to contribute a significant loading (except for possible local effects) to the Great Lakes. Nearly 90 percent of the major tributaries identified had sufficient water quality data to consider annual loading calculations. However, only 70 percent of the major streams had gauging stations near the river mouths.

Of the five Great Lakes, more Lake Superior tributaries were sufficiently monitored for loading calculation purposes than tributaries of other lakes. Lake Ontario had the smallest percentage of tributaries monitored. In terms of flow, Lake Huron and Lake Ontario tributaries were gauged less than tributaries of other lakes, while Lake Michigan had the highest percentage of tributaries gauged. All the lakes except Lake Superior had one or more major tributaries that did not have adequate data for loading calculations. However, these tributaries tend to drain undeveloped land in remote areas or are smaller (in terms of discharge and/or drainage basin) than other major tributaries.

2. In general, there is a good water quality record for Great Lakes tributaries from the standpoint of monthly monitoring. However, the information available for many tributaries may lead to inaccurate estimations of some parameters due to the lack of data during high flow periods when a large portion of the total annual loading can occur. It is important to emphasize that much of the water quality tributary data have been collected as part of multi-objective programs or programs that were not conducted specifically to obtain loading information.

Very little data are available that are based on specific runoff events. Importantly, even some data collected at a high frequency, such as weekly, may not provide enough detail to monitor the input over runoff events. It is now well known that, in order to determine the loading of some parameters, such as total phosphorus, it is necessary to measure concentrations during the high flow periods. Even though storm flow events represent only a small portion of the total duration of flows to the lake, a large amount of total phosphorus is

carried to the lakes at this time. This may occur in less than a week's time. ULRG data on tributaries draining forested areas show that even these tributaries have much higher total phosphorus concentrations during high flow periods. Nevertheless, it is still not known what effect flow-sensitive parameters carried into the streams have on the lakes during high flow periods. Until more is known about monitoring high flow events and the effect of event inputs, routine monthly sampling programs that have been established for a number of years should not be hastily modified.

Regular monthly or low flow data may be at least partially useful for long-term trend analysis and for the development of regional loading models. There is a considerable amount of long-term monthly water quality data available for Lake Michigan and Lake Erie tributaries, and to a lesser extent, Lake Ontario tributaries. Very few tributaries in Lake Superior and Lake Huron have a long-term data base. Even event data taken over a one or two year period are probably inadequate by themselves because of the great year to year variability in the loadings.

3. A large number of studies conducted over the years has maintained water quality monitoring only during part of the year. Often a season is skipped or monitored with one grab sample to represent the whole season. Often, the season skipped is the winter or spring season when sampling is more difficult due to adverse weather conditions. This is characteristic of many of the historical data. Unfortunately, the winter and spring seasons are perhaps the more important seasons to sample from a loading standpoint. It would have been better then, to increase the sampling frequency during this period rather than during the low flow period when loadings are the smallest. Again, it must be realized that most sampling programs that have been conducted have not been necessarily geared to lake loading calculations. Monitoring during the low flow periods is often the most critical in terms of determining the input and effects of point source pollution.

4. Of the key loading parameters measured, perhaps the most significant gap is the lack of dissolved reactive phosphorus data for a number of major tributaries, particularly for certain Lake Superior, Lake Michigan and Lake Erie tributaries. In most studies where some form of phosphorus has been measured, total phosphorus has generally been the form evaluated. Very few total soluble phosphorus data were found. Nitrogen species were generally monitored at approximately the same frequency as total phosphorus. Nitrate and ammonia were usually measured more often than total kjeldahl nitrogen. Silica was measured less frequently than other nutrients, but surprisingly large silica data records exist, including a relatively extensive historical data base. Chloride has been measured more frequently than other chemical loading parameters. A rather extensive data base also exists for suspended solids, with some especially detailed monitoring having been conducted on Lake Superior and Lake Erie tributaries. Only a few Lake Erie tributaries were found to have particle size data available. There are relatively few data available on heavy metals, pesticides and refractory organics. However, there are some tributaries which do have heavy metal and pesticide data available which were collected on a monthly or

greater frequency over one or more annual cycles. Few refractory organics data were found for any of the tributaries.

5. There are several areas on each of the Great Lakes Basins which are drained by many small tributaries, and which are currently both unmonitored and ungauged. These minor tributaries are individually unimportant, but collectively they could exert a significant loading to the respective lakes. In some cases the land area drained by these small tributaries may comprise a significant portion of the total basin. Locations of significant groups of these minor tributaries for which there are few loading data include the south shore of Lake Superior, northern Lake Michigan, southwestern Lake Huron (thumb area), eastern Lake Erie and most parts of the U.S. Lake Ontario watershed. Also, while the low flow input of the minor tributaries may be insignificant, the high flow or runoff event input from the tributaries, many of which drain agricultural lands (particularly Lake Huron, Lake Erie and Lake Ontario minor tributaries), could be a potentially important source of pollution from land drainage to the Great Lakes.

6. The most significant project in which runoff event data have been collected was conducted by the Lake Erie Wastewater Management Study (LEWMS). In this study nine Lake Erie tributaries were monitored over the hydrograph for nutrients and other parameters during major spring runoff events. The only other studies which have been specifically geared to measure loadings during runoff events are Task C, PLUARG, studies on the Menomonee River in Wisconsin and Genesee River in New York. Data from these projects should provide analysis of the loading contributed by these rivers during runoff events. In addition, the Grand River, which was recommended for more detailed sampling in the preliminary report of this project, is being monitored during 1976 on a daily basis. Also, studies during IFYGL were made on a three day per week basis and should at least provide some information on the contribution during high flows. The Upper Lakes Reference Group Study also attempted to collect samples during the spring runoff period for upper lakes tributaries. However, sample collections were limited to several samples during the spring period and not necessarily during a runoff event. A number of other studies provide weekly to biweekly data on Great Lakes tributaries.

7. In reviewing the available river mouth loading data and the characteristics of the drainage basins, it is worthwhile to mention several problems that will complicate loading calculations and the interpretation of loading data. First, many tributaries have a large estuarine zone. This is particularly evident along the Lake Erie coast, especially the western basin. However, the effect that the lake has on the estuary is ill-defined and varies a great deal with time. In interpreting some of the data at stations very close to one of the lakes, it will be difficult to account for any possible lake effects. However, lake effects during periods of high flow, such as problems with reverse flow, will not likely be a problem.

There are also a number of man-made structures which will likely complicate interpretation of loading data. Canals, such as those found along Lake Ontario

and in the Chicago area which interconnect with a number of tributaries, may complicate interpretation of loading data. Natural impoundments near the river mouth may cause similar problems. The drowned river mouth areas and/or impoundments found at the mouths of tributaries draining into Lake Michigan present a difficult problem. Sampling stations located above these impoundments are inadequate for calculating loadings because many of the pollutants may settle out in the impoundment. However, because the outlets are generally so close to the lake, sampling of these locations is complicated by lake effects.

8. It is apparent from looking through the vast amounts of data on U.S. tributaries to the Great Lakes that increased coordination in data collection problems involving water quality data would be useful. It was also found that in comparing the same data reported in two different sources numerous discrepancies occurred, indicating that many errors were apparently made in transferring data into different formats. Thus there is a lack of quality control in entering data into different storage systems. The nomenclature used to report data also causes considerable confusion. For example, terms used to describe certain forms of phosphorus or solids, many of which are operationally defined, caused considerable confusion.

RECOMMENDATIONS

Under Subactivity 2.2 of the PLUARG Task D Plan of Study (April, 1975), new surveys of tributaries were to be given priority to fill gaps in river mouth sampling of the four pilot watersheds being studied under Task C (PLUARG). Because the Grand River mouth area is being studied in detail by the Environmental Protection Agency, in part as the result of the recommendation of the preliminary report of this project, all river mouth areas of the pilot watershed streams are now being adequately monitored. Loadings from the Menominee, Maumee and Genesee Rivers are being studied as part of the Task C project or by some other group. For example, the Maumee River mouth area is being studied in detail by the Corps of Engineers as well as by other groups.

1. All U.S. tributaries which would potentially contribute large amounts of land derived pollutants are being monitored on at least a monthly basis. Thus, it is recommended that no new routine surveys need to be initiated at this time solely for the purpose of collecting additional data which are "...imperative...to adequately assess the total tributary input to the lakes" (Task D Plan of Study).

2. Despite the fact that there are data available on most major tributaries draining into the Great Lakes, there are relatively small amounts of loading data available on these tributaries during periods of high flow. Thus, it is recommended that future consideration for additional tributary surveys be limited to those studies which evaluate loadings during periods of high flow, such as spring runoff.

3. Because there are more Great Lakes tributaries which lack adequate flow data (i.e., continuous flow data as measured from a gauging station) than lack water quality data, it is recommended that the establishment of additional gauging stations be given a higher priority than new water quality data collection stations. Even where gauging stations are present on a tributary, many are located too far upstream and above the confluence of major river tributaries to provide an accurate assessment of the total discharge to the lake. The establishment of more gauging stations at strategic locations could have a much greater impact upon improving the estimate of loadings to the Great Lakes than establishing additional water quality stations. It is not possible to obtain accurate estimates of loading based on detailed chemical data if good flow data are not available. Instantaneous flow measurements taken at the time of sample collection may not be adequate, particularly when rivers are subject to rapid variations in flow. Discharge can increase tremendously over a runoff event. Unless this runoff event is monitored in detail, a large portion of the total annual flow and thus the total annual loading to a lake may be missed. Also, based on some results of the Lake Erie Wastewater Management Study sponored by the Corps of Engineers, it may be possible to estimate loading of some tributaries for certain flow-sensitive parameters with only low flow water quality data if a continuous flow record is available.

4. Although there are some major tributaries that are currently unmonitored and ungauged, most of these drain relatively undeveloped areas or are small relative to other major tributaries. While it would be useful to obtain additional data on these unmonitored tributaries, it is recommended that a low priority be placed on this task at this time.

5. More research is needed to determine the importance of runoff events to total tributary loadings and the means by which loading contributions from these events can be predicated without detailed sampling. It is important to emphasize that it would be impractical to monitor a large number of runoff events across an entire lake basin because these events often occur simultaneously across large portions of the basin. Also, many routine monitoring programs have multi-purpose objectives, of which estimating lake loadings is only one. Thus, it is not recommended that event sampling be employed for all tributaries.

Not only is there a need for more research into runoff events, but more long-term data are needed on runoff events. Presently, all event data on Great Lakes tributaries have been obtained over one or two years. Obviously, there is great year to year variation in annual loading and in the loadings contributed during runoff events. Thus, it is recommended that some of the present programs designed to monitor runoff events be continued until the magnitude of the year to year variability can be established.

6. More attention also needs to be given to measuring both total and dissolved chemical species. One of the major questions currently asked in

terms of importance of the loading contributed during runoff events is the availability of certain chemical constituents to biological organisms. For example, during runoff events a large amount of total phosphorus is discharged to the Great Lakes. However, the availability of the phosphorus, much of which is associated with suspended particulate matter, is not well known. Before more funds are allocated for event monitoring, the question of availability of loading species must be resolved. At the present time the best that can be said is that the available fraction is found between the soluble and the total fraction. However, it is not known just how much of the total fraction is available, both on a short-term and, importantly, long-term basis. Presently, research on this question is being conducted as part of Task D as well as a number of other studies.

7. More data also need to be gathered to determine the input of heavy metals, pesticides, and refractory organics, particularly during periods of high flow. This will present special analytical problems for certain parameters, such as PCBs, which may be extremely dilute and difficult to measure. Nevertheless, the loading of these parameters from the land needs to be given more attention. A possible source of these pollutants is atmospheric fallout. Since dry fallout onto the land occurs continuously, the subsequent washing of these materials off the land and into the stream courses during a runoff event could be a mechanism of land-based transport of pollutants to the Great Lakes.

8. It is recommended that in the future more attention be given to the coordination of the collection, storage and retrieval of Great Lakes data. There is a need to exert more quality control in transferring raw data to a report format or to a storage system.

9. There is also a need to have more cooperative studies where multi-purpose objectives can be achieved at a minimal cost. Frequently a particular data collection study has a limited purpose. The extra cost of collecting the additional data needed to satisfy multi-purpose objectives would often be minimal. Thus, more cooperative studies, particularly between agencies, would be useful.

10. In terms of availability of data, the STORET system is a very large and useful data base. What is needed is more input of useful data into the STORET system. Also, STORET contains a good deal of data which may be of limited usefulness. Rather than put all data in STORET, which makes review of the STORET data base a formidable task, it might be wiser to store only those data which have a good probability of receiving heavy use. Those data not in STORET could be referenced in a referral system, such as the Environmental Data Index (ENDEX) system operated by NOAA. Such a system describes the type of data available and method of access without actually listing the data. Two such systems (STORET and ENDEX) would tend to complement each other, and promote the least possible cost.

11. In terms of data storage and retrieval systems, there are many already available. Rather than develop a new storage and retrieval system, it is recommended that an analysis be made of those systems already in use to determine how they can best be utilized. A great deal of coordination in these areas would be very useful in maximizing the efficiency of the use of existing data and of the collection of data in the future.

12. Upon close examination, it is obvious that a great deal of data is available. However, rather than continuing to collect more data at an even more rapid pace, data already collected should be subjected to a more thorough analysis.

13. Finally, it is recommended that the Data Availability Matrix be kept updated as new loading data are collected. This could be done with a minimum of effort. In this way the future availability of tributary loading data can be readily assessed. Further, progress made in the collection of loading data can be regularly monitored. Information on routine sampling programs can be updated on a yearly basis. Similarly, flow data can be updated yearly. More importantly, however, special studies, the availability of data on previously unmonitored tributaries, or data from new sampling stations on previously monitored tributaries, can be kept updated on a continuous basis. Because of the large geographic area of the Great Lakes Basin, such a coordinated approach needs to be taken in order to determine the sampling priorities over the Basin as a whole. If the Great Lakes are to be viewed and evaluated as an integrated system, it is necessary to keep track of the output of research on tributary loading conducted over the entire basin.

INTRODUCTION

In April of 1975 a plan of study was developed to further define the direction of the United States portion of Task D of the Pollution from Land Use Activities Reference Group Study. In this Plan of Study, Subactivity 2-1, "Identification and Evaluation of Existing River Mouth Loading Data," was described as follows:

> (a) All available data on water discharges, sediment, and water quality (including nutrients, pesticides, heavy metals, and refractory organics) for stream mouth inputs will be identified. Other stations and data collection sites on tributaries without stream mouth data will be selected in order that all major tributaries may be considered. No attempt will be made to publish a compilation of all collected tributary data. However, a summary report will be prepared which identifies the tributaries monitored, parameters measured, frequency of sampling, period of record, source of data, location, and availability of data, etc.
>
> (b) An evaluation will be made of the adequacy of the sampling network for computing total stream mouth loading to the Great Lakes. Data will be evaluated with regard to how well the sediment and chemical data relate to flow. Gaps in data and evaluations will be identified. All ongoing programs will be considered. Recommendations will be made as to additional sampling (location, event, and element analyses) which, if necessary, will be done between October 1975 and July 1976.

The purpose of this project was to complete Subactivity 2-1 as outlined above. All appropriate river mouth loading data have been sought from the various data sources such as state and regional agencies, the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), the U.S. Army Corps of Engineers (COE), universities, industries, and local agencies. Data related to river mouth pollution to the Great Lakes have been identified, including water discharge, sediment, and chemical loading data. Emphasis is on pollutants potentially derived from land drainage. Chemicals considered include nutrients, pesticides, heavy metals, and refractory organics (i.e., persistent organic contaminants that are not normally classified as pesticides, such as polychlorinated biphenyls), both in solution and attached to particulate materials. In addition to data already available, data likely to come from ongoing studies in the near future have been sought.

Data identified have been evaluated in terms of their adequacy for computing total stream mouth loading to the Great Lakes. Data have been termed "adequate" or "sufficient" according to the criteria of frequency of sampling, period of

record and station location. No attempt was made to evaluate the quality of the data in terms of the accuracy and precision of the numbers.

Data identified were also evaluated according to major gaps in the data base. These include areas of Great Lakes land drainage that are essentially unmonitored and/or ungauged. Specific parameters that have not been adequately sampled to permit reasonable estimates of loading to the Great Lakes from various watersheds have also been noted. In addition, the relation between water quality data and flow data has been considered.

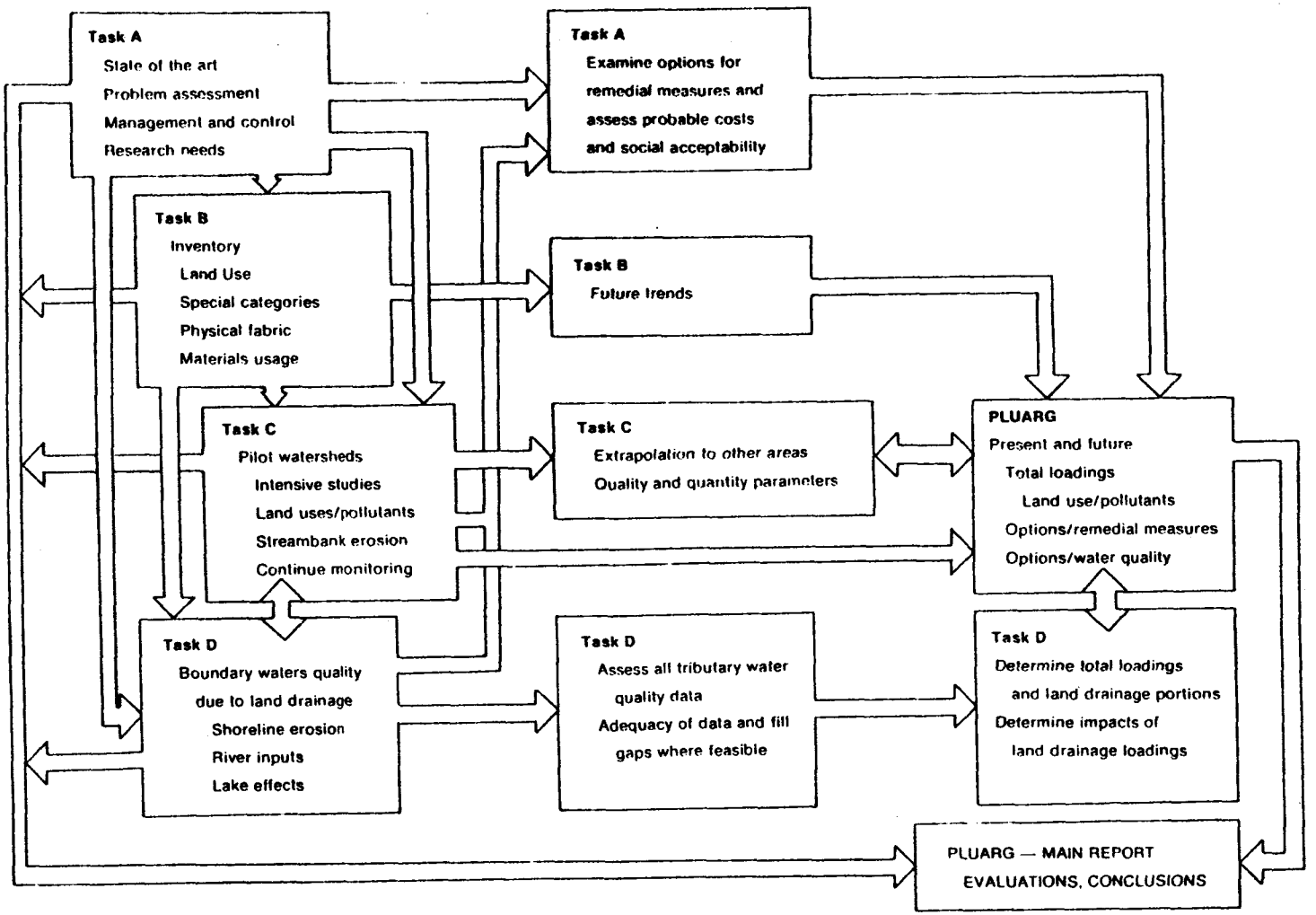
This report is not designed to function as a data referral system or as a bibliography. No attempt was made to include the exact detailed references of sources that have retrievable data. One of the major reasons this was not done was because of the space limitations. However, enough information is available in the report to facilitate acquisition of the data from the proper agency or location. The data are displayed in a format that allows the user to efficiently determine the usefulness of a particular data set with regard to sampling frequency, parameters examined, sample location, period of record and many other factors. The Great Lakes Basin Commission has on file more detailed information from all data sources. Should the user desire more information on a particular station, the STORET number of a particular station, or the exact agency and person to contact, the reader can contact the GLBC staff for this information. Much of this information is stored on supplementary card files.

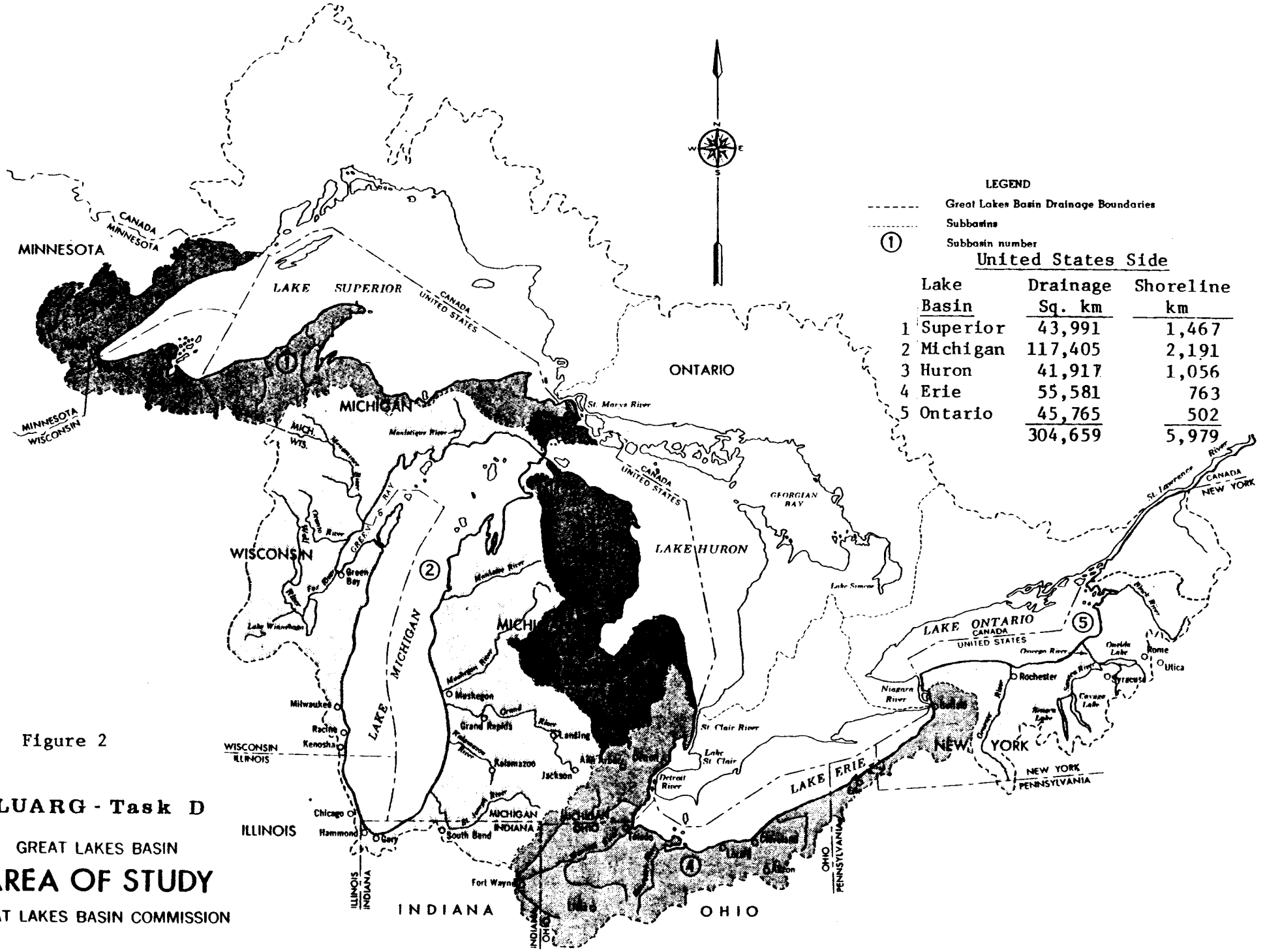
This project is also designed to provide information for subsequent studies in Task D. Based on this project's Preliminary Report, recommendations were made as to which tributaries, if any, should be surveyed as part of Subactivity 2-2. This study also forms the basis for Subactivity 2-3, in which actual calculations of total tributary loadings will be made. Computation of total tributary loadings is a key aspect of the PLUARG study and is necessary before any one remedial program can be evaluated. The total loadings of specific tributaries, based on river mouth input calculations from Task D of PLUARG, will also be compared to the PLUARG Task C pilot watershed data. In addition, extrapolation of Task C data to other Great Lakes tributaries will be simplified by the identification of existing loading data which follow in this report. A schematic representation of the interrelationships of the Tasks in the PLUARG study are given in Figure 1. The U.S. PLUARG study area is shown in Figure 2.

Finally, the summarization of Great Lakes river mouth loading information into an organized fashion will be useful to many other investigations, both in PLUARG and elsewhere. Further, in its 1975 Annual Report the Water Quality Board of the IJC recommended heavy emphasis on the refinement of loading estimates for phosphorus. This study will facilitate this refinement.

Figure 1

INTERRELATIONSHIPS OF TASKS IN THE PLUARG STUDY





United States Side

	Lake Basin	Drainage Sq. km	Shoreline km
1	Superior	43,991	1,467
2	Michigan	117,405	2,191
3	Huron	41,917	1,056
4	Erie	55,581	763
5	Ontario	45,765	502
		304,659	5,979

Figure 2

PLUARG - Task D

GREAT LAKES BASIN

AREA OF STUDY

GREAT LAKES BASIN COMMISSION

METHODOLOGY FOR IDENTIFICATION AND EVALUATION OF DATA

OVERALL PROCEDURE

The first step in the procedure used in identifying data for inclusion in this report was to search the generally well-known sources, such as the USGS Water Resources Data series. Next, state and regional agencies with water monitoring programs, as well as university and industry personnel, were contacted for information on data available through their programs. In addition, individual reports on specific tributaries or basins from other agencies and groups were examined. Finally, summary printouts of data in the EPA STORET system were scanned for data not located previously.

Information on any given data set is summarized on a Data Availability Matrix (DAM). The DAM is organized according to hydrologic areas (complexes and individual river basins), river basin groups, and lake basins following the procedure used in the Great Lakes Basin Framework Study. The breakdown of the U. S. portion of the Great Lakes Basin into these categories is given in Tables 1 and 2. A brief narrative description of the general geology, land use, and other hydrophysical characteristics of each hydrologic area is included. An evaluation and summary of tributary data for calculating loadings is presented for each hydrologic area, river basin group, and lake basin. The organization for presenting the summary of identified loading data and the evaluation of that data is shown below:

Lake Basin Level (repeat scheme for each Lake Basin)
- General description of Basin
- Map of Lake Basin showing River Basin Groups (RBG's)
- Summary and evaluation of loading data for the basin

River Basin Group Level (repeat scheme for all RBG's in each Lake Basin)
- Map of RBG showing Hydrologic Areas

Hydrologic Area Level--River Complex or River Basin
(repeat scheme for all river complexes in each RBG)
- Hydrologic area description (including map of area, showing monitoring station location)
- Data Availability Matrices (DAM's)
- Evaluation and Summary of Loading Data for RBG and Hydrologic Areas

Table 1

DRAINAGE AREA MEASUREMENT (HYDROLOGIC)[1]

	AREA 1,000 Hectares
LAKE SUPERIOR BASIN	4,400
River Basin Group 1.1	2,391
1. Superior Slope Complex (Minnesota)	595
2. Saint Louis River	944
3. Apostle Island Complex	514
4. Bad River (Wisconsin)	258
5. Montreal River Complex	80
River Basin Group 1.2	2,009
1. Porcupine Mountains Complex	272
2. Ontonagon River	353
3. Keweenaw Peninsula Complex (Michigan)	350
4. Sturgeon River (Michigan)	183
5. Huron Mountain Complex (Michigan)	252
6. Grand Marais Complex (Michigan)	311
7. Tahquamenon River (Michigan)	218
8. Sault Complex (Michigan)	70
LAKE MICHIGAN BASIN	11,741
River Basin Group 2.1	4,367
1. Menominee Complex (Michigan)	273
2. Menominee River	1,061
3. Peshtigo River (Wisconsin)	298
4. Oconto River (Wisconsin)	275
5. Suamico Complex (Wisconsin)	125
6. Fox River (Wisconsin)	1,710
7. Green Bay Complex (Wisconsin)	625
River Basin Group 2.2	563
1. Chicago-Milwaukee Complex	563
River Basin Group 2.3	3,356
1. Saint Joseph River	1,211
2. Black River (South Haven) Complex (Michigan)	93
3. Kalamazoo River (Michigan)	520
4. Black River (Ottawa Co.) Complex (Michigan)	66
5. Grand River (Michigan)	1,466
River Basin Group 2.4	3,455
1. Muskegon River (Michigan)	685
2. Sable Complex (Michigan)	503

[1]Area measurements also include small watersheds, streams, and land areas that drain directly into Basin Lakes. Source: Great Lakes Basin Framework Study, Appendix 1, Alternative Frameworks.

Table 1 (Continued)

DRAINAGE AREA MEASUREMENT (HYDROLOGIC)

	AREA 1,000 Hectares
3. Manistee River (Michigan)	520
4. Traverse Complex (Michigan)	683
5. Seul Choix-Groscap Complex (Michigan)	142
6. Manistique River (Michigan)	375
7. Bay De Noc Complex (Michigan)	310
8. Escanaba River (Michigan)	237
LAKE HURON BASIN	4,192
River Basin Group 3.1	2,108
1. Les Cheneaux Complex (Michigan)	364
2. Cheboygan River (Michigan)	409
3. Presque Isle Complex (Michigan)	145
4. Thunder Bay River (Michigan)	327
5. Au Sable and Alcona Complex (Michigan)	576
6. Rifle-Au Gres Complex (Michigan)	287
River Basin Group 3.2	2,084
1. Kawkawlin Complex (Michigan)	100
2. Saginaw River (Michigan)	1,617
3. Thumb Complex (Michigan)	367
LAKE ERIE BASIN	5,559
River Basin Group 4.1	1,347
1. Black River (Michigan)	180
2. St. Clair Complex (Michigan)	155
3. Clinton River (Michigan)	203
4. Rouge Complex (Michigan)	189
5. Huron River (Michigan)	220
6. Swan Creek Complex (Michigan)	74
7. Raisin River	326
River Basin Group 4.2	2,685
1. Ottawa River	44
2. Maumee River	1,711
3. Toussaint-Portage Complex (Ohio)	266
4. Sandusky River (Ohio)	397
5. Huron-Vermilion Complex (Ohio)	267
River Basin Group 4.3	843
1. Black-Rocky Complex (Ohio)	230
2. Cuyahoga River (Ohio)	234
3. Chagrin Complex (Ohio)	77
4. Grand River (Ohio)	212
5. Ashtabula-Conneaut Complex	90

Table 1 (Continued)

DRAINAGE AREA MANAGEMENT (HYDROLOGIC)

	AREA 1,000 Hectares
River Basin Group 4.4	684
1. Erie-Chautauqua Complex	169
2. Cattaraugus Creek (New York)	144
3. Tonawanda Complex (New York)	371
LAKE ONTARIO BASIN	4,577
River Basin Group 5.1	911
1. Niagara-Orleans Complex (New York)	269
2. Genesee River	642
River Basin Group 5.2	1,766
1. Wayne-Cayuga Complex (New York)	177
2. Oswego River (New York)	1,316
3. Salmon Complex (New York)	273
River Basin Group 5.3	586
1. Black River (New York)	521
2. Perch Complex (New York)	65

To Convert From	To	Multiply By
Hectares (ha)	Acres (ac)	2.471

Table 2

DRAINAGE AREA MANAGEMENT (HYDROLOGIC)

	AREA 1,000 Hectares		AREA 1,000 Hectares
STATE SUMMARY			
Illinois	16	New York	3,832
Indiana	944	Ohio	3,027
Michigan	15,030	Pennsylvania	156
Minnesota	1,591	Wisconsin	4,558
GREAT LAKES TOTAL			30,468

To Convert From	To	Multiply By
Hectares (ha)	Acres (ac)	2.471

Hydrologic Area Description

A short description of each of the 70 hydrologic areas found on the U. S. side of the Great Lakes Basin is given to provide an overview of the land resource factors affecting water quality within a hydrologic area. Most of the information used in these descriptions was derived from the Great Lakes Basin Framework Study. Other available information sources were also utilized. Key resource factors which are discussed as appropriate for each area include: drainage area (in hectares and acres), major rivers and their flows when available (in cubic meters and cubic feet per second), important tributaries to the rivers, topography, impact of wetlands, land use (in terms of approximate percentages), geology, mineralogy, and soil characteristics. Human influences on water quality such as industrial and municipal wastewater discharges and major cities (those with a population greater than 2,500 according to the 1970 Census), are also presented. These descriptions are also designed to be used in evaluating the data, since land resource factors may influence a judgment on the adequacy of data. For example, the availability of phosphorus data during the spring thaw period would be more critical for a agricultural watershed than for watershed that was predominately urban.

A map of the hydrologic area accompanies each watershed description. The map shows important tributaries and the locations of monitoring stations that were included in this report. The map station key is shown on the opposite page directly below the hydrologic area descriptions. The names of specific rivers can be obtained under the station location column by correlating station letters found there with those on the map. All identified stations appear on the hydrologic area maps unless otherwise noted on the DAM.

Data Availability Matrix

There are vast amounts of data being collected by government agencies, universities, industries, and a variety of other groups that are useful for measuring tributary input from the U. S. side into the Great Lakes. The Data Availability Matrix (DAM) is designed to organize these data in a uniform display system that will allow the user to survey the available data at a glance and to determine how useful the data will be for calculating loadings. The criteria for such a system include the following:

1. The data must be summarized in an easily readable fashion.

2. The format must display the tributaries monitored, parameters measured, frequency of sampling, period of record, and source of data.

3. The format must show where data gaps are.

4. The system must be flexible enough to accommodate a wide variety of data recorded by a variety of investigations with many differing purposes.

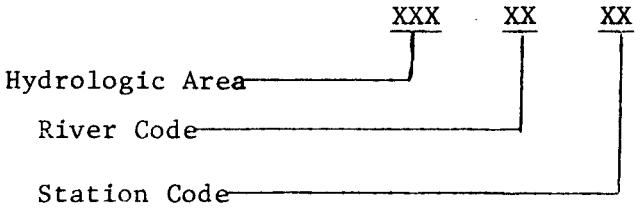
5. The format must facilitate an evaluation of the adequacy of existing data for loading calculations, including how well the data relate to flow.

After considering a number of alternatives, it was decided that the best way to proceed was to develop a matrix-type format with a supplementary card file which would contain bibliographic information and more detailed information on the data sources reviewed. The Matrix was designed for publication in the final report, while the supplementary card file was designed for in-house use, although it is available for reference to any individuals desiring more detailed information on a DAM entry. A sample of the Data Availability Matrix form is given in Figure 3. DAM codes are given in Table 3. More detailed descriptions of these headings and codes follow.

Year of Study. This column on the DAM indicates the year in which the data were collected. The code number corresponds to the last two digits of the year. If the same types of data were collected at a fixed frequency over several years, the inclusive dates are given (e. g., 72-74). However, in long-term studies where the frequency of sampling changes or when the types of parameters changed, separate entries were necessarily made on the DAM. If, for example, in a two-year study in which chloride and flow were monitored, the frequency of sampling for chloride were changed from monthly to daily between the first and second years of the study, separate entries would be made for each year. The Year of Study corresponds to a seasonal year from December 1 to November 30, with the date corresponding to the year the data were gathered. This seasonal year is discussed further in a subsequent section on sampling frequency and codes.

Agency. Coded entries in this column indicate the agency which reported the data. Agency codes are listed in Table 3. It is important to note that the reporting agency may not be the same as the collecting agency. A more detailed description of the reporting agency or investigator is maintained in the supplementary card file.

Station Number and Description. The third column on the DAM form specifies the tributary station from which the data were collected. The station is identified by a seven-digit number in the following form:



The initial three-digit number is simply the number assigned to the given hydrologic area, as listed in Table 1. The second component is a two-digit river code from 01 to 99 that has been assigned to each stream of interest in the hydrologic area. Streams are numbered consecutively, starting at the end of the complex adjacent to the preceding complex. Thus, each hydrologic area will have a Stream 01 (that is, the first stream in the hydrologic area). The highest number reached depends on the number of streams in the hydrologic area. These first five digits are referred to as the river number. The last two digits in the station number refer to a specific station on the stream. These stations are numbered in downstream order, following procedures similar

Figure 3

DATA AVAILABILITY MATRIX

page 1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD

page 2

STATION NUMBER	TYPE OF DATA: pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS: TOTAL	HEAVY METALS: DISSOLVED	PESTICIDES	REFRACTORY ORGANICS

Table 3

DATA AVAILABILITY MATRIX (DAM) CODE LIST

Code	Reporting Agency
01:	Indiana (State) Board of Health, Stream Pollution Control Board
02:	(Ohio) Toledo Pollution Control Agency
03:	The University of Michigan
04:	International Joint Commission
05:	Illinois (State) Environmental Protection Agency
06:	Michigan Department of Natural Resources
07:	(Minnesota) Arrowhead Regional Development Commission
08:	National Commission on Water Quality
09:	New York (State) Department of Environmental Conservation
10:	New York (State) Department of Health
11:	New York (State) Erie-Niagara Basin Regional Water Resources Planning Board
12:	New York Water Resources Commission
13:	Ohio (State) Division of Water
14:	Ohio State University
15:	Pennsylvania Department of Environmental Resources
16:	(Pennsylvania) Erie-County Health Department
17:	U.S. Army Corps of Engineers, Buffalo Division
18:	U.S. Environmental Protection Agency
19:	U.S. Federal Water Pollution Control Administration (now U.S. EPA)
20:	U.S. Fish and Wildlife Service
21:	U.S. Geological Survey
22:	U.S. Lake Survey Center
23:	U.S. Water Quality Office
24:	Northwestern Wisconsin Regional Planning and Development Commission
25:	Wisconsin University Center for Lake Superior Environmental Studies
26:	Wisconsin University Sea Grant Program
27:	Wisconsin Department of Natural Resources
28:	Minnesota Department of Natural Resources
29:	Minnesota Pollution Control Agency (MPCA)
30:	Southeastern Wisconsin Regional Planning Commission
31:	Wisconsin State Committee on Water Pollution
32:	Michigan State University, Institute of Water Research
33:	(Minnesota) Department of Water and Gas, City of Duluth
34:	Minnesota Department of Conservation
35:	U.S. Forest Service
36:	Argonne National Laboratory
37:	(Minnesota) Reserve Mining Company
38:	Northern Michigan University
39:	Michigan Technological University
40:	Minnesota Department of Health
41:	(Michigan) Grand River Watershed Council
42:	(Michigan) Andrews University
43:	Ohio (State) Environmental Protection Agency
44:	(Ohio) Heidlburg College

Frequency Codes

Code	Definition
1	Continuous
2	Grab
3	Daily
4	Weekly
5	Monthly
6	Quarterly

Frequency Codes

Code	Definition
7	Annually
8	Biweekly
9	Irregular
10	Unknown
11	Other Seasonal (defined for each case)

Seasonal Modifiers

Code	Season
A	Winter (Dec-Feb)
B	Spring (Mar-May)
C	Summer (June-Aug)
D	Fall (Sept-Nov)

to those used by the U.S. Geological Survey. If two or more studies, done independently or in concert, have used the same sampling location, the same station code is used for each. Thus, each location along a given stream has a unique seven digit station number assigned to it. The station number will be used to identify the location of the station on the hydrologic area maps.

In the station description field a short general description of the location of stations is given (e.g., at Waterville, near mouth). When available, a more exact location is given such as: latitude and longitude; township range and section; or river miles. These descriptions are usually assigned by the reporting agency or investigator. This field is designed to provide a supplemental identification of each station reported.

Office of Water Data Coordination (OWDC) Station. An asterisk in the Office of Water Data Coordination Station (OWDC STA) column indicates that the corresponding set of data has been assigned an OWDC number in the Catalog of Information on Water Data. This Catalog, published annually by the OWDC of the U.S. Geological Survey, under the U.S. Department of the Interior, contains a summary of data voluntarily submitted in streamflow and stage, surface water quality, and groundwater quality for the entire U.S. The summaries are published as a series of regional volumes, each covering one water resources region. The purpose of the OWDC STA column is to flag data which are not described in the catalog. The Data Availability Matrix is designed so that the information can be readily converted to the format used by OWDC. The DAM system has a much greater level of detail than the OWDC system, since it is designed to assess river mouth loadings. Attempts have been made in all aspects of this project to complement rather than duplicate the activities of other agencies and organizations.

Types of Data. The parameters included on the DAM are designed to provide the information of most concern in loading studies. Different forms of certain chemicals are shown on the DAM to provide more detailed information on those pollutants of most concern, such as phosphorus species, nitrogen species, and heavy metals. Other parameters generally considered to be less important in terms of land use pollution, such as silica, manganese, and iron, were not differentiated according to form.

In the data summaries and evaluations a distinction is made between gauging and monitoring stations. As they are used here, gauging stations are used for compiling data on flow only, usually on a continuous basis. Monitoring stations collect information on the various physical and chemical parameters. Both types of stations are commonly found at the same location. Also, instantaneous flows may be measured at a monitoring station.

The general procedure followed in logging information onto the DAM is that entries will be made whenever data are thought to be of some importance in evaluating loadings. As such, data identified on the DAM may not, in fact, be useful for estimating quantitative loadings, but can be used for gaining insights into comparing older data with more recent data, into changes in stream quality over periods of time, or into general trends in data. Thus, if data were thought to be potentially useful in some fashion, their existence was recorded on the DAM. In the completion of Activity 2-3 of Task D, in which loadings will be calculated, some of the data recorded on the DAM may prove to

be of limited or no value. Nonetheless, a rather complete review of all potentially pertinent data has been performed in this activity.

It should not be implied that the existence of data as noted on the DAM indicates anything about their quality. In obtaining information on the existence of data, no determinations were made concerning the analytical techniques used, the statistical validity of the data, or problems with quality control. Since any one parameter is determined by a variety of methods, many of which are operationally defined and not directly comparable, a certain amount of judgement is used in determining whether the data in a report fit under one of the DAM categories. For example, in the case of dissolved reactive phosphorus, the type of filter paper used may have a bearing on the results reported. Soluble P data obtained using a glass fiber filter may not correlate exactly with data obtained using a 0.45 micron membrane filter. However, where results from two operationally defined techniques define approximately the same form or fraction of a given pollutant, they are considered as the same parameter. For the purposes of river mouth loading estimates, slight modifications in methodology will probably have no bearing on the results.

In analyzing some of the data, particularly some of the older data, there were some problems with terminology, especially in the case of phosphorus. A variety of terms have been used for different phosphorus fractions, and unless the analytical technique used is known, it is sometimes difficult to determine which form of phosphorus is actually implied. For example, the term "phosphate P" could mean several different fractions, including total inorganic phosphorus or soluble ortho phosphorus. In cases such as these, it was sometimes necessary to look at the analytical methods used to see what form of phosphorus was actually implied.

Because of the importance of phosphorus in land use loading studies, a generalized analytical scheme for differentiation of phosphorus forms is shown in Figure 4. This figure shows the general scheme in which the three different types of phosphorus forms are analyzed and helps define the terminology used on the DAM.

Another parameter which frequently caused problems is "heavy metals." In many data reports it is not specified whether heavy metal data refers to the soluble or the total fraction. This often occurs when the results from several studies are summarized in a single summary report. Where confusion of this nature existed, the original source of the data was consulted wherever possible in order to clarify this uncertainty. There is also confusion as to what metals are reported as a "heavy metal" in the literature. The metals grouped as heavy metals for the purposes of this project are given in a subsequent discussion.

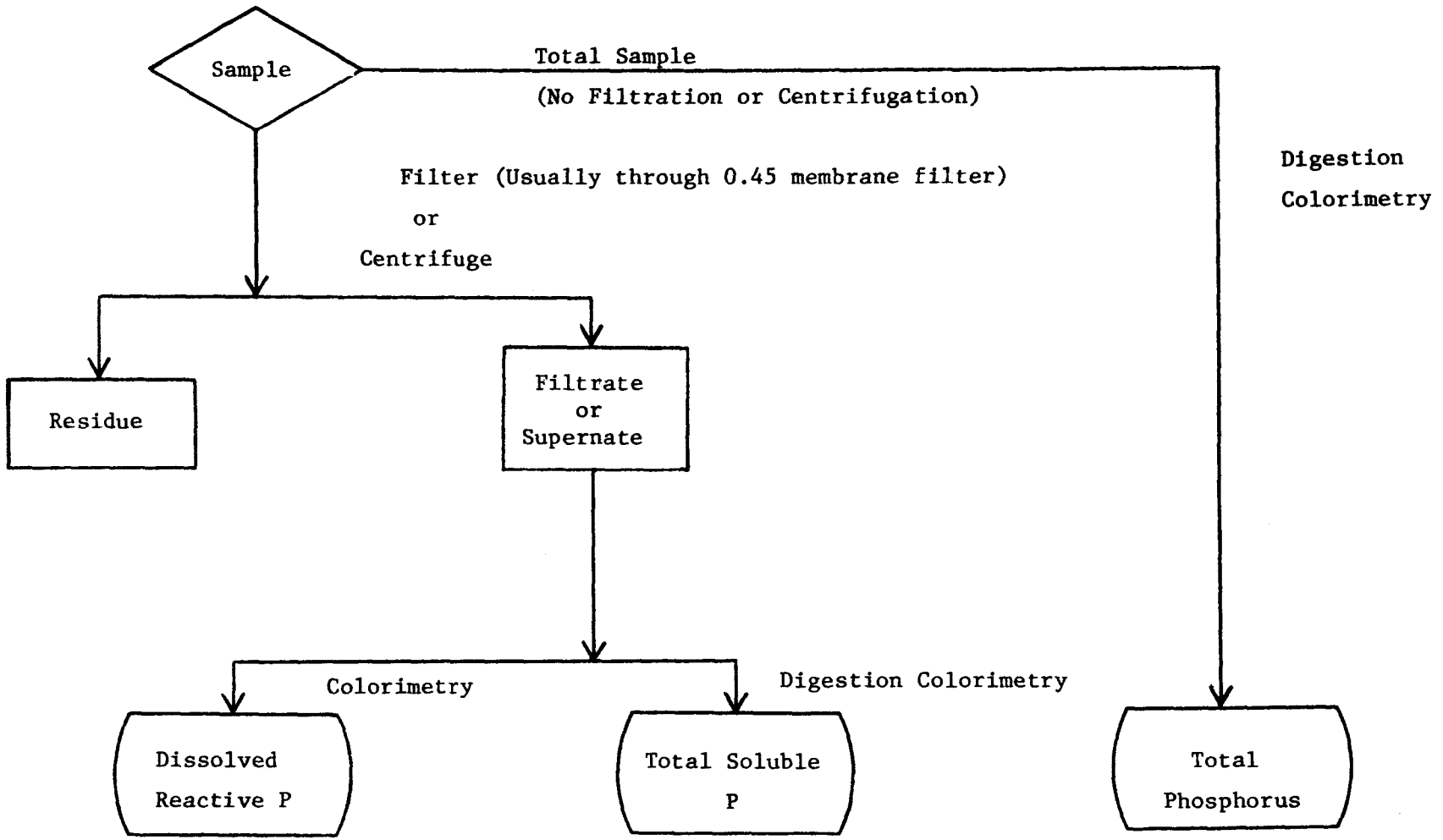
Explanations of the individual headings under the Types of Data section of the DAM form are given below:

> Discharge Rate - This category denotes the availability of flow data for the station of concern. Discharge and chemical data must be related if loading calculations are to be made. If additional entries for other parameters are made on the same line as discharge rate entry, it indicates that the flow data correlate with the physico-chemical data.

Figure 4

GENERALIZED ANALYTICAL SCHEME

FOR DIFFERENTIATION OF PHOSPHORUS FORMS



Temperature (Temp) - A routine parameter measured in most water quality studies.

Turbidity - An optical property related to the extent to which the penetration of light is inhibited by the presence of suspended particulate matter. Although turbidity gives a general indication of the suspended matter in a sample, it is not generally practical to directly correlate turbidity with concentrations of suspended solids since turbidity is an optical parameter, dependent on the size, shape, and refractive index of the particulate materials.

Total Dissolved Solids/Specific Conductance (TDS/COND) - Total dissolved solids are a measure of the dissolved solid matter in the sample. Specific conductance has also been included in this category since it has been found that in most natural waters total dissolved solids may be estimated from the specific conductance by multiplying the specific conductance (in μmhos/cm at 25°C) by a factor which generally lies in the range 0.55-0.7. Recently, the Upper Lakes Reference Group of the International Joint Commission has adopted a recommendation that specific conductance replace conventional gravimetric determinations of total dissolved solids in waters of the upper Great Lakes. Where conversion to a gravimetric value is required, a conversion factor of 0.65 has also been adopted.

Total Solids - This parameter is a measure of the particulate plus dissolved solids in a sample. It is routinely taken to be the sample residue after evaporation and subsequent drying at a temperature generally ranging from 95°-105°C.

Suspended Solids - This parameter is important in that large quantitites of land-derived pollutants may be transported in association with the suspended solids or particulate material. Suspended solids are operationally defined to be those solids retained on a filter, usually a 0.45 micron membrane filter. Suspended solids plus total dissolved solids equals total solids, so that one of these parameters can be determined if the other two are known.

Particle Size - This parameter may be of importance in analyzing loading data, since the amount of pollutants associated with suspended particulate material may be related to particle size. Particle size is the diameter of suspended sediment determined usually by sieve or sedimentation methods. Most particle size determinations reported were based on procedures of the U.S. Geological Survey. It should be noted that particle size distributions given in USGS reports are not necessarily representative of all particles in transport in the stream since, in the standard USGS procedure, most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water.

Hardness - This parameter is a measure of the alkaline earth cations in a solution. Calcium and magnesium normally comprise the bulk of the hardness-causing cations.

Alkalinity - Alkalinity is a measure of the capacity of water to neutralize hydrogen ions. The alkalinity of most waters is primarily a function of the carbonate, bicarbonate, and hydroxide content so that the alkalinity determination is normally taken as an indication of the concentration of these components.

Dissolved Oxygen - A routine parameter measured in most water quality investigations is dissolved oxygen. It can be measured by conventional wet chemical techniques or commercially available instrumental techniques.

Biochemical Oxygen Demand, Chemical Oxygen Demand (BOD/COD) - Biochemical oxygen demand is a measure of the amount of oxygen required by microorganisms to stabilize the organic matter present in a sample under aerobic conditions. The incubation period for the BOD test is usually 5 days at 20°C, but other lengths of time and temperatures can be used. In identifying BOD data in this report, no distinction is made between BOD data reported for different incubation times and temperatures. Chemical oxygen demand is a measure of the readily oxidizable material in the sample. It is the oxygen equivalent of the organic matter that can be oxidized by using a strong chemical oxidizing agent in an acidic medium. The term COD is in reality operationally defined. For the purposes of this report, no distinction as to the method of COD determination was made. Either BOD and/or COD can be reported in this column. Generally, the one with the greater sampling frequency was included.

pH - A measure of the hydrogen ion activity of a sample and a routine parameter in water quality studies.

Silica - Analysis of silica is not routinely performed on most water quality studies. However, silica is considered in this report because of its role in phytoplankton productivity, particularly as an element required by diatoms. No distinction is made in this report as to the form of silica measured.

Nitrate - Nitrate is a common form of nitrogen in water and is a nutrient readily available to most plants. In some water quality studies, the sum of nitrate (NO_3^{-1}) plus nitrite (NO_2^{-1}) nitrogen concentration is presented. Since nitrite is absent or present in minute quantitites in most natural waters due to its instability in the presence of oxygen, nitrite has not been included as a DAM parameter, and results reported as nitrate plus nitrite have been logged onto the DAM as indicating nitrate data availability.

Ammonia - Ammonia is another form of nitrogen which can be utilized directly by at least some aquatic organisms. Ammonia nitrogen includes nitrogen in the forms of NH_3 (free ammonia) and NH_4^{+1} (ammonia ion).

Total Kjeldahl Nitrogen - Total Kjeldahl nitrogen includes free ammonia and organic nitrogen but does not include nitrate and nitrite nitrogen. Organic nitrogen is usually determined by total Kjeldahl nitrogen analysis after the free ammonia is driven off or, most commonly,

from the difference between the value obtained for total Kjeldahl nitrogen and that for ammonia nitrogen. Where data were reported as organic nitrogen, an entry was made on the DAM in the total Kjeldahl nitrogen column. Similarly, where total nitrogen (total Kjeldahl nitrogen and nitrate-nitrite nitrogen) data were reported, entries were made in all three nitrogen columns.

Total Phosphorus (Total P) - Phosphorus is the nutrient given the most attention in the Great Lakes, not only because it is often implicated as a key nutrient involved in the eutrophication of the Great Lakes, but also because it is the nutrient whose input to the Great Lakes is most easily controlled. Total phosphorus includes both the soluble and particulate phosphorus fractions.

Dissolved Reactive Phosphorus (Dissolved Reactive P) - Dissolved reactive phosphorus is the often-measured form of phosphorus in filtrates or supernates which reacts with molybdate to form a colored complex and is generally considered to be available for uptake by phytoplankton. In the literature, various terminologies are used for this form, including soluble ortho phosphate, soluble ortho P, soluble P, soluble inorganic P, and soluble reactive P. Also, as discussed previously, these terms do not always refer to the same exact form of phosphorus. In reality, the forms of phosphorus reported are operationally defined, so that the meaning of the terminology depends on the analytical techniques used. For the purposes of the DAM, phosphorus data in the literature which is equal to or approximates that fraction in a sample filtered or centrifuged, which reacts with molybdo-phosphoric acid complex to form a colored complex, was logged as "dissolved reactive P" data.

Generally, the dissolved reactive phosphorus fraction is immediately available for biological uptake. The available phosphorus fraction (the fraction taken up by biota) is likely to fall between the total phosphorus and the dissolved reactive phosphorus content.

Total Soluble Phosphorus (Total Soluble P) - This phosphorus fraction comprises the phosphorus in the filtered or centrifuged sample subjected to digestion procedure (as in the total phosphorus analysis). This form consists of all dissolved forms, including those which do not readily react with molybdo-phosphoric acid complex to form a colored sample, such as some species of organic phosphorus. The difference between total soluble phosphorus and total phosphorus is the particulate phosphorus fraction. This fraction is important in river mouth loading studies, since particulate phosphorus (phosphorus associated with suspended sediment) may comprise a large percentage of the total phosphorus transported by a stream. Most of the total soluble fraction is likely to be biologically available, at least in terms of long-term availability.

Chloride - Chloride is a commonly measured parameter in water quality studies. Since chloride is a conservative constituent, high

chloride concentrations may be indicative of pollution from sewage or other sources, and because chloride is a conservative chemical, variations in its concentrations may indicate major changes in water composition.

Manganese - This element is sometimes thought to have a role in limiting the productivity of certain types of phytoplankton. In the DAM, no distinction is made as to the oxidation state of manganese, nor to whether the particulate or soluble fraction is reported.

Iron - This parameter also can be a limiting factor to phytoplankton under some conditions. Iron species occur in both the particulate and dissolved form, although no distinctions are made on the DAM.

Heavy Metals - The Heavy Metals column denotes the occurrence of either total (soluble plus particulate) or dissolved heavy metals, since the toxicity and availability of these metals in natural waters may vary according to their form. Heavy metals considered for the DAM include Ag, As, Cd, Co, Cr, Cu, Hg, Mo, Pb, Sm, Se, Ti, V, Y, Zn, and Ni.

Pesticides - Data useful for estimating pesticides contributed to the Great Lakes via tributary flow are identified here. No attempt has been made on the DAM to identify the individual pesticide(s) measured.

Refractory Organics - This category includes those persistent organic contaminants which are not normally categorized as pesticides. Examines include the polychlorinated biphenyls (PCB's) and the phthalate compounds.

Sampling Frequency and Season of Collection Codes. A sampling frequency code has been designated to indicate the frequency of data measurements, as well as the time of year in which the measurements were made. Both the frequency of sampling and the time of sampling are important factors in considering the usefulness of data for river mouth loading purposes. For example, if data are only collected a few times a year, they may be of little value for calculating loadings, since estimates of loading based on one or two data points are usually associated with a very high degree of error. The time of sampling is important since it has been found that a large proportion of the total annual input of certain pollutants can occur during a very short period of time. The spring thaw period is usually an important time when a large amount of pollutants enter the lakes. Thus, if measurements are not made at that time, a large fraction of the total tributary input may be missed in calculated loadings.

Frequency codes used on the DAM have been previously summarized in Table 3. Detailed definitions of the frequency codes are given below. These codes are designed to cover a large array of possible sampling frequencies. They generally follow the codes used by OWDC in their Catalog of Information on Water Data, but have been modified slightly to provide more useful information for evaluating loading data.

Code	Definition
1	Continuous: This category is for cases in which samples were collected on a continuous basis or in which several samples were taken during a 24-hour period. In most cases, data are reported as either a daily mean or as daily minimums and maximums. The parameters most often reported on a continuous basis are discharge, temperature, pH, and conductance. For purposes of entering a reference on the DAM , a collection frequency of two or more times per day is classified as being continuous.
2	Grab: A grab sample in this study is defined as the case where there was only one sample, or two closely spaced samples (within the same month) reported. In general, a seasonal modifier will be included to define when the sample was taken.
3	Daily: In contrast to Continuous, Daily refers to a sampling program in which one sample was drawn from a stream each day, usually at a specified time. Results were then reported in terms of the actual sample parameter values rather than as a mean or range.
4	Weekly: This category is for those cases in which samples were collected at approximately weekly intervals. This includes the range from one every five days to one every ten days. The interval may vary during the sampling period within that range and still have the overall frequency classified as Weekly.
5	Monthly: Cases in which one sample was taken per calendar month are included in this category. The samples do not have to be collected during the same period within each month to be considered monthly. Generally, if two out of three months in a given season are sampled, the Monthly code is used.
6	Quarterly: The Quarterly designation is for those situations in which one sample is collected during each seasonal division. A sample must have been taken in each of the four seasons in the given year for the program to be identified as Quarterly.
7	Annually: Annual sampling is distinguished from a series of yearly grab samples if (a) the samples are collected within the same season, and (b) the period of record is three years or more. A seasonal modifier is included when possible.
8	Biweekly: Biweekly sampling covers most cases where two samples are collected in a given month. The sampling interval may range from eleven to twenty-one days and still have the program categorized biweekly. However, at least two months of the season must have two samples each.

Code	Definition
9	Irregular: This category is for all cases in which a sampling program was carried out with either (a) no regular frequency used in the sampling, or (b) the study was done on a short-term basis, generally for less than one season. As such, it is a catch-all category for those cases that do not fit under any other heading.
10	Unknown: This classification is used when the reference does not give the sampling frequency or the exact dates that the data were collected. If the season is given in the source, it is included in the DAM. The year of sampling is always included.
11	Other Periodic: This category is distinguished from Irregular in that it is used in cases where sampling was done at regular intervals that are not described by any of the above descriptors (for example, Bimonthly). It is also used in cases that, while they do not fit the categories described above, are important enough for definition (for example, a case in which three or more samples are taken in one month). Footnotes are always included.

The seasonal modifiers are presented in Table 3. For this project, the year has been divided into the four seasons of Winter, Spring, Summer, and Fall. However, the divisions between them have been altered from the calendar year to better meet the project goals. In particular, Spring is considered to include the period in which major runoff events often occur (March, April, and May), as opposed to the calendar definition, which would be March 21 to June 21.

The seasonal divisions defined for this study better reflect the periods of importance in an annual hydrological cycle than do more tradiational breakdowns. Using this scheme, the "year" is considered to run from December 1 through November 30. Thus, December 1972 would be part of the 1973 year for the purposes of this study. It should be noted that this "year" does not correspond to the USGS water year which runs from October 1 through September 30. Importantly, spring thaw runoff events can occur before March in southern portions of the Basin and after May in the northern portions of the Basin, although March through May are the months in which major thaws typically occur. When known, the existence of data which were obtained specifically to characterize a runoff event in a non-spring period will be noted on the DAM sheets.

Seasonal Modifiers

A	Winter:	December-February
B	Spring:	March-May
C	Summer:	June-August
D	Fall:	September-November

The seasonal modifiers are used in combination with the frequency codes to specify when the sampling was done. For instance, 2B would indicate a grab sample was taken in the spring, while 5D would mean that a monthly program was carried out in the fall. Modifiers can also be used in combination to

represent more than one season. For example, 8BC means that a biweekly sampling program was conducted during the spring and summer. A frequency of 8B-D would indicate a program extending from spring through fall, while 8BD would mean spring and fall. Two examples of how the frequency code and seasonal modifiers could be applied to different types of data are given below.

Example 1

A sampling program has collected data on several parameters on the following dates: 2/9/69, 5/25/69, 6/10/69, 7/1/69, 8/4/69, 9/10/69, and 11/2/69.

Dividing the program into the seasons we have defined, the following pattern emerges:

Winter:	one sample on 2/9/69
Spring:	one sample on 5/25/69
Summer:	three samples, one each in June, July, and August
Fall:	two samples, one each in September and November

The samples in winter and spring would each be termed Grab Samples, so their code would be 2AB. The summer samples are obviously Monthly, so they would be coded 5C. The fall samples would also be coded as Monthly, because two of the three months of that season are covered. This is a general rule that has been followed in coding the data: if two of the three months of a given season fall into a particular category, then the entire season is coded as that category.

The complete entry for this example would then be 2AB 5CD.

Example 2

A study has collected data on two dates, 11/29/71 and 12/2/71. In cases like this, two row entries must be made, one for 1971 and one for 1972, since December 1 marks the start of a new year under our system. The samples would be classed as 2D and 2A, respectively.

Criteria for Stream and River Mouth Station Selection

There are literally hundreds of streams tributary to the Great Lakes throughout the Basin. Clearly, some selection procedure is required to eliminate those small streams which neither contribute significant pollution to the Great Lakes nor have existing data useful for understanding pollutional loading patterns.

Several criteria have been developed to include or reject a particular tributary to the Great Lakes. First and foremost is the availability of data. If loading data are available on a given stream, such data are summarized on the DAM sheets. As mentioned previously, data logged onto the DAM forms might not be useful for estimating quantitative loadings, but could be used in comparing older data to more modern data. Changes in stream quality over periods of time, general trends in data, and information on concentrations and flows might be extrapolated to tributaries with similar drainage and flow characteristics. The availability of data for even a small stream indicates that the stream was significant enough to some research group to expend the resources needed to

collect and analyze at least one sample from it. This would indicate that the stream may be more important or significant in some sense than others in the same area that were not studied, or that these stream data could be used to represent similar streams in the area.

A second criteria for selecting streams to be included on the DAM is an estimate of their drainage area. Using USGS 1:250,000 topographic maps, an approximation of the drainage area of a tributary was made. If an area of discharge is more than approximately 50 km^2, then the tributary is included on the DAM.

Another criteria for selection was whether the stream is named on a 1:250,000 USGS topographic map. If the stream is large enough to be named at that scale, it is generally included. Another criteria for selection is whether or not the stream has intermittent flow. Intermittent streams, unless they have relatively large drainage basins, are generally not listed on the DAM.

The above criteria for selection are summarized in a decision tree given in Figure 5. By following the path prescribed by affirmative or negative answers to the four condition questions, a determination can be made as to whether the stream should be included in the study. It should be realized that the criteria are used only as a guide, and some judgements were made concerning stream selection.

A problem common to most studies of this nature is determining what can be considered a "river mouth" station and what is an upstream station. Unfortunately, there are no uniformly accepted definitions of "river mouth" utilized by USGS or other agencies that fit the purposes of this study. The problem is further complicated by the existence of estuaries in some Great Lakes tributaries. Estuarine river effects are particularly common in lowland rivers, such as those found on the U.S. drainage basin to Lake Erie. On a large river like the Maumee River or the Sandusky River, estuarine effects can occur many miles upstream. The estuarine effect can also shift depending on flow conditions, lake levels, and wind direction. Some rivers are protected by embayments or peninsulas so that the estuarine effect is minimal. Dams and other obstructions also complicate the determination of the river mouth.

The presence of embayments can also cause a problem. For example, the St. Louis River in River Basin Group 1.1 drains into a small bay which is separated from Lake Superior by a narrow island, as illustrated in Figure 6. Exchange between the bay and the lake occurs between two narrow outlets on either end of the island. In cases such as this, the river mouth is considered to be the section of the river before it flows into the embayment. However, where flow and loading data in the exchange areas of the embayment are available, such data are included on the DAM with an explanation. Attempts were made to include river stations immediately above the estuarine zone. Stations which occur in the estuarine zones are also included when the data are deemed to be useful.

As a general criteria, stations located more than about 30 km (18 miles) (river distance) upstream are not considered to be river mouth stations. However, where the closest station to the "river mouth" is greater than 30 km upstream, it is generally considered to be a useful station. In some situations the estuarine effect may extend as much as 25 km (15.5 miles) from what may be termed the estuarine mouth. In this case stations immediately above the estuarine effect

Figure 5

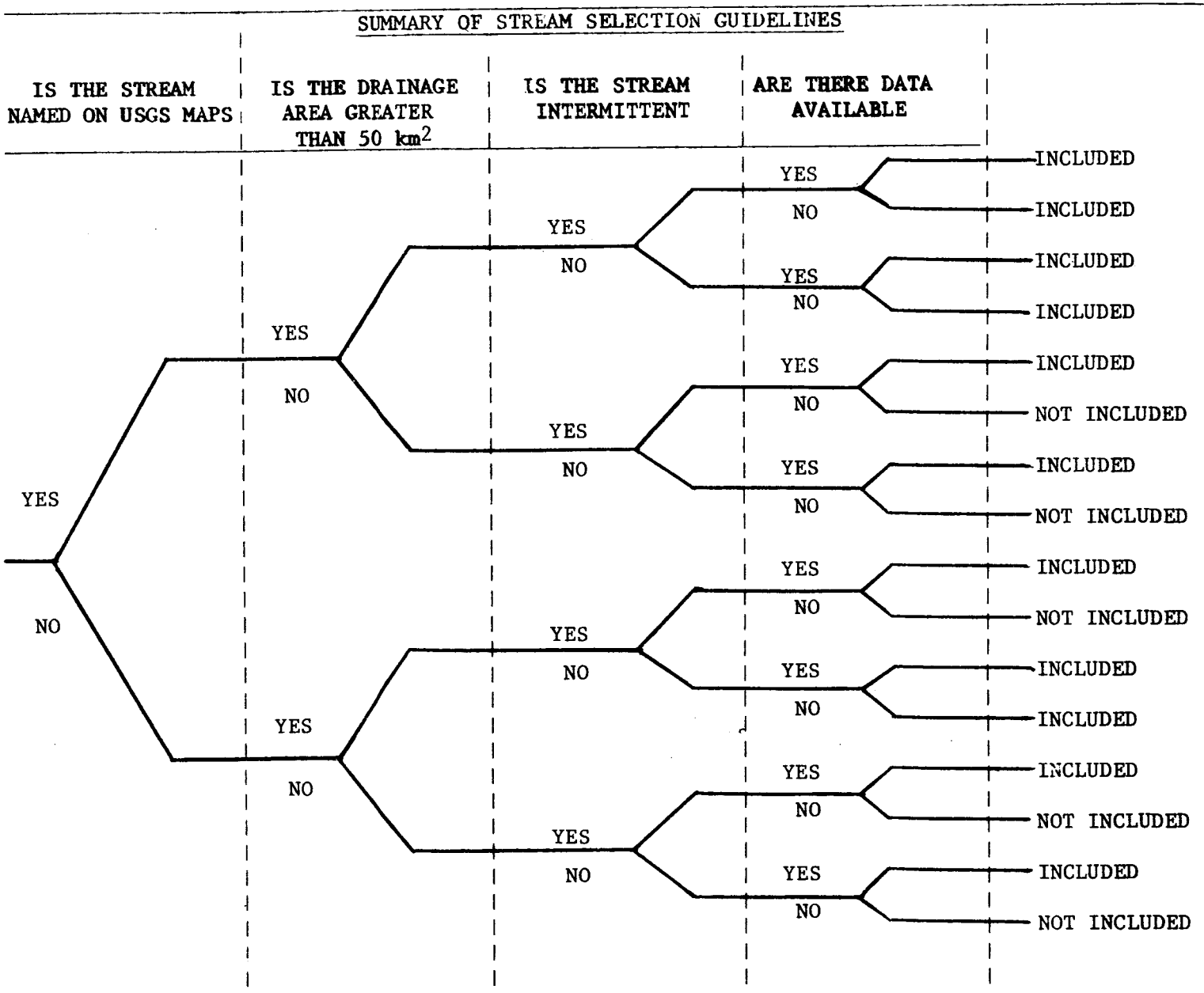
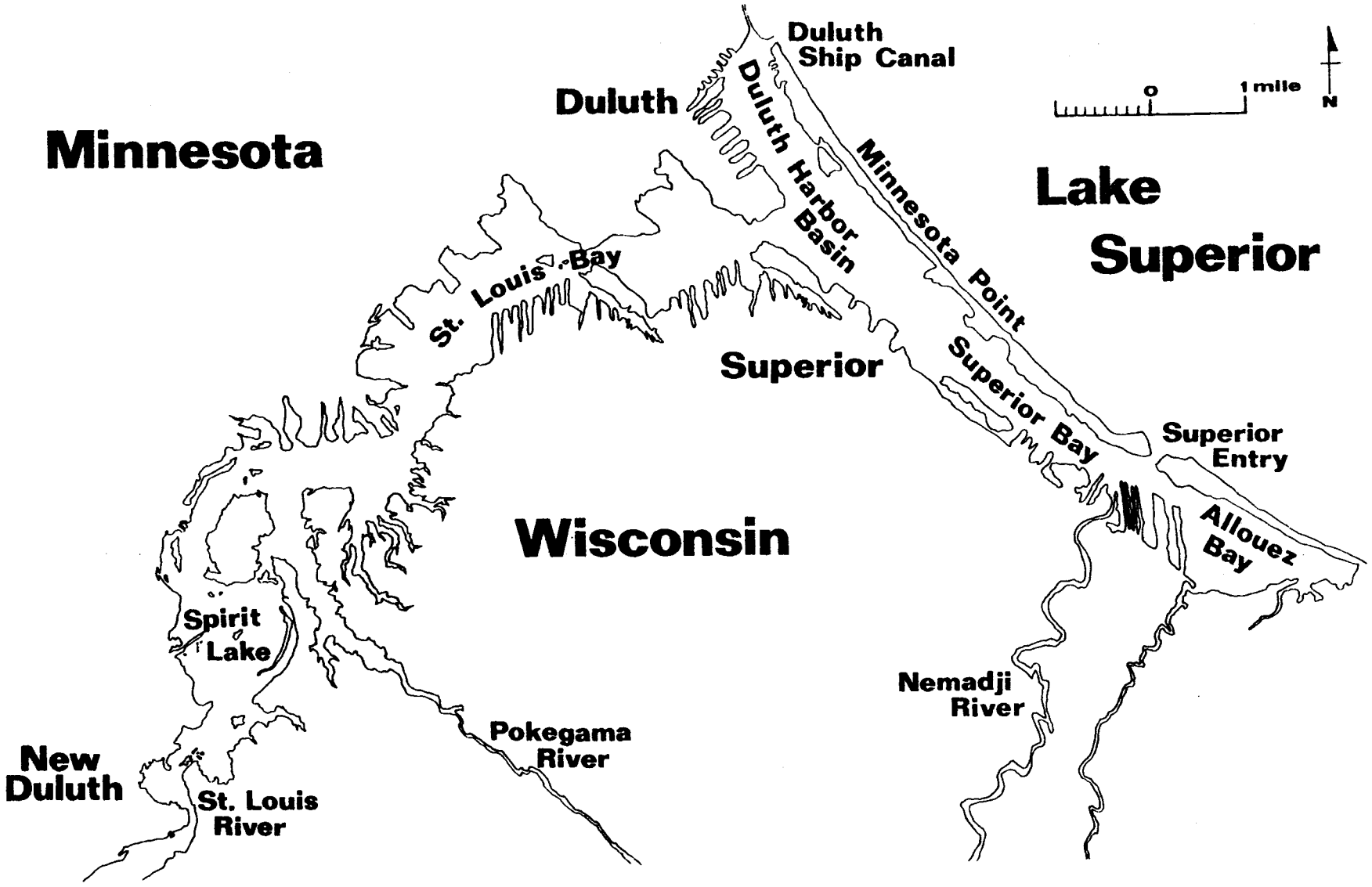

SUMMARY OF STREAM SELECTION GUIDELINES
IS THE STREAM NAMED ON USGS MAPS
IS THE DRAINAGE AREA GREATER THAN 50 km2
IS THE STREAM INTERMITTENT
ARE THERE DATA AVAILABLE
YES
NO
INCLUDED
NOT INCLUDED

Figure 6

ST. LOUIS BAY AREA



are included. Each stream is unique and must be considered individually; as a result, no hard and fast rules for determining a station's usefulness as a river mouth station can be set. The general procedure was to report any data that was thought to be useful for river mouth loading purposes and let the users apply these data relative to the context of their own criteria. The intent then is to present a rather complete review of all potentially pertinent data.

Evaluation and Summary of Loading Data - Procedure

A narrative evaluation and summary of the available data for potential use in loading calculations was made of each hydrologic area based on the information provided by the DAM forms. The data available for each area were evaluated according to the following criteria:

1. What parameters were measured? Were those parameters of key importance, such as phosphorus, nitrogen, heavy metals, and organic contaminants measured?

2. At what frequency were the parameters measured? Were there any measurements during the spring season when flow is expected to be the greatest?

3. Where chemical data are found, are concurrent flow data also available?

4. In a given complex, were all major streams monitored? What is the status of monitoring on some of the minor streams?

5. Are the sampling stations adequate for the purposes of measuring river mouth loadings? Could estuarine effects complicate the analysis? Are several stations available in one river mouth reach of the stream which could be used for comparison purposes?

6. Are there long periods of record for a given stream? Are there other pertinent historical data?

7. Are the data on a given stream sufficient to consider calculating loadings of at least some parameters? Data were considered adequate or sufficient if collected on a monthly or more frequent basis over one or more annual cycles.

While the above criteria were applied to each hydrologic area, summaries of the river basin groups have also been made. These evaluations show those river basin groups in which loading data are inadequate or insufficient. More consideration is given to geographically important areas. For example, rich agricultural areas, such as those found in the southern portion of the basin, generally have much higher pollutant loadings derived from land sources in their tributaries compared to tributaries in more northern parts of the watershed. Minnesota streams draining into Lake Superior generally drain highly forested areas, and the loadings expected from such streams would be small. Hence, it may be more important to have detailed information on southern streams compared to more northern streams where water quality is generally higher.

Summary evaluations have also been made on the lake basin level. These evaluations briefly explain the adequacy of available data regionally and show where major gaps exist and where data are generally adequate.

Data Collection

Of the data collected for this report, the most recent data are generally limited to the published information available. Since there is a time lag between data collection and publication, some recently collected data may not have been available for use in this report. However, many tributaries are monitored as part of regular sampling programs which continue beyond the latest date indicated on the DAM.

Data gathered for this report were obtained from a variety of sources. The following is a brief description of the major information sources utilized in this activity.

United States Geological Survey (USGS). One of the major information sources for this study was the U.S. Geological Survey. In 1941 the USGS added to its long established surface water records such information as chemical quality, water temperature, and sediment concentrations. Beginning with the 1964 USGS Water Year, water quality and water resources (quantity) records have been released by the Geological Survey in annual reports on a State boundary basis. These reports constitute a fundamental source of data for this project.

Another primary source of information was the U.S. Geological Survey's Office of Water Data Coordination (OWDC). Their Catalog of Information on Water Data contains computer-filed information about U.S. water data acquisition activities. Their Station Location Maps supplement the Catalog information by showing the exact locations of OWDC data stations. The Catalog is developed on a regional basis, including a separate catalog for the Great Lakes Region. The information contained in the Catalog file is reported to the OWDC on a voluntary basis by Federal, State, and local agencies and private organizations that acquire water data directly in the field and laboratory. The Catalog is thus a file of information about water data acquisition activities and not a file of the actual water data, which must be obtained from the reporting agency. It should be pointed out that not all available tributary data are presently logged in the Catalog of Information on Water Data; however, the Catalog does serve as the convenient starting point for information retrieval. An arrangement has also been made for the Great Lakes Basin Commission to supply information not listed in the Catalog to the Office of Water Data Coordination so that it can be included in subsequent OWDC catalogs. The DAM forms used in this project are designed so that the information they contain can be readily transferred to the Catalog of Information on Water Data.

The International Field Year for the Great Lakes (IFYGL). The International Field Year for the Great Lakes is an intensive field study of Lake Ontario and its drainage basin, under the joint direction of Canada and the United States. Coordinated research into the physical, chemical, and biological aspects of Lake Ontario took place between April 1, 1972, and March 31, 1973, although data reduction and analysis are still in progress. As part of the IFYGL effort, annual loadings of a variety of parameters were determined for the U.S. portion of Lake Ontario. Aside from the Niagara River, which is the principal inflow to Lake Ontario, three major U.S. streams were monitored. These streams, the

Black, Genesee, and Oswego Rivers, represent the principal sources of land drainage to Lake Ontario.

The United States Environmental Protection Agency (U.S. EPA). The U.S. Environmental Protection Agency sponsors a variety of programs having to do with the Great Lakes. Publications such as the Ecological Research Series, the Environmental Protection Technology Series, and the Water Pollution Investigation Series are examples of EPA reports that were very useful to this study. EPA-sponsored projects such as the Great Lakes Initiative Contract Program, as well as a variety of other research studies and reports, were utilized in preparing this document.

The U.S. EPA also sponsors STORET (STOrage and RETrieval), which is a computerized information system that draws on data acquired from 200 locations in an attempt to define the causes and effects of water pollution. A retrieval of all STORET data for stations located up to 50 miles inland was scanned for data pertinent to this study and recorded on the DAM.

The Upper Lakes Reference Group (ULRG). The Upper Lakes Reference Group of the International Joint Commission also served as a primary source of tributary loading data. ULRG conducted a comprehensive study of pollution problems of Lake Huron and Lake Superior, and their connecting waters. Part of this study included the investigation of sources and characteristics of material inputs to these lakes. A number of tributaries draining into Lakes Superior and Huron were examined as part of the Upper Lakes Reference Group's study. Sampling programs were carried out on a monthly basis with extra samples taken in the spring. Most of these studies were conducted by the state in which the tributaries are located. Much of the Upper Lakes Reference Group's tributary data are located in the States' STORET file.

Lake Erie Wastewater Management Study. Of particular importance to Task D and PLUARG as a whole is the Lake Erie Wastewater Management Study being conducted by the U.S. Army Corps of Engineers. As part of this study, most of the major tributaries draining into Lake Erie are being intensively studied. A basic objective of the tributary sampling program is to sample river mouth stations so that representative changes in chemical concentration during storm runoff periods may be obtained. Thus, this study is one of the first in the Great Lakes Basin to emphasize the importance of measuring loadings during high flow conditions. As such, it should provide very valuable information, not only for Lake Erie, but for all of the Great Lakes.

Additional Information Sources. There are a number of other state and Federal agencies, universities, industries, and other groups that have collected or are now currently collecting stream loading data on their own. These programs are generally very specific and on a much smaller scale than those previously discussed. A list of all agencies and study groups from which data were obtained is found in Table 3.

Major Tributaries

Table 4 is a list of the major tributaries that discharge into the Great Lakes. Of all the tributaries examined, these rivers were selected as major for one or more of the following reasons:

Table 4

DISCHARGE OF MAJOR GREAT LAKES TRIBUTARIES

River	Discharge (m^3/s)	Range (m^3/s)	Period of Record (years, through 1974 unless otherwise noted)	Drainage Area at Gauge (km^2)	Approximate Gauge Location (km from river mouth)
Lake Superior Basin					
River Basin Group 1.1					
Pigeon	14.3	0.9-312	49 (1972)	1,554	6
Poplar	2.9	0.07-53	33 (1961)	206	0.6
Baptism	4.8	0.01-265	45 (1972)	363	0.3
St. Louis	64.3	3.1-1,101	64 (1972)	8,884	13
Nemadji	---	1.5-144	1	1,093	16
Bois Brule	4.9	1.9-43	32	311	32
Iron (Wisc)	ungauged	---	---	---	---
Bad	17.4	1.4-784	34	1,582	20
Montreal	9.2	0.06-187	32 (1970)	679	3
River Basin Group 1.2					
Black	6.7	0.2-419	19 (1973)	518	24
Presque Isle	5.1	0.6-131	29	443	29TT
Iron (Mi)*	4.2	1.4-16.3	2	---	0
Ontonagon	40.0	5.0-1,189	32	3,471	32
Sturgeon	23.3	4.5-439	32	1,826	18
Carp	0.7	0.1-9.9	13	132	13
Two-Hearted*	8.5	3.9-15.3	2	---	0
Tahquamenon	26.2	4.5-198	21	2,046	29
Lake Michigan Basin					
River Basin Group 2.1					
Ford	10.6	0.6-215	20	1,166	11
Cedar	ungauged	---	--	---	---
Menominee	89.2	4.6-935	62	9,816	40

Table 4 (Continued)

DISCHARGE OF MAJOR GREAT LAKES TRIBUTARIES

River	Discharge (m^3/s)	Range (m^3/s)	Period of Record (years, through 1974 unless otherwise noted)	Drainage Area at Gauge (km^2)	Approximate Gauge Location (km from river mouth)
Peshtigo	26.2	0.5-277	21	2,911	19
Oconto	16.5	2.6-238	63	1,756	47
Pensaukee	---	0.2-110	2	355	6
Fox	118.5	3.9-680	78	15,929	29
Kewaunee	2.4	0.5-102	8	334	11
East Twin	---	0.3-88	2	287	16
West Twin	ungauged	---	--	---	---
Manitowac	---	0.7-88.9	2	1,373	11
Sheboygan	6.6	0.03-202	32	1,119	7
River Basin Group 2.2					
Milwaukee	11.2	0.0-428	60	1,777	11
Menomonee	2.5	0.08-382	13	319	10
Root	4.4	0.04-127	11	486	8
Indiana Harbor Canal	ungauged	---	--	---	---
Burns Ditch	---	0.07-97.1	25	414	16
Trail Creek	1.9	0.6-31.4	5	140	7
Galien	ungauged	---	--	---	---
River Basin Group 2.3					
St. Joseph	88.8	11.9-572	44	9,495	70T
Black (Van Buren Co.)	2.8	0.6-24.9	8	218	10T
Kalamazoo	38.6	2.1-496	44	4,144	16T
Grand	99.2	10.8-530	48	12,691	66T
River Basin Group 2.4					
Muskegon	54.9	1.5-423	52	6,087	63
White	11.4	4.6-106	17	984	19
Pentwater	ungauged	---	--	---	---
Pere Marquette	18.1	5.9-84.1	35	1,836	16

Table 4 (Continued)

DISCHARGE OF MAJOR GREAT LAKES TRIBUTARIES

River	Discharge (m^3/s)	Range (m^3/s)	Period of Record (years, through 1974 unless otherwise noted)	Drainage Area at Gauge (km^2)	Approximate Gauge Location (km from river mouth)
Big Sable	4.0	1.8-15.7	31 (1973)	329	26
Little Manistee	4.9	2.0-16.3	18	518	12
Manistee	56.1	28.1-198	23	4,610	17
Betsie	ungauged	---	--	---	---
Platte	ungauged	---	--	---	---
Boardman	5.4	0.9-34.6	22	578	16
Pine	5.2	3.1-33.4	8	176	7
Manistique	39.7	8.2-479	36	2,849	32
Sturgeon	5.9	1.1-44.7	8	474	8
Whitefish	ungauged	---	--	---	---
Escanaba	25.4	2.6-297	33	2,253	26
Lake Huron Basin					
River Basin Group 3.1					
Munuscong	ungauged	---	--	---	---
Pine	---	1.8-101	2	477	32
Carp	ungauged	---	--	---	---
Cheboygan	22.9	2.6-46.4	32	2,240	11
Ocqueoc*	4.7	1.0-11.5	2	---	0
Thunder Bay	13.2	2.6-115	29	1,523	24T
AuSable	27.8	0.03-118	22	2,849	117T
AuGres	2.8	0.2-71	24	438	21T
Rifle	8.7	2.1-151	38	829	32
River Basin Group 3.2					
Kawkawlin (N. Branch)	1.6	0.0-45.6	23	262	13T
Saginaw	---	?-1,930	intermittent	15,695	32
Pigeon	0.9	0.003-72.2	22	142	24
Willow*	1.3	0.0-7.9	2	---	0

Table 4 (Continued)

DISCHARGE OF MAJOR GREAT LAKES TRIBUTARIES

River	Discharge (m^3/s)	Range (m^3/s)	Period of Record (years, through 1974 unless otherwise noted)	Drainage Area at Gauge (km^2)	Approximate Gauge Location (km from river mouth)
Lake Erie Basin					
River Basin Group 4.1					
Black	7.8	0.05-408	30	1,243	29T
Pine	ungauged	---	--	---	---
Belle	2.3	0.09-115	12	391	40
Clinton	14.3	?-600	40	1,901	8
Rouge	6.4**	0.1-333	27	958	---
Huron	12.6	0.1-165	70	1,878	88
Swan Creek	ungauged	---	--	---	---
Stony Creek	---	0.08-17.2	4	176	40
Raisin	19.5	0.06-365	37	2,699	8
River Basin Group 4.2			(through 1973)		
Maumee	134.7	0.6-2,600	48	16,395	34
Toussaint Creek	ungauged	---	--	---	---
Portage	8.6	0.2-185	41	1,109	24
Sandusky	26.7	0.1-793	47	3,240	30
Huron	8.2	0.6-1,400	23	961	16
Vermillion	6.6	0.0-1,160	23	674	7
River Basin Group 4.3			(through 1973)		
Black	8.8	0.0-1,460	24	1,026	19
Rocky	7.3	0.01-606	42	392	13
Cuyahoga	21.6	0.6-702	42	1,831	16
Chagrin	9.0	0.09-213	44	637	8
Grand	18.7	0.0-598	48	1,505	40
Ashtabula	4.1	0.0-329	42	313	9
Conneaut	7.2	0.01-481	36	453	10

Table 4 (Continued)

DISCHARGE OF MAJOR GREAT LAKES TRIBUTARIES

River	Discharge (m^3/s)	Range (m^3/s)	Period of Record (years, through 1974 unless otherwise noted	Drainage Area at Gauge (km^2)	Approximate Gauge Location (km from river mouth)
River Basin Group 4.4					
Cattaraugus Creek	20.2	1.5-980	33	1,119	16
Eighteen Mile Creek	ungauged	---	--	---	---
Buffalo Creek	5.4	0.01-368	35	373	13T
Tonawanda Creek	7.5	0.2-255	18	598	56T
Lake Ontario Basin					
River Basin Group 5.1					
Johnson Creek	ungauged	---	--	---	---
Oak Orchard Creek	ungauged	---	--	---	---
Genesee	76.8	2.6-1,370	66	6,364	10
River Basin Group 5.2					
Sterling Creek	1.7	0.01-42	16	114	5
Oswego	183.0	0.9-1,060	40	13,204	1
Salmon River	ungauged	---	--	---	---
Sandy Creek	6.9	0.04-334	16	332	16
River Basin Group 5.3					
Black	110.0	3.9-1,040	53	4,859	13

* Upper Lakes Reference Group (ULRG) data
**Estimated from gauges on three branches
T-A major tributary enters a given river after the last gauging station downstream

To Convert From	To	Multiply By
Cubic Meters Per Second (m^3/s)	Cubic Feet Per Second (cfs)	35.31
Square Kilometers (km^2)	Square Miles (sq mi)	0.3861
Kilometers (km)	Miles (mi)	0.62114

1. significant drainage area (150 square kilometers or more)
2. significant average flow (4 cubic meters per second or more)
3. long-term USGS monitoring (greater than 10 years)
4. monitored for special studies such as ULRG
5. drainage of a highly developed area.

For the most part, these tributaries were selected for the quantitative significance of their flows, rather than for their qualitative impact on the Great Lakes. This selection method was used so that a rough base of important streams could be established. Since loadings are directly related to flow, these major tributaries were isolated to enable a more efficient study of the key lake inputs.

All of the data in Table 4 were obtained from the USGS Water Resources Data, Part I, Surface Water Records, unless otherwise noted. The tributaries are identified by their river basin group. Their mean discharge and range of discharge is given in cubic meters per second. The range of discharge is over the period of record, which, unless otherwise noted, is through the 1974 USGS Water Year. The drainage area is not the total tributary basin area, but only that area upstream from the gauging station. The approximate gauge location, in river kilometers upstream from the lake, is also provided to give the reader an appreciation of the distance between the gauge and the lake.

IDENTIFICATION AND EVALUATION OF LAKE SUPERIOR DATA

BASIN DESCRIPTION

The United States portion of the Lake Superior Basin covers over 43,991 km^2 (16,985 mi^2). Approximately 46 percent of the area is located in the State of Michigan, 36 percent is found in Minnesota, and the remaining 18 percent is located in Wisconsin. The Lake Superior Basin is divided into two river basin groups as shown in Figure 7 . River Basin Groups 1.1 and 1.2 drain areas of 23.903 km^2 (9,229 mi^2) and 20,088 km^2 (7,756 mi^2), respectively.

The Lake Superior Basin is typified by either low rounded hills with deep cut valleys or level to gently undulating plains, with the exceptions being Michigan's Huron and Porcupine Mountains, the ridges of the Keweenaw Peninsula, and the steep slopes northeast of Duluth.

The soils in the western portion of the basin have poor drainage characteristics, whereas those in Michigan and northeastern Wisconsin are better drained, being composed of sandy loams, sandy clays, and sandy clay loam tills. The drainage capabilities of these soils have a major influence on the overall land use of the Lake Superior Basin. The proportion of forest land to agriculture is very high. Hardwood forests of beech, birch, maple, and aspen typify the Michigan-Wisconsin areas of the basin. Intermixed hardwood and softwood forests characterize the Minnesota portion. Second-growth jack, red, and white pine along with spruce and fern typify the softwood forests. The most import agricultural products are potatoes, clover seed, and dairy products.

Mineral commodities presently produced in the basin include clay, iron ore, peat, sand and gravel, silver, copper, and crushed stone (gabbro and basalt). Current reserves of iron ore are considerd to be in excess of 40 billion gross tons. Reserves of titaniferous iron, anorthosite, and copper, silver, and nickle sulfides are also available, but commercial expoltation is currently uneconomical.

The population density in the basin is low, with only about 12 people per square kilometer (31 per square mile). According to the 1970 census 529,500 people live in this area. Three of the 17 counties found in the Basin - St. Louis County, Minnesota; Douglas County, Wisconsin; and Marquette County, Michigan account for 330,000 people or 63 percent of the total population.

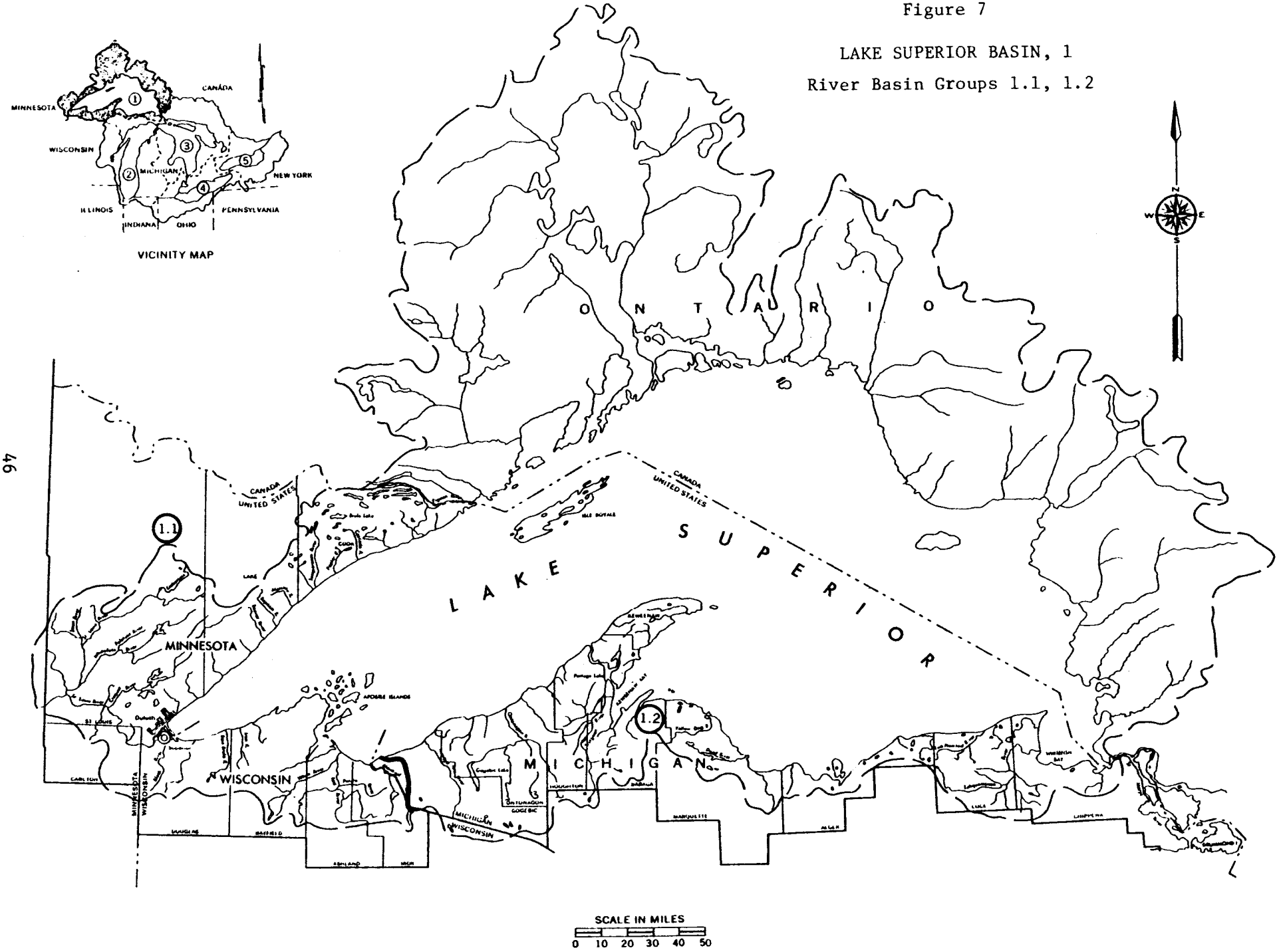
Municipal water supply systems throughout the area are generally in need of replacement. Lack of population and economic growth has meant little or modernization of these systems for many decades.

Water quality is generally excellent throughout the basin, although some localized area such as the St. Louis river basin, experience water degradation

Figure 7

LAKE SUPERIOR BASIN, 1

River Basin Groups 1.1, 1.2



from both municipal and industrial wastewater sources. Mining wastes also present problems in some areas. One of the more serious mine discharge problems is in the Superior Slope Complex along the northern Lake Superior shoreline. The Basin contains approximately 23,500 hectares (58,000 acres) of inland lakes over 16 hectares (40 acres) in size, with many more smaller lakes dotting the region. Seventeen reservoirs have been constructed in the region with several located near Duluth.

Overall, the heavy forest cover and lack of agricultural activity keep erosion from becoming a basin wide problem. Lack of conservation treatment practices in some agricultural and forest lands, however, results in runoff, erosion, and sedimentation problems. Topography and erodibility factors contribute to these problems, especially in the western portions of Wisconsin where geologically young red clay soils encourage massive erosion and sedimentation. Although streambank erosion is widespread throughout the basin, it reaches serious proportions in only a few localized areas.

EVALUATION AND SUMMARY OF LAKE SUPERIOR DATA

The U.S. Lake Superior drainage basin has been divided into 13 hydrologic areas, with 20,270 (7795), 15,970 (6142) and 7925 (3048) square kilometers (square miles) in Michigan, Minnesota, and Wisconsin, respectively. About one third of the 142 tributaries included on the DAM for this Basin had data sufficient for annual loading estimates, despite the fact that Lake Superior drainage is the most undeveloped of the five Great Lakes. All but one of the 17 major tributaries (identified in Table 4) in this basin have been monitored for water quality at least monthly for one or more years. However, out of all tributaries in the Basin only 14 have gauging stations at or near their mouths. Much of the data that are available were collected for the ULRG study between 1973 and 1975. Those streams that do have long term water quality records for at least some of the parameters included on the DAM include the St. Louis, Montreal, Big Garlic, Little Garlic, and Tahquamenon Rivers.

Data collection programs on Lake Superior tributaries have generally operated on a monthly or grab sample basis. No specific runoff event monitoring was found. Suspended solids data consist mostly of monthly measurements, although some biweekly measurments were made during the spring in support of ULRG. In addition, studies of the red clay erosion problem have provided some detailed data for several tributaries. Most nutrient data including that for silica, nitrogen, and phosphorus, have come from monthly sampling programs. On a number of tributaries in Hydrologic Area 1.1.1, there was a lack of concurrent measurements of both total and dissolved reactive phosphorus. Very little total soluble phosphorus data were found, except in some areas of Hydrologic Area 1.1.2, although these measurements were probably to infrequent to be of use in loading calculations. Chlorides were generally monitored at the same frequency as nutrients. Heavy metal, pesticide, and refractory organics data are very limited. While there have been data collected on these parameters for several years, the frequency of measurement within any given year is low. As a result in most cases annual loadings for these parameters cannot be estimated from the data available. Exceptions include tributaries draining into the U.S. north shore of Lake Superior, where streams monitored in support of the ULRG study generally have heavy metal data available on a monthly or greater basis. In addition,

the St. Louis River has some heavy metal and refractory organics data which might be used in loading estimations. Also, the Big Garlic and Little Garlic River have some heavy metal data from the 1960s that is judged useful loading estimations.

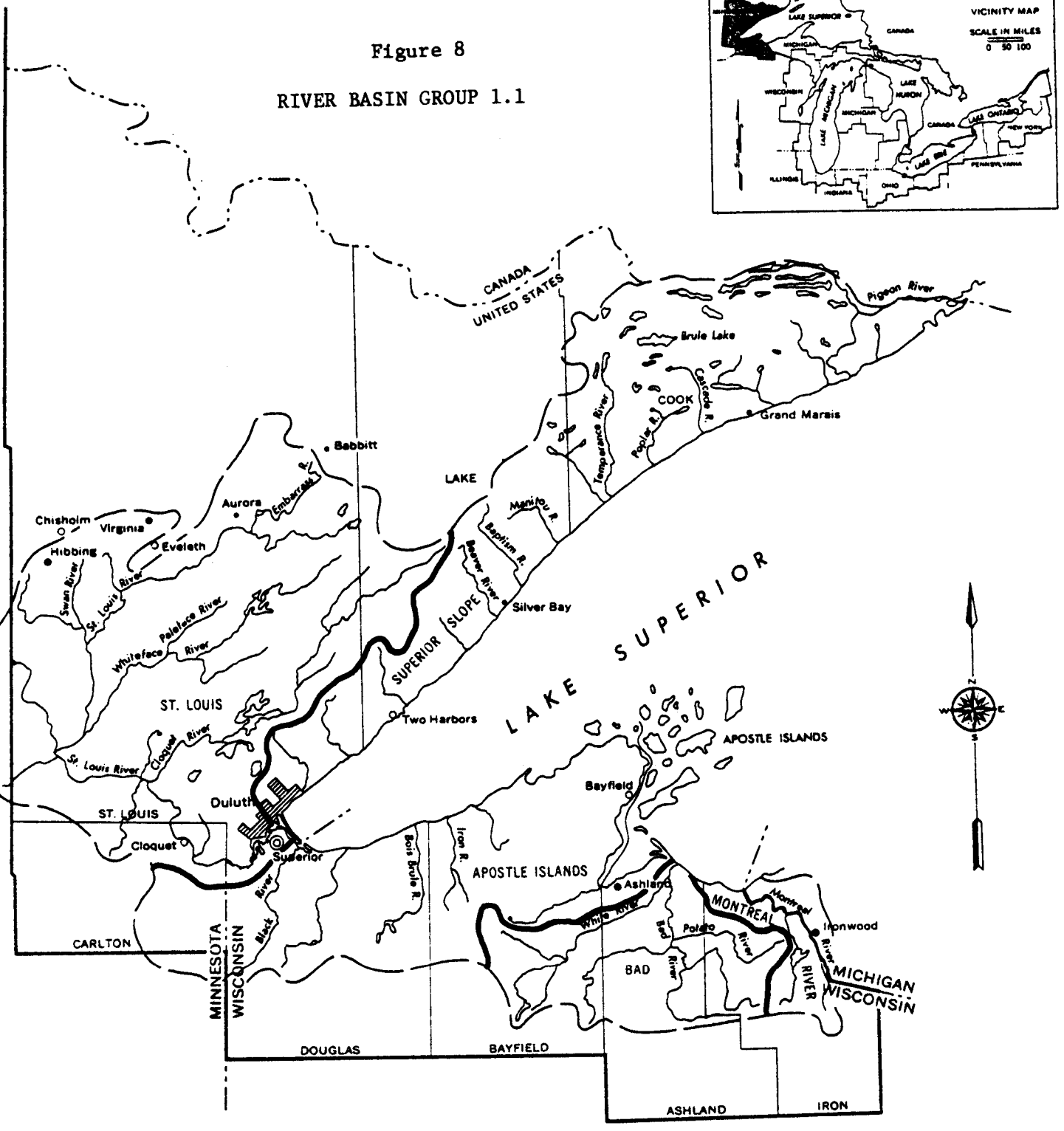
In summary, general deficiencies in the tributary data for loading calculation purposes include a lack of continuous flow data on many of the tributaries and the absence of detailed monitoring of runoff events. Also, while there is a considerable amount of data on some of the minor tributaries draining into the north shore of Lake Superior, very little data is available on minor tributaries along the southern shore.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 1.1

River Basin Group 1.1 covers an area of 23,903 square kilometers (9,229 square miles). This group contains 5 hydrologic areas, and is shown in Figure 8. Maps and descriptions of these Hydrologic areas follows.

Figure 8

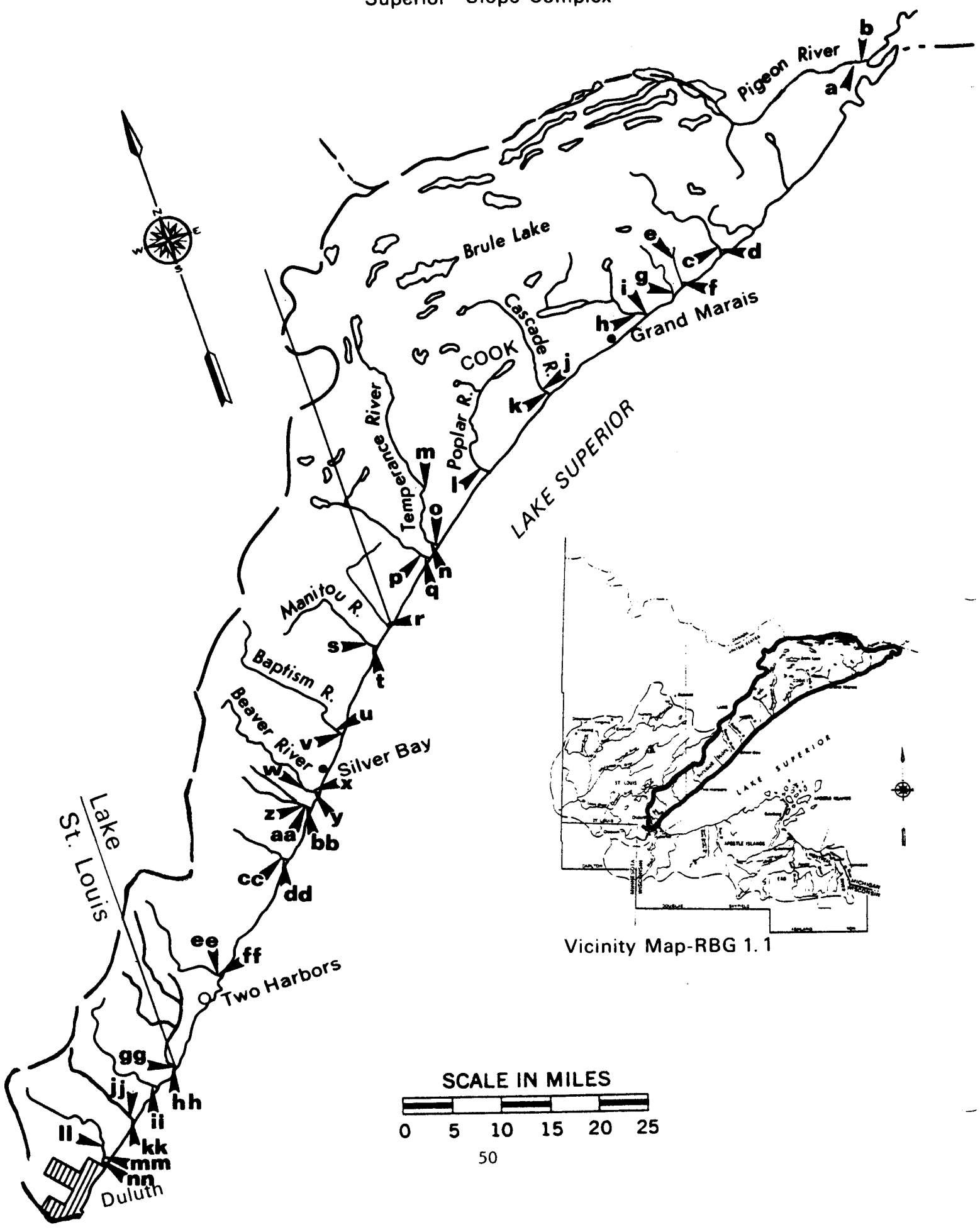
RIVER BASIN GROUP 1.1



SCALE IN MILES

0 5 10 15 20 25

Hydrologic Area 1.1.1
Superior Slope Complex



Vicinity Map-RBG 1.1

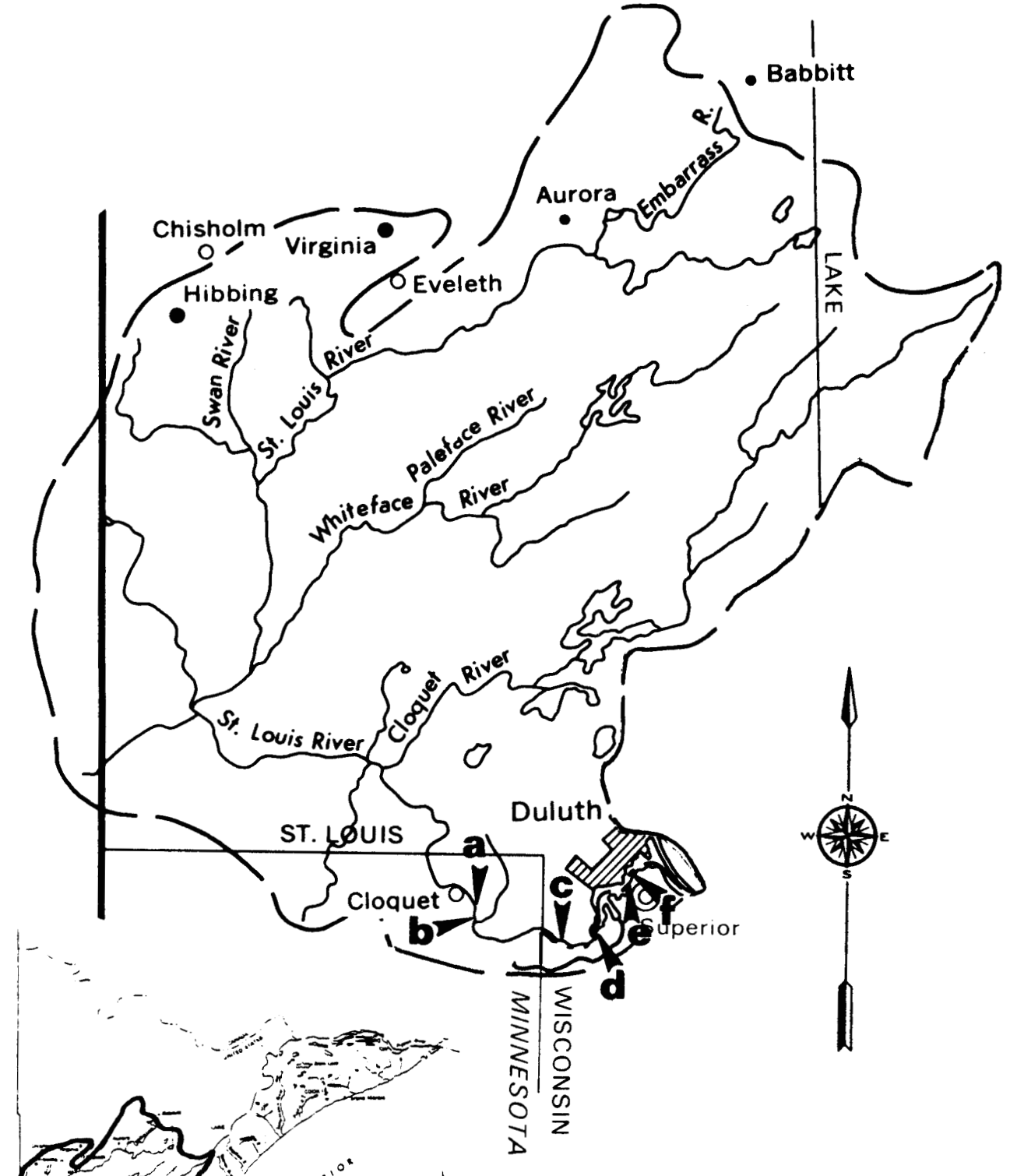
Hydrologic Area 1.1.1
Superior Slope Complex

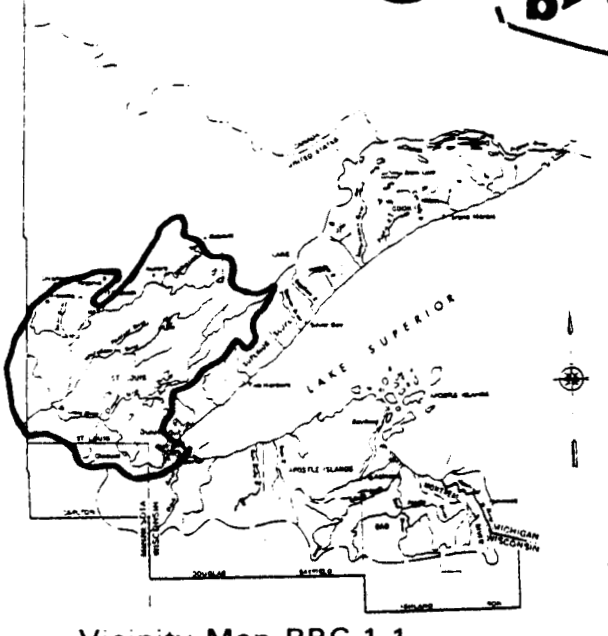
The Superior Slope Complex encompasses an area of 595,000 hectares (1,470,000 acres) in northern Minnesota. This area is characterized by a series of rivers with relatively short channels, steep gradients with few lakes in the watershed. Consequently, high flows of short duration commonly occur following significant rainfall. Some of the more important rivers in the area are: the Pigeon River; part of which is the border between the United States and Canada, the Cascade River; the Poplar River; the Temperance River; the Manitou River; the Baptism River; the Beaver River; and the Stewart River. The topography is quite rugged with numerous rock outcroppings, particularly along the lake shoreline. A considerable amount of the area consists of wetland. Approximately 80 to 90 percent of the area is forested, only about 5 percent is devoted to agriculture, and less than 2 percent of this sparsely settled area is urbanized. The bedrock is composed of igneous and metamorphic rock. The overlying material is composed of glacial till with some silt and clay near the shoreline. Red clays in the area contribute color to many of the surrounding streams. The rock and soil material in this region tends to be relatively low in phosphorus and nitrogen. Extraction of mineral resources such as anorthosite, taconite, sand and gravel form the basis of the economy along with forest products. Currently a large amount of taconite tailings are discharged into Lake Superior near Silver Bay from an iron mining operation. Except for a portion of the City of Duluth (pop.: 100,578) located at the extreme southwestern end of the complex, population density is very low with only a few small communities utilizing the area's surface waters for waste assimiliation.

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Pigeon River	11101	Cross River	11110	Stewart River	11120
a	1110101	p	1111001	ee	1112001
b	1110102	q	1111002	ff	1112002
Brule River	11103	Caribou River	111120	Knife River	11121
c	1110301	r	1111201	gg	1112101
d	1110302	Manitou River	11113	hh	1112102
Kadunce Creek	11104	s	1111301	Sucker River	11122
e	1110401	t	1111302	ii	1112201
f	1110402	Baptism River	11114	French River	11123
Kimball Creek	11105	u	1111401	jj	1112301
g	110501	v	1111402	kk	1112302
Devil Track River	11106	Beaver River	11115	Lester River	11124
h	1110601	w	1111501	ll	1112401
i	1110602	x	1111502	mm	1112402
Cascade River	11107	y	1111503	nn	1112403
j	1110701	Split Rock River	11116		
k	1110702	z	1111601		
Popular River	11108	aa	1111602		
l	1110801	bb	1111603		
Temperance River	11109	Gooseberry River	11117		
m	1110901	cc	1111701		
n	1110902	dd	1111702		
0	1110903				

Hydrologic Area 1.1.2
St. Louis River





Vicinity Map-RBG 1.1

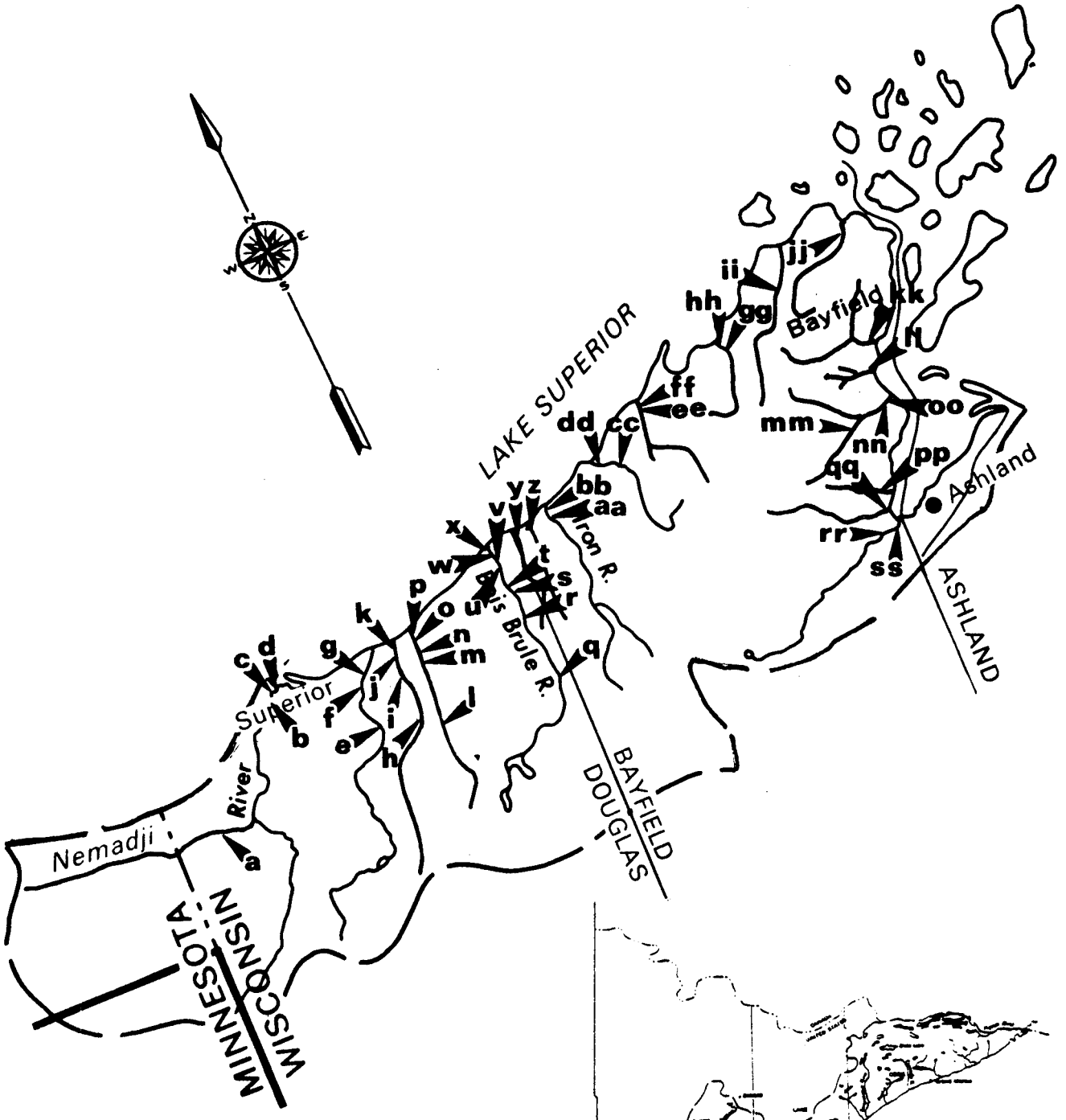
Hydrologic Area 1,1,2
St. Louis River

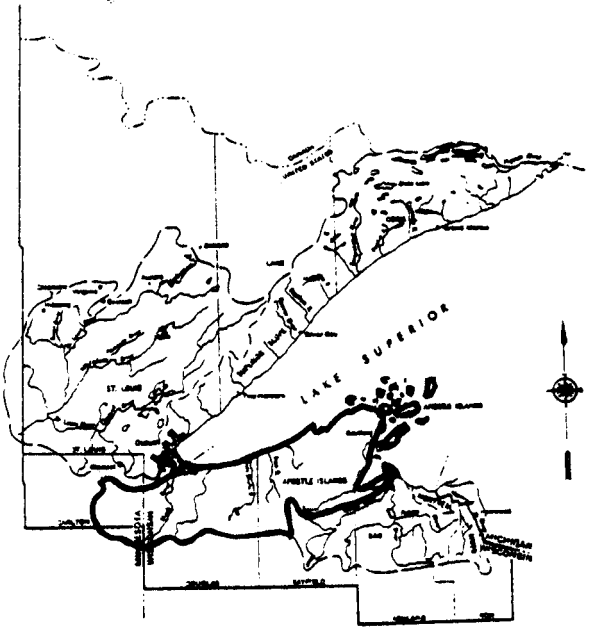
The St. Louis River Basin covers 945,270 hectares (2,334,000 acres). Minnesota contains 98 percent of the area, and the remaining 2 percent is located in Wisconsin. The St. Louis has a mean annual discharge of 62 m^3/s (2,189 cfs). Major tributaries to the St. Louis are the Whiteface and Cloquet Rivers. Much of the area lies within the site of former glacial Lake St. Louis. The area is generally flat and the drainage pattern weakly defined. Approximately 80 to 90 percent of the area is forested, roughly 5 percent is devoted to agriculture and less than 3 percent is urbanized. The bedrock is composed mostly of igneous and metamorphic rock. The bedrock is covered by silt and clay in the northwest and glacial till in the southeast. Municipal and industrial waste discharges have created serious water quality problems in the lower reaches. The cities of Duluth, Minnesota (pop.: 100,578) and Superior, Wisconsin (pop.: 32,327) at the mouth of the St. Louis River constitute the largest population concentration in the Lake Superior Basin.

Station Key

Station Location	DAM River and Station Numbers
St. Louis River	11201
a	1120101
b	1120102
c	1120103
d	1120104
e	1120105
f	1120106

Hydrologic Area 1.1.3
Apostle Island Complex





SCALE IN MILES

0 5 10 15 20 25

Vicinity Map-RBG 1.1

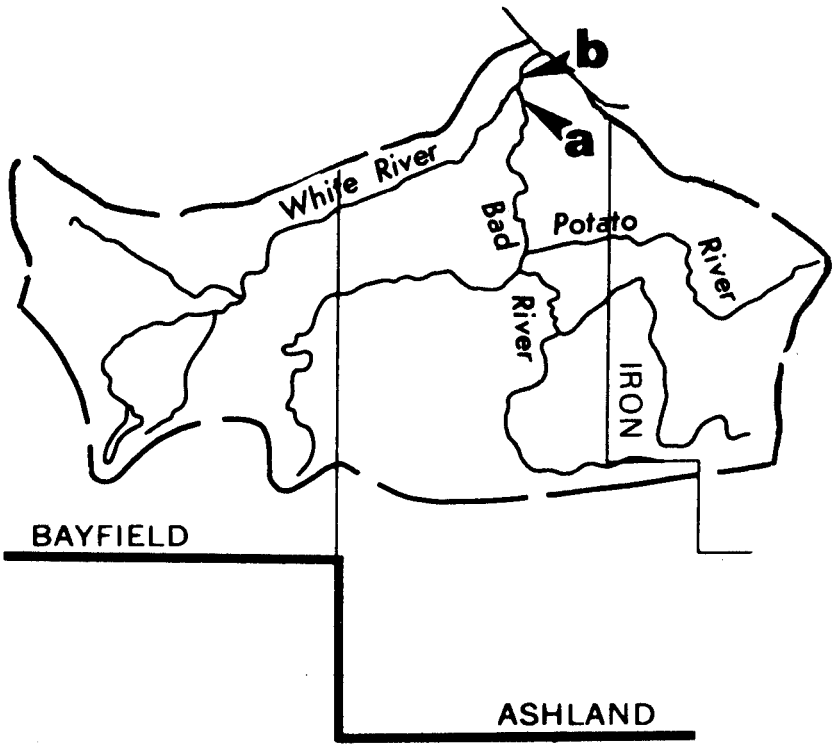
Hydrologic Area 1.1.3
Apostle Island Complex

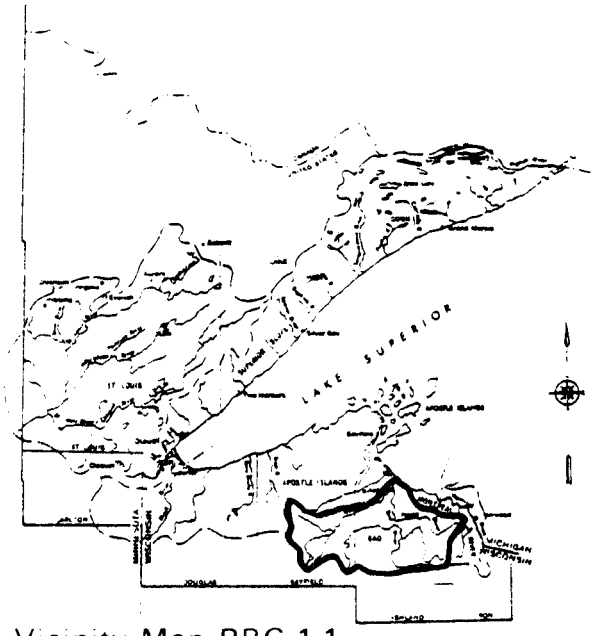
The Apostle Island Complex covers 514,000 hectares (1,269,000 acres). Eighty-seven percent of this complex is located in northwestern Wisconsin, and the remaining 13 percent is located in Minnesota. The major tributaries draining this area are: The Bois Brule River, which has a mean annual discharge of 4.9 m^3/S (173 cfs), the Nemadji River (records beginning December 1973), and the Iron River (ungauged). A major tributary to the Nemadji River is the Black River. The remaining area is drained by numerous small tributaries, the largest of which have a mean annual discharge of 3-6 m^3/S. The topography consists of rugged hills and valleys in the Bayfield Penninsula and flat red clay plains in the rest of the area. Approximately 90 percent of the area is forested, about 5 percent is in agriculture, and less than 3 percent consists of sparsely settled urban areas. Bedrock is composed mostly of igneous and metamorphic rock. The overlying material is composed of sand and gravel with areas of red clay deposited by glacial Lake Duluth. The economy is based on the rich timber resources of the area as well as on tourism and some mining. The only major population center in this sparsely populated area is the city of Ashland (Pop.: 9,615). Soil erosion is a significant problem in the area with many streams having the characteristic red clay color of the surrounding soil. Tourist influx to the very popular Apostle Islands creates water quality problems throughout the area.

Station Key

Station Location	DAM River and Station Numbers
Nemadji River	11301
a	1130101
b	1130102
c	1130103
d	1130104
Amnicon River	11302
e	1130201
f	1130202
g	1130203
Middle River	11303
h	1130301
i	1130302
j	1130303
k	1130304
Poplar River	11304
l	1130401
m	1130402
n	1130403
o	1130404
p	1130405
Bois Brule River	11308
q	1130801
r	1130802
s	1130803
t	1130804
u	1130805
v	1130806
w	1130807
x	1130808
Fish Creek (I)	11309
y	1130901
Reefer Creek	11310
z	1131001
Iron River	11311
aa	1131101
bb	1131102
Flag River	11312
cc	1131201
dd	1131202
Cranberry River	11313
ee	1131301
ff	1131302
Siskiwit River	11314
gg	1131401
hh	1131402
Sand River	11315
ii	1131501
Raaberry River	11316
jj	1131601
Pikes Creek	11317
kk	1131701
Onion River	11318
ll	1131801
Sioux River	11319
mm	1131901
nn	1131902
oo	1131903
Boyd Creek	11320
pp	1132001
Whittlesey Creek	11321
qq	1132101
Fish Creek (II)	11322
rr	1132201
ss	1132202

Hydrologic Area 1.1.4
Bad River





Vicinity Map-RBG 1.1

SCALE IN MILES

0 5 10 15 20 25

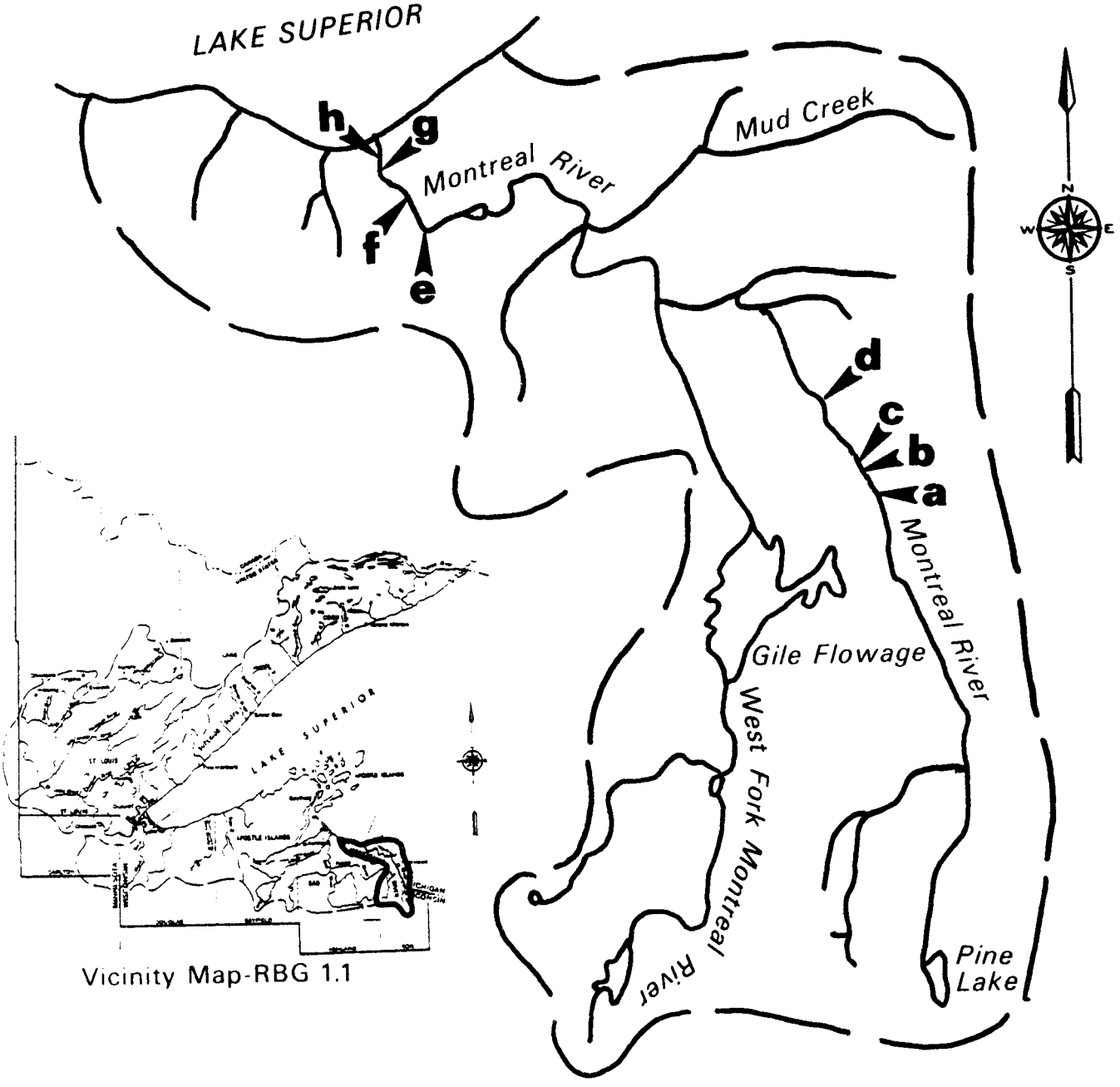
Hydrologic Area 1.1.4
Bad River (Wisconsin)

The Bad River drains an area of 258,000 hectares (637,000 acres). The area is located in north central Wisconsin. The Bad River has a mean annual discharge of 17 m^3/S (600 cfs). Major tributaries to the Bad River are the White River and the Marengo River. The topography varies from rolling to mountainous and includes portions of the Gogebic Iron Range, an exposure of precambrian bedrock at the southern extent of the Canadian Shield. The drainage pattern is poorly defined. Swamps and marshlands are prevelant. Approximately 90 percent of the area is forested, 5 percent is in agriculture, and less than 2 percent urbanized. The bedrock is composed mostly of igneous and metamorphic rock. The overlying material is composed of glacial till with some silt and red clay near the shore. There is very little economic development in the area. The major natural resources are minerals and forest production. The population of this entire area is less than 10,000.

Station Key

Station Location	DAM River and Station Numbers
Bad River	11401
a	1140101
b	1140102

Hydrologic Area 1.1.5
Montreal River Complex



Vicinity Map-RBG 1.1

0 5 10 15 20 Statute Miles

Hydrologic Area 1.1.5
Montreal River

The Montreal River drains an area of 80,000 hectares (197,00 acres). Approximately 57 percent of the area is situated in northeastern Wisconsin and the remaining 43 percent is in Michigan. The Montreal River, which forms part of the Michigan-Wisconsin border, has a mean annual discharge of 9 m^3/S (318 cfs). The topography is rough and is dominated by the rugged Gogebic Iron Range. Approximately 80 to 90 percent of the area is forested, less than 10 percent is devoted to agriculture, and about 5 percent is urbanized. The bedrock is composed mostly of igneous and metamorphic rock. The area is covered mostly with glacial till with some silt and red clay in the lower reaches. The economy is based on iron ore mining, agriculture, and forestry products. The major population centers are the cities of Ironwood, Michigan (Pop.: 8,711) and Hurley, Wisconsin (Pop.: 2,418). Municipal and industrial discharges have resulted in excessive nutrient levels downstream from population areas.

Station Key

Station Location	DAM River and Station Numbers
Montreal River	11503
a	1150301
b	1150302
c	1150303
d	1150304
e	1150305
f	1150306
g	1150307
h	1150308

RIVER BASIN GROUP 1.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 1.1.1 Superior Slope Complex												
		11101	Pigeon River flow : 14.3 m^3/s (505 cfs)												
23-74	21	1110101	At Middle Falls River Mile 3.5	*	1										
68	"	"	"	*	1	5BC		5BC				5BC	5BC		
70	"	"	"	*	1	3D									
71	"	"	"	*	1	3B-D[a] 5A	5AC 8B 2D								
72	"	"	"	*	1	3[a]	5								
73	29	"	"		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
70	18	1110102	At mouth			5CD	2B-D			2B-D					
71	37	"	"					5CD					5CD		
72	"	"[b]	"					5AB 2C					5AB 2C		
		11102	Flute Reed River (No Data Found)												
		11103	Brule River												
64	20	1110301	US -61 Bridge near Mouth			2AD		2AD				2AD	2AD		
70	18	"	"			5CD	2BC 5D			2BC 5D					
71	18	"				2A	2A			2A					
73	29	"	"		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"			5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
71	37	1110302	At Mouth				5CD						5CD		

[a] Major gaps in data Oct. 1971 - April, 1972.

[b] Weekly samples were collected during April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1110101															
"	5BC	5BC	5BC				5BC		5BC		5BC				
"															
"															
"															
"	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
"														2B 5CD	
1110102	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D	2D	
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	
1110301	2AD	2AD	2AD						2AD		2AD				
"														2B 5CD	
"														2A	
"	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1110302	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	37	1110302[a]	(cont.)					5AB 2C					5AB 2C		
		11104	Kadunce Creek												
74	35	1110401	47-49-00 x 90-09-34			2D	2D	2D		2D					
74	35	1110402	47-48-30 x 90-09-33			2D	2D	2D		2D					
		11105	Kimball Creek												
74	35	1110501	47-48-30 x 90-10-30			2D	2D	2D		2D					
		11106	Devil Track River												
64	20	1110601	US-61 Bridge Near Mouth			2A		2A				2A	2A		
71	37	1110602	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11107	Cascade River												
73	29	1110701	US-61 Bridge		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"			5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
71	37	1110702	At Mouth					5CD					5CD		

[a]Weekly samples collected in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1110302	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1110401	2D		2D		2D	2D									
1110402	2D		2D		2D	2D									
1110501	2D		2D		2D	2D									
1110601	2A	2A	2A						2A		2A				
1110602	5CD	5CD	5CD	5CD		5CD	5CD		5CD	5CD	5CD		5CD		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1110701	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1110702	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	37	1110702[a]	(Continued)					5AB 2C					5AB 2C		
		11108	Poplar River Flow: 2.9 m^3/S (102 cfs)												
12-17	21	1110801	US-61 Bridge 350 feet from Mouth	*	1										
28-47	"	"	"		1										
52-61	"	"	"		1										
73	29	"	"		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
		11109	Temperance River												
73	29	1110901	Maple Leave Drive Bridge 5 mi. North of Tufte		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"			5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
64	20	1110902	US-61 Bridge near Mouth			2A		2A				2A	2A		
71	37	1110903	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11110	Cross River												
73	29	1111001	500 feet up from US-61 Bridge at Schroeder		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 3B

[a]Weekly samples collected in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1110702	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1110801															
"															
"															
"	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1110901	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD		5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B		5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B		5A 8B			
1110902	2A	2A	2A						2A		2A				
1110903	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1111001	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
75	29	1111001	(cont.)			5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
71	37	1111002	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11111	Two Island River (No Data Found)												
		11112	Caribou River												
71	37	1111201	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11113	Manitou River												
73	29	1111301	US-61 Bridge		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"			5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
71	37	1111302	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11114	Baptism River flow:4.8 m^3/s (170 cfs)												
27-75	21	1111401	US-61 Bridge near Beaver Bay	*	1										
53	40	"	"			2C	2C		2C				2C		

[a]Weekly samples collected in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1111001	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1111002	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1111201	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1111301	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD				
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B				
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B				
1111302	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1111401															
"		2C							2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
62	21	1111401	(cont.)	*	1			2D				2D			
63	"	"	"	*	1			2AB				2AB			
64	20	"	"			2A		2A				2A	2A		
68	21	"	"	*	1	5BC		5BC		11[a]		5BC	5BC		
69	"	"	"	*	1	2D				2C 11[b]					
70	"	"	"	*	1	5AC 9BD		2B		9C 5A		2B	2B		
70	18	"	"			5CD	2BC 5D			2BC 5D					
71	20	"	"		1	5A 3B-D		5							
71	18	"	"			2A	2A			2A					
72	20	"	"		1	3B-D[c]		5							
73	"	"	"		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
71	37	1111402	At Mouth					5CD					5CD		
72[d]	"	"	"					5AB 2C					5AB 2C		
		11115	Beaver River												
73	29	1111501	River Mile 1.5		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
53	40	1111502	At Brave Bay US-61 Bridge			2C	2C		2C				2C		
00	21	"	"	*	3	5BC		5BC				5BC	5BC		
70	18	"	"			5CD	2BC 5D			2BC 5D					
71	18	"	"			2A	2A			2A					
71	37	1111503	At Mouth					5CD					5CD		
72	"	"	"					5AB 2C					5AB 2C		

[a] Continuously sampled from Oct. 7 to Nov. 7, 1968.

[b] Continuously sampled from April 5 to May 22, 1969.

[c] March 15 through Sept. 30, 1972.

[d] Weekly samples collected in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1111401	2D	2D	2D						2D	2D	2D				
"	2AB	2AB	2AB						2AB	2AB	2AB				
"	2A	2A	2A						2A		2A				
"	5BC	5BC	5BC				5BC		5BC		5BC				
"															
"	2B	2B	2B			2B	2B	2B	2B	2B	2B				
"														2B 5CD	
"															
"														2A	
"															
"	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1111402	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1111501	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1111502		2C							2C	2C	2C				
"	5BC	5BC	5BC				5BC		5BC		5BC				
"														2B 5CD	
"														2A	
1111503	5CD	5CD	5CD	5CD			5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C			5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB 2C		

RIVER BASIN GROUP 1.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11116	Split Rock River												
73	29	1111601	500 Feet Upstream from US-61 Bridge		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
64	20	1111602	At US-61 Bridge near Mouth			2AD		2AD				2AD	2AD		
71	37	1111603	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11117	Gooseberry River												
53	40	1111701	US-61 Bridge near Danger Castle			2C	2C		2C				2C		
57	34	"	"					2B				2B			
75	21	"	"	*	9										
73	29	1111702	100 Feet Downstream from US-61		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
		11118	Encampment River (No Data Found)												
		11119	Silver Creek (No Data Found)												
		11120	Stewart River												

[a]Weekly Samples Collected in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1111601	5CD	5CD		5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1111602	2AD	2AD	2AD						2AD		2AD				
1111603	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D	2D			
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C			
1111701		2C							2C	2C	2C				
"	2B	2B	2B						2B						
"															
1111702	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			

RIVER BASIN GROUP 1.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
64	20	1112001	US-61 Bridge near Mouth			2A		2A				2A	2A		
71	37	1112002	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11121	Knife River												
70	18	1112101	500 Feet Upstream from US-61 Bridge			5CD	2BC 5D			2BC 5D					
71	"	"	"			2A	2A			2A					
73	29	"	"		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
53	40	1112102	At Mouth			2C	2C		2C				2C		
71	37	"	"					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
		11122	Sucker River												
73	29	1112201	At US-61 Bridge		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
		11123	French River												
73	29	1112301	French River Hatchery 100 Feet Upstream from US-61		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
53	40	1112302	At US-61			2C	2C		2C				2C		

[a]Weekly Samples Collected in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1112001	2A	2A	2A						2A			2A			
1112002	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1112101														2B 5CD	
"														2A	
"	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1112102		2C							2C	2C	2C				
"	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1112201	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1112301	5CD	5CD	5CD		5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1112302		2C							2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11124	Lester River												
70	18	1112401	1 1/2 Miles up from US-61			5CD	2BC 5D			2BC 5D					
71	"	"	"			2A	2A			2A					
73	29	1112402	At Duluth (Lester Park)		5CD	5CD	5CD	5CD				5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B		5A 8B	5A 8B	5A 8B	5A 8B
71	37	1112403	At Mouth					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
			HYDROLOGIC AREA 1.1.2 St. Louis River												
		11201	St. Louis River flow: 64.3 m^3/s (2,270 cfs)												
73	18[b]	1120101[c]	Scanlon Dam			11D		11D						11D	2D
08-74	21	1120102	Scanlon Bridge (US-61)	*	1										
55	34	"	"		2D			2D				2D			
58	"	"	"		2B 5CD		2B 5CD	2B 5CD				2B 5CD			
59	"	"	"		2D 5A-C		2D 5A-C	2D 5A-C				2D 5A-C			
60	"	"	"		5CD		2D	5CD				5CD			
61	"	"	"		8D 5A-C		5A-C	8D 5A-C				8D 5A-C			
62	"	"	"		2C 5AB			2C 5AB				2C 5AB			
62	21	"	"	*	1			5D				5D			
63	"	"	"	*	1			5				5			
64	"	"	"	*	1			5A-C 2D				5A-C 2D			
68	"	"	"	*	1	5BC 2AD		5BC 2AD				5BC 2AD	5BC 2AD		
69	"	"	"	*	1	2BC 5D		2BC 5D				2BC 5D	2BC 5D		

[a] Weekly Samples Collected During April.

[b] Additional Stations Available as Part of Same Study.

[c] Samples Taken Two or More Times Per Day, November 27, 28 and 29, 1973 (11D).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1112401														2B 5CD	
"														2A	
1112402	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5CD	5CD	5CD			
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B			
"	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B	5A 8B			5A 8B	5A 8B	5A 8B	5A 8B			
1112403	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
1120101	11D		11D	11D	11D	11D	11D								
1120102															
"	2D	2D	2D						2D		2D				
"	2B 5CD	2B 5CD	2B 5CD						2B 5CD		2B 5CD				
"	2D 5A-C	2D 5A-C	2D 5A-C						2D 5A-C		2D 5A-C				
"	5CD	5CD	5CD						5CD		5CD				
"	8D 5A-C	8D 5A-C	8D 5A-C						8D 5A-C		8D 5A-C				
"	2C 5AB	2C 5AB	2C 5AB						2C 5AB		2C 5AB				
"	5D	5D	5D						5D		5D				
"	5	2AB 5CD	2AB 5CD						5	2ABD	5ACD 2B				
"	5A-C 2D	5A-C 2D	5A-C 2D						5A-C 2D	5A-C 2D	5A-C 2D				
"	5BC 2AD	5BC 2AD	5BC 2AD			2D	5BC 2AD		5BC 2AD		5BC 2AD				
"	2BC 5D	2BC 5D	2BC 5D			2D	2D	2D	2BC 5D	2BC 5D	2BC 5D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	21	1120102	(Continued)	*	1	2A-C 5D		6				6	6		
71	"	"	"	*	1	5AB 2CD		6				6	6		
72	"	"	"	*	1	5		5				6	6		
72	18	"	"												
73	"	"	"												
73	18[a]	"	"			2D		2D						2D	2D
74	18[a]	"	"			2A		2A						2A	2A
45-65	33	1120103	Fond du Lac Bridge			4B-D								4B-D	4B-D
53	29	"	"	*		5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD			5B 2ACD	5B 2ACD	5B 2ACD
54	"	"	"	*		5CD 2AB	5CD 2AB	5CD 2AB	5CD 2AB	5CD 2AB			5CD 2AB	5CD 2AB	5CD 2AB
55	"	"	"	*		5AC 2B	5AC 2B	2A	2A	2A			2A	5A 2BC	5AC 2B
56	"	"	"	•		5CD 2AB	5CD 2AB	2C	2C	2C			2C	2A-C	5CD 2AB
57	"	"	"	*		5C 2ABD	5C 2ABD		2D					5C 2ABD	5C 2ABD
58	"	"	"	*		5A-C 2D	5A-C 2D		5AC 2D					5A-C 2D	5A-C 2D
59	"	"	"	*		5A 2BD	5AD 2BC		5AD 2BC					5AD 2BC	5AD 2BC
60	"	"	"	*		5D 2AB	5D 2AB	5D 2AB						5D 2AB	5D 2AB
61	"	"	"	*		2BD	2BD	2BD						2BD	2BD
62	"	"	"	*		2CD	2CD	2CD						2CD	2CD
63	"	"	"	*		2AC	2AC	2AC						2AC	2AC
64-65	"	"	"	*		5C 2BD	5C 2BD	5C 2BD						5C 2BD	5C 2BD
64	20	"	"			2A		2A				2A	2A		
66-75	33	"	"			4B-D	4B-D	4B-D		4B-D		4B-D	4B-D	4B-D	4B-D
67	29	"	"	•		5C 2BD	5C 2BD	5C 2BD	5C 2BD	5C 2BD		5C 2BD	5C 2BD	5D 2BC	5D 2BC
68	"	"	"	•		5B-D 2A	5B-D 2A	5	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5	5
69	"	"	"	*		5	5	5	5	5		5	5	5	5
70	"	"	"	*		5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B		5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B
71	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D

[a]Additional stations available as part of same study.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1120102	6		6			6	2AB	2AB	6	6	6	2D	2D		
"	6		6			6			6	6	6				
"	6	6	6			6			6	6	6		2B		
"			5D	5D	5D	5D	5D								
"			8B 5AC	8B 5AC	8B 5AC	5AC	8B 5AC								
"	2D		2D	2D	2D	2D	2D								
"	2A		2A	2A	2A	2A	2A								
1120103	4B-D														
"	5B 2ACD								5B 2AD						
"	5CD 2AB								5D 2C						
"	5AC 2B								2A						
"	5CD 2AB								2C						
"	5C 2ABD														
"	5A-C 2D														
"	5AD 2BC		5AD 2BC			5AD 2BC									
"	5D 2AB			2AD					5C 2A						
"	2BD								2BD						
"	2CD			2CD		2CD			2CD						
"	2AC			2AC		2AC			2AC						
"	5C 2BD			5C 2BD		5C 2BD			5C 2BD						
"	2A	2A	2A						2A		2A				
"	4B-D					4B-D			4B-D						
"	5C 2B		5D 2BC	5D 2BC	5D 2BC	5D 2BC			5D 2BC						
"	5B-D 2A		5B-D 2A	5	5	5			5B-D 2A	2D	2D	2D			
"	5		5	5	5	5			5	5	5	5			
"	5ACD 2B		5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B			5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B			
"	5A-C 2D			5A-C	5AB 2C	5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA											
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	37	1120103	(Continued)					5CD					5CD		
72[a]	"	"	"					5AB 2C					5AB 2C		
72	29	"	"	*		5	5B-D	5	2D	2D		5	5	5B-D	5B-D
73	"	"	"	*		5	5	5	5D 2C	5D 2C		5	5	5	5
73	18[bc]	"	"			11D		11D						11D	2D
74	29	"	"	*		5	5	5	5	5		5	5	5	5
75	"	"	"	*		5AB	5AB	5AB	5AB	5AB		5AB	5AB	5AB	5AB
45-65	33	1120104	Oliver Bridge	*		4B-D								4B-D	4B-D
66-75	"	"	"	*		4B-D	4B-D	4B-D		4B-D		4B-D	4B-D	4B-D	4B-D
72	27	"	"			2AB 5CD		2AB 5CD	2AB 5CD	2AB 5CD		2AB 5CD	2AB 5CD	2AB 5CD	2AB 5CD
73	"	"	"			5		5	5	5		5	5	2B 5D	
73	18[bc]	"	"			11D		11D						11D	2D
73	29	"	"		5CD	5CD	5CD	5CD		5CD		5CD	5CD	5CD	5CD
74	27	"	"			5		5	5	5		5	5	5	
74	29	"	"		2A	2A	2A	2A		2A		2A	2A	2A	2A
75	"	"	"			8B 2C	8B 2C	8B 2C		8B 2C		8B 2C	8B 2C	8B 2C	8B 2C
75	27	"	"			5		5	5	5		5	5	5CD	
70	18	1120105	Off Billings Park, Superior, Wisc.			5CD	2C 5D								
71	"	"	"			2A	2A								
45-65	33	1120106	At Arrowhead Bridge	*		4B-D								4B-D	4B-D
66-75	"	"	"	*		4B-D	4B-D	4B-D		4B-D		4B-D	4B-D	4B-D	4B-D
72	18	"	"												
73	"	"	"												
73	18[b]	"	"			2D		2D						2D	2D
74	18[b]	"	"			2A		2A						2A	2A
		Unnamed Tributary into Superior Bay													

[a] Weekly sample collected during April.

[b] Additional stations available as part of the same study.

[c] Samples taken two or more times per day, November 27, 28 and 29, 1973. (11D)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1120103	5CD	5CD	5CD	5CD		5CD	5CD		5CD	2D	2D		2D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C		
"	5		5B-D	5B-D	2D	5B-D			5B-D	5B-D	5B-D	5B-D			5B-D
"	5		5	5	5D 2C	5			5	5	5	5			5
"	11D		11D	11D	11D	11D	11D								
"	5		5	5	5	5			5	5	5	5			5AB 2D
"	5AB		5AB	5AB	5AB	5AB			5AB	5AB	5AB	5AB			
1120104	4B-D														
"	4B-D					4B-D			4B-D						
"	2AB 5CD		2ACD	2ACD	2ACD	2ACD			2AB 5CD						
"	5		6	6	6	6			5						
"	11D		11D	11D	11D	11D									
"	5CD	5CD	5CD	5CD	5CD	5CD			5CD	5D 2C	5D 2C	2CD		2D	2D
"	5		6	6	6	6			5						
"	2A	2A	2A	2A	2A	2A			2A	2A	2A	2A			
"	8B 2C	8B 2C	8B 2C	8B 2C	8B 2C	8B 2C			8B 2C	8B 2C	8B 2C	8B 2C		2B	2B
"	5			2ABD 5C	2ABD 5C	2ABD 5C			5						
1120105														5CD	
"														2A	
1120106	4B-D														
"	4B-D					4B-D			4B-D						
"			5D	5D	5D	5D	5D								
"			5A-C	5A-C	5A-C	5A-C	5A-C								
"	2D		2D	2D	2D	2D	2D								
"	2A		2A	2A	2A	2A	2A								

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	18	1120299	Exact Location Unknown												
73	"	"	"												
			HYDROLOGIC AREA 1.1.3 Apostle Islands Complex												
		11301	Nemadji River												
64	20	1130101	Bridge near Borea T47N, R14W, Sec. 4			2A		2A				2A	2A		
73	21	"	"	*	5C	5C				5C					
70	18	1130102	At Highway C Near South Superior T48N,R14W,Sec14			5CD 2B	2BC 5D			2BC 5D					
71	"	"	"			2A	2A			2A					
73	21	"	"			5D		5D		8D					
73-74	"	"	"	*	1										
74	"	"	"	*	1	5A 9B 8C 2D		5A 9B 8C 2D		9A 3B-D	2B	2C	2C		
74	27	" [b]	"		5C 11B 2AD	5ACD 8B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5ACD 11B	2A 5CD	5ACD 11B
75	"	" [b]	"		2A 11B 2C	2A 11B 5CD	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5ACD 11B	2A 5CD	5ACD 11B
71	21	1130103	Near Lake Superior	*	2AB	2AB		2AB				2AB	2AB		
70	18	1130104	At US-2 Bridge			5CD	2C 5D			2C 5D					
71	"	"	"			2A	2A			2A					
72	"	"	"												
73	"	"	"												
73	"	1130199	Exact Location Unknown			9D		9D						9D	9D
		11302	Amnicon River												
72	25	1130201	At Highway 2		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		8C	8C		8C		8C			5C	8C	8C
64	20	1130202	At Highway 13	*		2A		2A				2A	2A		
72	25	"	"		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D

[a] Exact phosphorous form unknown.

[b] Additional samples taken in the spring. (11B)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1120299			5D	5D	5D	5D	5D								
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D								
1130101	2A	2A	2A						2A		2A				
"															
1130102														2B 5CD	
"														2A	
"															
"															
"		2C	2C	2C	2C	2C	2C[a]	2C[a]		2C	2C		2C		
"	5ACD 11B	2A 5B-D	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5B-D	2A 5B-D	2AC		2A-C	2A-C
"	5ACD 11B	5A 2C 11B	5A 2C 11B	5A 2C 11B	5A 2C 11B	5A 2C 11B	5A 2C 11B		5ACD 11B	2A 11B	2A 11B	2B		2B	2B
1130103	2AB	2AB	2AB						2AB	2AB	2AB				
1130104														5CD	
"														2A	
"			5D	5D	5D	5D	5D								
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D								
1130199	9D		9D	9D	9D	9D									
1130201	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	8C		8C				8C	8C							
1130202	2A	2A	2A						2A		2A				
"	2B 8C 5D		2B 8C 5D					2B 8C 5D							

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	25	1130202	(Continued)		2B 8C 5D	2B 8C 5D		2B 8C 5D		2B 8C 5D			8C 5D	2B 8C 5D	2B 8C 5D
57-74	20	1130203[a]	At Weir 46-40-10 X 91-53-20	*		9		9							
		11303	Middle River												
72	25	1130301	At Highway 2		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
64	20	1130302	At Highway 13	*		2A		2A				2A	2A		
72	25	"	"		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		2B 8C 5D	2B 5C		2B 8C 5D		2B 8C 2D			8C 5D	2B 8C 5D	8C 5D
57-70	20	1130303[a]	At Weir 46-40-50 X 91-49-10			9		9							
73	25	1130304	At the Mouth		2C	2B 8C 5D		2BC		2BC			2BC	2BC	2BC
		11304	Poplar River												
72	25	1130401	North of Highway 2		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		2B 9C 2C	2BC		2B 5C		2B 5C			5C 2D	5C 2BD	5C 2BD
64	20	1130402	At Highway 13	*		2A		2A				2A	2A		
72	25	"	"		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		5CD 2B	8C 2D 2B		5CD 2B		5C 2BD			5CD	5CD 2B	5CD
69	25	1130403	River Mile 2.5			10C		10C						10C	
69	25	1130404	River Mile 1.0			10C		10C						10C	
69	25	1130405	At the Mouth			10C		10C						10C	
73	"	"	"		8C 5D	2B 5CD		8C 2D		8C 2D			8C 2D	8C 2D	8C 2D
		11305	Barden Creek (No Data Found)												

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

[b]Copper only, form uncertain.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1130202	2B 8C 5D		2B 8C 5D				2B 8C 5D	2B 8C 5D							
1130203	9		9	9					9						
1130301	2B 8C 5D		2B 8C 5D					2B 8C 5D							
1130302	2A	2A	2A						2A		2A				
"	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	2B 8C 5D		2B 8C 5D				2B 8C 5D	2B 8C 5D							
1130303	9		9	9					9						
1130304	2BC		2BC				2BC	2BC							
1130401	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	5C 2B		5CD 2B				2BD 5C	2BD 5C							
1130402	2A	2A	2A						2A		2A				
"	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	5CD 2B		5CD 2B				5CD 2B	5CD 2B							
1130403	10C		10C	10C			10C					10C[b]			
1130404	10C		10C	10C			10C					10C[b]			
1130405	10C		10C	10C			10C					10C[b]			
"	8C 2D		8C				8C 2D	8C 2D							

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11306	Pearson Creek (No Data Found)												
		11307	Haukkala Creek (No Data Found)												
		11308	Bois Brule River flow 4.9 m^3/s (173 cfs)												
42-74	21	1130801	At Brule-- 46-32-16 X 91-53-43	*	1										
64	"	"	"	*	1					5CD					
65	"	"	"	*	1					5					
66	"	"	"	*	1	5C		2D		5BC 2D		2D			
67	"	"	"	*	1	5A-C		5A-C		5BC 2D		2B			
68	"	"	"	*	1	5ABD		5ABD		9B[a] 5C 2D					
69	"	"	"	*	1	5A-C 2D		5A-C 2D		2B					
70	"	"	"	*	1	5		5		9B[b] 2D	2D				
71	"	"	"	*	1	5ACD 2B		5ACD 2B		9BC 11D[c]					
72	"	"	"	*	1	5A-C 2D		5A-C 2D		2AC 11B[d]					
73	"	"	"	*	1	5		5		9					
74	"	"	"		1	5BC		5BC		2A 4B 9C					
70	21	1130802	Near Lake Superior at River Mile 5.0	*	5BC 2D	2D		2D		5BC 2D					
71	"	"	"	*	5CD 2B	5C		5C		5CD 2B	2C				
72	"	"	"	•	5BC 2D	5BC 2D				5BC 2D					

[a] Sampled on March 28, April 11, and four times May 14, 1968.

[b] Sampled on April 10-13, 22 and two times each day on April 23, and May 22, 1970.

[c] Six times each day October-November 1971.

[d] Once each in March and May, 11 times in April.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1130801															
"															
"															
"	2D	2D	2D						2D						
"	2B		2B						2B						
"															
"															
"															
"															
"															
"															
"															
1130802															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	21	1130802	(Continued)	*	9	9			2D	9	2B				
74	"	"	"	*	5ACD					5ACD					
73	25	1130803	At County Road River Mile 4.9		5C 2BD	5C 2BD		5C 2BD		5C 2BD			5C 2D	5C 2BD	8C 2D
63	20	1130804	County Road near Waino T48N, R10W			5A 2B		5A 2B				5A 2B	5A 2B		
64	"	"	"			2A		2A				2A	2A		
65	"	"	"			2C		2C				2C	2C		
73	27	1130805	Near Port Wing 46-40-48 X 91-35-41		2C 5D	5CD	2C 5D	2C 5D	5CD	5CD		5CD	5CD	5D	5CD
74	"	" [a]	"		5AC 2D 11B	5AC 8D 11B	5ACD 11B	2AC 8D 11B	5AC 8D 11B	5AC 8D 11B		5AC 8D 11B	5AC 8D 11B	5AC 8D 11B	5AC 8D 11B
75	"	" [a]	"		2AC 11B	2A 5CD 11B	2A 5CD 11B	2A 5CD 11B	2A 5CD 11B	5CD 11B		2A 5CD 11B	2A 5CD 11B	5B-D	2A 5CD 11B
68	25	1130806	River Mile 3.0			10C		10C						10C	
69	"	"	"			10C		10C						10C	
57-74	20	1130807[c]	Approx. River Mile 1.0 46-44-05 X 91-36-25	*		9		9							
68	"	1130808	At the Mouth			10C		10C						10C	
		11309	Fish Creek (I)												
63	20	1130901	At Old Highway 13			2A		2A				2A	2A		
64	"	"	"			2D		2D				2D	2D		
		11310	Reefer Creek												
63	20	1131001	At Old Highway 13			2A		2A				2A	2A		
64	"	"	"			2D		2D				2D	2D		

[a] Additional samples in spring. (11B)

[b] Copper only--form uncertain.

[c] Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1130802															
"															
1130803	5C 2BD		8C 2BD				8C 2BD	8C 2BD							
1130804	5A 2B	5A 2B	5A 2B						2B		5A 2B				
"	2A	2A	2A						2A		2A				
"	2C	2C	2C						2C		2C				
1130805	5CD	5CD	2C 5D	5CD	5CD	2C 5D	2C		5CD	5CD	2C 5D				
"	5AC 8D 11B	5AC 8D 11B	5AC 8D 11B	5AC 8D 11B	5AC 8D 11B	5AC 8D 11B	2A 8D 5C 11B		5AC 8D 11B	2A 5C 8D 11B	5AC 8D 11B	2A-C		2A-C	2A-C
"	2A 5CD 11B	2AC 11B	2AC 11B	2AD 11B	2AD 11B	2AC 11B	2AC 11B		2A 5CD 11B	2AC 11B	2AC 11B	2B		2B	2B
1130806	10C		10C	10C			10C					10C[b]			
"	10C		10C	10C			10C					10C[b]			
1130807	9		9	9											
1130808	10C		10C	10C			10C					10C[b]			
1130901	2A	2A	2A						2A		2A				
"	2D	2D							2D		2D				
1131001	2A	2A	2A						2A		2A				
"	2D	2D							2D		2D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11311	Iron River												
73	25	1131101	At County Road South of Highway 13		2B 8C 5D	2B 8C 5D		2B 8C 5D		2B 8C 5D			8C 5D	2B 8C 5D	2B 8C 5D
63	20	1131102	At Highway 13			2A		2A				2A	2A		
72	25	"	"		2B 8C 5D	2B 8C 5D								2B 8C	2B 8C 5D
		11312	Flag River												
64	20	1131201	County Road Bridge T50N, R8W, Sec. 27			2A		2A				2A	2A		
72	25	1131202	At Highway 13		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		2B 8C 5D	2B 8C 5D		2B 8C 5D		2B 8C 5D			8C 5D	8C 5D	8C 5D
		11313	Cranberry River												
73	25	1131301	Dirt Road 1/4 Mile South of Highway 13		5C 2D	5C 2D		5C 2D		5C 2D			5C 2D	5C 2D	5C 2D
64	20	1131302	At Highway 13			2A		2A				2A	2A		
72	25	"	"		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
		11314	Siskiwit River												
64	20	1131401	County Road Bridge near Hwy 13, T51N, R6W, Sec. 35			2A		2A				2A	2A		
73	25	"	"		8C 2D	2BD 8C		2BD 8C		2BD 8C			5C 2D	2BD 8C	2BD 8C
72	"	1131402	At Highway 13		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1131101	2B 8C 5D		2B 8C 5D				2B 8C 5D	2B 8C 5D							
1131102	2A	2A	2A						2A		2A				
"	2B 8C 5D		2B 8C 5D					2B							
1131201	2A	2A	2A						2A		2A				
1131202	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	2B 8C 5D		2B 8C 5D				2B 8C 5D	2B 8C 5D							
1131301	5C 2D		5C 2D				5C 2D	5C 2D							
1131302	2A	2A	2A						2A		2A				
"	2B 8C 5D		2B 8C 5D					2B 8C 5D							
1131401	2A	2A	2A						2A		2A				
"	2BD 8C		2BD 8C				2BD 8C	2BD 8C							
1131402	2B 8C 5D		2B 8C 5D					2B 8C 5D							

RIVER BASIN GROUP 1.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11315	Sand River												
64	20	1131501	At Highway 13			2AD		2AD				2AD	2AD		
72	25	"	"		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		5C 2D	5C 2D		5C 2D		5C 2D			5C 2D	5C 2D	5C 2D
		11316	Rasberry River												
72	25	1131601	County Road just off of Highway 13		2B 8C 5D	2B 8C 5D								2B 8C 5D	2B 8C 5D
73	"	"	"		5C 2D	5C 2D		5C 2D		5C			5C 2D	5C 2D	5C 2D
		11317	Pikes Creek												
72	25	1131701	At Highway 13		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		2B 5CD	2BD 5C		5C 2B		5C			5C	2BD 5C	5C 2B 9D
		11318	Onion River												
72	25	1131801	At Highway 13		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		5CD	5C 2D		5C		5C			5C	5C 2D	5CD

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1131501	2AD	2AD	2AD						2AD		2AD				
"	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	5C 2D		5C 2D				5C 2D	5C 2D							
1131601	2B 8C 5D		2B 8C 5D					2B 8C 5D							
"	5C 2D		5C 2D				5C 2D	5C 2D							
1131701	8C 5D		8C 5D					8C 5D							
"	5C 2B		5C				5C 2B	5C 2B							
1131801	8C 5D		8C 5D					8C 5D							
"	5C		5C				5C	5C							

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11319	Sioux River												
68	21	1131901	Near Washburn 46-41-20 X 90-57-02	*						5BC					
73	"	"	"	*	2B					2B	2B				
64	20	1131902	One Mile Upstream from Highway 13			2A		2A				2A	2A		
72	25	1131903	At Highway 13		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		5CD	5C 2BD		5C 2B		5C			5C	5C 2BD	5C 5D 2B
		11320	Boyd Creek												
72	25	1132001	At Highway 13		8C 5D	8C 5D								8C 5D	8C 5D
		11321	Whittlesey Creeke												
72	25	1132101	At Highway 13		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		5CD	5C 2D		5C		5C			5C	5C 2D	5CD
		11322	Fish Creek (II)												
72	25	1132201	Highway 2--On North Fork		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		5CD	5C 2BD		2B 2C		5C			5C	5C 2BD	5CD 2B
64	20	1132202	Highway 2 at Mouth T47N, R5W, Sec. 2			2A		2A				2A	2A		
72	25	"	"		8C 5D	8C 5D								8C 5D	8C 5D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1131901															
"															
1131902	2A	2A	2A						2A		2A				
1131903	8C 5D		8C 5D					8C 5D							
"	5C 2B		5C				5C 2B	5C 2B							
1132001	8C 5D		8C 5D					8C 5D							
1132101	8C 5D		8C 5D					8C 5D							
"	5C		5C				2B 5C	5C							
1132201	8C 5D		8C 5D					8C 5D							
"	2B 5C		5C 2B				5C	5C							
1132202	2A	2A	2A						2A		2A				
"	8C 5D		8C 5D					8C 5D							

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		11324	Kakagon River (No Data Found)												
			HYDROLOGIC AREA 1.1.4 Bad River												
		11401	Bad River flow 17.4 m^3/s (614 cfs)												
14-22	21	1140101	Near Odonah on Government Road	*	1										
48-74	"	"	"	*	1										
64	"	"	"	*	1					2BD 5C					
65	"	"	"	*	1					2BC					
66	"	"	"	*	1	2A		2AD		2D		2D			
67	"	"	"	*	1	5AB		5AB		2BC		2B			
68	"	"	"	*	1	5ABD		5ABD		5B					
69	"	"	"	*	1	5		5							
70	"	"	"	*	1	5ACD 2B		5ACD 2B							
71	"	"	"	*	1	5A-C 2D		5A-C 2D		5D					
72	"	"	"	*	1	5A-C 2D		5A-C 2D		8C 2D					
72	25	"	"		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		5CD	5C 2D		5C	2CD	8C 2D			5C	5C 2D	5C 9D
73	21	"	"	*	1	5		5		9					
74	"	"	"	*	1	5A-C		5A-C		9AB 5C					
61	27	1140102	At Highway 2 Bridge			5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62	"	"	"			5BD 2AC		5BD 2AC	5BD 2AC	5BD 2AC		5BD 2AC	5BD 2AC	5BD 2AC	5BD 2AC
63	"	"	"			5ABD 2C		5ABD 2C	5ABD 2C	5ABD 2C		5ABD 2C	5ABD 2C	5ABD 2C	5ABD 2C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1140101															
"															
"															
"															
"	2D	2D	2D						2D						
"	2B		2B						2B						
"															
"															
"															
"															
"															
"	8C 5D		8C 5D					8C 5D							
"	5C		5C				8C	5C							
"															
"															
1140102	5B-D 2A		6	6	6	6	6		5B-D 2A						
"	5BD 2AC		6	6	6	6	6		5BD 2AC						
"	5ABD 2C		5B 2AD	5B 2AD	5B 2AD	5B 2A	5B 2A		5ABD 2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
63	20	1140102	(Continued)			2B		2B				2B	2B		
64-68	27	"	"			5		5	5	5		5	5	5	5
69-72	"	"	"			5		5	5	5		5	5	5	5
72	25	"	"		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		8C 2D	5C 2D		5C	2CD	8C 2D			5C	5C 2D	5C 9D
73	27	"	"		2C 5D	2A 5B-D	5D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2AB 5D	2A 5B-D
74	"	" [a]	"		5ACD 11B	5ACD 11B	5	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B
75	"	" [a]	"		5A 2C 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5ACD 11B	5CD	5AC 2B 11B
		11402	Denomie Creek (No Data Found)												
			HYDROLOGIC AREA 1.1.5 Montreal Complex												
		11501	Graveyard Creek (No Data Found)												
		11502	Oronto Creek (No Data Found)												
		11503	Montreal River flow 9.2 m^3/s (325 cfs)												
61	24	1150301	Below Hurley			6			6	6		6	6	6	6

[a] Additional samples in spring. (11B)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1140102	2B								2B		2B				
"	5		6	6	6	6	6		5						
"	5		6	6	6	6			5						
"	8C 5D		8C 5D					8C 5D							
"	5C		5C				5C	5C							
"	2A 5B-D	5D	2A-C 5D	2A-C 5D	2A-C 5D	2A-C 5D	2ABD		2A 5B-D	2C 5D	2C 5D				
"	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5ACD 11B	5ACD 11B	2A-C			
"	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5A 2C 11B	5A 2C 11B	2B		2B	2B
1150301	6		2BD	2BD	2BD	2BD			6						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
62	24	1150301	(Continued)			6			6	6		6	6	6	6
63	"	"	"			5			5	5		5	5	5	5
64-73	"	"	"			5			5	5		5	5	5	5
72	25	"	"		8C 5D	8C 5D								8C 5D	8C 5D
73	"	"	"		5C 2D	2BD 8C		2B 5C		5C			5C	2BD 5C	2B 5C 8D
66	06	1150302	Ironwood Road Bridge			2B	2B		2B	2B				2B	2B
69	06	1150303	US-2 Bridge		2C	2C		2C	2C	2C		2C	2C	2C	2C
70	"	"	"		2D	2D	2D	2D	2D	2D		2D	2D	2D	2D
71	"	"	"		2BC	2BC	2BC	2BC	2BC	2BC		2BC	2BC	2BC	2B
72	"	"	"		2AB	5C 2ABD	5C 2ABD	5C 2BD	5C 2ABD	5C 2ABD		5C 2ABD	5C 2ABD	5C 2ABD	5C 2ABD
73	"	"	"		2A	5	5B 2AC	5	5	5		5	5	5	5
74		"	"		5	5		5	5	5		5	5	5	5
75	"	"	"		5	5		5	5	5		5	5	5	5
68-71	06	1150304	4.2 Miles Northwest of Ironwood		2D[a]	8	8	8	8	8		8	8	8	8
69	21	"	"	*		2D		2D				2D	2D	2D	2D
70	"	"	"	*	5D	5	5	5ABD 2C				5	5A-C 2D	5	5
71-73	"	"	"	*	5	5	5	5		5		5	5	5	5
38-70	21	1150305	Near Saxon River Mile 2.0	*	1										
68	"	"	"	*	1	5D		5D							
69	"	"	"	*	1	5		5							
70	"	"	"	*	1	5A-C 2D		5A-C 2D							
72	25	1150306	Above Dam River Mile 1.0			8C 5D								8C 5D	8C 5D
73	"	"	"			2B 8C		2B 5C		5C			5C	2B 5C	2B 8D 5C
64	20	1150307	County Road 505 Bridge River Mile 0.5			2A		2A				2A	2A		
67	06	"	"		2C	2C		2C	2C	2C		2C	2C	2C	2C
68	"	"	"		5C	5C		5C	5C	5C		5C	5C	5C	5CD
69	"	"	"		5	5	5AD 2C	5	5	5		5	5	5	5

[a]Discharge data available: 1969-2D, 1970-2D, 1971-2BC.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1150301	6		2B-D	2B-D	2B-D	2BC			6						
"	5		5B 2A	5B 2A	5B 2A	5B			5						
"	5		6	6	6	6			5						
"	8C 5D		8C 5D					8C 5D							
"	2B 5C						2B 5C	2B 8C							
1150302	2B		2B				2B		2B		2B	2B			
1150303	2C		2C	2C		2C	2C		2C	2C	2C		2C		
"	2D		2D	2D		2D	2D		2D				2D		
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC		2C		2C		
"	5C 2ABD	5C 2ABD	5C 2ABD	5C 2ABD	5C 2ABD	5C 2ABD	5C 2ABD		5C 2ABD		2C		2C		
"	5	2A-C	5	5	5	5	5		5	2A					
"	5	2B 5CD	5	5	5	5	5		5		2C		2C		
"	5	5	5	5	5	5	5		5						
1150304	8	8	8	8	8				8		7	7			
"	2D		2D	2D		2D		2D	2D		2D				
"	5		5	5AB 2CD		5		5	5		5A-C 2D				
"	5		5	5	5	5	5		5						
1150305															
"															
"															
"															
1150306	8C 5D		8C 5D					8C 5D							
"	2B 5C		2B 8C				2B 5C	2B 5C							
1150307	2A	2A	2A						2A		2A				
"	2C		2C	2C	2C	2C	2C		2C	2C	2C	2C	2C		
"	5C		5C	5C	5C		5C		5C		5C		2C		
"	5	2C	5	5	5	5	5		5	2C	2C		2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	06	1150307	(Continued)		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5	5	5	5	5	5		5C 2ABD		5	5
72	"	"	"		2AB	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
73	"	"	"		5C 2D	5B-D 2A	2AD 5BC	5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B				5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 8B 2C	5A 2BC		5A 2C 8B	5A 2C 8B	5A 2C 8B		5AB 2C	5A 2BC	5A 2BC	5A 2BC
61	27	1150308	Highway 122-- Superior Falls Dam			5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62	"	"	"			5BD 2AC		5BD 2AC	5BD 2AC	5BD 2AC		5BD 2AC	5BD 2AC	5BD 2AC	5BD 2AC
63	"	"	"			5ABD 2C		5ABD 2C	5ABD 2C	5ABD 2C		5ABD 2C	5ABD 2C	5ABD 2C	5ABD 2C
64-68	"	"	"			5		5	5	5		5	5	5	5
69-72	"	"	"			5		5	5	5		5	5	5	5
73	"	"	"			2A 5B-D	2C 5D	2A 5B-D	2A 5B-D	2A 5B-D		2A-C 5D	5B-D 2A	2AB 5D	2A 5B-D
74	"	" [a]	"			5AD 2C 11B	5ABD 2C	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B		5AD 2C 11B	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B
75	"	" [a]	"		5A 2C 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5ACD 11B	2A 5CD	5AC 2D 11B

[a] Additional samples in spring. (11B)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1150307	5	5CD	5	5	5	5	5		5						
"	5	5	5	5	5	5	5		5	2C	5C		5C		
"	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C		2C		2C		
"	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5CD	5CD	2C	2CD	2CD	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2B-D	2B-D	
"	5A 2BC	5AB 2C	5A 2BC	5ACD 8B	5ACD 8B	5A 2BC	5ACD 8B		5AB 2C	5AB 2C	5AB 2C		2B	2B	
1150308	5B-D 2A		6	6	6	6	6		5B-D 2A						
"	5BD 2AC		6	6	6	2BC	2BC		5BC 2AC						
"	5ABD 2C		6	6	6	2BC	2BC		2C 5ABD						
"	5		6	6	6	6	6		5						
"	5		6	6	6	6			5						
"	2A 5B-D	5D	2A-C 5D	2A-C 5D	2A-C 5D	2A-C 5D	2BC 5D		2A-C 5A	2C 5D	2C 5D				
"	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B	5AD 2C 11B		5AD 2C 11B	5ABD 2C	5ABD 2C	2A-C		2A-C	2A-C
"	5ACD 11B	5A 11B	5ACD 11B	5A 2CD 11B	5A 2CD 11B	5ACD 11B	5ACD 11B		5ACD 11B	5A 2C 11B	5A 2C 11B	2B		2B	2B

Evaluation and Summary of Data for River Basin Group 1.1

This river basin group includes five hydrologic areas in three states, with 15,970 km^2 (6,142 mi^2) in Minnesota, 3,685 km^2 (2,956 mi^2) in Wisconsin, and 340 km^2 (131 mi^2) in Michigan. Of the 54 tributaries included on the DAM for this river basin group, only 12 have no data with which to estimate loadings. Twenty-one of the tributaries had at least monthly data available for one or more years, and many were monitored at increased frequencies during the spring period. Only seven of the tributaries, however, had gauging stations near their mouths. Deficiencies in the data for purposes of calculating loadings include a lack of continuous flow records and a lack of detailed water quality and flow data for runoff events. On a number of tributaries in Hydrologic Area 1.1.1, concurrent measurements of both total and dissolved reactive phosphorus were lacking.

Hydrologic Area 1.1.1 - Superior Slope Complex. The Superior Slope Complex includes the U.S. area draining into northern Lake Superior. Twenty-four tributaries were identified for inclusion on the DAM. Although these streams drain undeveloped forest land and are rather remote, a relatively large amount of river mouth loading data were found for all but six of the waterways. Several of the rivers have been gauged at river mouth locations and have long-term discharge records.

Fifteen of the tributaries in this complex were monitored during 1973, 1974, and 1975 as part of the ULRG Study including the Pigeon, Brule, Cascade, Poplar, Temperance, Cross, Manitou, Baptism, Beaver, Split Rock, Gooseberry, Knife, Sucker, French, and Lester Rivers. Starting in the summer of 1973, essentially monthly monitoring took place at stations located at or near the river mouths. During the spring of 1974 and 1975, sampling was conducted biweekly in order to provide more complete data during periods of high flow. The parameters measured include suspended solids, silica, nitrate, ammonia, total kjeldahl nitrogen, total phosphorus and some heavy metals. For these streams generally no dissolved reacitve or total soluble phosphorus, pesticides, or refractory organics were measured. Instantaneous flow measurements were made at the time of sampling.

The northernmost tributary identified for inclusion on the DAM from this hydrologic area was the Pigeon River. A continuous flow record in available at station 1110101 for over 50 years. This station was also used in the ULRG study. The combination of flow and water quality data should make this station valuable for loading calculation purposes. A considerable amount of nutrient data, including total and dissolved reactive phosphorus, were also found for station 1110102. No specific flow measurements were made at this station, although it is likely that there would be little change in discharge from that measured at the gauge about 5 km (3 mi) upstream.

The Brule River was sampled at station 1110301 to provide data for the ULRG study. Some nutrient data are also available for an annual cycle during 1971 and 1972 at station 1110302 located close to the river mouth. These data were obtained monthly, except during April of 1972 when weekly data were gathered as part of a study by the Reserve Mining Company. Thus, in the spring 1972, 1974, and 1975, sampling frequency was increased over the normal monthly frequency to better monitor spring runoff events.

Some limited data, (including some nutrient data) are available for Kaydunce Creek and Kimble Creek for 1974 and 1975. However, data are limited to grab samples during the fall period. The Devil Track River has some river mouth data available from the mid-1960's, but it is of very limited frequency. Over a one year cycle in 1971 and 1972, data were collected as part of the Reserve Mining study.

Some detailed data exist for the Cascade River, at station 1110701 which was sampled as part of the ULRG study during 1973, 1974 and 1975. Also, over a year's period beginning in summer 1972, nutrient and heavy metal samples were collected at station 1110702 for the Reserve Mining study. Thus, there is a fairly good record of data for this river between 1971 and 1975, with weekly to biweekly sample collection during the likely high flow period.

The Poplar River was gauged between 1912 and 1961 at the river mouth, although there are some interruptions in the record. Unfortunately, the river was not gauged during 1973 to 1975 when a considerable amount of data were taken in support of the ULRG study. The ULRG data were the only water quality data found for this tributary.

The Temperance River was sampled several miles upstream from the mouth at station 1110901 during 1973, 1974, and 1975 in support of ULRG. Instantaneous flow measurements were made during 1973 and 1974 at the same time that water samples were taken from the river but no flow data were reported for 1975. Two stations (1110902 and 1110903) were sampled close to the mouth. Data were collected at station 1110903 as a part of the Reserve Mining study. Unfortunately, no accompanying flow data were collected. This lack of flow data will limit efforts to estimate loadings from this tributary.

The Cross River was sampled at station 1111001 in support of ULRG. In addition to the ULRG data, nutrient and heavy metal data were collected at station 11110001 for the Reserve Mining study. Unfortunately, no discharge rate measurements were made during 1975 at station 1111001 or during 1971 or 1972 at station 1111002. Thus, despite the relatively good chemical record, including attempts at measurements during likely high flow periods, loading calculations would be limited by the lack of flow data. The only data found for the Caribou River were from the 1971 and 1972 Reserve Mining study.

The Manitou River was monitored in support of the ULRG study at station 1111301, several miles upstream from the river mouth. No continuous flow measurements are available for this river near its mouth, although instantaneous discharge measurements were made in connection with sample collection during the ULRG effort. During a year period in 1971 and 1972, station 1111302 at the river mouth, was monitored by Reserve Mining. Once again, despite the relatively extensive chemical record available for this station, there are few data on discharge available.

Two stations have been samples on the Baptism River, including a river mouth station which has been gauged since 1927. Water quality measurements have also been made on an irregular basis since 1953 at this station. In 1968 and 1969 this station was sampled on a continuous basis from October 7 to November 7 and April 5 to May 22, respectively, for suspended solids. Since

it is likely that one or more high flow events occurred during this period these data may prove useful in evaluating suspended solids laodings during the high flow period. Some other parameters of interest to loading studies, such as certain nutrients, were measured during the spring and summer of 1968, although there was no continuous sampling done for these parameters in the fall of 1968. Station 1111401 was also monitored in support of the ULRG study. At a station slightly closer to the river mouth (station 1111402) monitoring was conducted for several key parameters, including nutrients for a one year period in 1971 and 1972 by Reserve Mining. Heavy metal data were also collected at both stations including weekly to biweekly data during the spring of 1972, 1974 and 1975. Very few pesticide data were found for the tributary. Because of the gauging station at station 1111401 and the likelyhood of some high flow water quality measurements, the Baptism River probably has one of the best data sets for loading calculation purposes in this complex.

The Beaver River has been sampled at three stations near its confluence with Lake Superior. The farthest upstream station (1111501) was monitored in support of the ULRG study. At station 1111502, located close to Lake Superior, discharge was gauged on a continuous basis during 1966. Some water qualtiy data were obtained during that same year, but only in the summer and fall. Station 1111503, located at the mouth, was sampled by Reserve Mining. Some limited heavy metal and pesticide data are also available.

The Split Rock River was sampled at station 1111601 as part of the ULRG study effort. During 1974 and 1975, samples were collected in the spring on a biweekly basis. In addition to the ULRG data, the river was sampled at station 1111603 during 1971 and 1972. The lack of continuous flow data is a major limitation in the data for estimating loadings from this tributary.

The Gooseberry River was also sampled as part of the ULRG study. Other than the ULRG monitoring program discussed earlier, no data useful for loading calculations were found. Although the Stewart River was not sampled during the ULRG study, nutrients and other parameters were monitored over a year's period in 1971 and 1972. However, there apparently are no flow data available for this river, so that estimates of loading would have to be based on assumed flows.

The Knife River was sampled in support of ULRG at station 1112101. During part of 1970 and 1971, there were also a number of suspended solids and pesticide measurements made at this station. During 1971 and 1972, the Reserve Mining Company collected data at station 1112102 close to the actual river mouth. There are some heavy metal data available for 1971 through 1975. Again, loading estimates for the Knife would be limited by lack of continuous flow data.

The only data available for the Sucker River are those collected as part of the ULRG study. With the exception of some limited data obtained in 1953, the only water quality data available on the French River near the river mouth were collected in support of the ULRG study.

The Lester River, the last stream in this complex, was also sampled in support of ULRG (station 1112402). Data are also available for other stations on this river. During 1970 and 1971, suspended solids and pesticides were monitored at a station a few miles upstream from the river mouth. The most

significant data for loading purposes were collected by Reserve Mining over an annual cycle in 1971 and 1972. Again, the lack of flow data over runoff events and over a long-term period is a major flaw in the data base.

Hydrologic Area 1.1.2 - St. Louis River. The river mouth area of the St. Louis River is marked by dams, widened river stretches, lakes, and bays which will complicate estimation of loadings. Nevertheless, there is a relatively long period of record for both flow and certain physical and chemical parameters in the lower stretch of the river.

A continuous water stage recorder exists approximately 45 river kilometers (27 miles) upstream from Lake Superior with nearly 70 years of discharge records available. For certain physical parameters, such as turbidity, total dissolved solids, conductance, total solids, and suspended solids, considerable amounts of data exist for several stations along the lower stretch of the river. Monthly sampling for suspended solids was conducted at a station located approximately 20 river kilometers (12 miles) upstream in 1969 and 1974. Some additional sampling occurred for suspended solids on a weekly basis between 1966 and 1971.

Data on parameters such as hardness, alkalinity, dissolved oxygen, BOD, COD and pH are available as a result of a variety of point source investigations. There is also a considerable amount of nutrient data available for the St. Louis River. Weekly measurements were made for total phosphorus at stations 1120103, 04, and 06. Suspended solids were also sampled on a weekly basis at these same stations. Both total and dissolved reactive phosphorus were measured on a weekly basis during April of 1972 at station 1120103. Despite the fact that considerable nutrient data do exist, there does not appear to have been any specific measurements of nutrient loadings over a runoff event. Considerable data also exist for nitrate, ammonia, and total kjeldahl nitrogen. Nutrient measurements were also made during November 27, 28, and 29, of 1973 at stations 1120101 and 1120103 two or more times per day. Biweekly measurements of dissolved reactive phosphorus and nitrogen species were made at station 1120102 during 1973. Silica and nitrate measurements were made on a biweekly basis during the fall of 1962. Chlorides were also measured at stations 1120103, 04, and 06 on a weekly basis during spring through fall of 1966 to 1975. In support of the ULRG study, data were collected at stations 1120103 and 1120104, generally following the sampling frequency established before the ULRG effort. Also, some data, including nutrient and instantaneous flow data, were collected from St. Louis Bay (coordinates 46° 37' 00", 92° 06' 06"). This information was not included on the DAM as the Bay was considered to be part of the lake.

A relatively large amount of data on heavy metals was found for the St. Louis River. Although pesticides data are sparse, a relatively significant amount of refractory organics data are available for the lower stretch of the St. Louis. Monthly analyses of PCB's were made during 1972, 1973, and 1974, possibly allowing the estimation of PCB loadings from the St. Louis River. Apparently, there were no special measurements taken during high flow periods.

In addition to the St. Louis River, some data were also found on a small, unnamed tributary into Superior Bay. Although there are no flow data for this tributary, nutrient measurements were made on a monthly basis during most of 1972 and 1973.

In summary, a relatively large amount of data are available on the lower stretch of the St. Louis River, one of the most important streams draining into Lake Superior in terms of land drainage and point source pollution. Loading calculations for Lake Superior will be complicated by the effects of the widened river mouth on flow and on chemical transport. The presence of several dams on the lower stretches of the river form a dendritic-like lake before it flows into St. Louis and Superior Bay. As a result, the processes affecting the exchange of water between Superior Bay and the open lake are complex. There is also significant point source pollution to the river which must be subtracted from the total tributary loading if the non-point source input is to be estimated. The lower stretches of the river are also subject to backwater effects due to tides and seiches, which will further complicate loading estimates.

Hydrologic Area 1.1.3 - Apostle Islands Complex. Of the 23 tributaries in this hydrologic area identified on the DAM, only four have sufficient data available for loading calculations. Data are insufficient to estimate loadings for most of the remaining streams.

Although the Nemadji River is a major tributary, useful loading data have only been gathered in recent years. A continuous flow gauge was established at station 1130102 in 1973. Suspended solids were measured biweekly at this station in the fall of 1973 and daily from spring through fall of 1974. Suspended solids, nutrients and a variety of other parameters were sampled monthly at this station during 1974 and 1975, with extra samples collected in the spring as part of the ULRG study. Grab samples were taken periodically for heavy metals, pesticides, and refractory organics during these years. Several other grab samples were taken for pesticide analysis in the 1970's at stations 1130102 and 1130104.

The Amnicon River has been sampled at three different stations close to its mouth. Various parameters were measured biweekly during the summer months of 1972 and 1973, including total soluble phosphorus. Instantaneous flow measurements were made at stations 1130201 and 1130202 at the time of sampling. No heavy metal, pesticide, or refractory organic data are available for this tributary.

The Poplar River has been sampled at five different stations near the river mouth. However, data covering full annual cycles were not found. The flow data were limited to instantaneous measurements made at the time samples were obtained. Some dissolved reactive phosphorus data are available on a biweekly basis from the summer of 1973 near the river mouth. Also, some total soluble phosphorus data were found, including biweekly data during summer months.

Considerable data are available for the Bois Brule River. A continuous flow record has been kept since 1942 at station 1130801, although this station is located approximately 30 river kilometers (19 miles) upstream from the mouth. A large amount of suspended solids data were collected on a sporadic to monthly basis. More detailed measurements were made during fall 1971 and spring 1972. No nutrient data were collected at this station.

A number of other station closer to the river mouth were sampled and some nutrient data were collected. During summer 1973 some nutrient measurements were

made, including measurements of total soluble phsophorus. Station 1130805 was sampled as part of the ULRG study. Suspended solids, silica, nitrogen species, and total and dissolved reactive phosphorus, among other parameters, were measured during 1973 and 1974. Instantaneous discharge was usually measured at the time samples were collected. Heavy metal, pesticide, and refractory organic measurements were made on a grab basis during 1974 and 1975. Other stations closer to the river mouth were sampled between 1957 and 1974, although measurements were generally limited to the summer months.

In summary, while the Bois Brule River has a flow gauge, it is located so far upstream that it may not truly reflect conditions at the river mouth. This factor will likely limit the usefulness of the available data for loading calculations.

Fish Creek I and Reefer Creek have some data available, but they are not adequate for any type of loading calculations. The Iron River has information on suspended solids and some nutrients (including total soluble phosphorus) which were measured biweekly during summer 1973. Flow data are limited to a few instantaneous measurements. As a result, the data available are generally not adequate for calculating loadings.

The Flag River was sampled on a grab basis in 1964 and on a more frequent basis in 1972 and 1973. Although there were biweekly measurements during the summer of 1973 for suspended solids, nitrate, and dissolved reactive and total soluble phosphorus, the data are probably not useful for loading calculations.

The Cranberry River was sampled during 1972 and 1973 at two different stations. Scattered data are available for suspended solids, nitrate, dissolved reactive and total soluble phosphorus. There are some flow data that coincide with the collection of quality samples. The data are not sufficient for annual loading calculations. The Siskiwit River was sampled during 1972 and 1973 at two different stations near the river mouth. While there are some suspended solids and nutrient data (including total soluble phosphorus) available, there does not appear to be sufficient data available for making any estimates of loading on an annual basis.

Scattered data exist for the Sand River, the Rasberry River, Pike's Creek, and the Onion River for a number of parameters, including some nutrients. Some biweekly sampling was conducted during the summer of 1972 on these tributaries. Generally, the data do not appear to be adequate for annual loading calculation purposes.

Some data were found for the Sioux River, including some biweekly samples collected during the summer for nitrate and total soluble phosphorus analysis. No heavy metal, pesticide, or refractory organic data are available. These data are generally not sufficient for annual loading estimates.

Boyd Creek data include some biweekly measurements taken during the summer of 1972 of total soluble phosphorus and nitrate. Whittlesey Creek and Fish Creek II have some data available, the most significant of which were obtained from a biweekly sampling program during the summer months. Total soluble and dissolved reactive phosphorus data were obtained for these tributaries.

Hydrologic Area 1.1.4 - Bad River. Both discharge and water quality data have been gathered on the Bad River, which has the second highest discharge in River Basin Group 1.1, over a long period of time. Except for a few minor interruptions, the river has been continuously gauged since 1914 at a station located relatively close to the mouth (station 1140101) above the confluence of the White River, which is a major tributary of the Bad. Physico-chemical data from this station are minimal.

A second station near the mouth of the Bad River (station 1140102) is located below the confluence of the White and Bad Rivers. Quarterly measurements were made here as early as 1961 for a number of nutrients, including dissolved reactive and total phosphorus. There are also considerable suspended solids data available for the 1960's. Total soluble phosphorus was measured at this station during 1972 and 1973 on a relatively irregular basis, although sampling was biweekly during the summer of 1972.

Data were collected from Station 1140102 during 1973, 1974, and 1975 in support of the ULRG study. A large number of parameters were measured, including some heavy metals, pesticides, and refractory organics. Nutrients and suspended solids, in particular, were monitored during most of 1975, with extra samples collected during the spring. Instantaneous flow measurements were made concurrently with sampling over most of the ULRG study.

Hydrologic Area 1.1.5 - Montreal Complex. Of the three streams identified for this complex, data were only found on the Montreal River, which is by far the most significant of the tributaries. Stations 1150301, 02, 03, and 04 are located a considerable distance upstream, above the confluence of the West Fork and a number of other smaller tributaries. There are a considerable amount of data for these upstream stations, however, including biweekly analysis for a number of key parameters during 1968-1971. Monthly measurements of nutrients and other loading parameters were made from 1973 to 1975. Suspended solids were measured at station 1150301 during the period 1963 to 1973 on monthly basis.

Stations 1150305 through 1150308 are located much closer to the confluence of the Montreal with Lake Superior. At station 1150305, the USGS operated continuous flow gauge between 1938 and 1970. At station 1150307, monthly analyses of a number of parameters, including nutrients and suspended solids, were conducted between 1969 and 1971. Similar measurements were made in 1972 and 1973 at this station, but the frequency was less than monthly. During 1974 and 1975 at this station, measurements of nutrients were generally made on a monthly basis with biweekly measurements made during the spring period. Some analyses of heavy metals, pesticides, and refractory organics were made at this station in the 1970's. Station 1150308, located close to the river mouth, also has been sampled considerably. Suspended solids were measured generally on a monthly basis between 1962 and 1972, while nutrients were measured quarterly during the same period. This station was also used to collect data in support of the ULRG study from 1973 through 1975.

In general, there seems to be sufficient data collected at a number of stations over the years to consider detailed data analysis and comparisons. Also, the data seem to be sufficient for calculating loadings, especially since there is a continuous flow record available from 1938 through 1970.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 1.2

River basin group 1.2 covers an area of 20,088 square kilometers (7,756 square miles). This Lake Superior River Basin Group contains eight hydrologic areas, shown in Figure 9. Maps and descriptions of these hydrologic areas follow.

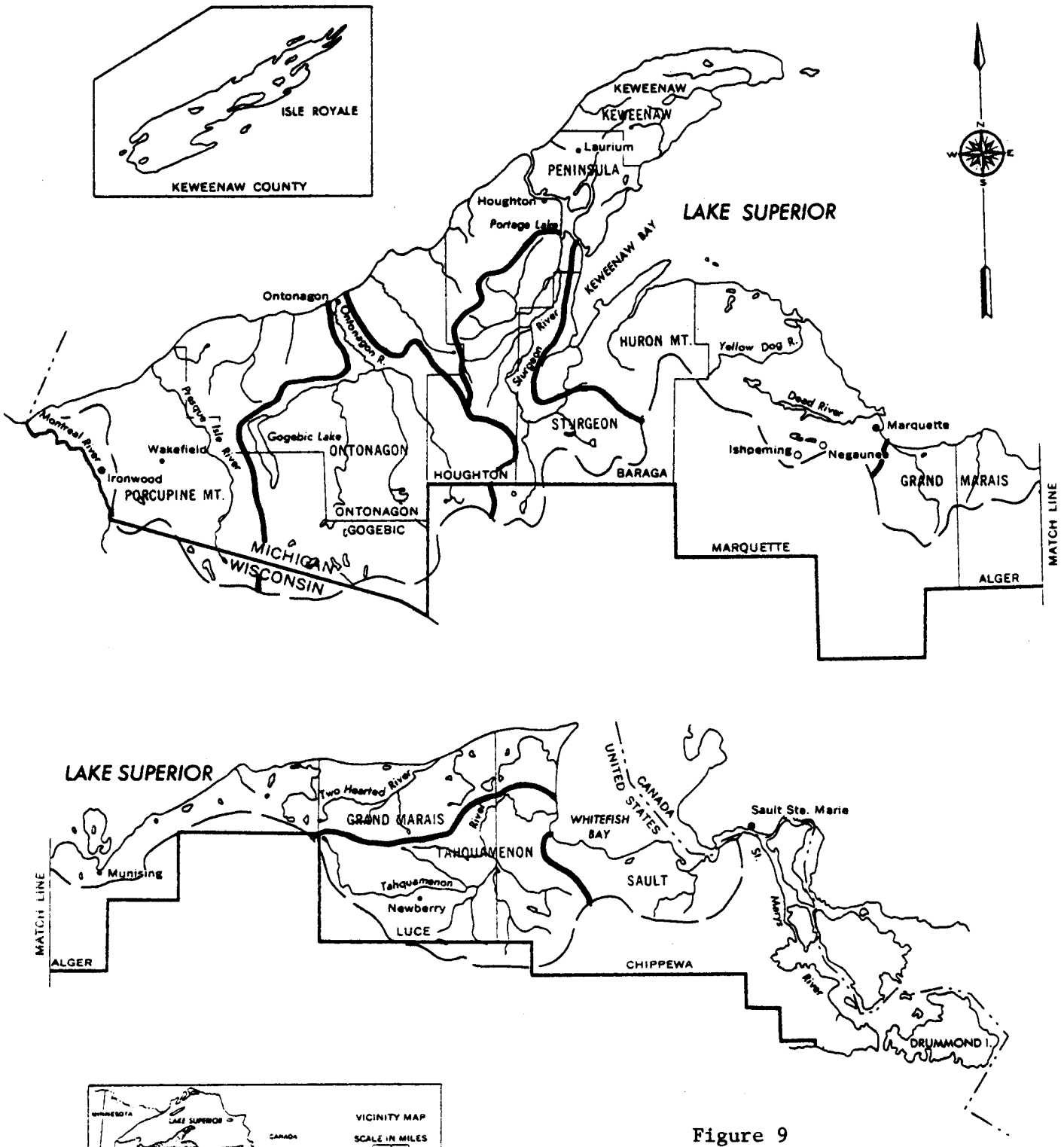
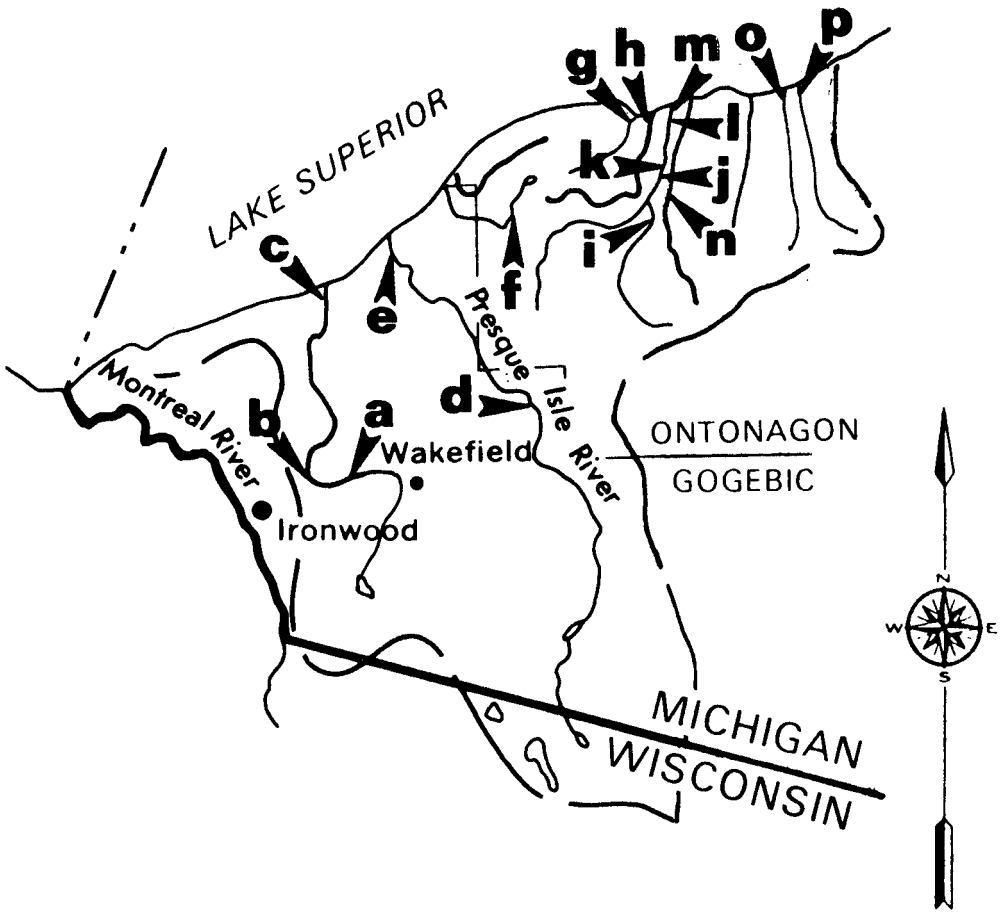
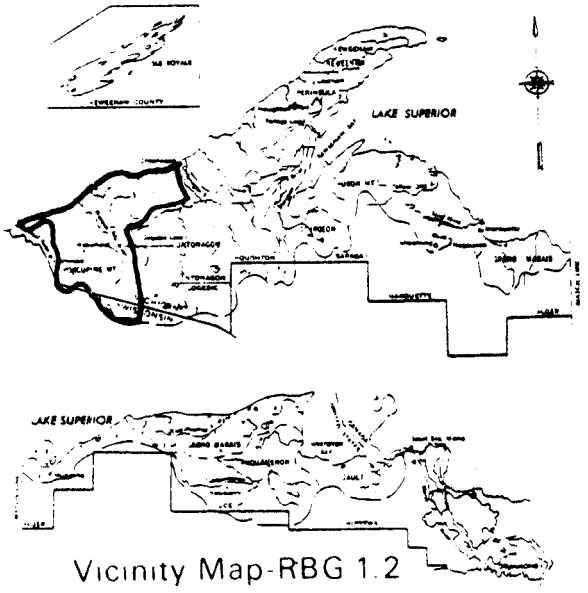


Figure 9

RIVER BASIN GROUP 1.2

Hydrologic Area 1.2.1
Porcupine Mountains Complex





Vicinity Map-RBG 1.2

SCALE IN MILES

0 5 10 15 20 25

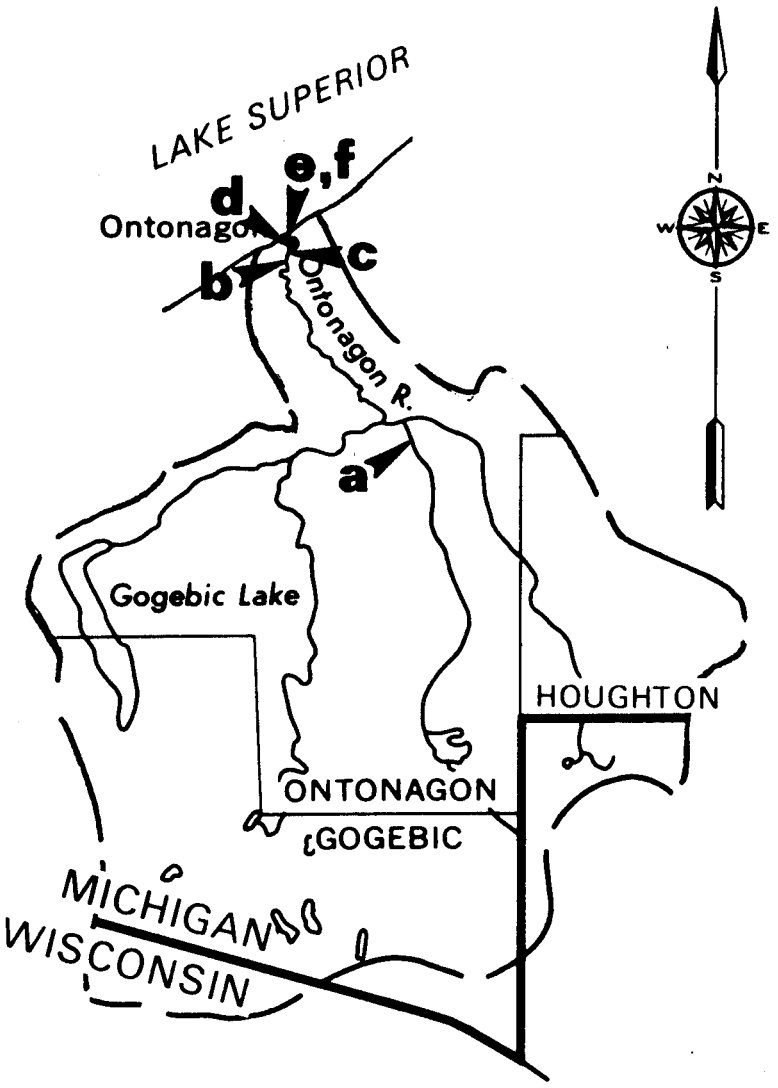
Hydrologic Area 1.2.1
Porcupine Mountains Complex

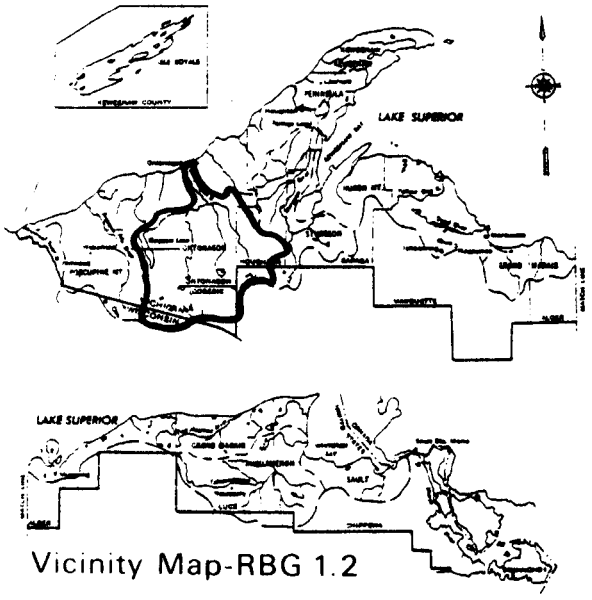
The Porcupine Mountains Complex covers 272,000 hectares (672,000 acres). The State of Michigan contains 94 percent of the area, and the remaining 6 percent is located in the State of Wisconsin. The major rivers in the area and their mean annual discharges are: the Black River (6.7 m^3/s; 237 cfs); the Presque Isle River (5.1 m^3/s; 180 cfs); the Iron River (4.2 m^3/s; 148 cfs); and the Mineral River (ungauged). The terrain is rolling, marked by the Porcupine Mountain chain. There are relatively few wetlands. About 80 to 90 percent of the area is forested, 5 percent devoted to agriculture and approximately 3 percent urbanized. The bedrock is composed mostly of igneous and metamorphic rock. The overlying material is composed of silt and clay in the northern section, and glacial till in the south. The economy is based to a large extent on extraction of materials such as copper, silver, sand and gravel, and some iron. There is some manufacturing in this sparsely populated area. There is only one major raw sewage discharge in the complex. The cities of Wakefield, Michigan (Pop.: 2,757) and Bessmer, Michigan (Pop.: 2,805) located on the Black River constitute the largest population centers in the complex.

Station Key

Station Location	DAM River and Station Numbers
Black River	12102
a	1210201
b	1210202
c	1210203
Presque Isle River	12104
d	1210401
e	1210402
Little Carp River	12106
f	1210601
Union River	12108
g	1210801
Little Iron River	12109
h	1210901
Iron River	12110
i	1211001
j	1211002
k	1211003
l	1211004
m	1211005
Mineral River	12111
n	1211101
Cranberry River	12117
o	1211701
Potato River	12118
p	1211801

Hydrologic Area 1.2.2
Ontonagon River





Vicinity Map-RBG 1.2

SCALE IN MILES

0 5 10 15 20 25

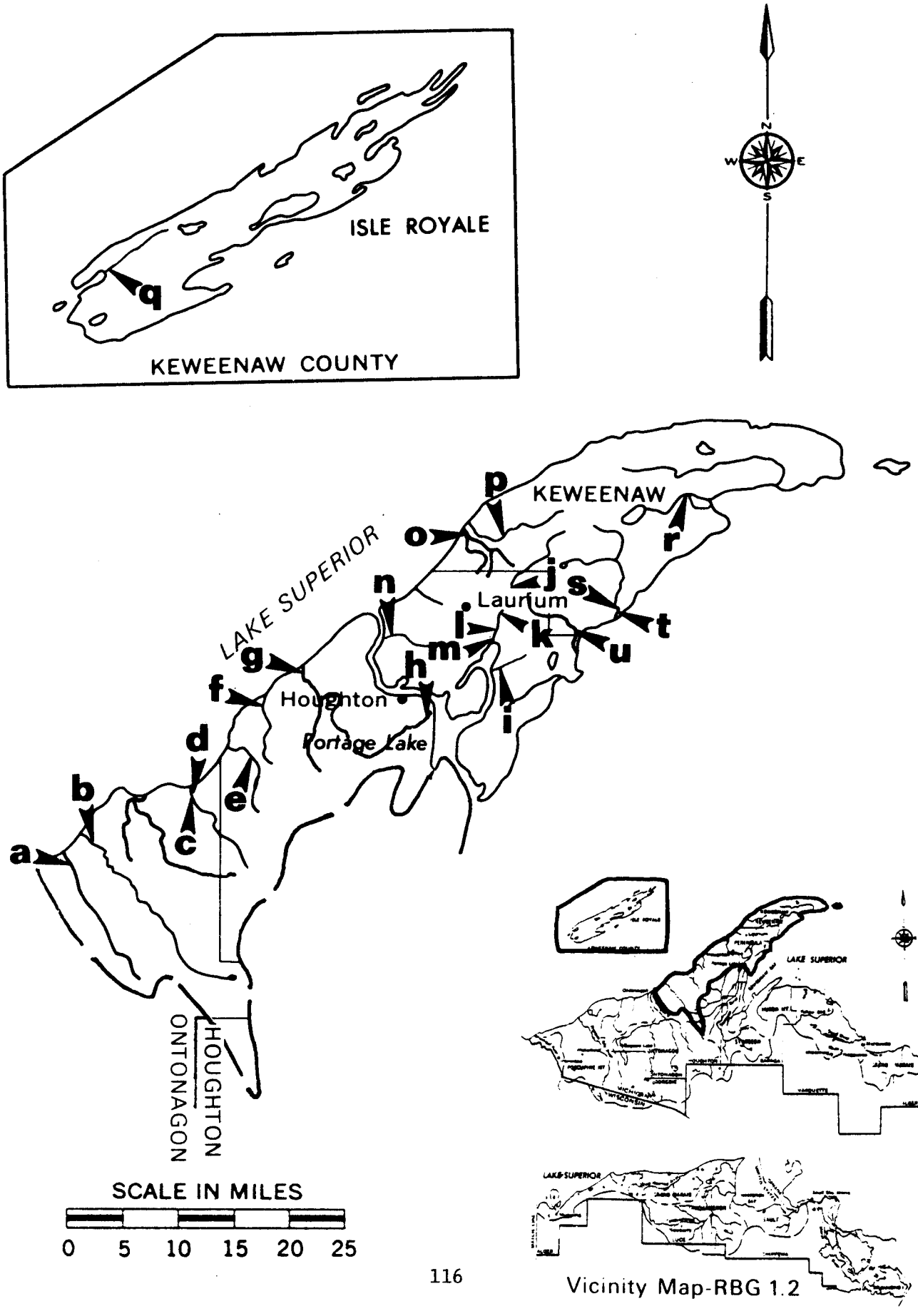
Hydrologic Area 1.2.2
Ontonagon River

The Ontonagon River Basin covers 353,000 hectares (872,000 acres). Ninety-eight percent of the area is contained in the western section of Michigan's Upper Peninsula, and the remaining 2 percent is located in Wisconsin. The Ontonagon River has a mean annual discharge of 40 m^3/s (1,412 cfs). The area is marked by a rolling topography, with many lakes in the southern portion, and a well-defined drainage pattern. There are significant wetland areas. About 80 to 90 percent of the area is forested (including portions of the Ottawa National Forest); 5 percent is devoted to agriculture and about 2 percent is composed of sparsely settled urban areas. The bedrock is composed mostly of igneous and metamorphic rock. The bedrock is covered by silt and clay in some portions with glacial till in others. The economy is generally limited to small mining and manufacturing operations. The only wastewater point sources of concern are the treated municipal and industrial effluents from the city of Ontonagon (Pop.: 2,432), which is the only major urban center in the basin.

Station Key

Station Location	DAM River and Station Numbers
Ontonagon River	12201
a	1220101
b	1220102
c	1220103
d	1220104
e	1220105
f	1220106

Hydrologic Area 1.2.3
Keweenaw Peninsula Complex



Vicinity Map-RBG 1.2

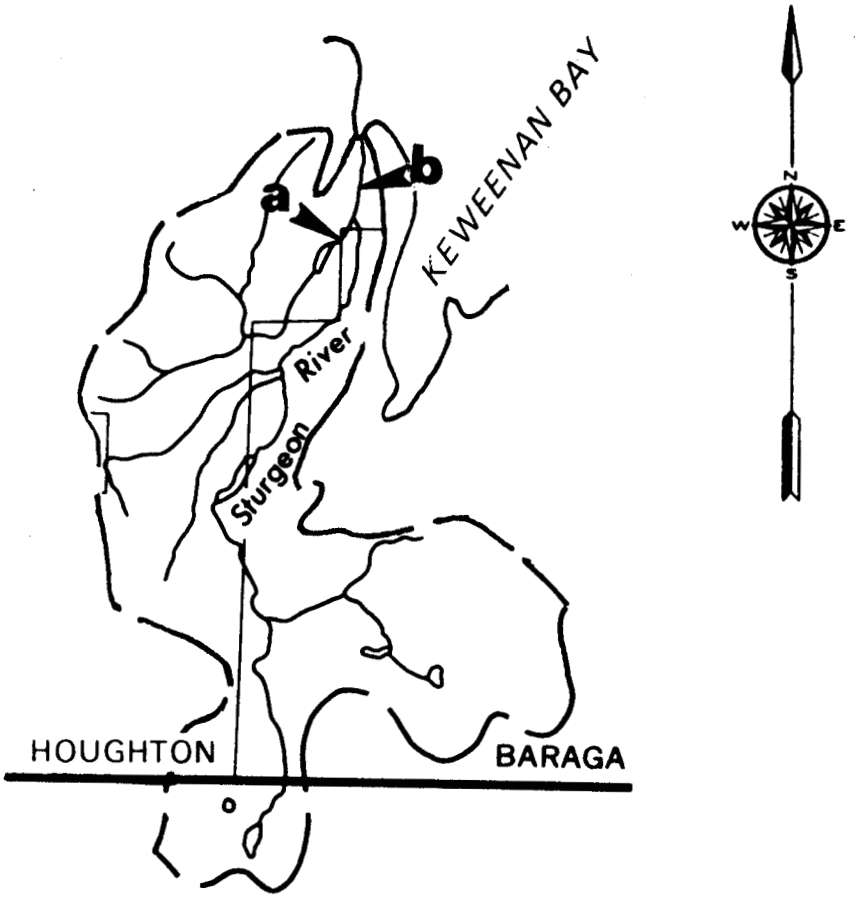
Hydrologic Area 1.2.3
Keweenaw Peninsula Complex

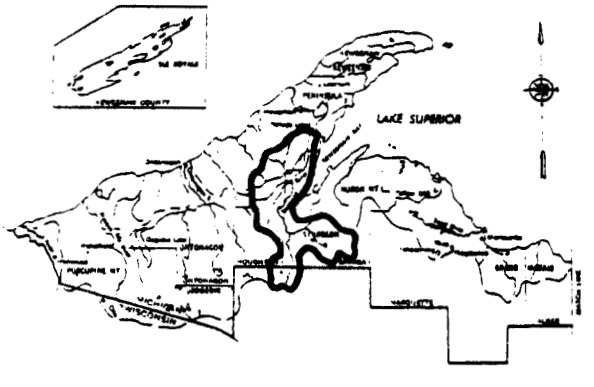
The Keweenaw Peninsula Complex covers 350,000 hectares (865,000 acres). The complex is located in the northern portion of Michigan's Upper Peninsula and includes Isle Royale. The major river in the area is the Traprock, which has a mean annual discuarge of 1.2 m^3/s (42 cfs). The area is marked by many minor streams. The area is also characterized by a very steep, rolling topography. Wetland regions are significant. Approximately 80 to 90 precent of the area is forested, about 5 percent devoted to agriculture and 2 percent is urbanized. The bedrock is composed mostly of igneous and metamorphic rock. The overlying material is made of silt and clay in some portions, and glacial till in others. Significant extraction of copper, sand and gravel, and stone occur in the area. Wastewater is introduced to the rivers from the Calumet area copper mines and small community sewage discharges. The cities of Houghton (Pop.: 6,067), Hancock (Pop.: 4,820), and Laurium (Pop.: 2,868) constitute the largest urban areas in the complex.

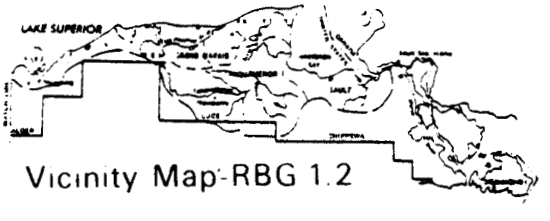
Station Key

Station Location	DAM River and Station Numbers
Flintsteel River	12302
a	1230201
Firesteel River	12303
b	1230301
Misery River	12307
c	1230701
d	1230702
Elm River	12308
e	1230801
Deer Creek	12309
f	1230901
Salmon Trout River	12310
g	1231001
Pilgrim River	12312
h	1231201
McCallum Creek	12315
i	1231501
Trap Rock River	12317
j	1231701
k	1231702
l	1231703
m	1231704
Boston Creek	12319
n	1231901
Hills Creek	12320
o	1232001
Gratiot River	12321
p	1232101
Washington Creek	12324
q	1232401
Little Gratiot River	12326
r	1232601
Tobacco River	12327
s	1232701
t	1232702
Traverse River	12327
u	1232701

Hydrologic Area 1.2.4
Sturgeon River







Vicinity Map-RBG 1.2

SCALE IN MILES

0 5 10 15 20 25

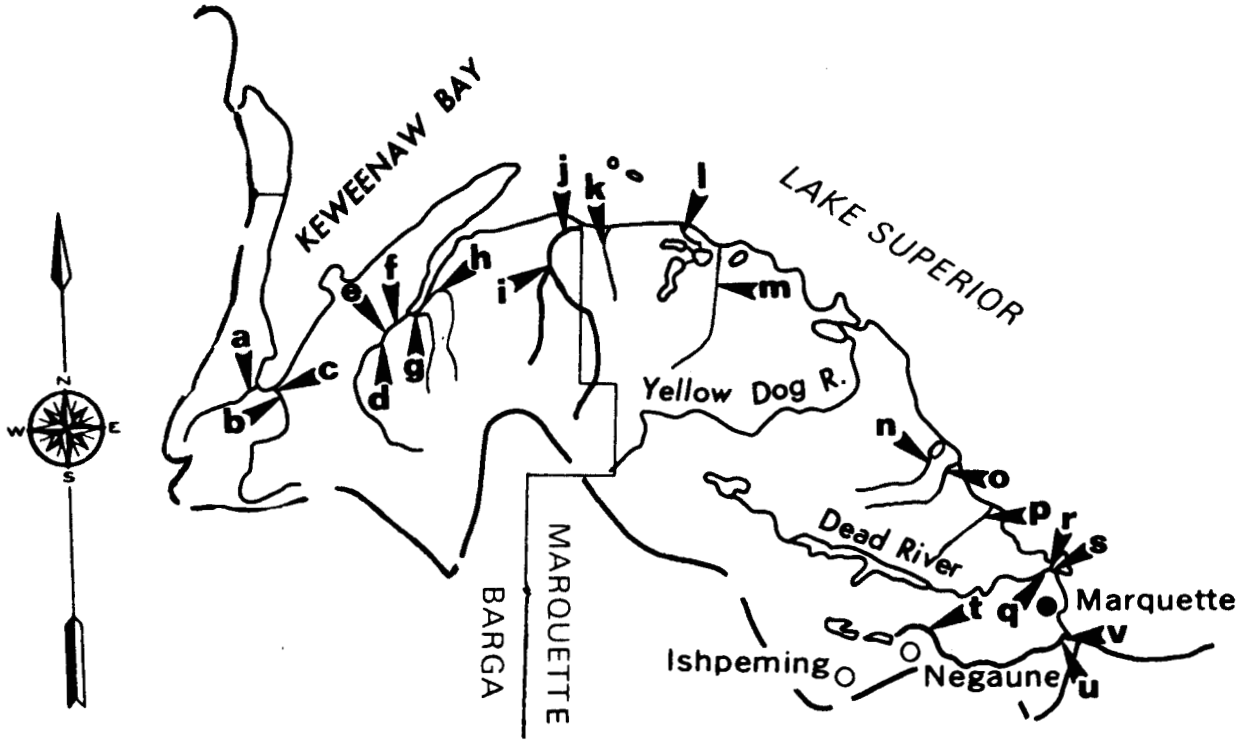
Hydrologic Area 1.2.4
Sturgeon River

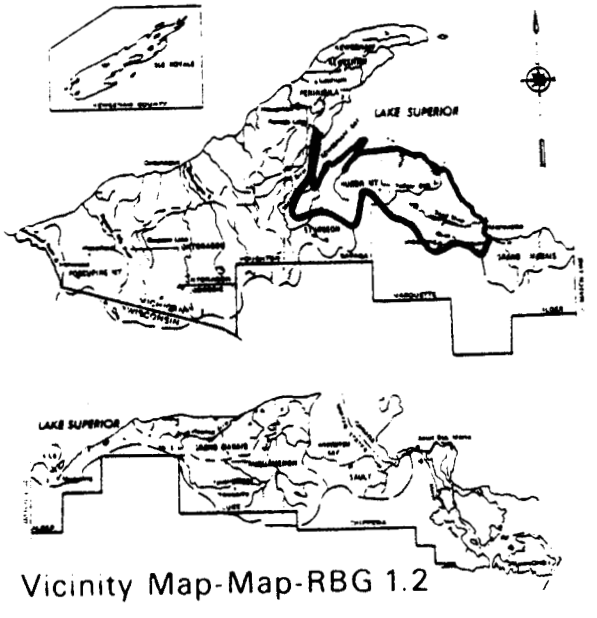
The Sturgeon River Basin covers 183,000 hectares (452,000 acres). The entire area is located in the State of Michigan. The Sturgeon has a mean annual discharge of 23.3 m^3/s (823 cfs). The area has a rolling topography with a well-defined drainage pattern. There are few wetlands in the area. About 80 to 90 percent of the area is forested, roughtly 5 percent is used in agriculture, and 2 percent is sparsely-settled, urban areas. The bedrock is composed mostly of metamorphic and igneous rock. The bedrock is predominantly covered by glacial till, and to a lesser extent, sand and gravel. There is some manufacturing and stone extraction in the watershed. There are no major untreated wastewater sources entering into the river and no major population centers.

Station Key

Station Location	DAM River and Station Numbers
Sturgeon River	12401
a	1240101
b	1240102

Hydrologic Area 1.2.5
Huron Mountain Complex





Vicinity Map-Map-RBG 1.2

SCALE IN MILES
0 5 10 15 20 25

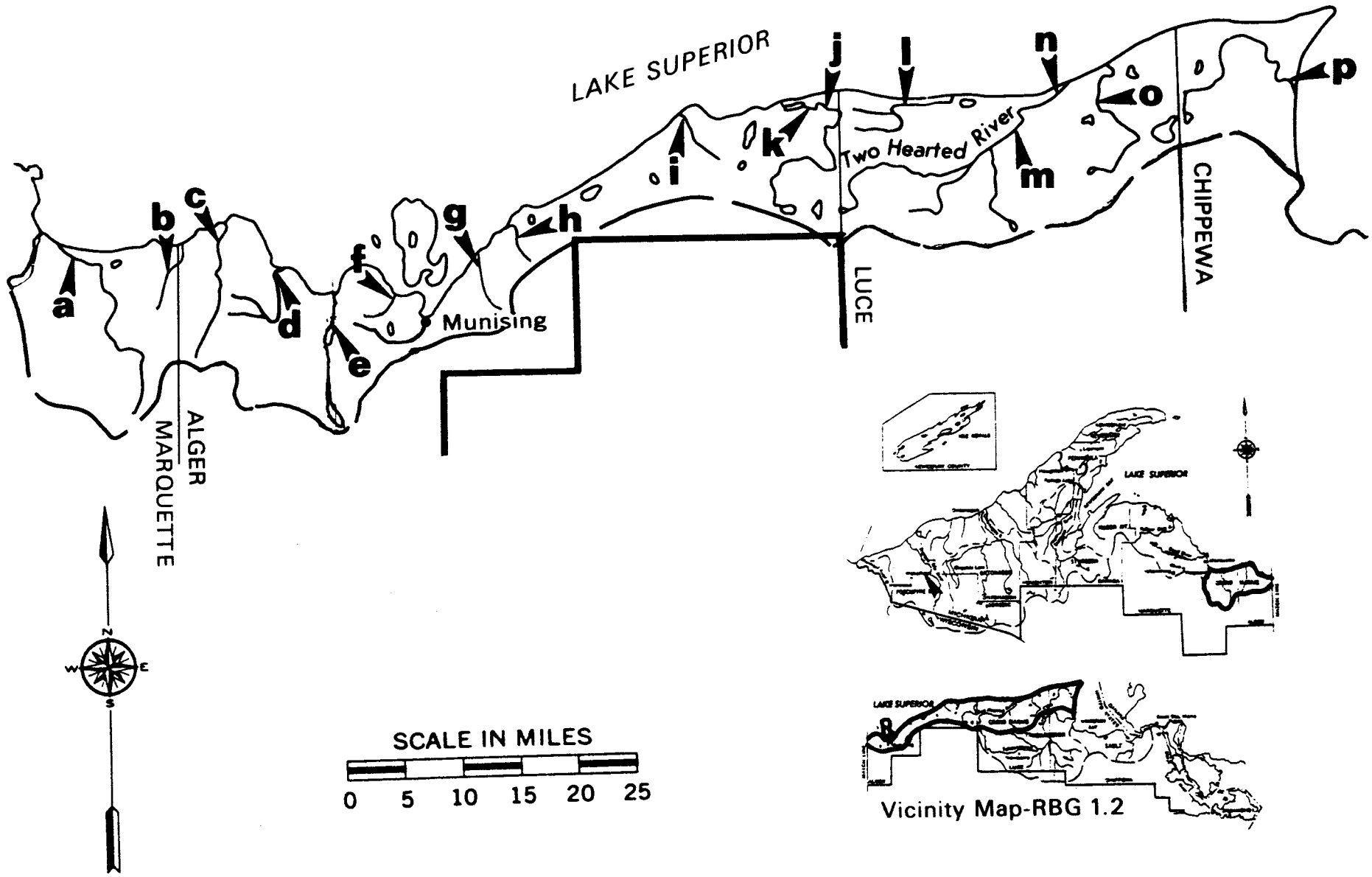
Hydrologic Area 1.2.5
Huron Mountain Complex

The Huron Mountain Complex covers 252,000 hectares (622,000 acres). The complex is located in the northcentral portion of Michigan's Upper Peninsula. The major rivers in the area and their mean annual discharges are: the Carp River (0.7 m^3/s; 25 cfs) and the Dead River (ungauged). The area contains steep, rolling hills marked by the Huron Mountain chain. There are few wetlands in the area. Approximately 80 to 90 percent of the area is forested (including portions of the Michiguamme and Baraga State Forests), roughly 5 percent is devoted to agriculture and approximately 3 percent is urbanized. The bedrock is made up mostly of metamorphic and igneous rock. The overlying material is composed of silt and clay in some areas and glacial till in others. The cities of Marquette (Pop.: 21,967), Ishpeming (Pop.: 8,245), and Negaunee (Pop.: 5,245) constitute the largest population centers in the Huron Mountain Complex. Copper mining operations near the cities of Ishpeming and Negaunee, and treated municipal sewage effluent have had a localized effect on water quality.

Station Key

Station Location	DAM River and Station Numbers
Sixmile Creek	12503
a	1250301
Falls River	12505
b	1250501
c	1250502
Silver River	12506
d	1250601
e	1250602
f	1250603
Slate River	12507
g	1250701
Ravine River	12508
h	1250801
Huron River	12509
i	1250901
j	1250902
Little Huron River	12510
k	1251001
Pine River	12511
l	1251101
Salmon Trout River	12512
m	1251201
Big Garlic River	12514
n	1251401
Little Garlic River	12515
o	1251501
Harlow Creek	12516
p	1251601
Dead River	12517
q	1251701
r	1251702
s	1251703
Carp River	12518
t	1251801
u	1251802
v	1251803

Hydrologic Area 1.2.6
Grand Marais Complex



Vicinity Map-RBG 1.2

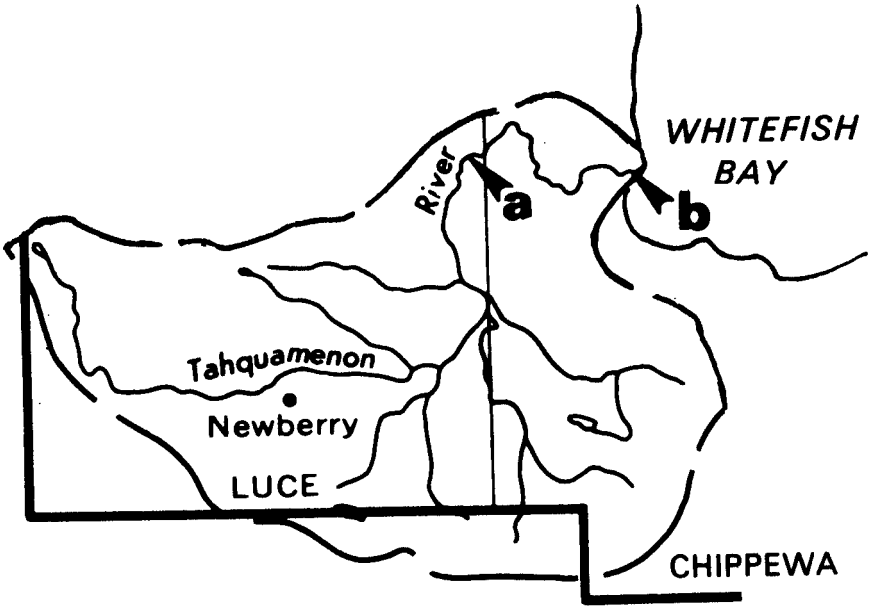
Hydrologic Area 1.2.6
Grand Marais Complex

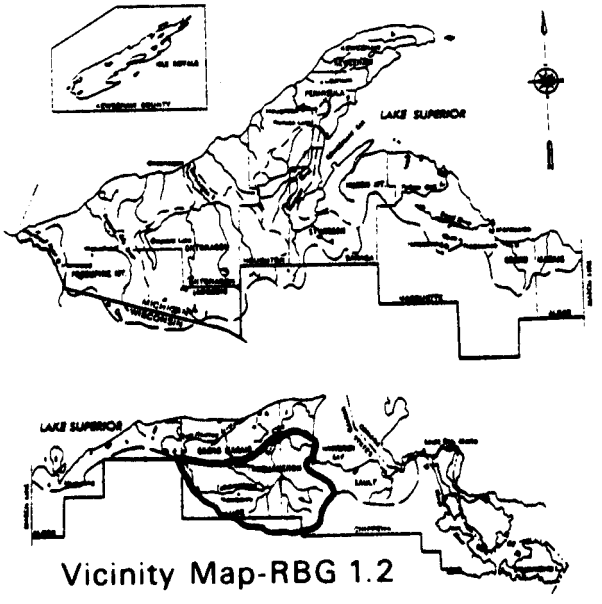
The Grand Marais Complex covers 311,000 hectares (768,000 acres). This complex is located in the north central region of Michigan's Upper Peninsula. The major river in this complex is the Two-Hearted River, which has a mean annual discharge of 8.5 m^3/s (300 cfs). A number of small streams drain remaining portions of this complex. The topography is marked by very steep hills in the west and a rolling relief in the east. Wetland areas are significant. About 80 to 90 percent of the area is forested (including portions of the Lake Superior State Forest), 5 percent is devoted to agriculture, and only a small portion of the land is urbanized. The bedrock is composed of mostly igneous and metamorphic rock, with some shale formations in portions of the area. The overlying material is composed of sand and clay, with areas of glacial till. Raw sewage is discharged to several small streams in the area from surrounding communities. The city of Munising (Pop.: 3,677) is the largest population center in this hydrologic area.

Station Key

Station Location	DAM River and Station Numbers
Chocolay River	12601
a	1260101
Sand River	12602
b	1260201
Laughing Whitefish River	12603
c	1260301
Rock River	12604
d	1260401
Au Train River	12605
e	1260501
Furnace Creek	12606
f	1260601
Miners River	12607
g	1260701
Mosquito River	12608
h	1260801
Hurricane River	12610
i	1261001
Sucker River	12611
j	1261101
k	1261102
Blind Sucker River	12612
l	1261201
Two Hearted River	12613
m	1261301
n	1261302
Little Two Hearted River	12614
o	1261401
Betsy River	12615
p	1261501

Hydrologic Area 1.2.7
Tahquamenon River





Vicinity Map-RBG 1.2

SCALE IN MILES

0 5 10 15 20 25

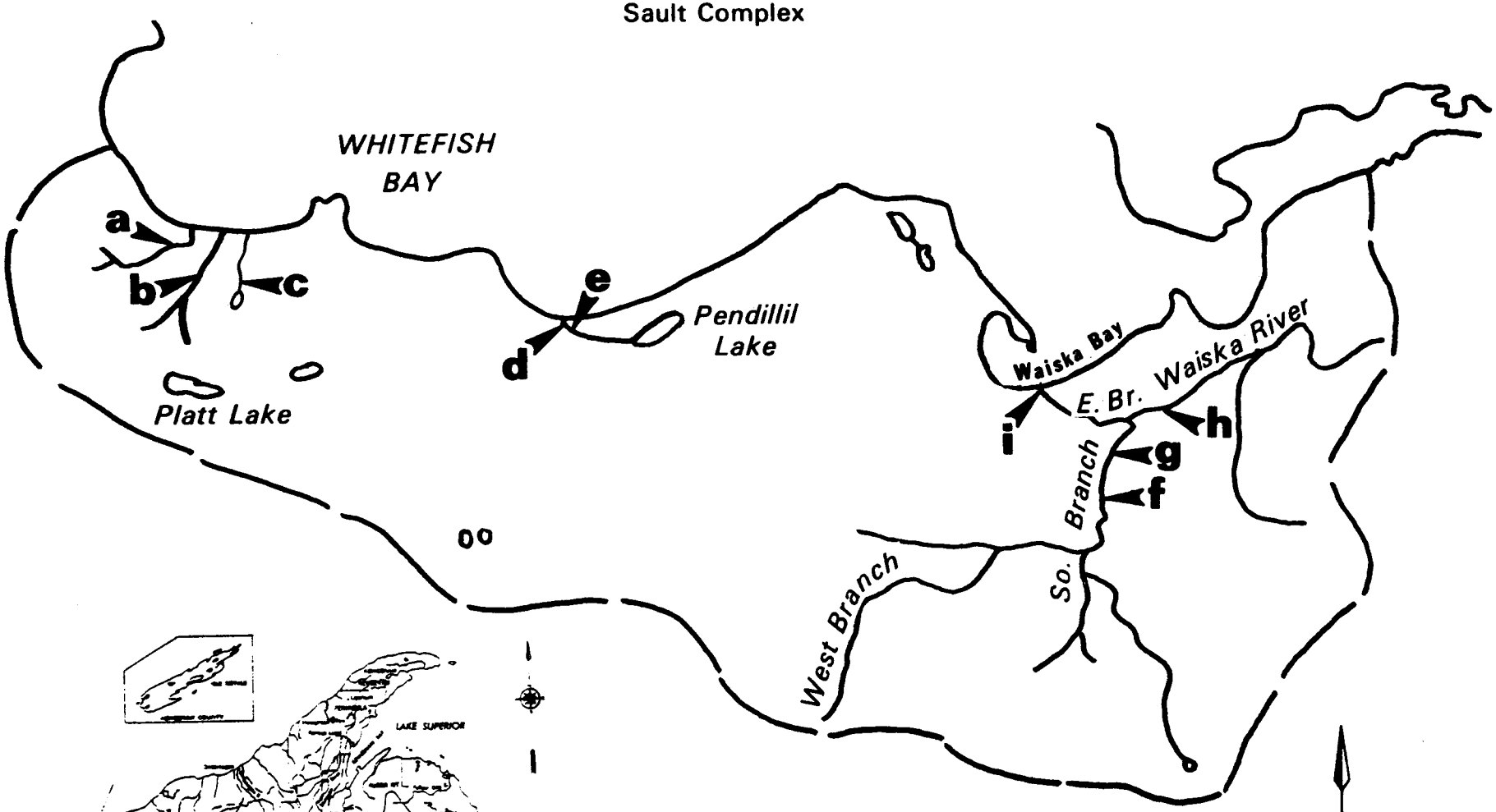
Hydrologic Area 1.2.7
Tahquamenon River

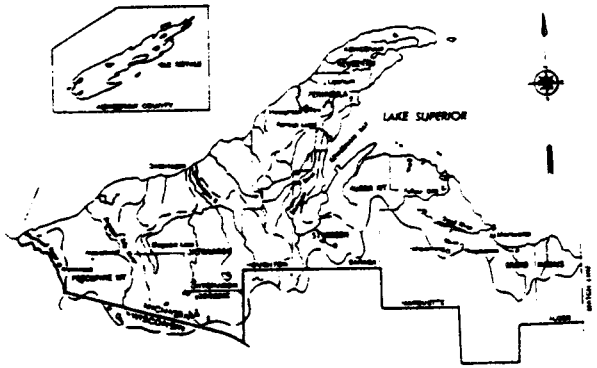
The Tahquamenon River Basin covers 218,000 hectares (540,000 acres). The area is located in the northeast section of Michigan's Upper Peninsula. The Tahquamenon River has a mean annual discharge of 26.2 m^3/s (925 cfs). The area is generally flat and the drainage pattern weakly defined. Wetland areas are significant. Roughly 70 to 80 percent of the area is forested (including portions of the Lake Superior and Mackinac State Forests), 5 percent devoted to agriculture, and 2 percent urbanized. The bedrock is composed mostly of shale. The overlying material is composed of silt and clay, with some areas of glacial till present. The village of Newberry (Pop.: 2,334) is the largest urban center in the area and provides the only important wastewater source from its municipal sewage treatment plant.

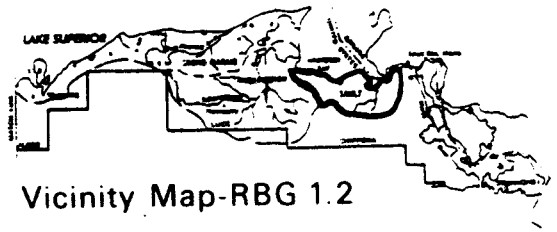
Station Key

Station Location	DAM River and Station Numbers
Tahquamenon River	12701
a	1270101
b	1270102

Hydrologic Area 1.2.8
Sault Complex







Vicinity Map-RBG 1.2

SCALE IN MILES
0 5 10

Hydrologic Area 1.2.8
Sault Complex

The Sault Complex covers 70,000 hectares (173,000 acres). The complex is contained in the northeast portion of Michigan's Upper Peninsula. The major river in the area is the Waiski River and it is ungauged. The area is generally flat and the drainage pattern is weakly defined. Approximately 70 percent of the area is forested and includes portions of the Hiawatha National Forest and Mununuscong State Forest. Roughly five percent of the area is devoted to agriculture and 3 percent urbanized. The bedrock is composed mostly of igneous and metamorphic rock with some areas of shale. The overlying formations are composed of glacial till in the west, silt and clay in the east, and a sand and gravel mixture in the center of the complex. The only important source of wastewater in the area is the treated sewage effluent from the Kincheloe Air Force Base that drains into the Wauiska River.

Station Key

Station Location	DAM River and Station Numbers
Roxbury Creek	12801
a	1280101
Ankodosh Creek	12802
b	1280201
Naomikong Creek	12803
c	1280301
Pendills Creek	12804
d	1280401
e	1280402
Waiska River	12805
f	1280501
g	1280502
h	1280503
i	1280504

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 1.2.1 Porcupine Mountain Complex												
		12101	Maple Creek (No Data Found)												
		12102	Black River flow 6.7 m^3/s (237 cfs)												
54-74	21	1210201	2.3 Miles North of Bessemer	*	1	1[a]									
65	"	"	"	*	1	1		5D							
66	"	"	"	*	1	1		5CD 2AB							
67	"	"	"	*	1	1		5				2BD			
68	"	"	"	*	1	1		5A-C							
64	20	1210202	County Road Bridge T48N, R46W, Sec. 32			2A		2A				2A	2A		
67	06	1210203	Below Rainbow Falls 46-40-00 X 90-02-44			2C		2C	2C	2C		2C	2C	2C	2C
68	"	"	"			5C		5C	5C	5C		5C	5C	5C	5C
73	"	"	"		5CD	5CD	5C 2D	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
		12103	Tiebel Creek (No Data Found)												
		12104	Presque Isle River flow 5.1 m^3/s (180 cfs)												

[a] Records through 1971.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1210201															
"															
"															
"	2BD								2BD						
"															
1210202	2A	2A	2A						2A		2A		2A		
1210203	2C		2C	2C			2C		2C	2C	2C		2C		
"	5C		5C	5C		5C	5C		5C		5C				
"	5CD	5CD	5CD	5CD	5C 2D	5CD	5CD		5CD	5CD	5CD	2BC	2CD	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2B-D	2A-C	
"	5AB 2C	5AB 2C	5AB 2C	5A 2C 8B		5AB 2C	5A 2C 8B		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	06	1210401	At South Boundry Road T50N, R45W, Sec. 30		2A 5D	5D	2D	5D	5D	5D		5D	5D	5D	5D
74	"	"	"		5CD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
64	20	1210402	M-28 Bridge			2A		2A				2A	2A		
		12105	Pinkerton Creek	(No Data Found)											
		12106	Little Carp River												
71	21	1210601	11.5 Miles Southwest of White Pine	*	2C	2C	2C	2C				2C			
		12107	Carp River	(No Data Found)											
		12108	Union River												
64	20	1210801	M-107 Bridge			2A		2A				2A	2A		
		12109	Little Iron River												
64	20	1210901				2A		2A				2A	2A		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1210401	5D	5D	5D			5D			5D	5D	5D		2D		
"	5ACD 8B	5ACD 8B	5ACD 8B			5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B		2B-D		
"	5AB 2C	5AB 2C	5AB 2C			5AB 2C			5AB 2C	5AB 2C	5AB 2C		2B		
1210402	2A	2A	2A						2A		2A		2A		
1210601	2C		2C						2C						
1210801	2A	2A	2A						2A		2A		2A		
1210901	2A	2A	2A						2A		2A		2A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12110	Iron River flow 4.2 m^3/s (148 cfs)												
75	35	1211001	Near White Pine 46-45-00 X 89-34-00												
75	35	1211002	Two Miles North of White Pine 46-47-00 X 89-33-00												
71	35	1211003	Near White Pine 46-47-00 X 89-35-00			2B		2B							
72	"	"	"			2D		2D				2D	2D		2D
64	20	1211004	At M-107 Bridge			2A		2A				2A	2A		
67	06	"	"		2D	2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"		2D	2D	2D	2D	2D	2D		2D	2D	2D	
73	"	"	"			5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	06	1211005	At Bonanza Falls		5	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2AC 8B	5A 2C 8B		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5A 2C 8B	5A 2C 8B	5A 2C 8B
		12111	Mineral River												
71	06	1211101	At M-64 Bridge		2D	2D		2D	2D	2D		2D	2D	2D	2D
72	"	"	"			2D	2D	2D	2D	2D		2D	2D	2D	2D
73	"	"	"			5CD	5C 2D	5CD	5CD	5CD		5CD	5CD	5CD	5C 2D
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5A 2C 8B		5A 2C 8B	5AB 2C	5AB 2C		5AB 2C	5A 2C 8B	5A 2C 8B	5A 2C 8B
		12112	Patent Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1211001	2C				2C		2C				2C	2C			
1211002	2C				2C		2C				2C	2C			
1211003		2C	2C			2C			2C	2C	2C	2C			
"		2D	2D	2D	2D	2D			2D		2D				
1211004	2A	2A	2A						2A		2A		2A		
"	2D		2D	2D		2D	2D		2D		2D				
"	2D		2D	2D		2D	2D		2D		2D				
"	5CD	2D 5C	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD		2C	2C	
1211005	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5A 2C 8B	5A 2C 8B	5AB 2C	5AB 2C	5A 2C 8B		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1211101		2D	2D	2D		2D	2D		2D		2D	2D	2D		
"	2D	2D	2D	2D		2D	2D		2D		2D		2D	2D	
"	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	2C	2C	2C	
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5A 2C 8B	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12113	Stony Creek (No Data Found)												
		12114	Pine River (No Data Found)												
		12115	Duck Creek (No Data Found)												
		12116	Halfway River (No Data Found)												
		12117	Cranberry River												
64	20	1211701	At M-64 Bridge			2A		2A				2A	2A		
67	06	"	"		2D	2D		2D	2D	2D		2D	2D	2D	2D
		12118	Potato River												
64	20	1211801	At M-64 Bridge			2A		2A				2A	2A		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1211701	2A	2A	2A						2A		2A		2A		
"	2D		2D	2D		2D	2D		2D		2D				
1211801	2A	2A	2A						2A		2A		2A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 1.2.2 Ontonagon River												
		12201	Ontonagon River flow 40.0 m^3/s (1,412 cfs)												
42-74	21	1220101	Near Rockland 46-41-57 X 49-09-36	*	1										
67	"	"	"	*	1	2BD		2BD				2BD			
71	"	"	"	*	1	2AD									
72	"	"	"	*	1	5B 2CD									
73	"	"	"	*	1	5BC 2D									
74	"	"	"	*	1	2ABD 5C									
70	39	1220102[a]	1/2 Mile Upstream from CMSTP&P Railroad Bridge			8C 2D		8C 2D					8C 2D	8C 2D	
67	39	1220103	At CMSTP&P Railroad Bridge in Ontonagon			8C 2D		8C 2D					2D	8C 2D	8C 2D
73	06	"	"		2D	2D		2D	2D	2D		2D	2D	2D	2D
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
67	39	1220104	M-64 Bridge in Ontonagon			8C 2D		8C 2D					2D	8C 2D	8C 2D
68	06	"	"		5C	5C		5C	5C	5C		5C	5C	5C	5C
69	"	"	"		5	2A 5B-D	5ACD	5	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
70	39	" [a]	"			8C 2D		8C 2D					8C 2D	8C 2D	
71	06	"	"		2D 5A-C	5	5	5	5	5		2B-D	6	5	5
72	"	"	"			5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"		5C 2D	5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD		5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD
67	39	1220105	750 Feet Downstream from M-64 Bridge			8C 2D		8C 2D					2D	8C 2D	8C 2D
67	39	1220106	1/2 Mile Downstream from M-64 Bridge			8C 2D		8C 2D					2D	8C 2D	8C 2D

[a] Bi-weekly for July only. (8C)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1220101															
"	2BD								2BD						
"															
"															
"															
"															
1220102															
1220103	8C 2D								2D						
"	2D	2D	2D	2D	2D	2D	2D		2D	2D	2D				
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5ACD 8B	5AB 2C	5AB 2C	5AB 2C	5ACD 8B		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1220104	8C 2D								2D						
"	5C		5C	5C		5C	5C		5C		5C				
"	5		5	5	2AD 2B	5	5		5						
"	5	2B 5CD	5	5	5A 2BD	5	5		5						
"															
"	5	5	5	5	2AD 5B	5	5		5	2C	2C	2BC	2C	2B	2B
"	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD		2C	2C	2C		
"	5BC 2AD	5BC 2AD		5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD		5BC 2AD	5C 2D	2C	2D	2C	2C	2C
1220105	8C 2D								2D						
1220106	8C 2D								2D						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 1.2.3 Keweenaw Peninsula Complex												
		12301	Bear Creek (No Data Found)												
		12302	Flintsteel River												
64	20	1230201	County Road Bridge T52N, R39W, Sec. 14			2A		2A				2A	2A		
		12303	Firesteel River												
57-70[a]	20	1230301	46-55-30 X 89-11-20	*		9		9							
64	"	"	County Road Bridge T52N, R38W, Sec. 7			2A		2AD				2AD	2AD		
		12304	Tenmile Creek (No Data Found)												
		12305	West Sleeping River (No Data Found)												

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1230201	2A	2A	2A						2A		2A		2A		
1230301	9		9	9											
"	2AD	2AD	2A						2AD		2AD		2A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12306	East Sleeping River (No Data Found)												
		12307	Misery River												
62	20	1230701	County Road Bridge T53N, R37W, Sec. 15			2CD		11C 2D				11C 2D	11C 2D		
64	"	"	"			2A		2A				2A	2A		
55-70	20	1230702[a]	At Mouth 47-00-00 X 88-59-10			9		9							
		12308	Elm River												
64	20	1230801	County Road Bridge T54N, R36W, Sec. 34			2A		2AD				2AD	2AD		
		12309	Deer Creek (Graversaet River)												
63	20	1230901				2D		2D				2D	2D		
		12310	Salmon Trout River												
62	20	1231001	At Mouth			2C		2C				2C	2C		
63	"	"	"			2D		2D				2D	2D		
64	"	"	"			2A		2A				2A	2A		

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1230701	2CD	11C 2D	2CD								11C 2D				
"	2A	2A	2A						2A		2A		2A		
1230702	9		9	9											
1230801	2AD	2AD	2AD						2AD		2AD		2D		
1230901	2D	2D							2D		2D		2D		
1231001	2C	2C											2C		
"	2D	2D							2D		2D		2D		
"	2A	2A	2A						2A		2A		2A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12311	Cole Creek (to Portage Lake) (No Data Found)												
		12312	Pilgrim River (to Portage Lake)												
62	70	1231201	US-41 Bridge near Mouth					2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		
72	18	"	"												
73	"	"	"												
		12313	Pike River (to Portage Lake) (No Data Found)												
		12314	Silver Creek (to Portage Lake) (No Data Found)												
		12315	McCallum Creek (to Portage Lake)												
63	20	1231501	County Road Bridge T55N, R32W, Sec. 20			2C		2C				2C	2C		
		12316	Sawmill Creek (to Portage Lake) (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1231201	2C	2C							2C		2C				
"	2A	2A	2A						2A		2A		2C		
"			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
1231501	2C	2C							2C		2C		2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12317	Trap Rock River (to Portage Lake)												
67	06	1231701	County Road Bridge T55N, R32W, Sec. 5		2D	2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"		2D	2D		2D	2D	2D		2D	2D	2D	
64	21	1231702	Near Lake Linden River Mile 3.0	*	1										
66-74	"	"	"	*	1										
71	"	"	"	*	1	1[a]									
72	"	"	"	*	1	1[b]									
73	"	"	"	*		1									
74	"	"	"	*		1D[c]									
63	20	1231703	Below Junction with Scales Creek T56N, R32W Sec. 10			2C		2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		
72	18	1231704	Bootjack Road Bridge 47-12-00 X 88-24-00												
73	"	"	"												
		12318	Dover Creek (to Portage Lake) (No Data Found)												
		12319	Boston Creek (to Portage Lake)												
62	20	1231901	At M-203 Bridge					2C				2C	2C		
72	18	"	"												
73	"	"	"												

[a] No data from Nov. 23 to Dec. 13.

[b] Minor gaps.

[c] (1D) September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1231701	2D		2D	2D		2D	2D		2D		2D				
"	2D		2D	2D		2D	2D		2D		2D				
1231702															
"															
"															
"															
"															
"															
1231703	2C	2C	2C						2C		2C		2C		
"	2A	2A	2A						2A		2A		2A		
1231704			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
1231901	2C	2C									2C		2C		
"			5D	5D	5D	5D	5D								
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D								

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12320	Hills Creek												
63	20	1232001	At Mouth					2C				2C	2C		
67	06	"	"					2D	2D	2D		2D	2D	2D	2D
		12321	Gratiot River												
64	20	1232101	County Road Bridge T57N, R32W, Sec. 19			2A						2A	2A		
65	"	"	"			2D						2D	2D		
		12322	Silver Creek (No Data Found)												
		12323	Eagle River (No Data Found)												
		12324	Washington Creek (On Isle Royal)												
66	21	1232401	At Windigo	*	2D					2D	2C				
67	"	"	"	*	2ACD	1D		2ACD		2ACD	2C	2D	2D	2D	2ACD
68	"	"	"	*	2ABD 8D[a]	1		2ABD 9C		2AB 8D[a]	2C	2ABD 9C	2ABD 9C	2A-C	2A-C

[a]Biweekly Aug., Sept., and Oct. (8D)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1232001	2C	2C							2C		2C		2C		
"	2D		2D	2D		2D	2D		2D		2D				
1232101	2A	2A	2A						2A		2A		2A		
"	2D	2D	2D						2D		2D		2D		
1232401															
"	2ACD	2D	2ACD			2D			2ACD	2D	2D			2D	
"	2ABD 9C	2ABD 9C	2ABD 9C			2ABD 9C			2ABD 9C					2B	

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	21	1232401	(Continued)	*	2ABD 4C	1D		2D		2ABD 4C	2D	2D	2D	2D	2D
70	"	"	"	*	6	1		6		6	2D	6	6	6	6
71	"	"	"	*	2ABD 5C	1		2ABD 5C		2BD	2D	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
72	"	"	"	*	6	1	2C	6		2B	2B	6	6	6	6
73	"	"	"	*	2BD 5C		2C	2BD 5C		2B	2B	2BD 5C	2BD 5C	2B-D	2B-D
		12325	Montreal River (No Data Found)												
		12326	Little Gratiot River												
64	20	1232601	County Road Bridge T58N, R29W, Sec. 31			2AD		2AD				2AD	2AD		
65	"	"	"			2B		2B				2B	2B		
		12327	Tobacco River												
67	06	1232701	County Road Bridge T56N, R30W, Sec. 20		2D	2D		2D	2D	2D		2D	2D	2D	2D
64	20	1232702	At Mouth			2A		2A				2A	2A		
		12328	Traverse River												
63	20	1232801	Gay-Lake Linden Road Br T56N, R31W, Sec. 28			2C		2C				2C	2C		
64	"	"	"			2AB		2AB				2AB	2AB		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1232401	2D	2D	2D			2D			2D	2D	2D		2D	2D	
"	6	6	6			6			6	2CD	2CD	2D	2BD	2D	
"	2ABD 5C	2ABD 5C	2ABD 5C			2ABD 5C			2ABD 5C	2ABD 5C	2ABD 5C	2D	2B	2D	2D
"	6	6	6			6			6	6	6	2BD		2D	2D
"	2BD 5C	2BD 5C	2BD 5C			2BD 5C			2BD 5C	2B-D	2B-D	2D			
1232601	2AD	2AD	2A						2AD		2AD		2A		
"	2B	2B	2B						2B		2B		2B		
1232701	2D		2D	2D		2D	2D		2D		2D				
1232702	2A	2A	2A						2A		2A		2D		
1232801	2C	2C							2C		2C		2C		
"	2AB	2AB	2A						2AB		2AB		2A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12329	Lahti Creek (No Data Found)												
			HYDROLOGIC AREA 1.2.4 Sturgeon River												
		12401	Sturgeon River												
42-74	21	1240101	Near Arnheim 46-55-42 X 88-33-23	*	1										
67	"	"	"	*	1	2BD		2BD				2BD			
71	"	"	"	*	1	2AD									
72	"	"	"	*	1	5CD 2AB									
73	"	"	"	*	1	5									
74	"	"	"	*	1	5AC 2BD									
63	20	1240102	M-41 Bridge			2D		2D				2D	2D		
64	"	"	"			2A		2A				2A	2A		
69	06	"	"		5	5	2B 5ACD	5	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5A-C 2D	5	5	5	5	5		6	6	5	5
72	"	"	"			2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
72	18	"	"												
73	"	"	"												
73	06	"	"		5CD	5B-D 2A	5BC 2AD	5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
74	"	"	"		5AC 2D 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"			5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1240101															
"	2BD								2BD						
"															
"															
"															
"															
1240102	2D	2D							2D		2D		2D		
"	2A	2A	2A						2A		2A		2A		
"	5		5	5	5ABD	5	5		5						
"	5	2B 5CD	5	5	5A 2B	5	5		5						
"	5	5	5	5	2AC 5B	5	5		5	2C	2C		2A-C	2B	2B
"	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	5AC 2BD	2ABD 5C	2ABD 5C		2ABD 5C		2C		2C	2C	
"			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
"	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A	2AD 5BC	5B-C 2A	5B-C 2A		5CD 2A	5CD	5CD	2C	2CD	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2B-D	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5ACD 8B		5AB 2C	5ACD 8B		5AB 2C	5AB 2C	5AB 2C		2B	2AB	2AB

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 1.2.5 Huron Mountains Complex												
		12501	Kelsey Creek (No Data Found)												
		12502	Little Carp River (No Data Found)												
		12503	Sixmile Creek												
62	20	1250301	US-41 Bridge			2C		2C				2C	2C		
63	"	"	"			2C		2C				2C	2C		
		12504	Mange Creek (No Data Found)												
		12505	Falls River												
64	20	1250501	US-41 Bridge in L'Anse			2AD		2AD				2AD	2AD		
67	06	"	"		2D	2D		2D	2D	2D		2D	2D	2D	2D
73	"	"	"			5CD	5C 2D	5CD	5CD	5CD		5CD	5CD	5CD	5CD

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1250301	2C	2C									2C				
"	2C	2C							2C		2C		2C		
1250501	2AD	2AD	2AD						2AD		2AD		2AD		
"	2D		2D	2D		2D	2D				2D				
"	2C 5D	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5C 2D	5CD	2C	2C	2C	2C

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	06	1250501	(Continued)		2D	2D		2D	2D	2D		2D	2D	2D	2D
75	"	"	"		2AC 8B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
74	06	1250502	At Celotex Plant Bridge in L'Anse		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
		12506	Silver River												
63	20	1250601	At Skanee Road Bridge T51N, R32W, Sec. 25			5AB		5AB				5AB	5AB		
64	"	"	"			2A		2A				2A	2A		
74	06	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5AB 2C		5AB 2C	5AB 2C	5ACD 8B		5AB 2C	5AB 2C	5AB 2C	5AB 2C
73	06	1250602	County Road Bridge 46-48-37 X 88-17-53			5CD	5C 2D	5CD	5CD	5CD		5CD	5CD	5CD	5CD
54-74	20	1250603[a]	46-49-05 X 88-18-05	*		9		9							
		12507	Slate River												
64	20	1250701	Skanee Road Bridge T51N, R31W, Sec. 8			2AD		2AD				2AD	2AD		
		12508	Ravine River												
64	20	1250801	Skanee Road Bridge T51N, R31W, Sec. 8			2AD		2AD				2AD	2AD		
		12509	Huron River												
63	20	1250901	At Junction of East and West Branch			2D		2D				2D	2D		

[a] Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1250501	2D	2D	2D	2D	2D	2D	2D		2D	2D	2D				
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5A 2C 8B		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1250502	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
1250601	5AB	5AB	5AB						2B		5AB		2B		
"	2A	2A	2A						2A		2A		2A		
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5A 2C 8B	5AB 2C	5AB 2C	5A 2C 8B		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1250602	2C 5D	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5C 2D	5CD	2C	2C	2C	
1250603	9		9	9											
1250701	2AD	2AD	2A						2AD		2AD		2A		
1250801	2AD	2AD	2A						2AD		2AD		2A		
1250901	2D	2D	2D						2D		2D		2D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
64	20	1250901	(Continued)			2A		2A				2A	2A		
65	"	"	"			2D		2D				2D	2D		
54-70	20	1250902[a]	Near Mouth 46-54-20 X 88-04-20	*		9		9							
		12510	Little Huron River												
63	20	1251001	County Road Bridge T52N, R29W, Sec. 29			2D		2D				2D	2D		
		12511	Pine River												
63	20	1251101	At County Road 550 Bridge near Mouth			2C		2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		
		12512	Salmon Trout River												
63	20	1251201	At County Road 550 Bridge, River Mile 3.1			2C		2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		
71	21	"	"	*	2B	1CD[b]	2B	2B				2B			
72	"	"	"	*		1BCD									
73	"	"	"	*		1BCD									
		12513	Yellow Dog River (No Data Found)												

[a] Taken directly from OWDC Catalog of Information on Water Data, 1974.

[b] D represents Oct. 1 through Nov. 7 only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1250901	2A	2A	2A						2A		2A		2A		
"	2D	2D	2D						2D		2D		2D		
1250902	9		9	9											
1251001	2D	2D	2D						2D		2D		2D		
1251101	2C	2C							2C		2C		2C		
"	2A	2A	2A						2A		2A		2A		
1251201	2C	2C							2C		2C		2C		
"	2A	2A	2A						2A		2A		2A		
"	2B		2B						2B						
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12514	Big Garlic River												
62	20	1251401	At County Road 550 Bridge					2C				2C	2C		
63	"	"	"	*		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D		
64	"	"	"	*		5AD 8B 2C		5AD 8B 2C				5AD 8B 2C	5AD 8B 2C		
65	"	"	"	*		5		5				5	5		
66	"	"	"	*		2A		2A				2A	2A		
67-74[a]	"	"	"	*		9		5							
		12515	Little Garlic River												
63	20	1251501	County Road 550 Bridge	*		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D		
64	"	"	"	*		5AD 8B 2C		5AD 8B 2C				5AD 8B 2C	5AD 8B 2C		
65	"	"	"	*		5		5				5	5		
66	"	"	"	*		2A		2A				2A	2A		
67-74[a]	"	"	"	*		9		5							
		12516	Harlow Creek												
64	70	1251601	County Road 550 Bridge			2A		2A				2A	2A		
65	"	"	"			2C		2C				2C	2C		
		12517	Dead River												
71	38	1251701	Broken Dam Rapids T48N, R25W, Sec. 10			2B								2B	

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1251401	2C	2C	2C								2C				
"	8A-C 5D	8A-C 5D	8A-C 5D						5BD 8C		8A-C 5D		5AD 8BC		
"	5AD 8B 2C	5AD 8B 2C	5AD 8B 2C						5AD 8B 2C		5AD 8B 2C		5A 8B		
"	5	5	5						5		5		5CD 2B		
"	2A	2A	2A						2A		2A		2A		
"	5		5	5					5						
1251501	8A-C 5D	8A-C 5D	8A-C 5D						5BD 8C		8A-C 5D		8A-C 5D		
"	5AD 8B 2C	5AD 8B 2C	5AD 8B 2C						5AD 8B 2C		5AD 8B 2C		5A 8B		
"	5	5	5						5		5		2B 5CD		
"	2A	2A	2A						2A		2A		2A		
"	5		5	5					5						
1251601	2A	2A	2A						2A		2A		2A		
"	2C	2C	2C						2C		2C		2C		
1251701	2B		2B				2B		2B	2B			2B		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
63	20	1251702	County Road 550 Bridge			2A		2A				2A	2A		
64	"	"	"			2A		2A				2A	2A		
73	06	"	"			5CD	5C 2D	5CD	5CD	5CD		5CD	5CD	5CD	5C 2D
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2AC 8B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	06	1251703	"		2D	2D		2D	2D	2D		2D	2D	2D	2D
		12518	Carp River												
61-74	21	1251801	Near Negaunee 46-31-29 X 87-34-25	*	1										
61	"	"	"	*	1		5C	5C		2C		5C		5C	
62	"	"	"	*	1		2BD	2BD		2BD		2BD		2BD	
63	"	"	"	*	1		2B	2B		2B		2B			
66	"	"	"	*	1	2A		2A				2A			
67	"	"	"	*	1	6		6				6			
71	"	"	"	*	1	2AD									
72	"	"	"	*	1	2AB 5CD									
73	"	"	"	•	1	5BC 2A									
74	"	"	"	*	1	2AC 5B									
63	20	1251802	Near M-28 Bridge			2AC		2AC				2AC	2AC		
64	"	"	"			2A		2A				2A	2A		
67	06	1251803	Near M-41 Bridge in Marquette					2D	2D	2D		2D	2D	2D	2D
68	"	"	"			5C		5C	5C	5C		5C	5C	5C	5C
71	"	"	"		2AD 5BC	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2B-D	2B-D	2A 5B-D	2A 5B-D
72	"	"	"			5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"		5CD	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1251702	2A	2A	2A								2A		2A		
"	2A	2A	2A						2A		2A		2A		
"	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5C 2D	5CD	2C	2C	2C	
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5A 2C 8B	5AB 2C	5AB 2C	5A 2C 8B		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1251703		2D	2D	2D		2D	2D		2D		2D		2D		
1251801															
"	5C	5C	5C						5C	5C	5C				
"	2BD	2BD	2BD						2BD	2BD	2BD				
"	2B	2B	2B						2B	2B	2B				
"	2A		2A						2A						
"	6		6						6						
"												2BC	2BC		
"															
"															
"															
1251802	2AC	2AC	2A						2AC		2AC		2AC		
"	2A	2A	2A						2A		2A		2A		
1251803	2D		2D	2D			2D		2D	2D	2D		2D		
"	5C		5C	5C		5C	5C		5C		5C				
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	5B 2CD	2A 5B-D	2A 5B-D		2A 5B-D	2C	2C	2A-C	2C		
"	5AC 2D	5AC 2DB	5AC 2DB	5AC 2DB	5AC 2DB	5AC 2DB	5AC 2DB		5AC 2BD		2C	2C	2C		
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	5CD	5CD	2C	2C	2C	2C

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	06	1251803	(Continued)		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2AB	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
			HYDROLOGIC AREA 1.2.6 Grand Marais Complex												
		12601	Chocolay River												
73	06	1260101	At County Road Bridge T47N, R24W, Sec. 5			5CD	5C 2D	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2AC 8B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
		12602	Sand River												
63	20	1260201	County Road 480 Bridge T47N, R23W, Sec. 14			2B		2B				2B	2B		
64	"	"	"			2A		2AC				2AC	2AC		
		12603	Laughing Whitefish River												
63	20	1260301	County Road Bridge T47N, R22W, Sec. 3			2B		2B				2B	2B		
64	"	"	"			2A		2A				2A	2A		
		12604	Rock River												

STATION NUMBER	TYPE OF DATA														
												HEAVY METALS			
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	TOTAL	DIS-SOLVED	PESTICIDES	REFRACTORY ORGANICS
1251803	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1260101	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	2C	2C	2C	
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1260201	2B	2B	2B								2B		2B		
"	2AC	2AC	2AC						2AC		2AC		2A		
1260301	2B	2B	2B								2B		2B		
"	2A	2A	2A						2A		2A		2A		

RIVER BASIN GROUP 1.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
55-70	20	1260401[a]	M-28 Bridge 46-27-45 X 86-55-00			9		9				2A[b]	2A[b]		
		12605	Au Train River												
63	20	1260501	County Road Bridge T46N, R20W, Sec. 5			5AB		5AB				5AB	5AB		
64	"	"	"			2A		2A				2A	2A		
		12606	Furnace Creek												
53-70[a]	20	1260601	M-28 Bridge 46-26-30 X 86-42-25			9		9							
64	"	"	"			2A		2AB				2AB	2AB		
65	"	"	"			2D		2D				2D	2D		
		12607	Miners River												
53-70	20	1260701[a]	County Road Bridge T47N, R18W, Sec. 10			9		9				2D[c]	2D[c]		
		12608	Mosquito River												
63	20	1260801	County Road Bridge T48N, R47W, Sec. 31			2D		2D				2D	2D		
		12609	Seven Mile Creek (No Data Found)												

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

[b]1964 only.

[c]1963 only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1260401	9	2A[b]	9	9					2A[b]		2A[b]		2A[b]		
1260501	5AB	5AB	5AB						5AB		5AB		2A 5B		
"	2A	2A	2A						2A		2A		2A		
1260601	9		9	9											
"	2AB	2AB	2AB						2AB		2AB		2AB		
"	2D	2D	2D						2D		2D		2D		
1260701	9	2D[c]	9	9					2D[c]		2D[c]		2D[c]		
1260801	2D	2D	2D						2D		2D		2D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12610	Hurricane River												
63	20	1261001	Near Mouth			2D		2D				2D	2D		
		12611	Sucker River												
63	20	1261101	T49N, R13W, Sec. 2			5D		5D				5D	5D		
65	"	"	"			2C		2C				2C	2C		
53-74	20	1261102[a]	46-40-00 X 85-54-45	*		9									
		12612	Blind Sucker River												
63	20	1261201	T49N, R12W, Sec. 1			2D		5D				5D	5D		
		12613	Two Hearted River flow: 8.5 m^3/s (300 cfs)												
73	06	1261301	At End of County Road 423, T50N, R9W, Sec. 33			5CD	2CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"		5ACD 8B	5ACD 8B	2A	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		8B 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
53-70[a]	20	1261302	At Weir 46-42-00 X 85-25-30			9		9							
63	"	"	"			2D		2D				2D	2D		
65	"	"	"			2C		2C				2C	2C		

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
1261001	2D	2D	2D						2D		2D		2D		
1261101	5D	5D	2D						5D		5D		5D		
"	2C	2C	2C						2C		2C		2C		
1261102															
1261201	5D	5D	2D						5D		5D		5D		
1261301	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	2C	2C	2C	
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1261302	9		9	9											
"	2D	2D	2D						2D		2D				
"	2C	2C	2C						2C		2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12614	Little Two Hearted River												
63	20	1261401	T49N, R9W, Sec. 12			2D		2D				2D	2D		
65	"	"	"			2C		2C				2C	2C		
		12615	Betsy River												
64	20	1261501	Wire Road Bridge T49N, R6W, Sec. 3			2A		2A				2A	2A		
65	"	"	"			2C		2C				2C	2C		
67	06	"	"		2D	2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"		2D	2D	2D	2D	2D	2D		2D	2D	2D	
73	"	"	"			2C 5D	2CD	2C 5D	2C 5D	2C 5D		2C 5D	2C 5D	2C 5D	2C 5D
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
			HYDROLOGIC AREA 1.2.7 Tahquamenon												
		12701	Tahquamenon River flow: 26.2 m^3/s (925 cfs)												
53-74	21	1270101	0.7 Miles up from Big Falls 46-34-30X85-16-10		1										
67	06	"	"		2C	2C		2C				2C			
64	20	1270102	M-123 Bridge at the Mouth			2AC		2AC				2AC	2AC		
67	06	"	"		2D			2D	2D	2D		2D	2D	2D	2D
68	"	"	"		5C	5C		5C	5C	5C		5C	5C	5C	5C
69	"	"	"		5	2A 5B-D	5ACD	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1261401	2D	2D	2D						2D		2D		2D		
"	2C	2C	2C						2C		2C		2C		
1261501	2A	2A	2A						2A		2A		2A		
"	2C	2C	2C						2C		2C		2C		
"	2D		2D	2D			2D		2D		2D				
"	2D		2D	2D			2D		2D		2D				
"	2C 5D	2C 5D	2C 5D	2C 5D	2C 5D	2C 5D	2C 5D		2C 5D	2C 5D	2C 5D		2C	2C	
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1270101															
"	2C														
1270102	2AC	2AC	2A						2AC		2AC				
"	2D		2D	2D		2D	2D		2D		2D				
"	5C		5C	5C		5C	5C		5C		5C				
"	5		5	5	5ABD	5	5		5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	06	1270102	(Continued)		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5A-C 2D	5	5	5	5	5		6	6	5	5
72	"	"	"			2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
73	"	"	"		5CD	2A 5B-D	2AD 5BC	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
			HYDROLOGIC AREA 1.2.8 Sault Complex												
		12801	Roxbury Creek												
64	20	1280101	T47N, R6W, Sec. 14			2A		2A				2A	2A		
		12802	Ankodosh Creek												
63	20	1280201	Lake Shore Drive T47N, R6W, Sec. 14			2C		2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		
		12803	Naomikong Creek												
63	20	1280301	At Lake Shore Drive T47N, R5W, Sec. 19			2C		2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1270102	5	5CD	5	5	5AB	5	5		5						
"	5	5	5	5	2ACD 5B	5	5		5	2C	2C	2BC	2AC	2B	2B
"	2AC 5D	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C		2C		2C		
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	5CD	5CD			2D	2D
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1280101	2A	2A	2A						2A		2A		2A		
1280201	2C	2C							2C		2C		2C		
"	2A	2A	2A						2A		2A		2A		
1280301	2C	2C							2C		2C		2C		
"	2A	2A	2A						2A		2A		2A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		12804	Pendills Creek												
70-74	20	1280401[a]	Near Mouth 46-26-25 X 84-49-20			3	9	5		9		9		9	9
63	20	1280402	Lake Shore Drive T47N, R4W, Sec. 28			2C		2C				2C	2C		
64	"	"	"			2A		2A				2A	2A		
		12805	Waiska River												
64	20	1280501	M-28 Bridge			2A		2A				2A	2A		
74	06	1280502	Orrs Road Bridge 46-23-50 X 84-31-58		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2AC 8B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
74	06	1280503	Forest Road Bridge 46-24-22 X 84-29-57		5ACD 8B	5ACD 8B	2B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2AC 8B	5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
63	06	1280504	At Waiska Bay Rd. Bridge		5C 2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		5C 2D	5C 2D	5C 2D	5C 2D

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
1280401	9		9	9		9	9								
1280402	2C	2C							2C		2C		2C		
"	2A	2A	2A						2A		2A		2A		
1280501	2A	2A	2A						2A		2A		2A		
1280502	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B		2A-C	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C			5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1280503	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B			5ACD 8B	5ACD 8B	5ACD 8B		2A-A	2A-C	2A-C
"	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C			5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB
1280504	5C 2D	5C	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		5C 2D	5C 2D	5C 2D		2C	2C	2C

Evaluation and Summary of Data for River Basin Group 1.2

This river basin group includes eight hydrologic areas in two states, 19,850 km^2 (7,635 mi^2) in Michigan and only 240 km^2 (92 mi^2) in Wisconsin. Of the 88 tributaries included on the DAM for this river basin group, 27 had sufficient data to consider annual loading calculations. All major streams in this river basin group have been monitored, although in some cases continuous flow data are not available. Nineteen tributaries have at least monthly data available for one or more years, and many have been monitored at increased frequency during the spring period. However, only six of the tributaries have gauging stations near their mouths. Deficiencies in the data for loading calculation purposes include a lack of continuous flow data on many of the tributaries and a lack of detailed sampling for water quality and flow over runoff events. Most tributary loading data covered only a short term period. Exceptions to this are the Tahquamenon, Big Garlic and Little Garlic Rivers. Only five tributaries have long term flow records. Few loading data were found for Hydrologic Areas 1.2.3, 1.2.5, and 1.2.7, although only one stream from each of these three hydrologic areas was considered to be a major tributary (table 4) to Lake Superior. Nonetheless, a considerable portion of these hydrologic areas is currently unmonitored.

Hydrologic Area 1.2.1 - Porcupine Mountains Complex. Of the 18 tributaries identified on the DAM, 14 minor streams had little or no data available for estimating loadings. The Black River has been gauged continuously since 1954 at station 121020<u>1</u>, located approximately 24 km (15 miles) from the mouth. Very few useful chemical data are available before 1973, although there were a number of monthly measurements made during the summer in the 1960's. Most of the useful data on the Black were collected at station 121020<u>3</u> which was sampled monthly in 1973 through 1975 in support of the ULRG Study. During the spring of 1974 and 1975, samples were collected on an approximately biweekly basis. Instantaneous flow measurements were taken at this station at the time of sample collection. Because there are no major tributaries which join the Black River below the continuous gauging station, its record plus the instantaneous measurements probably provide acceptable discharge data.

The Presque Isle River data consists mostly of data collected in support of the ULRG study. Frequency of measruement was similar to that of the Black River, except that biweekly measurements were made only in the spring of 1974. While there have been a number of samples taken for heavy metals analysis, no data were found for either pesticides or refractory organics.

Scattered data are available for the Little Carp River, the Carp River, the Union River, and the Little Iron River, but they are probably not sufficient for making loading calculations.

There are considerable amounts of data available for the Iron River, although few data sets cover an annual cycle. Station 112100<u>5</u> was monitored in support of the ULRG study on a monthly monitoring basis during 1974 and 1975, with extra samples taken in the spring of those years. Unfortunately, there is no gauging station on the Iron to provide sufficient flow data for loading estimation.

The Mineral River has been sampled since 1971 at a near-mouth station, with

regular sampling beginning in 1973 in support of the ULRG study. No continuous flow gauge exists near the mouth, although instantaneous measurements were made at the time of sampling during 1974 and 1975. Some data are available on heavy metals, pesticides, and refractory organics although sampling was relatively infrequent.

No other significant loading data are available for the other tributaries in this complex. Nevertheless, the streams in this hydrologic area drain mostly forested lands, so they would not be expected to contribute large non-point source loadings.

Hydrologic Area 1.2.2 - Ontonagon River. The Ontonagon River is the largest tributary in River Basin Group 1.2 in terms of discharge rate and has had a continuous flow gauge in service at station 1220101 since 1942. Unfortunately, this station is located approximately 34 river kilometers (21 miles) upstream from the mouth and above the confluence of several tributaries.

There are a number of stations near the mouth of the Ontonagon used for physico-chemical sampling. Monthly analyses were made in support of ULRG at station 1220103 for suspended solids, silica, nitrate, ammonia, total kjeldahl nitrogen, total phosphorus, and dissolved reactive phosphorus for most of 1974 and early 1975, with key loading parameters monitored on a biweekly basis during the spring period. Station 1220104 has been monitored on a generally monthly basis for a number of years.

In summary, there is a generally good record of monthly measurements on the Ontonagon River, although there have been no attempts at monitoring runoff events for this major tributary.

Hydrologic Area 1.2.3 - Keweenaw Peninsula Complex. Of the 29 tributaries identified for inclusion on the DAM, 26 were found to have either no data available or data insufficient for loading calculations. The drainage area in this complex, which is lacking any major tributaries, is second in size only to one other river in this river basin group (the Ontonagon).

For the purposes of this report, Portage Lake, which connects with Lake Superior by cutting across the Keweenaw Peninsula, was considered to be part of Lake Superior. Thus, tributaries draining into Portage Lake were considered for inclusion on the DAM. The Pilgrim River, tributary to Portage Lake, contains some potentially useful data. It was sampled approximately on a monthly basis in 1972 and 1973, with biweekly measurements made in the spring of 1973.

The Trap Rock River is the largest tributary in the area. Station 1231702, only a few kilometers above the mouth, has been gauged on a continuous basis since 1966. Physico-chemical data are rather sparse except at station 1231704 during 1972 and 1973, which represents approximately a year's worth of nutrient data. The Sampling frequency was monthly except during the spring of 1973 when biweekly monitoring was conducted.

Washington Creek, located on Isle Royal offshore of the Michigan coastline also has had some data collected near the mouth. Since 1966, there have been some scattered analyses of a number of parameters including suspended solids

and some nutrient species. For a number of years, measurements were made on a quarterly basis. There have also been a number of measurements of heavy metals, pesticides, and refractory organics, most of which have been made on a one-time basis during the fall. Instantaneous flow measurements have been made at this station at varying frequencies, but there is no continuous flow record available.

In summary, although Hydrologic Area 1.2.3 is relatively large, there are not large amounts of loading data available. Nevertheless, the streams drain relatively remote and undeveloped land except for the Houghton-Hancock area.

Hydrologic Area 1.2.4 - Sturgeon River. A continuous flow gauging station is located at station 124010<u>1</u> on the Sturgeon River and has been operating since 1974. Unfortunately, the station location is above the confluence of the major tributary of the Sturgeon. Most chemical data available for the river mouth area of the Sturgeon was collected at station 124010<u>2</u>, with approximately monthly nutrient analyses available between 1969 and 1971. Some heavy metals, pesticides, and refractory organics data are also available during this period. This station was also used as an ULRG station with nutrient and other data collected during 1974 and 1975. There were also a number of limited measurements of dissolved heavy metals, pesticides, and refractory organics. Some data useful for loading purposes were collected over similar periods during 1973 by two different agencies. Thus, there may be some opportunity for comparing independent data from the same station. The Sturgeon River drains a relatively undeveloped area and would be expected to be of high water quality. This stream does discharge into the Keweenaw Bay, a factor which may result in some localized effects due to the restrictions in circulation posed by the embayment.

Hydrologic Area 1.2.5 - Huron Mountains Complex. Of the 18 tributaries in this complex, 12 were found to have either no data or data that were judged insufficient for calculating loadings. Most of the unmonitored tributaries are relatively minor and probably contribute little loading to the lakes.

Although there are some scattered data available for the Falls River from the 1960's, the most useful data for loading estimation purposes were collected in support of the ULRG study. Station 125050<u>2</u> was originally sampled as part of the ULRG study until the fall of 1974. However, it was found that an industrial discharge interfered with this station so the sampling location was changed to station 125050<u>1</u>. During 1974 at station 125050<u>2</u> approximately monthly (biweekly in spring) measurements of key parameters were taken including nutrients and suspended solids. During 1975, at station 125050<u>1</u>, only dissolved reactive phosphorus was measured on a biweekly basis during the spring period. There are some limited heavy metal, pesticide, and refractory organic data available for both years, they are probably not sufficient for use in loading calculations. There is no continuous flow station in the vicinity of the river mouth. However, some instantaneous flow measurements have been made.

The Silver River was also sampled as part of the ULRG study during 1974 and 1975. Other historical data do exist but are not sufficient for loading calculation purposes. No flow data other than the instantaneous flow measurements taken during the ULRG study are available.

Data on the Big Garlic River are available dating from 1962. During some years monthly analysis of some parameters useful for loading purposes, such as silica, nitrate, and ammonia, were obtained. No phosphorus data are available, however. Biweekly measurements of silica and nitrate were made during the winter through summer period of 1963 and druing the spring of 1964. There are also some heavy metal data for this tributary, some of which were obtained on a biweekly basis. Similar data were found to exist for the Little Garlic River.

The most useful data for the Dead River were obtained as part of the ULRG study. Flow data are limited to instantaneous measurements taken at the time of sampling during 1974 and 1975. The Dead River drains several major impoundments located close to the river mouth. The gauging station on the Carp River, operational since 1961, is located approximately 15 river kilometers (9 miles) upstream from the mouth. Although this is not a particularly large distance, it is actually near the headwaters. Since 1971, there is a considerable amount of physical and chemical data available for the river mouth area of this tributary. Monthly to biweekly (during the spring) measurements of most of the key loading parameters were collected between 1973 and 1975. Instantaneous flow measurements were also made, generally at the same frequency at which the sampling was conducted.

Hydrologic Area 1.2.6 - Grand Marais Complex. Of the 15 tributaries identified for inclusion on the DAM in this complex, only 3 (the Chocolay, the Two-Hearted and the Betsy) were found to have sufficient data for loading calculations. Essentially, all of these data were collected in support of the ULRG study. No flow data are available for the mouth areas of these streams except for instantaneous measurements made at the time of sampling. Generally, these tributaries were sampled on a monthly basis except for biweekly measurements during the spring of 1974. A number of grab samples were taken for analysis of metals for a number of the streams in the complex. Pesticides and refractory organics were also analyzed from the grab samples taken during the ULRG study effort.

Hydrologic Area 1.2.7 - Tahquamenon. The Tahquamenon River has been gauged continuously since 1953 at station 1270101 located approximately 30 river kilometers (19 miles) upstream from the mouth. Nevertheless, the station is below the confluence of the major tributaries to the Tahquamenon River. A significant amount of data useful for loading purposes has been collected on this tributary since about 1969, generally, on a monthly basis. Station 1270102, located near the river mouth, was used to collect data in support of the ULRG study. In addition to the regular monthly and biweekly samples for nutrients and solids, some samples were analyzed for dissolved heavy metals, pesticides, and refractory organics. Thus, this station has a long period of record in which both water quality and flow data have been collected on a regular basis. Even though the flow gauge is located somewhat upstream from the river mouth, it should be possible to get a historical perspective on loadings from this river. The lack of measurements during storm events would limit the usefulness of estimations for some parameters, although this problem exists for most streams in the Great Lakes Basin.

Hydrologic Area 1.2.8 - Sault Complex. The Sault Complex has the smallest drainage area in River Basin Group 1.2. Of the five tributaries in this complex only the Waiska River has data that could possibly be useful for loading calculations. These data were obtained as part of the ULRG study, mostly during 1974 and 1975. Two stations on the Waiska, one on the west branch, were sampled during ULRG. The contributions from these two branches which converge just above the mouth, represent a reasonable approximation of total loadings. The parameters measured and the frequency of sampling were the same as the other ULRG stations studied in the Upper Peninsula of Michigan. No river flow data, other than some instantaneous measurements, are available.

IDENTIFICATION AND EVALUATION OF LAKE MICHIGAN DATA

BASIN DESCRIPTION

The Lake Michigan hydrologic boundaries encompass an area of 117,327 km^2 (45,300 mi^2). The State of Michigan contains 62.6 percent of the area, Wisconsin 32.1 percent, Indiana 5.2 percent and Illinois 0.1 percent. The Lake Michigan Basin is divided into four river basin groups, shown in Figure 10. River Basin Groups 2.1, 2.2, 2.3, and 2.4 drain areas of 43,670 km^2 (16,861 mi^2), 5,633 km^2 (2,175 mi^2), 33,556 km^2 (12,956 mi^2), and 34,545 km^2 (13,338 mi^2) respectively.

Soils of the Lake Michigan Basin vary from the sandy and gravelly soils of northern Michigan and Wisconsin to lightly colored loams and clay loams in eastern Wisconsin, to variable sands and clay soils in Michigan, Indiana and Illinois. Most of the soils are quite acid and low in organic matter. Poor drainage is a problem in central Wisconsin as well as northern Indiana, eastern Illinois, and southern Michigan.

From the north moving south, the extent of land in forests decreases. Most of the northern one-third is forested. The upper Peninsula of Michigan and the northeastern section of Wisconsin are both covered extensively by northern hardwoods and conifers with aspen stands appearing in great numbers. Bogs are also numerous. The northern lower penninsula of Michigan is also heavily forested. Approximately 70 percent of the area is covered with coniferous species and aspen. The southern sectors of the basin are primarily agricultural with only 10 to 20 percent left in forestland.

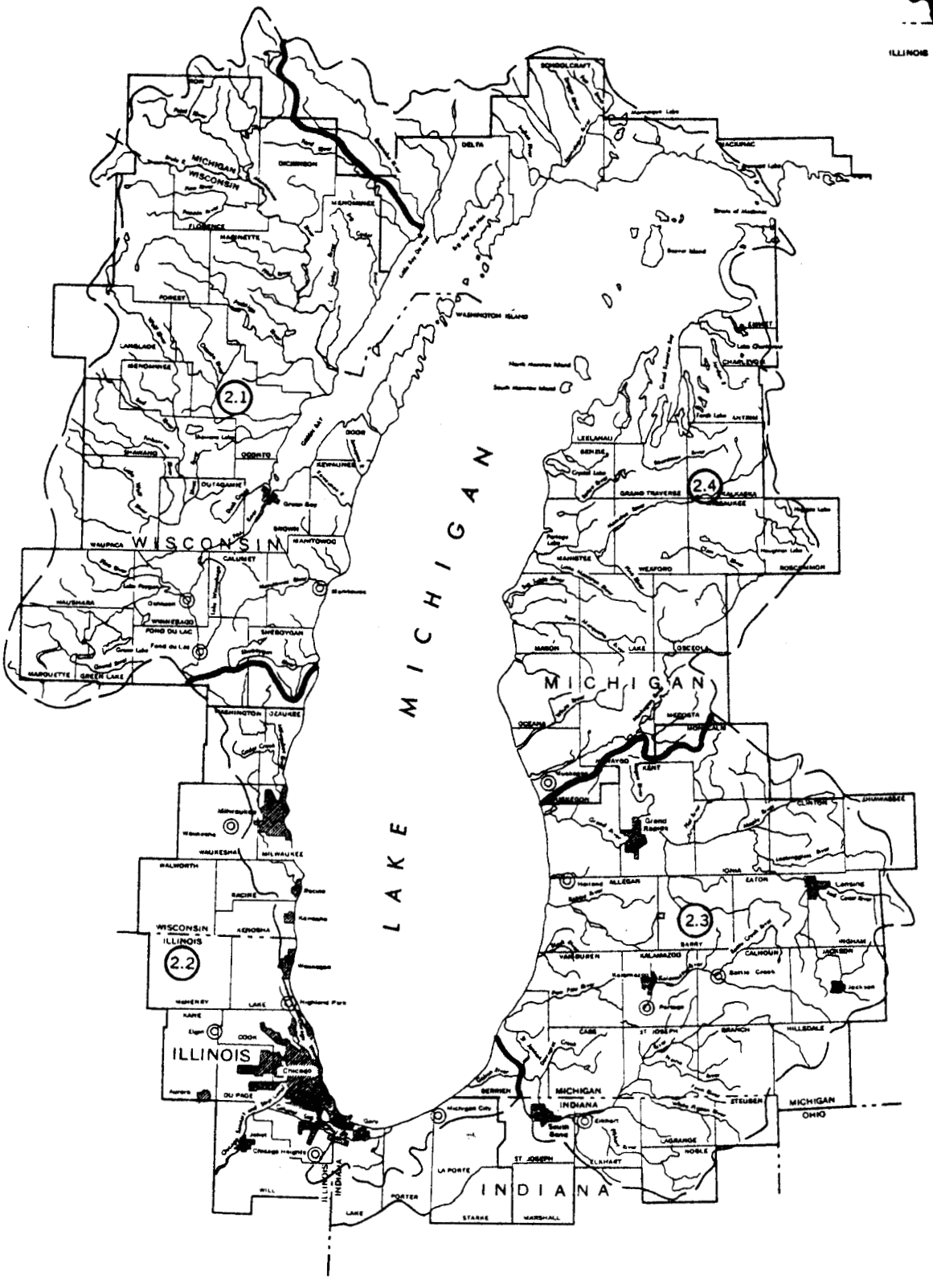
The basin has a distinct contrast in population distribution. The southern half is highly urbanized and also highly diversified in agricultural activities. The northern half is more devoted to the development and utilization of recreational resources. The Lake Michigan basin had the largest population of the five Great Lakes Basins in 1970, with a population density of about 114 people per square kilometer (296 per square mile). The 1970 population census showed 11,187,000 people, or 83 percent of the area's total population, living in urban areas.

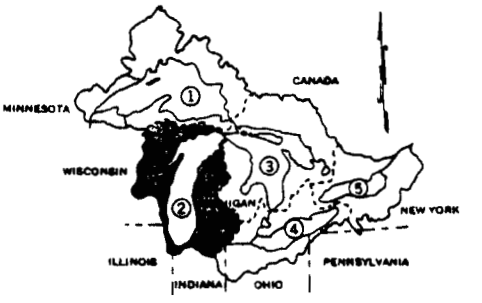
Mineral deposits found in the basin are reflections of its sedimentary origin and subsequent glaciation. Iron is found principally in the western Michigan section of the Basin while stone and sand and gravel are principal minerals in most of the basin. Oil, gas, salt, and gypsum deposits occur primarily in Michigan. Marl is also found in southern Michigan and northern Indiana. Northern Illinois produces peat in significant quantities.

Major sources of pollution in the basin include the wastewater effluents of forest product industries in the northern portion of the basin, the lack of tertiary,

Figure 10

LAKE MICHIGAN BASIN, 2
River Basin Groups 2.1 through 2.4





VICINITY MAP

SCALE IN MILES
0 10 20 30 40 50

and in many cases, secondary treatment in the public and private wastewater disposal systems, and the drainage from agricultural, urbanized, and natural lands. The City of Chicago in the State of Illinois diverts the natural drainage from about 810 square miles of the Lake Michigan Basin into the Illinois River. Except during extreme flood conditions this process has been successful in protecting Lake Michigan's waters. Wastewater from the City of Hammond, Indiana, and the area it serves also is normally diverted from the Lake Michigan drainage area to the Upper Mississippi River Basin. Occasionally the Grand Calumet River reverses and flows into Lake Michigan.

Intense soil erosion conditions occur in the southern portion of River Basin Group 2.1 due to intensified agriculture practices and relatively heavy rainfall. River Basin Group 2.3 suffers from significant amounts of erosion and sedimentation due to the presense of highly erodable soils, relief characteristics, relatively intense rainfall, and extensive cultivation of crop land. In River Basin Group 2.4 erosion and sedimentation rates are the highest in the western areas due primarily to the high concentration of fruit farming along the western shore.

Approximately 931,000 hectares (2.3 million acres) of agricultural land in the Lake Michigan basin have a drainage problem. About 60 percent of that land has some drainage improvements installed.

EVALUATION AND SUMMARY OF LAKE MICHIGAN DATA

The U.S. Lake Michigan drainage basin has been divided into 20 hydrologic areas and four river basin groups covering 117,780 km^2 (45,300 mi^2) in Michigan, Illinois, Indiana, and Wisconsin. About half of the 118 tributaries included on the DAM for this basin had water quality data sufficient for annual loading estimates. However, of the 38 major tributaries (as identified in Table 4) in the basin, about 70 percent have been monitored for water quality at least monthly for one or more years. Out of all the tributaries in the basin about 30 percent of the tributaries have long-term water quality records available on them.

Data collection programs on Lake Michigan tributaries have generally operated on a monthly or in some cases a grab sample basis. Detailed runoff event monitoring was found only on current studies being conducted on the Menomonee River. In addition, current studies are being conducted on the Grand River utilizing daily sampling which should give insight to runoff events. Most nutrient, suspended solids and chloride data for Lake Michigan have come from monthly sampling programs. Few dissolved reactive phosphorus data were found in River Basin Group 2.2. The Milwaukee River, one of the largest rivers in this river basin group, has inadequate data for a number of parameters. Heavy metal, pesticide, and refractory organics data are very limited. A number of tributaries in the industrialized Chicago area have relatively detailed data available on heavy metals, although in many cases accompanying flow data are lacking. Some detailed heavy metal data are also being collected from the Menominee River as part of the Task C Pilot Watershed Study.

Along the eastern shore of Lake Michigan the existence of drowned river valleys or small lakes near the river mouth will complicate loading estimates. In some areas gauging stations are located long distances upstream from the mouth.

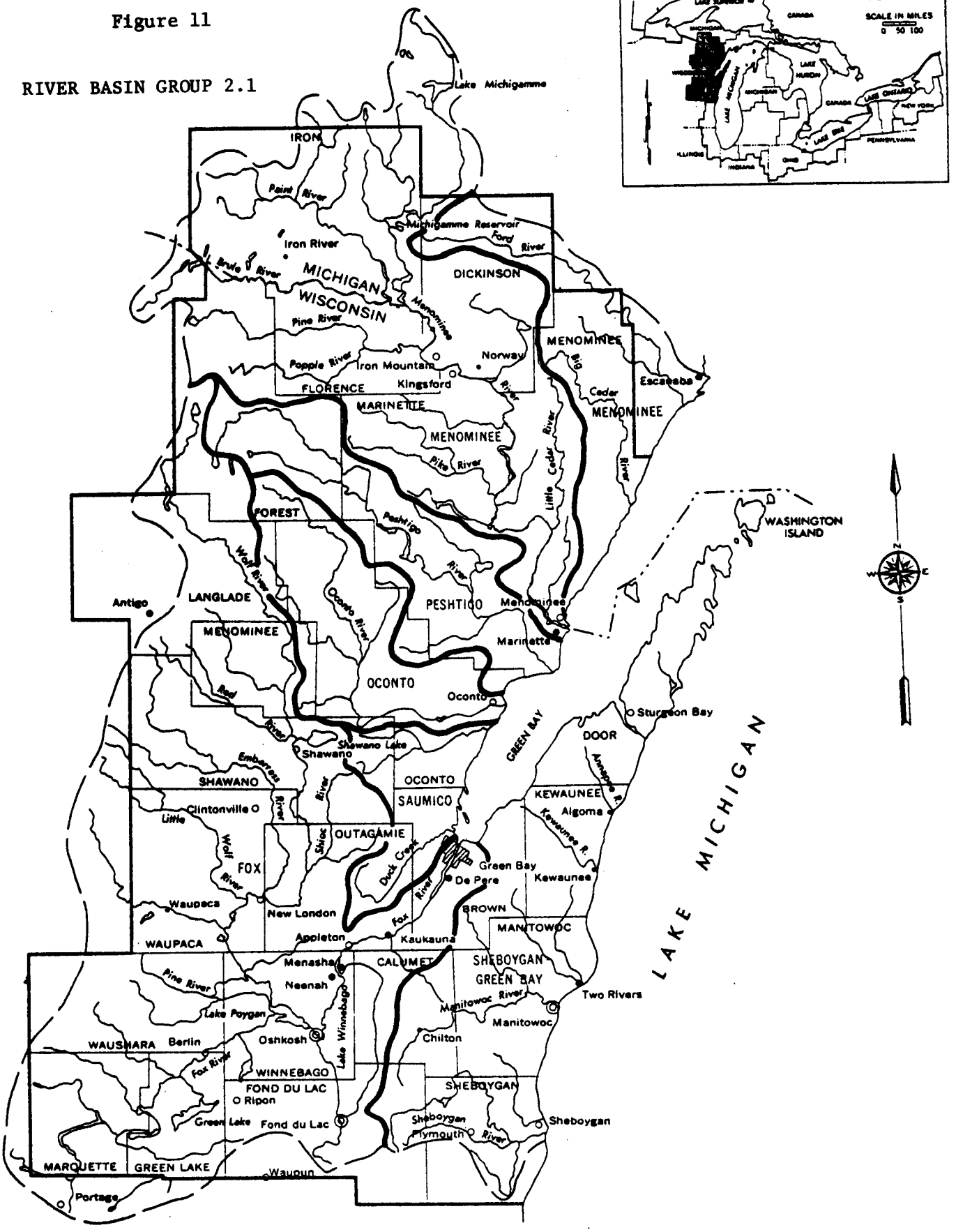
There is a large number of minor tributaries which drain into northern Lake Michigan which are both unmonitored and ungauged. One tributary which does have a good long-term data base for both water quality and discharge is the Escanaba River.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 2.1

River Basin Group 2.1 encompasses an area of 43,670 km^2 (16,861 mi^2). This river basin group contains seven hydrologic areas, and is shown in Figure 11. Maps and descriptions of these seven hydrologic areas follow.

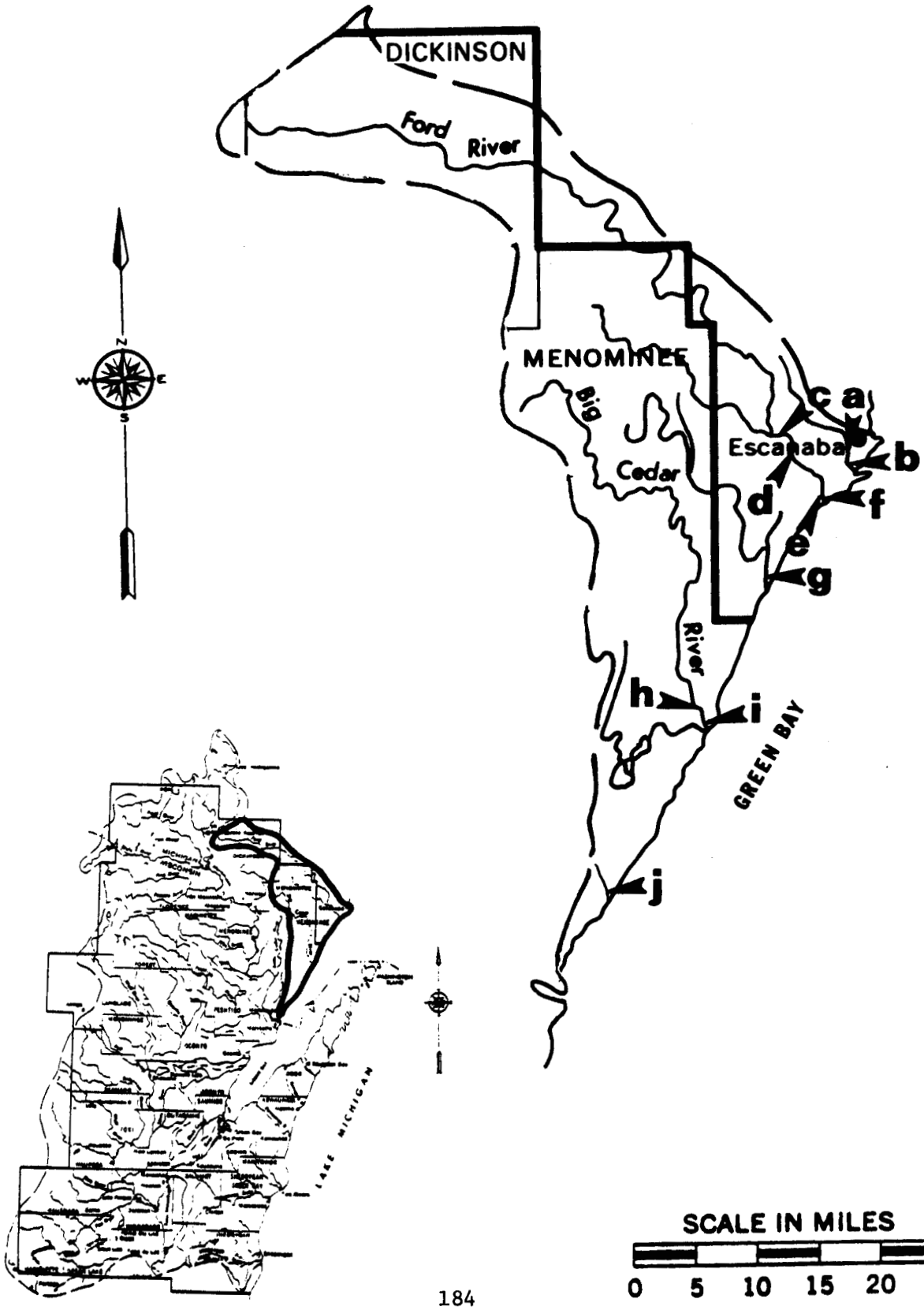
Figure 11

RIVER BASIN GROUP 2.1



Hydrologic Area 2.1.1

Menominee Complex



Vicinity Map-RBG 2.1

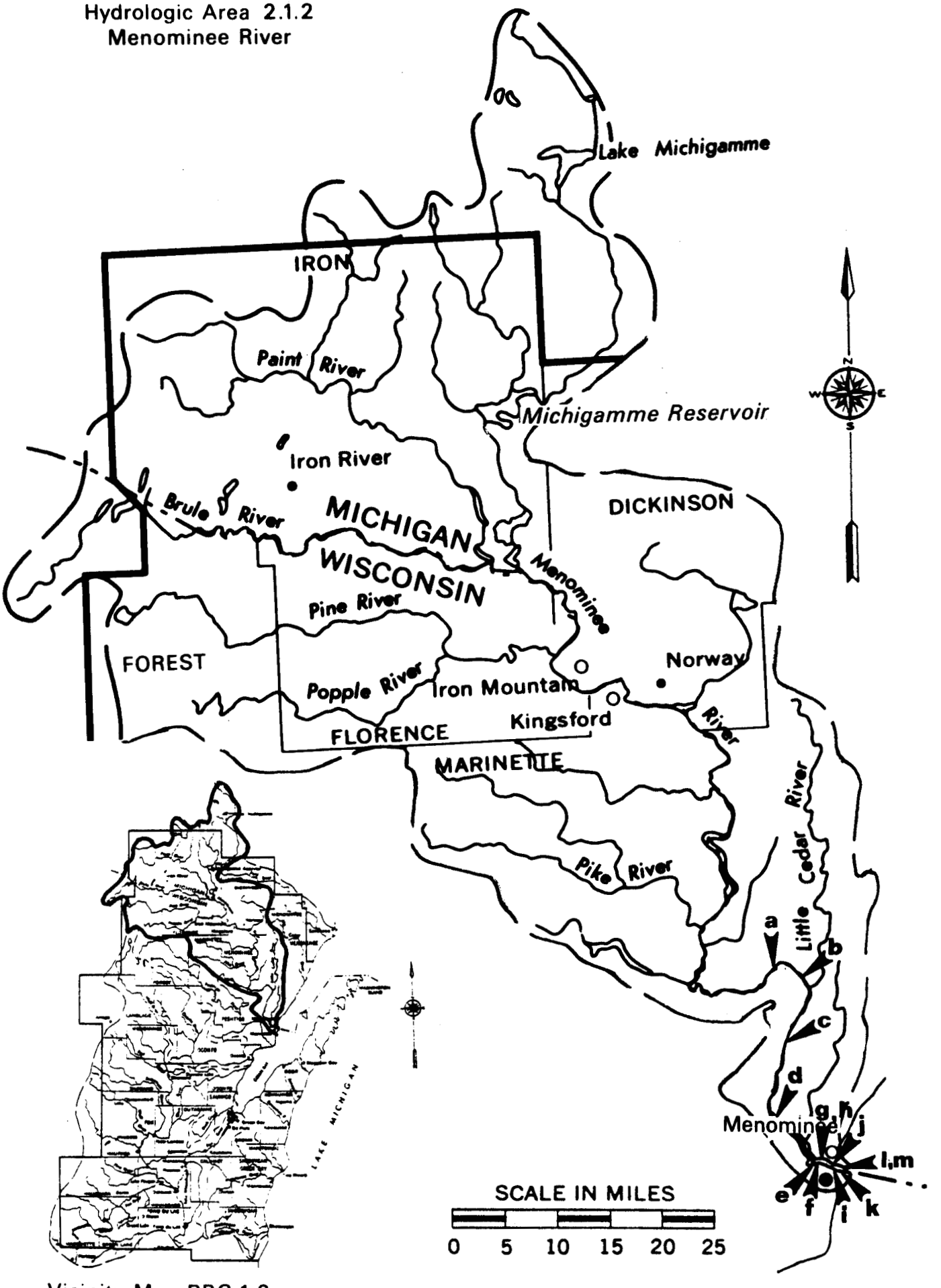
Hydrologic Area 2.1.1
Menominee Complex

The Menominee Complex encompasses 273,000 hectares (674,000 acres) and drains into the Green Bay area of Lake Michigan. The area is located entirely in Michigan in the southwest corner of the upper peninsula. The major rivers in the area are the Ford River, with mean annual discharge of 10.6 m^3/s (374 cfs), and the Cedar River (ungaged). Several minor streams also drain this hydrologic area. The topography varies from flat in the East to steep and rough in the West. Wetland areas are significant in the eastern portion. Approximately 70 to 80 percent of the area is forested (including some portions of the Menominee State Forest), 10 percent devoted to agriculture and 2 percent found in sparsely settled urban areas. The bedrock is composed mostly of igneous and metramorphic rock with some areas of shale. The overlying material is composed of silt and clay near the shoreline followed by glacial till to the northwest with scattered areas of sand and gravel. The water quality of the tributaries is generally good. The only major urban center in the area is the city of Escanaba (Pop.: 15,368).

Station Key

Station Location	DAM River and Station Numbers
Portage Creek	21101
a	2110101
b	2110102
Ford River	21102
c	2110201
d	2110202
e	2110203
f	2110204
Bark River	21103
g	2110301
Cedar River	21105
h	2110501
i	2110502
Beattie Creek	21107
j	2110701

Hydrologic Area 2.1.2
Menominee River



Vicinity Map-RBG 1.2

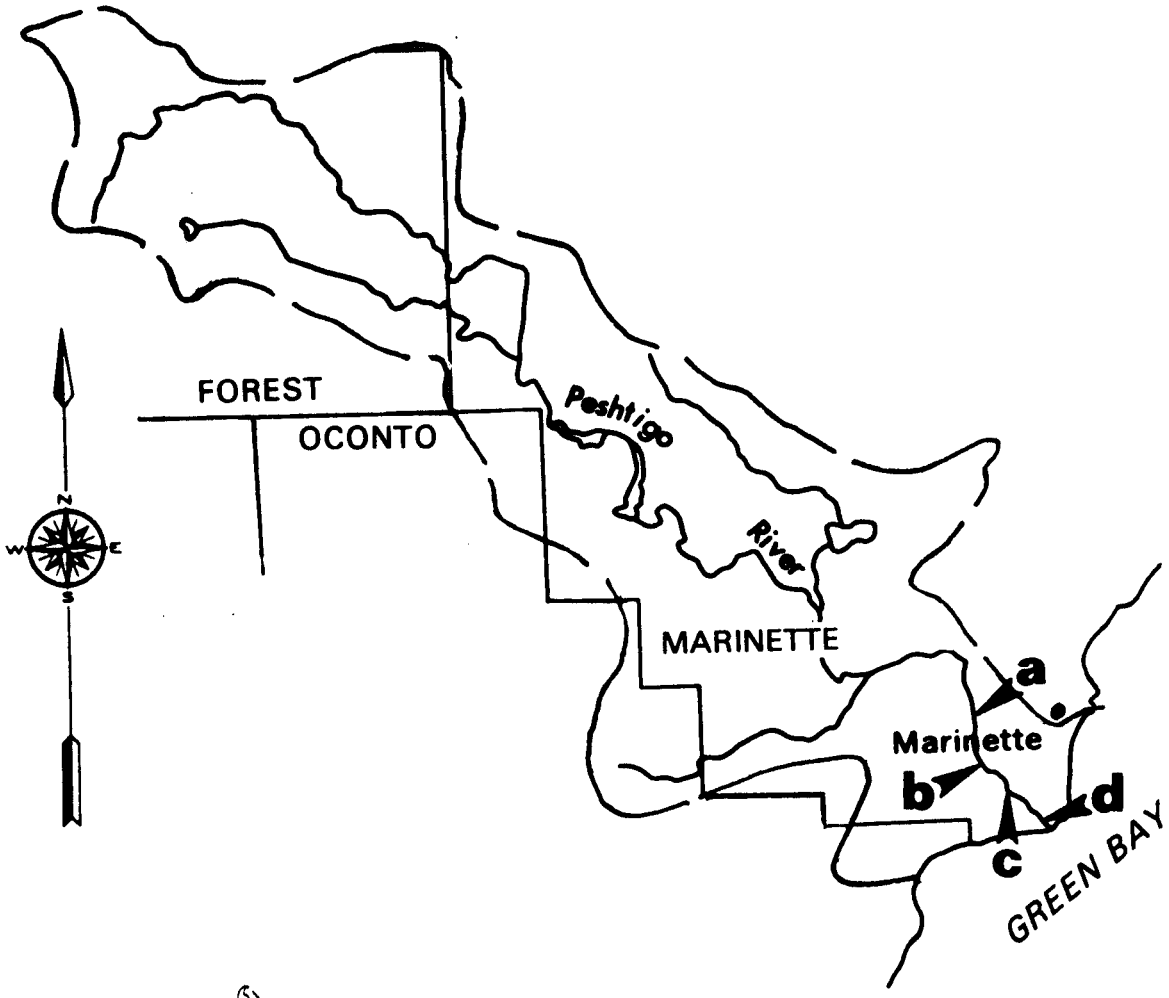
Hydrologic Area 2.1.2
Menominee River

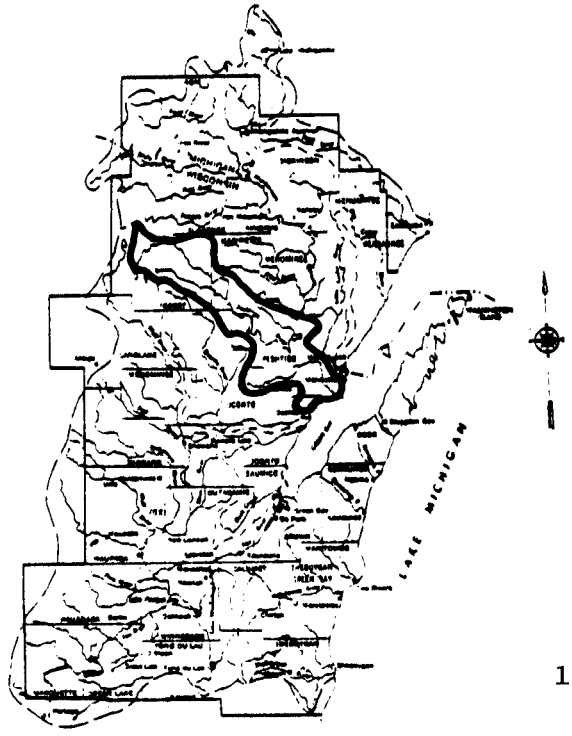
The Menominee River drains an area of 1,061,000 hectares (2,621,000 acres) and serves as a major input to Green Bay. Portions of the Menominee River mark the dividing line between the states of Michigan and Wisconsin. 62 percent of the area is located in Michigan and the remaining 38 percent is in Wisconsin. The Menominee River has a mean annual discharge of 89.2 m^3/s (3,150 cfs). Major tributaries to the Menominee River are the Brule, Paint, Pine, and Pike Rivers. The area is generally flat with rolling slopes to the northwest. Wetland areas are significant. Roughly 80 percent of the area is forested, 10 percent of the area is devoted to agriculture and 3 percent found in urban areas. The bedrock is composed mostly of igneous and metamorphic rock with some areas of shale. The overlying material is composed of silt and clay in the southeast with glacial till towards the center and sand and gravel in the northwest. There is considerable extraction of materials such as; sand and gravel, iron, and stone in the area. Acidic mine drainage is a problem in some areas. The major population centers in the area are Marinette, Wisconsin (Pop.: 12,696), Menominee, Michigan (Pop.: 10,748), Iron Mountain, Michigan (Pop.: 8,702), and Kingford, Michigan (Pop.: 5,276).

Station Key

Station Location	DAM River and Station Numbers
Menominee River	21201
a	2120101
b	2120102
c	2120103
d	2120104
e	2120105
f	2120106
g	2120107
h	2120108
i	2120109
j	2120110
k	2120111
l	2120112
m	2120113

Hydrologic Area 2.1.3
Peshtigo River





SCALE IN MILES
0 5 10 15 20 25

Vicinity Map-RBG 1.2

Hycrologic Area 2.1.3
Peshtigo River

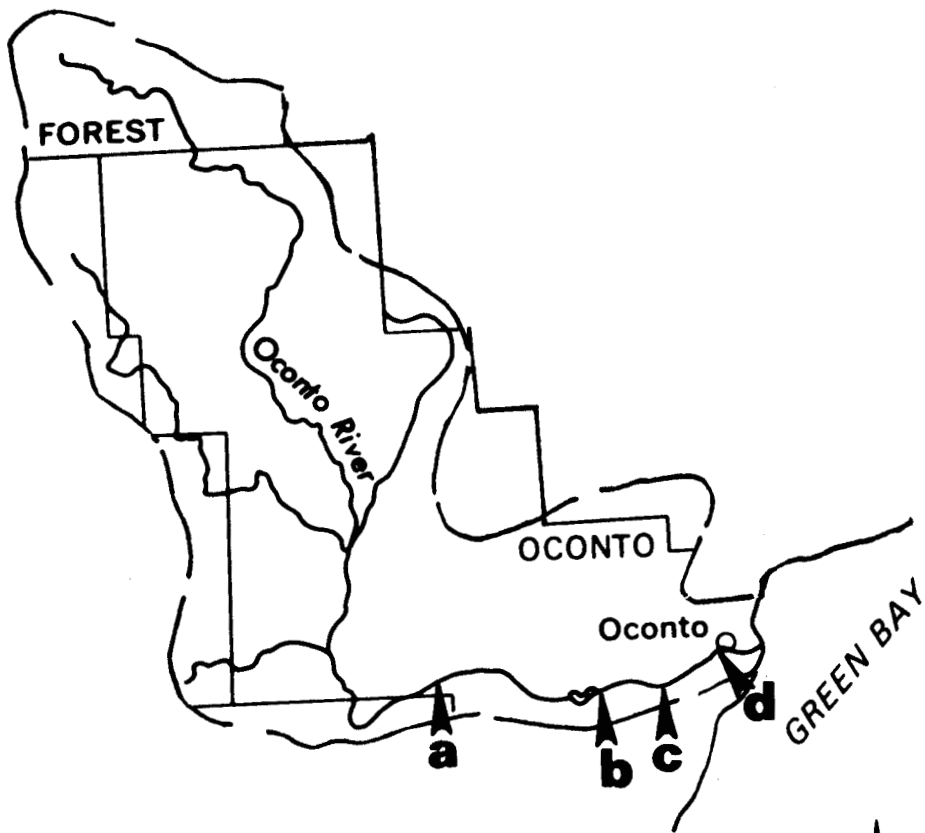
The Peshtigo River Basin covers 298,000 hectares (737,000 acres) in the northeast section of Wisconsin. The Peshtigo River, which drains into Green Bay, has a mean annual discharge of 26.2 m^3/s (925 cfs). The topography is flat in the eastern portions, changing to morainic in the northwest. Wetland areas are significant in the eastern portions of this hydrologuc area. Roughly 70 percent of the area is forested, 20 percent devoted to agriculture and 2 percent located in urban areas. The bedrock is composed mostly of metamorphic and igneous rock with some shale in the central regions. The overlying material is composed of silt and clay in the south, sand and gravel in the north with glacial till spread throughout the center areas. There are no major untreated municipal wastewater point sources in this area. Paper and pulp mills may exert localized pressure on some areas. The City of Peshtigo (Pop.: 2,836) is the only major urban center in this area.

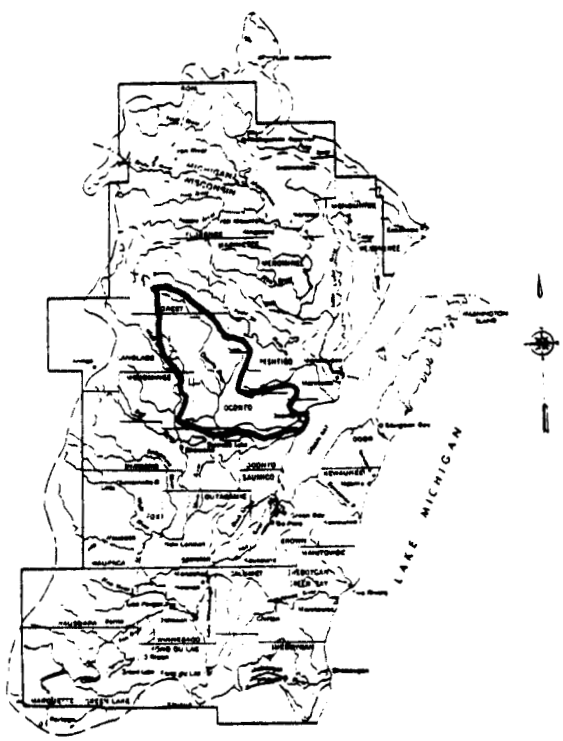
Station Key

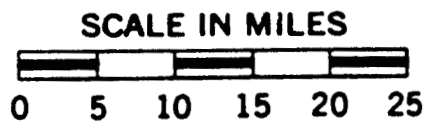
Station Location	DAM River and Station Numbers
Peshtigo River	21302
a	2130201
b	2130202
c	2130203
d	2130204

Hydrologic Area 2.1.4

Oconto River







Vicinity Map-RBG 2.1

Hydrologic Area 2.1.4
Oconto River

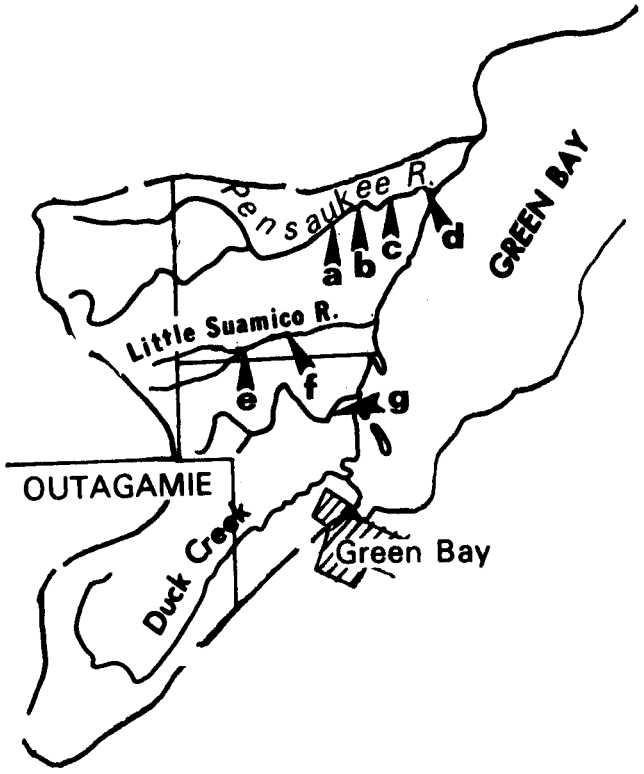
The Oconto River Basin encompasses an area of 275,000 hectares (680,000 acres). This Basin is located in the northeast section of the State of Wisconsin and drains into Green Bay. The major river in the area is the Oconto River, which has a mean annual discharge of 16.5 m^3/s (583 cfs). The area is generally flat near the Lake shore with a steep rolling relief in the western portions. Significant wetland areas are present in the east near Green Bay. Approximately 60 to 70 percent of the area is forested (including portions of the Nicolet National Forest), 20 percent utilized in agriculture and 2 percent found in urban areas. The bedrock is composed of shale in the southeast portions with metamorphic or igneous rock throughout the rest of the area. The overlying material is composed of silt and clay near the shoreline, glacial till in the central areas, and sand and gravel in the northwest portion. The only major population center in the area is the City of Oconto (pop.: 4,667) which has no untreated wastewater discharges.

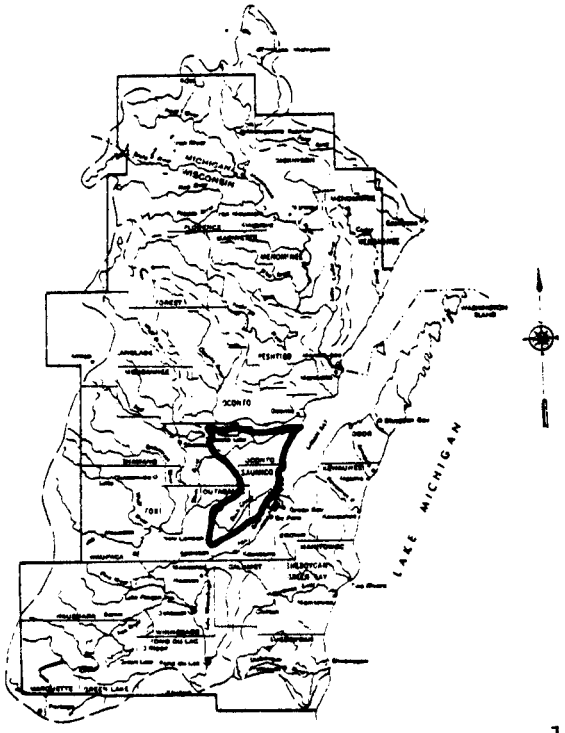
Station Key

Station Location	DAM River and Station Numbers
Oconto River	21401
a	2140101
b	2140102
c	2140103
d	2140104

Hydrologic Area **2.1.5**

Suamico Complex





SCALE IN MILES

0 5 10 15 20 25

Vicinity Map-RBG 2 . 1

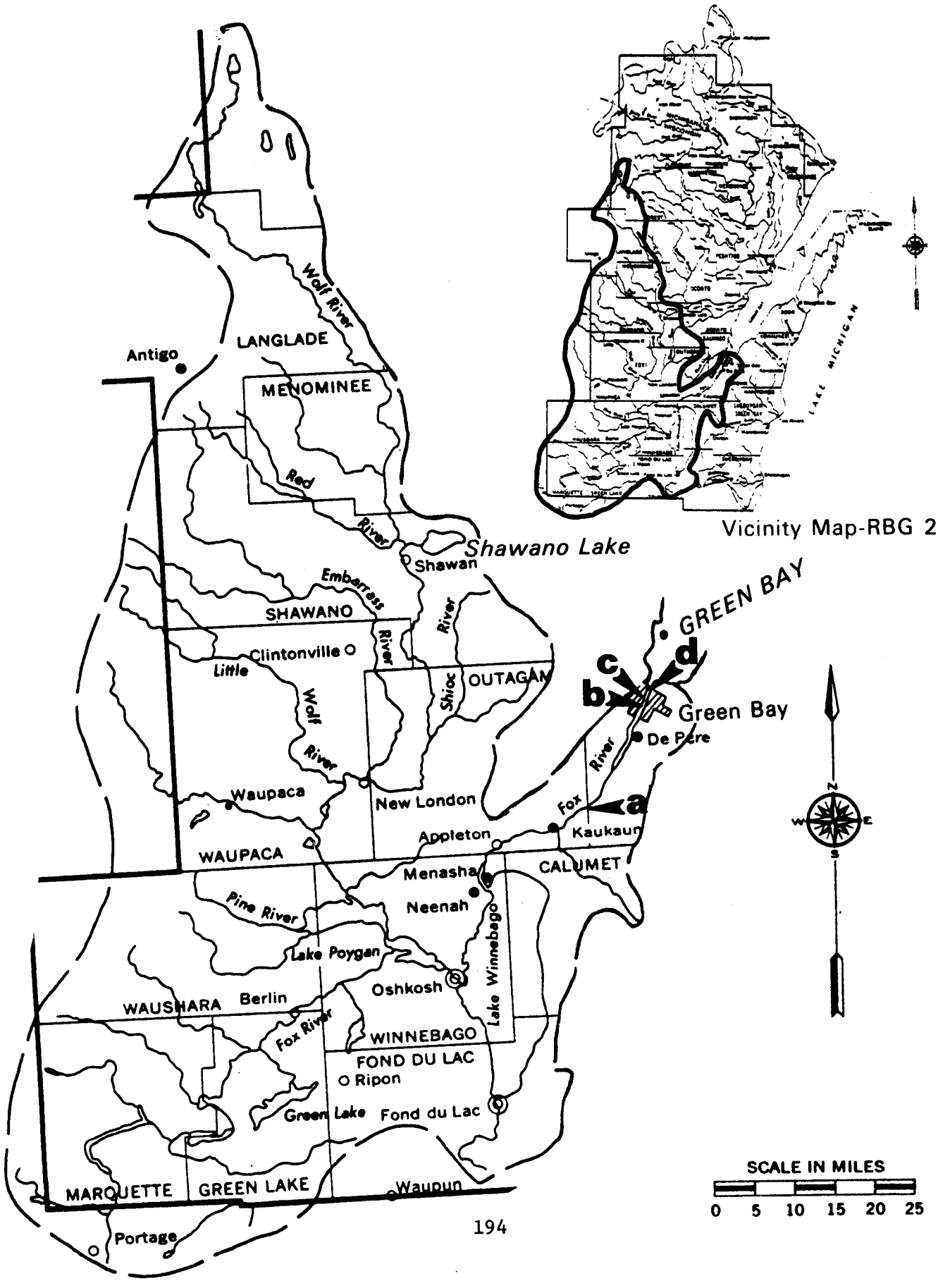
Hydrologic Area 2.1.5
Suamico Complex

The Suamico Complex covers 125,000 hectares (310,000 acres). The complex borders Green Bay in northeastern Wisconsin. The major rivers in the area are the Pensaukee River, the Little Suamico River, the Suamico River, and Duck Creek, none of which have mean flows available. The hydrologic area is flat and the drainage pattern is weakly defined. There are significant wetlands along the Green Bay shore. Approximately 30 to 40 percent of the area is forested and another 30 to 40 percent is devoted to agriculture. Roughly 8 percent of the area is urbanized. The bedrock is composed mostly of shale and dolomite. The overlying material is made up of silt and clay along the shore and glacial till throughout the rest of the area. Most of the area is sparsely settled. The Cities of Pensaukee (pop.: 863), Little Suamico (pop.: 1,138), and Suamico (pop.: 2,830) are the only major population centers found in the northern portion of the area. In the southern portion of the area, parts of the Cities of Howard (pop.: 4,911) and Green Bay (pop.: 87,809) drain into Duck Creek.

Station Key

Station Location	DAM River and Station Numbers
Pensaukee River	21501
a	2150101
b	2150102
c	2150103
d	2150104
Little Suamico River	21502
e	2150201
f	2150202
Suamico River	21503
g	2150301

Hydrologic Area 2.1.6
Fox River



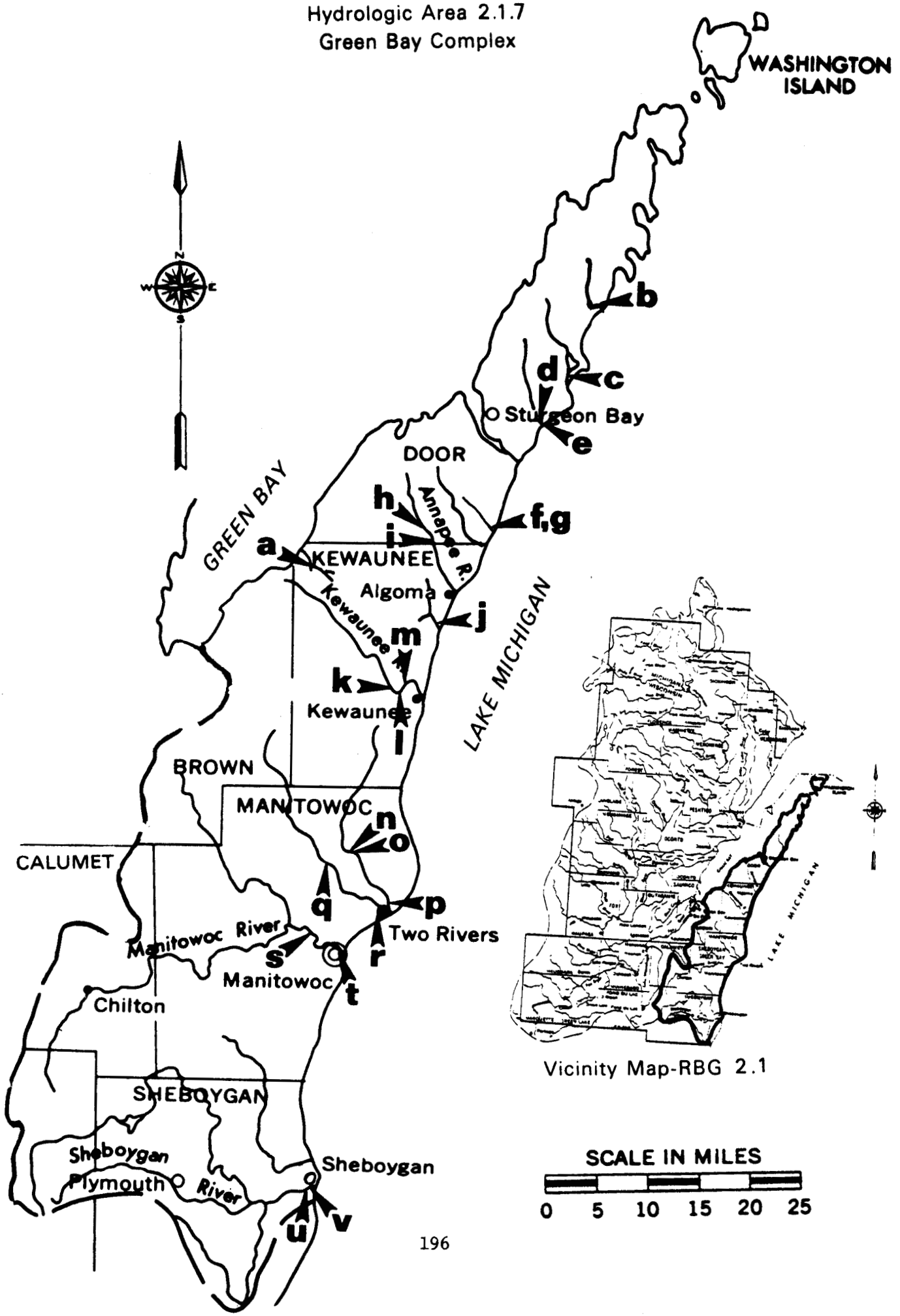
Vicinity Map-RBG 2.1

Hydrologic Area 2.1.6
Fox River

The Fox River Basin drains an area of 1,710,000 hectares (4,225,000 acres). This area is located in eastern Wisconsin. The major river in this area is the Fox River which has a mean annual discharge of 118.5 m^3/s (4,184 cfs). An important tributary to the Fox is the Wolf River. The eastern portion of this area is generally flat, the southwest rolling, and the northwest rough and hilly. The area is marked by many lakes including the largest Lake in Wisconsin, Lake Winnebago. Major wetland regions are located in the south central portion of the basin along the lower Wolf and upper Fox Rivers. Scattered wetlands are present in the north. The 39 mile (63 km) stretch of river between Lake Winnebago and Green Bay includes less than 7 percent of the total drainage basin. However, this is the area of the worst water quality. About 30 percent of the area is forested, 40 percent is utilized in agriculture and 5 percent is urbanized (including the Green Bay metropolitan area). The bedrock is composed of igneous and metamorphic rock with some areas of shale and dolomite. The overlying material is composed of silt and clay in the eastern portion, sand and gravel in the west, and glacial till scattered throughout the region. The City of Green Bay (Pop.: 87,809) is the major industrial center. The Cities of Appleton (Pop.: 57,143), Oshkosh (Pop.: 53,221), Fond Du Lac (Pop.: 35,515), Menasha (Pop.: 14,905), and DePere (Pop.: 13,309) also representing major areas of human pressure on the Fox River. Over 68 industries and 40 municipalities use the surface waters of the Fox River Basin for waste assimilation after treatment. Pulp and paper mills along with food processing plants dominate the industrial impact on water quality.

Station Key Station Location	DAM River and Station Numbers
Fox River	21601
a	2160101
b	2160102
c	2160103
d	2160104

Hydrologic Area 2.1.7
Green Bay Complex



Vicinity Map-RBG 2.1

SCALE IN MILES

0 5 10 15 20 25

Hydrologic Area 2.1.7
Green Bay Complex

The Green Bay complex encompasses an area of 625,000 hectares (1,544,000 acres) in the northeast section of Wisconsin. The major rivers in the area and their mean annual discharges are: the Kewaunee River (2.4 m^3/s; 85 cfs), the East Twin River (ungaged), the West Twin River (ungaged), the Manitowoc River (ungaged), and the Sheboygan River (6.6 m^3/s; 233 cfs). The remaining area is drained by many small streams. The topography of the area varies between cliffs and bluffs in Door County to a hilly relief over the remaining portions. Wetlands are significant in the northern areas and minor in the south. Only about 10 percent of the area is forested, roughly 30 percent is devoted to agriculture, and 5 percent urbanized. The bedrock is composed mostly of dolomite. The overlying material is mostly glacial till with some areas of silt and clay. The economy is based to a large extent upon manufacturing with the Manitowoc and Sheboygan Rivers supporting the largest industrial areas. Runoff, from fruit producing areas and related industries, taxes the area streams. Over 37 industries and 22 municipalities utilize the surface waters of this area. The major population centers include the Cities of Kewaunee (Pop.: 2,901), Two Rivers (Pop.: 13,553), Manitowoc (Pop.: 33,430), and Sheboygan (Pop.: 48,484).

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Red River	21701	Kewaunee River	21710
a	2170101	k	2171001
Hibbards Creek	21703	l	2171002
b	2170301	m	2171003
Whitefish Bay Creek	21704	East Twin River	21711
c	2170401	n	2171101
Lily Bay Creek	21705	o	2171102
d	2170501	p	1271103
e	2170502	West Twin River	21712
Bear Creek	21706	q	2171201
f	2170601	r	2171202
g	2170602	Manitowoc	21713
Annapee River	21708	s	2171301
h	2170801	t	2171302
i	2170802	Sheboygan River	21718
Three Mile Creek	21709	u	2171801
j	2170901	v	2171802

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 2.1.1 Menominee Complex												
		21101	Portage Creek												
68	06	2110101	South of Escanaba Airport 45-43-13 X 87-06-00			2D		2D	2D	2D		2D		2D	2D
63	20	2110102	At M-35 Bridge			2B		2B				2B	2B		
68	06	"	"			2D		2D		2D		2D		2D	2D
71	"	"	"			2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2B-D	2B-D	2A 5B-D	2A 5B-D
72	"	"	"			5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"		5D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
		21102	Ford River flow: 10.6 m^3/s (374 cfs)												
54-74	21	2110201	1 1/2 Mile Downstream from Tenmile Creek, Near Hyde	*	1	1									
62	"	"	"	*	1	1D									
63	"	"	"	*	1	1									
64	"	"	"	*	1	1A-C									
67	"	"	"	*	1	1D		2BC				2BC			
68	"	"	"	*	1	1A-C									
69	"	"	"	*	1	2AD 5BC		2AD 5BC							
70	"	"	"	*	1	5A 2BC		5A 2BC							
71	"	"	"	*	1	2AC 5BD	2B	2AC 5BD				2B			
72	"	"	"	*	1	5ABD		5ABD							
73	"	"	"	*	1	5A-C 2D		5A-C 2D							

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2110101	2D		2D	2D		2D	2D		2D						
2110102	2B	2B	2B						2B		2B		2B		
"	2D		2D	2D		2D	2D		2D						
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	5B 2CD	2A 5B-D	2A 5B-D		2A 5B-D	2C	2C		2C		
"	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		2AC 5BD		2C		2C		
"	2A 5BD	2A 5BC	2A 5BD	2A 5BD	2A 5BD	2A 5BD	2A 5BD		2A 5BD	2D	2D				
"	5		5	5	5	5	5		5		2C		2C		
"	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C						
2110201															
"															
"															
"															
"	2BC								2BC						
"															
"															
"															
"	2B		2B						2B						
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	2110202	US-2 Bridge			2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"			2D	2D	2D	2D	2D		2D	2D	2D	
63	20	2110203	River Mile 0.25			5A 2B		5A 2B				5A 2B	5A 2B		
64	"	"	"			2BC		2BC				2BC	2BC		
68	06	2110204	M-35 Bridge		5C	5C		5C	5C	5C		5C	5C	5C	5C
69	"	"	"		5	2A 5B-D	2AB 5CD	5	5	5		2A 5B-D	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5A-C 2D	5	5	5	5	5		6	6	5	5
72	"	"	"			2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
73	"	"	"		5D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
71	36	2110299	Near Mouth, Exact Location Unknown					2AC							
		21103	Bark River												
64	20	2110301	M-35 Bridge			2A		2A				2A	2A		
		21104	Deer Creek (No Data Found)												
		21105	Cedar River												
63	20	2110501	At Weir T35N, R25W, Sec. 11			5A 2B		5A 2B				5A 2B	5A 2B		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2110202	2D		2D	2D		2D	2D		2D		2D				
"	2D		2D	2D		2D	2D		2D		2D				
2110203	5A 2B	5A 2B	5A 2B						2B		5A 2B		5A 2B		
"	2BC	2BC	2B						2BC		2BC		2B		
2110204	5C		5C	5C		5C	5C		5C		5C				
"	5		5	5	2A 5BD	5	5		5	2A	2A				
"	5		5	5	5AB 2C	5	5	5CD	5						
"	5		5	5	2ACD 5B	5	5	5	5	2C	2C	2C	2C		
"	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C						
"	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D						
"	5		5	5	5	5	5	5B-D	5						
"	5A-C		5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C						
2110299														2AC	
2010301	2A	2A	2A						2A		2A		2A		
2110501	5A 2B	5A 2B	5A 2B						2B		5A 2B		5A 2B		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
64	20	2110501	(Continued)			2B		2B				2B	2B		
68	06	2110502	M-35 Bridge		5C	5C			5C	5C		5C	5C	5C	5C
69	"	"	"		5	2A 5B-D	5ACD 2B	5B-D	5	5		5	5	5	5
70	"	"	"		5		5	5	5	5		5	5	5	5
71	"	"	"		5	5	5A-C 2D	5	5	5		6	6	5	2A 5B-D
72	"	"	"		2B 5A			5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"		2D			2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"		5A 2BC				5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
		21106	Walton River (No Data Found)												
		21107	Beattie Creek												
63	20	2110701	M-35 Bridge			2B		2B				2B	2B		
64	"	"	"			2A		2A				2A	2A		
			HYDROLOGIC AREA 2.1.2 Menominee River												
		21201	Menominee River												
67	06	2120101	County Road Bridge Southeast of Koss		2C	2C		2C	2C	2C		2C	2C	2C	2C
69-70	"	"	"		2C	2C	2C	2C	2C	2C		2C	2C	2C	2C
71	"	"	"		2BC	2BC	2BC	2C	2BC	2BC		2BC	2BC	2BC	2BC

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2110501	2B	2B	2B						2B		2B		2B		
2110502	5C		5C	5C		5C	5C		5C		5C				
"	5		5	5	5ABD	5	5		5						
"	5		5	5	5AB 2C	5	5		5		2D		2D		
"	5		5	5	5B 2ACD	5	5		5	2C			2C		
"	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD		2C		2C		
"	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2D	2D				
"	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C						
2110701	2B	2B							2B		2B		2B		
"	2A	2A	2A						2A		2A		2A		
2120101	2C		2C			2C	2C		2C	2C	2C		2C		
"	2C		2C	2C		2C	2C		2C	2C	2C		2C		
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC		2C		2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
07-09	21	2120102	3.6 Miles Southeast of Koss, River Mile 24.7	*	1										
13-74	"	"	"	*	1										
67	06	2120103	At County Road 342 Bridge 45-19-16 X 87-39-40		2C	2C		2C	2C	2C		2C	2C	2C	2C
69-70	"	"	"		2C	2C	2C	2C	2C	2C		2C	2C	2C	2C
71	"	"	"		2BC	2BC	2BC	2BC	2BC	2BC		2BC	2BC	2BC	2BC
64	20	2120104	T32N, R28W, Sec. 14			2B		2B				2B	2B		
70	21	2120105	At Marinette 45-06 X 87-39		2D	2D		2D							
61	27	2120106	At Upper Dam in Marinette	*		5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69	"	"	"	*		5		5	5	5		5	5	5	5
70	"	"	"	*		2C 5AB		2C 5AB	2C 5AB	2C 5AB		2C 5AB	2C 5AB	2C 5AB	2C 5AB
71	"	"	"	*		5D 2BC		5D 2BC	5D 2BC	5D 2BC		5D 2BC	5D 2BC	5D 2BC	5D 2BC
72	"	"	"	*		5		5	5	5		5	5	5	5
73-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5	5	
67	06	2120107[a]	At Dam above 26th Street, Menominee		11C	11C		2C		2C		2C	2C	11C	2C
69	"	" [b]	"		2C	11C		2C	2C	2C		2C		11C	11C
70	"	"	"		2D	2D	2D	2D		2D		2D	2D	2D	2D
71	"	"	"		2BC	2BC	2BC	2BC	2BC	2BC		2BC	2BC	2BC	2BC
63	06	2120108	At US-41 Bridge		2B 5CD										
64	"	"	"		5AB 2C										
67	"	"	"		2CD[a]	2C[a]		2C		2C		2C	2C	2C[a]	2C
68	"	"	"		6										
69	"	"	"		2C	2C		2C	2C	2C		2C	2C	2C	2C
70	"	"	"		2D	2D	2D			2D		2D	2D	2D	2D
71	"	"	"		2BC	2BC	2BC		2BC	2BC		2BC	2BC	2BC	2BC
69	06	2120109[b]	ANSUL Company Pier 45-05-57 X 87-36-43			11C								11C	11C

[a](11C) Intensive sampling, July 24-25, 1967.

[b](11C) Intensive sampling, August 5-7, 1969.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2120102															
"															
2120103	2C		2C			2C	2C		2C	2C			2C		
"	2C		2C	2C		2C	2C		2C	2C	2C		2C		
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC		2C		2BC		
2120104	2B	2B	2B						2B		2B				
2120105										2D			2D		
2120106	5B-D 2A		2CD	2CD	2CD	2CD	2CD		5B-D 2A						
"	5		6	6	6	6	6		5						
"	5		5BD 2AC	5BD 2AC	5BD 2AC	5BD 2AC			5						
"	2C 5AB		5A 2BC	5A 2BC	5A 2BC	5A 2BC			2C 5AB						
"	5D 2BC		5D 2C	5D 2C	5D 2C	5D 2C			5D 2BC						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2120107	2C		2C	2C		2C	2C		2C	2C			2C		
"	2C		2C	2C		2C	2C		2C	2C	2C				
"	2D		2D	2D		2D	2D		2D				2D		
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC		2C	2C	2CB		
2120108															
"															
"	2C		2C	2C		2C	2C		2C	2C			2C		
"															
"	2C		2C	2C		2C	2C		2C	2C	2C		2C		
"	2D		2D	2D		2D	2D		2D				2D		
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC		2C	2C	2C		
2120109															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	06	2120110[a]	26th Street Bridge, Menominee			11C								11C	11C
73	"	"	"			2D	2D	2D	2D	2D		2D	2D	2D	2D
74	"	"	"		5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
75	"	"	"			2C		2C	2C	2C		2C	2C	2C	2C
69	06	2120111[a]	Marinette Municipal Water Line 45-05-48 X 87-36-01			11C								11C	11C
73	"	"	"									2B		2B	2B
66	06	2120112	End of M-173 at Mouth 45-05-45 X 87-35-26	•		2B	2B		2B	2B				2B	2B
67	"	"	"	*	2D	2D		2D	2D	2D		2D	2D	2D	2D
69	"	" [a]	"	*	5	5ABD 11C	5AD 2BC	5	5	5		5	5	5ABC 11C	5ABD 11C
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	•	5A-C 2D	5	5A-C 2D	5	5	5		2ABD 5C	5BC 2D	5	5
72	"	"	"	•		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD			5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"	•		2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC			2AD 5BC	2AD 5BC	2AD 5BC
67	06	2120113	1st Street Bridge			2C		2C	2C	2C		2C	2C	2C	2C
69	"	" [a]	"			11C								11C	11C
72	"	"	"									2B			
63	19	2120199	Exact Location Unknown, Near Mouth					4CD		4CD					
71	36	"	"					2AC							
			HYDROLOGIC AREA 2.1.3 Peshtigo River												
		21301	Little River (No Data Found)												
		21302	Peshtigo River flow: 26.2 m^3/s (925 cfs)												
61	27	2130201	US-41 Bridge, Peshtigo	*		5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A

[a](11C) Intensive sampling August 5-7, 1969.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2120110															
"	2D		2D	2D	2D	2D	2D		2D						
"	5AB 2C	5B 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	2A	2A				
"	2C	2C	2C	2C	2C	2C	2C		2C						
2120111															
"			2B	2B	2B	2B	2B								
2120112	2B		2B					2B	2B		2B		2B		
"	2D		2D	2D			2D		2D	2D	2D		2D		
"	5		5	5	5ABD	5	5		5	5AB 2C	5BD 2C		2C 5ABD		
"	5	5CD	5	5	5AB	5	5		5	2C	2AC 5B		2AD 5BC		
"	5	5	5	5	5BC 2D	5	5		5	2C	5C	2B 5C	5C	6	2B-D
"	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD		2C		2C	2B	2B
"	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC						
2120113	2C		2C	2C		2C	2C		2C	2C	2C		2C		
"															
"	2B		2B	2B	2B	2B									
2120199		4CD	4CD	4CD	4CD		4CD		4CD						
"													2AC		
2130201	5B-D 2A		2CD	2CD	2CD	2CD	2CD		5B-D 2A						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
62-68	27	2130201	(Continued)	*		5		5	5	5		5	5	5	5
69	"	"	"	*		5		5	5	5		5	5	5	5
70	"	"	"	*		2C 5AB		2C 5AB	2C 5AB	2C 5AB		2C 5AB	2C 5AB	2C 5AB	2C 5AB
71	"	"	"	*		5D 2BC		5D 2BC	5D 2BC	5D 2BC		5D 2BC	5D 2BC	5D 2BC	5D 2BC
72	"	"	"	*		5		5	5	5		5	5	5	5
73-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5A-C 2D	5	
53-74	21	2130202	At Peshtigo 45-02-50 X 87-44-40	*	1										
64	"	"	"	*	1					2B					
65	"	"	"	*	1					2B					
67	"	"	"	*	1	5D		5D							
68	"	"	"	*	1	5AB 2CD		5AB 2CD							
69	"	"	"	*	1	5A-C 2D		5A-C 2D							
70	"	"	"	*	1	5A-C 2D		5A-C 2D							
71	"	"	"	*	1	5		5							
72	"	"	"	*	1	5A-C 2D		5A-C 2D							
73	"	"	"	*	1	5A-C		5A-C							
70	21	2130203	Near Peshtigo 45-01-14 X 87-42-51		2D										
63	19	2130204[b]	At the Mouth					4CD		4CD					
64	"	" [b]	"					4AB		4AB					
71	36	2130299	Near Mouth, Exact Location Unknown					2AC							

HYDROLOGIC AREA 2.1.4 Oconto River

21401 Oconto River flow: 16.5 m^3/s (583 cfs)

[a] Only mercury.

[b] Samples collected weekly from June 12, 1963 to May 6, 1964.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2130201	5		6	6	6	6	6		5						
"	5		5BD 2AC	5BD 2AC	5BD 2AC	5BD 2AC			5						
"	2C 5AB		5A 2BC	5A 2BC	5A 2BC	5A 2BC			2A 5AB						
"	5D 2BC		5D 2C	5D 2C	5D 2C	5D 2C			5D 2BC						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2130202															
"															
"															
"															
"															
"															
"															
"															
"															
"															
2130203													2D[a]		
2130204		4CD	4CD	4CD	4CD			4CD	4CD				4CD		
"		4AB	4AB	4AB	4AB			4AB	4AB				4AB		
2130299													2AC		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
13-74	21	2140101	2 Miles South of Gillett 44-51-33 X 88-18-00	*	1										
64	20	2140102	US-141 Bridge T28N, R20E, Sec. 34			2A		2A				2A	2A		
60	21	2140103	Near Oconto 44-51-38 X 87-59-02		2C	2C		2C				2C	2C	2C	
61	27	2140104	US-41 Bridge at Oconto	*		5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69	"	"	"	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	"	"	"	*		5D 2BC		5D 2BC	5D 2BC	5D 2BC		5D 2BC	5D 2BC	5D 2BC	5D 2BC
72-74	"	"	"	●		5		5	5	5		5	5	5	5
75	"	"	"			5		5	5	5		5	5	5	5
71	36	2140199	Near Mouth, Exact Location Unknown					2AC							
			HYDROLOGIC AREA 2.1.5 Suamico Complex												
		21501	Pensaukee River												
64	20	2150101	US-141 Bridge	*		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D		
65-66	"	"	"	*		5		5				5	5		
67	"	"	"	*		2A		2A				2A	2A		
68-70[a]	"	"	"	*		5		5				5	5		
60	21	2150102	At Brookside		2C	2C		2C				2C	2C	2C	
72-74	21	2150103	Near Pensaukee, River Mile 3.5	*	1										
72	"	"	"	*	1	5D		5D		2C 4D[b]					
73	"	"	"	●	1	2D 5A-C		2D 5A-C		4D					
74	"	"	"	*	1					5A 4BC 9D					
69	27	2150104	At Pensaukee	*				5	5	5		5	5	5	5

[a] Taken directly from OWDC Catalog of Information on Water Data, 1974.

[b] September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2140101															
2140102	2A	2A							2A		2A				
2140103	2C	2C	2C						2C	2C	2C				
2140104	5B-D 2A		2CD	2CD	2CD	2CD	2CD		5B-D 2A						
"	5		6	6	6	6	6		5						
"	5		5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD			5						
"	5AB 2C		2BC 5A	2BC 5A	2BC 5A	2BC 5A			5AB 2C						
"	5D 2BC		2C 5D	2C 5D	2C 5D	2C 5D			5D 2BC						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2140199													2AC		
2150101	8A-C 5D	8AC 2B 5D	8A 2BD 5C								8A 2BC 5D				
"	5	5	5						5		5				
"	2A	2A	2A						2A		2A				
"	5	5	5						5		5				
2150102	2C		2C						2C	2C					
2150103															
"															
"															
"															
2150104	5		5BD 2AC	5BD 2AC	5BD 2AC	5BD 2AC			5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	27	2150104	(Continued)	*		2C 5AB		2C 5AB	2C 5AB	2C 5AB		2C 5AB	2C 5AB	2C 5AB	2C 5AB
71	"	"	"	*		2BC 5D		2BC 5D	2BC 5D	2BC 5D		2BC 5D	2BC 5D	2BC 5D	2BC 5D
72-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5	5	
		21502	Little Suamico River												
70	21	2150201	Near Suamico 44-42-41 X 88-03-00												
60	21	2150202	Sobieski Corners River Mile 10.0		2C	2C		2C				2C	2C		
		21503	Suamico River												
60	21	2150301	At Suamico			2C		2C				2C	2C		
70	"	"	"												
		21504	Duck Creek (No data found)												
			HYDROLOGIC AREA 2.1.6 Fox River												
		21601	Fox River flow: 118.5 m^3/s (4,184 cfs)												
17-74	21	2160101	Rapid Croche Dam River Mile 18.0		1										
61	27	2160102	US-54 Bridge at Green Bay	*		5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69	"	"	"	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2150104	2C 5AB		5C 2AB	5C 2AB	5C 2AB	5C 2AB			2C 5AB						
"	2BC 5D		2C 5D	2C 5D	2C 5D	2C 5D			2BC 5D						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2150201										2D					
2150202	2C		2C						2C	2C					
2150301	2C		2C						2C	2C					
"										2D					
2160101															
2160102	5B-D 2A		2CD	2CD	2CD	2CD	2CD		5B-D 2A						
"	5		6	6	6	6	6		5						
"	5		5BD 2AC	5BD 2AC	5BD 2AC	5BD 2AC			5						
"	5AB 2C		6	6	6	6			5AB 2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	27	2160102	(Continued)	*		2BC 5D		5D 2BC	5D 2BC	5D 2BC		5D 2BC	5D 2BC	5D 2BC	5D 2BC
72-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5	5	
70	21	2160103	At Green Bay		2D	2D		2D							
63	19	2160104	At the Mouth					4CD		4CD					
64	"	"	"					4AB		4AB					
70	26	"	"		4C 8D					4C 8D					4C 8D
71	"	"	"		8					8					8
72	"	"	"		5A-C 8D					5A-C 8D					5A-C 8D
73	"	"	"		8A-C					8A-C					8A-C
71	36	2160199	Near Mouth Exact Location Unknown					2AC							
73	26	"	"											10	
74	"	"	"											10A	
			HYDROLOGIC AREA 2.1.7 Green Bay Complex												
		21701	Red River												
60	21	2170101	Near Dykesville 44-39-00 X 87-44-36		2C	2C		2C				2C	2C		
		21702	Keyes Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2160102	5D 2BC		5D 2BC	5D 2BC	5D 2BC	5D 2BC			5D 2BC						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2160103										2D			2D		
2160104		4CD	4CD	4CD	4CD		4CD		4CD				4CD		
"		4AB	4AB	4AB	4AB		4AB		4AB						
"			4C 8D	4C 8D		4C 8D	4C 8D								
"			8	8		8	8								
"			5A-C 8D	5A-C 8D		5A-C 8D	5A-C 8D								
"			8A-C	8A-C		8A-C	8A-C								
2160199														2AC	
"						10	10								
"						10A	10A								
2170101	2C		2C						2C	2C					

YEAR (5)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		21703	Hibbards Creek												
63	20	2170301	At Mouth			2B		2B				2B	2B		
64	"	"	"			2A		2A				2A	2A		
		21704	Whitefish Bay Creek												
63	20	2170401	At Mouth			2B		2B				2B	2B		
64	"	"	"			2A		2A				2A	2A		
		21705	Lily Bay Creek												
63	20	2170501	County Road T · T27N, R27E, Sec. 6			2B		2B				2B	2B		
64	"	"	"			2A		2A				2A	2A		
72	21	2170502	Near Mouth 44-50-59 X 87-16-03		2C	2C		2C				2C	2C		
		21706	Bear Creek												
63	20	2170601	At Mouth			2B		2B				2B	2B		
64	"	"	"			2A		2A				2A	2A		
72	21	2170602	At Mouth 44-42-14 X 87-21-15		2C	2C		2C				2C	2C		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2170301	2B														
"	2A	2A	2A						2A		2A				
2170401	2B														
"	2A	2A	2A						2A		2A				
2170501	2B														
"	2A	2A	2A						2A		2A				
2170502	2C	2C	2C						2C	2C	2C				
2170601	2B														
"	2A	2A	2A						2A		2A				
2170602	2C	2C	2C						2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		21707	Silver Creek (No Data Found)												
		21708	Annapee River												
63	20	2170801	County Road J T26N, R25E, Sec. 29	*		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D		
64-65	"	"	"	*		5		5				5	5		
66	"	"	"	*		2A		2A				2A	2A		
67-70[a]	"	"	"	*		5		5				5	5		
60	21	2170802	At Forestville			2C		2C				2C	2C		
		21709	Three Mile Creek												
64	20	2170901	US-42 Bridge			2A 5B		2A 5B				2A 5B	2A 5B		
		21710	Kewaunee River flow: 2.4 m^3/s (85 cfs)												
64	20	2171001	County Road F T23N, R24E, Sec. 23			2A		2A				2A	2A		
64-74	21	"	"	*	1										
60	21	2171002	Near Kewaunee 44-27-30 X 87-33-23	*		2C		2C				2C	2C		
67	"	"	"	*	2AB 5CD	2AB 5CD		2AB 5CD							
68	"	"	"	*	5A-C 2D	5A-C 2D		5A-C 2D		5A-C 2D					
69	"	"	"	*	5A-C 2D	5A-C 2D		5A-C 2D							
70	"	"	"	*	5	5		5							

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2170801	8A-C 5D	8AC 2B 5D	8A 5C 2BD						5BD 8C		8A 2B 5CD				
"	5	5	5						5		5				
"	2A	2A	2A						2A		2A				
"	5	5	5						5		5				
2170802	2C		2C						2C	2C					
2170901	2A 5B	2A 5B	2A 5B						2A 5B		2A 5B				
2171001	2A	2A	2A						2A		2A				
"															
2171002	2C		2C						2C	2C					
"															
"															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	21	2171002	(Continued)	*	5	5		5		5BD					
72	"	"	"	*	5AD 4BC[a]	5		5		5AD 4BC[a]					
73	"	"	"	*	5A-C 4D	5A-C 2D		5A-C 2D		4D					
74	"	"	"	*	11BCD[b] 2A					11BCD[b] 2A					
69	27	2171003	Near Kewaunee 44-28-42 X 87-31-43	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	"	"	"	*		2A-C 5D		2A-C 5D	2A-C 5D	2A-C 5D		2A-C 5D	2A-C 5D	2A-C 5D	2A-C 5D
72	"	"	"	*		5		5	5	5		5	5	5	5
73-74	"	"	"	*		5		5	5	5		5		5	
75	"	"	"			5		5	5	5		5		5	
		21711	East Twin River												
64	20	2171101	Highway 147 Bridge T20N, R24E, Sec. 4			2A		2A				2A	2A		
60	21	2171102	At Mishicott			2C		2C				2C	2C		
72-74	"	"	"		1										
72	"	"	"	*	1					5C 2D					
73	"	"	"	*	1					5D					
74	"	"	"	*	1					2AD 5BC					
61	27	2171103	17th Street Bridge at Two Rivers			5B-D		5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
62-68	"	"	"			5		5	5	5		5	5	5	5
69	"	"	"			5		5	5	5		5	5	5	5
70	"	"	"			5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	"	"	"			5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C	5D 2A-C
72	"	"	"			5		5	5	5		5	5	5	5
73-74	"	"	"			5		5	5	5		5	5	5	

[a] Extra samples taken in April, 1972.

[b] Twice weekly sample taken March through June; weekly July through September, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2171002															
"															
"															
"															
2171003	5		5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD			5						
"	5AB 2C		2A-C	2A-C	2A-C	2A-C			5AB 2C						
"	2A-C 5D		2A-C 5D	2A-C 5D	2A-C 5D	2A-C 5D			2A-C 5D						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2171101	2A	2A	2A						2A		2A				
2171102	2C		2C						2C	2C					
"															
"															
"															
"															
2171103	5B-D		2CD	2CD	2CD	2CD	2CD		5B-D						
"	5		6	6	6	6	6		5						
"	5		5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD			5						
"	5AB 2C		6	6	6	6			5AB 2C						
"	5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C	5D 2A-C			5D 2A-C						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
75	27	2171103	(Continued)			5		5	5	5		5	5	5	
		21712	West Twin River												
60	21	2171201	Near Mishicott 44-12-54 X 87-40-50			2C		2C				2C	2C		
69	27	2171202	At Two Rivers	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	"	"	"	*		2A-C 5D		2A-C 5D	2A-C 5D	2A-C 5D		2A-C 5D	2A-C 5D	2A-C 5D	2A-C 5D
72	"	"	"	*		5		5	5	5		5	5	5	5
73-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5	5	
		21713	Manitowoc River												
72-74	21	2171301	At Manitowoc, River Mile 6.6	*	1										
73	"	"	"	*	1					5D					
74	"	"	"	*	1					2AB 5C					
61	27	2171302	10th Street Bridge in Manitowoc	*		5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69	"	"	"	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	"	"	"	*		5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C	5D 2A-C
72	"	"	"	*		5		5	5	5		5	5	5	5
73-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"	*		5		5	5	5		5	5	5	

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2171103	5			5	5	5			5						
2171201	2C		2C						2C	2C					
2171202	5		5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD			5						
"	5AB 2C		2A-C	2A-C	2A-C	2A-C			5AB 2C						
"	2A-C 5D		2A-C 5D	2A-C 5D	2A-C 5D	2A-C 5D			2A-C 5D						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2171301															
"															
"															
2171302	5B-D 2A		2CD	2CD	2CD	2CD	2CD		5B-D 2A						
"	5		6	6	6	6	6		5						
"	5		5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD			5						
"	5AB 2C		2A-C	2A-C	2A-C	2A-C			5AB 2C						
"	5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C	5D 2A-C			5D 2A-C						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						
"	5			5	5	5			5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	36	2171399	Unknown					2AC							
		21714	Silver Creek (No Data Found)												
		21715	Point Creek (No Data Found)												
		21716	Fischer Creek (No Data Found)												
		21717	Pigeon River (No Data Found)												
		21718	Sheboygan River flow: 6.6 m^3/s (233 cfs)												
50-74	21	2171801	At Sheboygan	*	1										
63	"	"	"	*	1					2C					
64	"	"	"	*	1					5B 2D					
65	"	"	"	*	1					9BD					
66	"	"	"	*	1					9B 2CD					
67	"	"	"	*	1	5ACD 11B[a]				5AD 9C 11B[a]					

[a] Sampled three times in March.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2171399													2AC		
2171801															
"															
"															
"															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
68	21	2171801	(Continued)	*	1	5A-C 2D		5A-C 2D		2B 5C					
69	"	"	"	*	1	5AC 2BD		5AC 2BD							
70	"	"	"	*	1	5D		5D							
71	"	"	"	*	1	5		5							
72	"	"	"	*	1	5		5							
73	"	"	"	*	1	5A-C		5A-C							
61	27	2171802	8th Street in Sheboygan	*		5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A		5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69	"	"	"	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5AB 2C		5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	"	"	"	*		5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C	5D 2A-C
72	"	"	"	*		5		5	5	5		5	5	5	5
73-74	"	"	"	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5	5	
71	36	2171899	Near Mouth Exact Location Unknown					2AC							
74	27	"	"		5	5		5		5				5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2171801															
"															
"															
"															
"															
"															
2171802	5B-D 2A		2CD	2CD	2CD	2CD	2CD		5B-D 2A						
"	5		6	6	6	6	6		5						
"	5		5B 2ACD	5B 2ACD	5B 2ACD	5B 2ACD			5						
"	5AB 2C		2A-C	2A-C	2A-C	2A-C			5AB 2C						
"	5D 2A-C		5D 2A-C	5D 2A-C	5D 2A-C	5D 2A-C			5D 2A-C						
"	5		5	5	5	5			5						
"	5		5	5	5	5			5						
"	5			5	5	5			5						
2171899													2AC		
"	5		5	5	5	5	5		5						9

Evaluation and Summary of Data for River Basin Group 2.1

This river basin group includes seven hydrologic areas in two states, 9,347 km^2 (3,595 mi^2) in Michigan and 34,491 km^2 (13,266 mi^2) in Wisconsin. Of the 33 tributaries included on the DAM for this river basin group, 27 were judged to have sufficient data to consider annual loading calculations. All 12 major streams in this river basin group have been monitored monthly for most of the parameters of interest, although two of the major streams are not gauged. None of the minor tributaries in this river basin group are gauged. Several major tributaries are lacking data on dissolved reactive phosphorus. Even though many of the tributaries have long-term water quality records, there have been very few measurements made at a frequency greater than monthly. One exception is the Fox River, which does have some biweekly and weekly data. There are few data on Hydrologic Area 2.1.7, which drains a relatively large agricultural area as well as a number of urban regions centered around Manitowac and Sheboygan.

Hydrologic Area 2.1.1 - Menominee Complex. Of the seven tributaries identified for inclusion on the DAM, four were found to have no data or data insufficient for loading calculations. Portage Creek was monitored for nutrients and suspended solids on a monthly or less basis during the 1970's. No flow data are available on this river other than some instantaneous measurements made at the time of sample collection.

The Ford River, however, has been gauged since 1954. The gauging station (2110201) is relatively close to the river mouth, approximately 10 river kilometers (6 miles) upstream. There is also a fairly regular water quality record for the Ford, with monthly data available for a number of chemical parameters at station 2110204 near the mouth. Although no silica data are available on a regular basis, other nutrient data, including some total soluble phosphorus data, were collected on a generally monthly basis (except during 1972 and 1973 when the sampling frequency fell below monthly). Some heavy metal and pesticide data are available, mainly on a grab sample basis.

There are also some monthly data available over a number of years for the Cedar River. These include both total and dissolved reactive phosphorus as well as some nitrogen and suspended solids data. During recent years, the monitoring frequency has been less than monthly. Flow data are limited to instantaneous measurements made at the time of sampling.

Although the three major tributaries in this complex have been monitored on a monthly basis over a number of years, there has apparently been no effort to take measurements during periods of high flow. Further, only one of the tributaries in the complex has continuous flow data available.

Hydrologic Area 2.1.2 - Menominee River. The Menominee River has been gauged at station 2120102 since the early 1900's. While this station is located approximately 40 river kilometers (24 miles) from the mouth, it probably monitores 90 percent of the drainage area, with all of the major tributaries joining the river upstream from this station. The Menominee River is second only to the Fox River in terms of mean annual flow and drainage area in River Basin Group 2.1.

There have been a number of stations monitored for water quality near the

mouth, although much of the data is the result of grab sample analyses or of sampling programs designed to take measurements over a small part of the annual cycle. Between 1969 and 1972, essentially monthly measurements of nutrients, chloride, and suspended solids were made at station 2120112. Similar measurements were made at station 2120106 between 1972 and 1975. There have been some measurements of heavy metals, pesticides, and refractory organics, although except for quarterly measurements of pesticides at station 2120112 during 1971, these measurements have not been made on a regular basis. No water quality measurements have apparently been made on the Menominee during high flow periods. However, the existance of dams on this river, especially near the mouth area, would complicate measuring the influence of spring runoff. It should also be mentioned that during the summer and fall of 1963 at a location near the mouth (station 2120199), weekly analyses were made for a number of parameters including suspended solids, silica, all three nitrogen species, and dissolved reactive phosphorus.

Hydrologic Area 2.1.3 - Peshtigo River. The Peshtigo River, which drains into Green Bay, has been gauged at a station close to its mouth (2130202) since 1953. The gauging station is locaated approximately 20 river kilometers (12 miles) from Green Bay, below the confluence of the river's major tributaries. In addition to a good record of discharge, there has also been a relatively extensive water quality record built up for the mouth area. At station 2310201 several miles upstream from the gauging station, a near-monthly record of a number of parameters is available between 1962 and 1975, with some gaps during 1970 and 1971. Quarterly measurements of nutrients were made at this same station between 1962 and 1968, changing to monthly by 1972 and continuing through 1975. Between June, 1963 and May, 1964 at station 2310204 near the mouth data are available on a weekly basis for silica, nitrogen total soluble phosphorus, and heavy metals. Although these data are somewhat dated and methods of sampling and analysis have changed since the early 1960's, this record may be useful for calculating historical loadings of certain parameters. The data at station 2310204 may be compared with monthly data taken at station 2310201 over the same time period.

Hydrologic Area 2.1.4 - Oconto River. The Oconto River has been gauged at a station (2140101) relatively close to its mouth since 1913. Although this station is nearly 50 river kilometers (30 miles) upstream from the mouth, it is above the confluence of any major tributaries. A generally monthly monitoring program was initiated in 1962 for a number of parameters and continues to the present. Between 1962 and 1968, nitrogen species, total phosphorus, and dissolved reactive phosphorus were measured quarterly instead of monthly. From 1969 through 1971, the sampling program had a number of gaps from the normal monthly sampling schedule. Between 1972 and 1975, both nitrogen species and total phosphorus were measured on a monthly basis. Some long-term chloride data are also available. Essentially no data are available on heavy metals, pesticides, and refractory organic compounds.

Hydrologic Area 2.1.5 - Suamico Complex. Of the four rivers identified for inclusion on the DAM in the Suamico Complex, only Duck Creek was found to have no data available. The Pensaukee River has been gauged since 1972 at station 2150103, located approximately six river kilometers (four miles) upstream from the mouth. Some nitrate and silica data are available between 1964 and 1970 on

mostly a monthly basis, with biweekly measurements available from the winter and summer in 1964. From 1972 through 1975 essentially monthly analyses were made for nutrients, chloride, and suspended solids. No heavy metals, pesticide, or refractory organics data are available for this complex. No significant flow data are available except for that measured on the Pensaukee River beginning in 1972.

The Little Suamico River and the Suamico River have a number of data points available for various parameters, but they are not sufficient for consideration of loading calculations. Thus, only the Pensaukee River has data sufficient for loading estimation in this complex.

Hydrologic Area 2.1.6 - Fox River. The Fox River is the largest river draining into Lake Michigan in terms of mean annual discharge and drainage area. In the entire U.S. Great Lakes Basin only the Maumee River has a larger drainage basin and only the Maumee and the Oswego Rivers have a larger mean annual discharge. The Fox has been gauged since 1917 at a station (2160101) approximately 29 river kilometers (18 miles) upstream from the mouth. This station is downstream from the outlet of Lake Winnebago and downstream from the confluence of the major tributaries. Even though the flow of the Fox River is regulated by a number of dams and other control structures, high spring flows do occur.

Between 1962 and 1968 monthly sampling for suspended solids and quarterly sampling for nitrogen species, total phosphorus, and dissolved reactive phosphorus was conducted at station 2160102 in the City of Green Bay. Except for an irregular period between 1969 and 1971, a monthly analysis for most nutrients, chloride, and suspended solids continues to the present. Dissolved reactive phosphorus was not measured at this station after 1968 and nitrate was not measured in 1975. At station 2160104, located at the mouth, suspended solids, chloride, and nutrients were measured from summer 1963 to spring 1964 at a weekly frequency. Generally, biweekly to monthly measurements were made at this station between 1970 and 1973.

Hydrologic Area 2.1.7 - Green Bay Complex. Eighteen tributaries have been identified for inclusion on the DAM from this complex. Eleven of these tributaries were found to have either no river mouth data or data that were insufficient for calculating loadings. The Red River is the only tributary identified in this complex draining into Green Bay, with the remaining streams flowing into Lake Michigan proper.

The Annappee River was monitored in the 1960's. There are some monthly and biweekly data available for silica, chloride, and nitrate. No additional water quality or quantity data useful for loading calculations are available for this tributary.

The Kewaunee River has a gauging station (2711001) located approximately 11 river kilometers (7 miles) from the mouth which has been operating since 1964. Most of the water quality data that are available were obtained at station 2171003, located close to the mouth. A monitoring program has been in operation since 1969 for a number of parameters including nutrients, chloride, and suspended solids. Monthly measurements have been made during a number of years. At station

21701103 from 1972 through 1974 some weekly to twice weekly suspended solids measurements were made. Instantaneous flow measurements were also made at the same frequency as suspended solids measurements.

The East Twin River is also gauged (station 2171102), but only since 1972. There is a relatively long-term water qulaity record available at station 21701103 running from 1962 until 1974, with essentially monthly analysis for a number of parameters. Between 1962 and 1968, nutrients were measured on a quarterly basis. This same sampling schedule was applied in 1970. Between 1972 and 1975, monthly analyses of nutrients and chloride were conducted. The West Twin River has been monitored on a regular basis since 1969. Monthly measurements have been made for nutrients, chloride, and suspended solids over much of this period, particularly in recent years. No flow data are available, however.

The Manitowoc River has been gauged since 1972 at a station (2171301) located about 11 river kilometers (seven miles) from the mouth, below the confluence of the major tributaries. The river mouth area of the Manitowoc has a relatively long-term water quality record at station (2171302) from 1962 to the present, generally monthly analyses have been made for a number of parameters including suspended solids. Nutrients and chloride were measured quarterly until 1968, changing to monthly by 1972. The only phosphorus form measured during this period was total phosphorus. No heavy metal, pesticide, or refractory organics data are available.

The Sheboygan River is the largest tributary in this complex. A gauging station (2171801) located about seven river kilometers (four miles) upstream from the mouth, has been operating since 1950. In 1967, suspended solids were measured in considerable detail, including extra samples during the month of March. All of the nutrient water chemistry has been obtained at station 2171802. Between 1962 and 1968 quarterly measurements of water chemistry parameters were made. Since 1968, the sampling program has been fairly regular for these nutrients, with monthly samples being collected and analyzed sincle 1972. No significant heavy metal, pesticide, or refractory organics data are available.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 2.2

River Basin Group 2.2 drains an area of 5,633 km^2 (2,175 mi^2). This river basin group is shown in Figure 12. The hydrologic boundaries of this river basin group are the same as those of its sole hydrologic area. A map and description of this area follow.

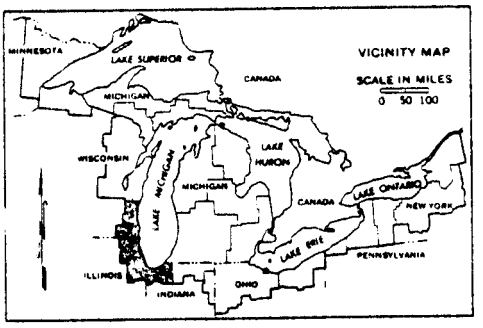
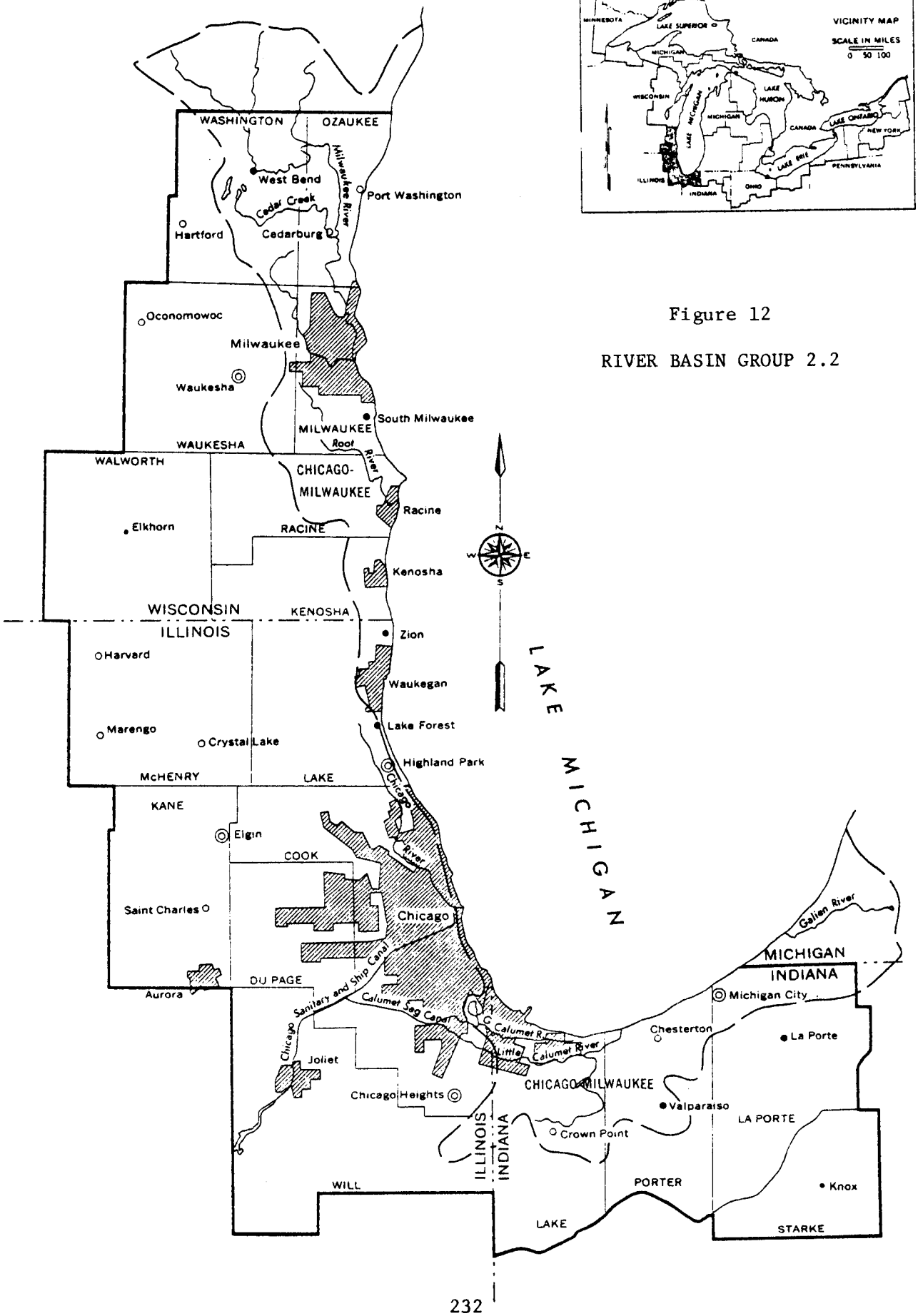
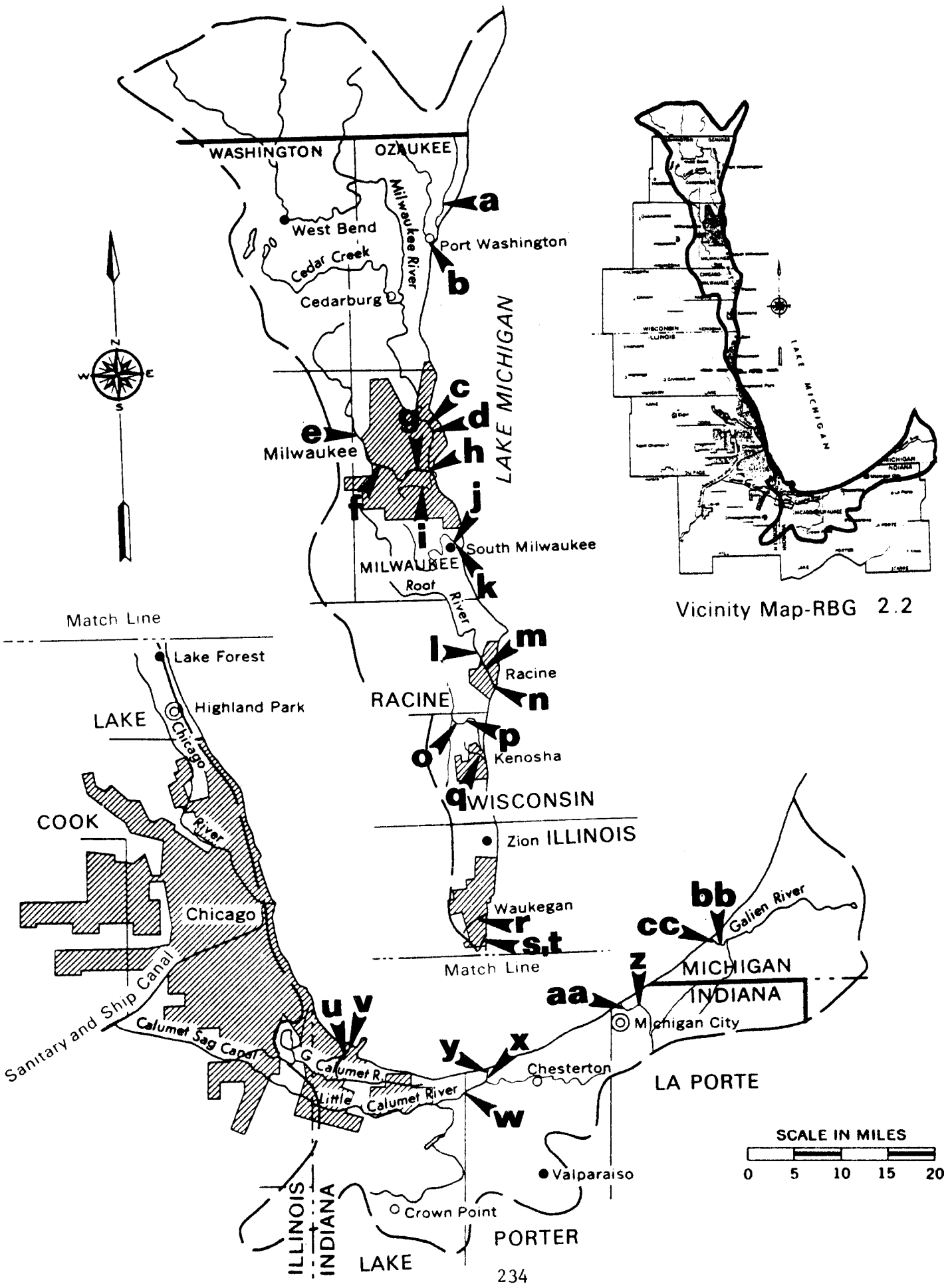


Figure 12

RIVER BASIN GROUP 2.2



Hydrologic Area 2.2.1
Chicago, Milwaukee Complex



Vicinity Map-RBG 2.2

Hydrologic Area 2.2.1
Chicago-Milwaukee Complex

The Chicago-Milwaukee complex covers 563,000 hectares (1,392,000 acres). The State of Wisconsin contains 59 percent of the area, Indiana contains 30.6 percent, Illinois contains 2.8 percent, and Michigan contains the remaining 7.6 percent. The area covers much of the western and southern shore of Lake Michigan. The major rivers and their mean annual discharges in the area are: the Milwaukee River (11.2 m^3/s; 395 cfs), the Menomonee River (2.5 m^3/s; 88 cfs), the Root River (4.4 m^3/s; 138 cfs), Trail Creek (1.9 m^3/s; 67 cfs), and the Galien River (ungaged). The entire area is very flat with few wetlands. About 5 to 10 percent of the area is forested (mostly in the northern portion), roughly 60 percent of the area is devoted to agriculture, and over 20 percent is highly developed urbanized or industrialized area. The bedrock in the western portion is composed principally of dolomite while the southern area bedrock consists mostly of shale. The majority of the overlying material is glacial till with some silt and clay in the southern areas and sand and gravel in the northwestern portion. The economy is based very heavily upon manufacturing (steel, petroleum, food, machinery, metal fabrication), although there is some agriculture found mostly in the Milwaukee River Basin. Almost the entire coast line from Milwaukee, Wisconsin, to Michigan City, Indiana, is industrialized. There are large concentrations of people throughout the area with over 40 municipal wastewater treatment plans in the Wisconsin portion alone. The Chicago Sanitary and Ship Canal removes most of the City of Chicago's waste and reduces the natural drainage area to Lake Michigan significantly. Well over 2 million people live within the boundaries of this hydrologic area.

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Sucker Creek	21101	Pike River	22107
a	2210101	o	2210701
Sauk Creek	22102	p	2210702
b	2210201	Pike Creek	22108
Milwaukee-Menomonee Rivers	22103	q	2210801
c	2210301	Waukegan River	22109
d	2210302	r	221901
e	2210303	Pettibone Creek	22110
f	2210304	s	2211001
g	2210305	t	2211002
h	2210306	Indiana Harbor Canal	22111
Kinnickinnic River	22104	u	2211101
i	2210401	v	2211102
Oak Creek	22105	Burns Ditch	22112
j	2210501	w	2211201
k	2210502	x	2211202
Root River	22106	y	2211203
l	2210601	Trail Creek	22113
m	2210602	z	2211301
n	2210603	aa	2211302
		Galien River	22114
		bb	2211401
		cc	2211402

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 2.2.1 Chicago-Milwaukee Complex												
		22101	Sucker Creek												
64	30	2210101	River Mile 3.3		2BD	2BD	2BD	2BD				2BD	2BD	2BD	2BD
65	"	"	"			10A								10A	
		22102	Sauk Creek												
64	30	2210201	River Mile 0.3		2BD	5	5	5				5	5	5	5
65	"	"	"			5A	5A	5A				5A	5A	5A	5A
		22103	Milwaukee-Menomonee Rivers												
14-74	21	2210301	Milwaukee River at Milwaukee	*	1										
63	"	"	"	*	1					2C					
64	"	"	"	*	1					2BCD					
65	"	"	"	*	1					2CD					
66	"	"	"	*	1			2D				2D			
67	"	"	"	*	1	2B 5ACD		2B 5ACD		2B		2B			
68	"	"	"	*	1	2AD 5BC		2AD 5BC		2CD					
69	"	"	"	*	1	5ACD 2B		5ACD 2B							
70	"	"	"	*	1	5A-C 2D		5A-C 2D							
71	"	"	"	*	1	5		5		2B 5C					
72	"	"	"	*	1	5AB 8C 2D		5AB 8C 2D							

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2210101	2BD	2BD	2D			2D			2BD	2B	2BD				
"															
2210201	5	5	5			5			5	5	5				
"	5A	5A	5A			5A			5A	5A	5A				
2210301															
"															
"															
"															
"	2D	2D	2D						2D	2D	2D				
"	2B		2B						2B						
"															
"															
"															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	21	2210301	(Continued)	*	1	5	5A-C 2D	5		5		5	5	5D	
74	"	"	"	*	1	5A-C 2D	5A-C 2D	5A-C 2D		5AC 10B 2D		5A-C 2D	5A-C 2D	5A-C 2D	
64	30	2210302	Milwaukee River at Hampton Ave.			5	5	5				5	5	5	5
65	"	"	"			5A	5A	5A				5A	5A	5A	5A
61	27	2210303	Menomonee River at County Line	*		2B 5CD		2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69-70	"	"	"	*		5		5	5	5		5	5	5	5
71	"	"	"	*		5		5	5	5		5	5	5	5
72	"	"	"	*		5A-C		5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
73	"	"	"	*		5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	
74	"	"	"	*		5		5	5	5		5A-C 2D	5	5	
75	"	"	"			5AB		5AB	5AB	5AB		5AB	5AB	5AB	
64	30	2210304	Menomonee River at N. 70th Street			5B-D	5B-D	5B-D				5B-D	5B-D	5B-D	5B-D
65	"	"	"			5A	5A	5A				5A	5A	5A	5A
61-74	21	2210305	Menomonee R at Wauwatosa 43-02-44 X 87-59-59	*	1										
62	"	"	"	*	1			2D				2D	2D		
67	"	"	"	*	1	2C 5ABD		2C 5ABD							
68	"	"	"	*	1	5AB 8C 2D		5AB 8C 2D		2D					
69	"	"	"	*	1	5		5							
70	"	"	"	*	1	5A-C 2D		5A-C 2D							
71	"	"	"	*	1	5		5							
72	"	"	"	*	1	5A-C 2D		5A-C 2D							
73	"	"	"	*	1	5ABD 8C		5ABD 8C		5D					
74	"	"	"	*	1	2A 5BC				2A 5BC					
61-64[a]	31	2210306	Machinery Bay near Mouth	*					10	10		10		10	10
61	27	"	"	*		2B 5CD		2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
62-68	"	"	"	*		5		5	5	5		5	5	5	5

[a]Only average values were found for each parameter noted. Raw data was not found.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2210301	5	5	5A-C 2D		5	5	5A-C 2D		5	2D	2D	2AD 5C	2AD 5C		
"	5A-C 2D	5A-C 2D			5A-C 2D	5A-C 2D			5A-C 2D			2A	2A-C		
2210302	5	5	5			5			5	5	5				
"	5A	5A	5A			5A			5A	5A	5A				
2210303	2B 5CD		2CD	2CD	2CD	2CD	2CD		2B 5CD						
"	5		6	6	6	6	6		5						
"	5		6	6	6	6			5						
"	5		2B 5CD	2B 5CD	2B 5CD	2B 5CD			5						
"	5A-C		5AB 2C	5AB 2C	5AB 2C	5AB 2C			5A-C						
"	5A-C 2D		2CD	2CD	2CD	2CD			5A-C 2D						
"	5		2A 5BC	2B 5C	2B 5C	2A 5BC			5A-C 2D						
"	5AB		2A	5AB	5AB	5AB			2A						
2210304	5B-D	5B-D	5B-D			5B-D			5B-D	5B-D	5B-D				
"	5A	5A	5A			5A			5A	5A	5A				
2210305															
"	2D		2D						2D						
"															
"															
"															
"															
"															
"															
"															
"															
2210306	10		10	10	10	10		10	10						
"	2B 5CD		2CD	2CD	2CD	2CD	2CD		2B 5CD						
"	5		6	6	6	6	6		5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	27	2210306	(Continued)	*		5		5	5	5		5	5	5	5
70	"	"	"	*		5		5	5	5		5	5	5	5
71	"	"	"	*		5		5	5	5		5	5	5	5
72	"	"	"	*		5		5	5	5		5	5	5	5
73	"	"	"	*		5		5	5			5		5	
74	"	"	"	*		5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		5A-C 2D	
75	"	"	"			5AB		5AB	5AB	5AB		5AB		5AB	
71	36	2210399	Unknown					2AC							
74	27	"	"		5	5		5	5	5				5	5
75[a]	27	2210304[b]	Menomonee R. at 70th Street		1B-D	8B-D		8B-D	8B-D	8B-D		8B-D	8B-D	8B-D	9B-D
75[a]	27	2210397[c]	Menomonee R. at 27th Street			8B-D		8B-D	8B-D	8B-D		8B-D	8B-D	8B-D	9B-D
74	27	2210398[c]	Menomonee R. at 2nd Street			8CD		8CD	8CD	8CD		8CD	8CD	8CD	9CD
75[a]	"	" [c]	"			8		8	8	8		8	8	8	9
		22104	Kinnickinnic River												
64	30	2210401	At 12th Street		2BD		2BD 10C	2BD	2BD			2BD	2BD	5B-D	
65	"	"	"			10A								5A	
		22105	Oak Creek												
63-74	21	2210501	At South Milwaukee	*	1										
67	"	"	"	*	1	8A 5B-D		8A 5B-D							
68	"	"	"	*	1	5		5							
69	"	"	"	*	1	5AB 8C 2D		5AB 8C 2D							
70	"	"	"	*	1	5A-C 2D		5A-C 2D							
71	"	"	"	*	1	5		5							
72	"	"	"	*	1	5A-C[d] 9D		5A-C[d] 9D							
73	"	"	"	*	1	5		5A-C		5D					

[a] Sampling to continue through 1976.

[b] Extra monitoring conducted during selected runoff events. Frequency dependent on hydrograph, generally every half hour for nutrients.

[c] Additional data not in downstream sequence or located on maps.

[d] September 18, 19, 22, 29.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2210306	5		5BC 2D	5BC 2D	5BC 2D	5BC 2D			5						
"	5		6	6	6	6			5						
"	5		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D			5						
"	5		5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD			5						
"	5		2B-D	2B-D	2B-D	2B-D			5						
"	5A-C 2D		6	6	6	6			5A-C 2D						
"	5AB		2A	5AB	5AB	5AB			5AB						
2210399													2AC		
"	5		5	5	5	5	5					9		9	9
2210304	8B-D	6B-D	8B-D	8B-D	8B-D	8B-D	8B-D		8B-D	6B-D	6B-D	6B-D		6B-D	6B-D
2210397	8B-D	6B-D	8B-D	8B-D	8B-D	8B-D	8B-D		8B-D	6B-D	6B-D	6B-D		6B-D	6B-D
2210398	8CD	6CD	8CD	8CD	8CD	8CD	8CD		8CD	6CD	6CD	6CD		6CD	6CD
"	8	6	8	8	8	8	8		8	6	6	6		6	6
2210401	2BD	2BD	2D			2D			2BD	2D	2BD				
"															
2210501															
"															
"															
"															
"															
"															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	21	2210501	(Continued)	*	1	2AC 5B				2AC 5B					
64	30	2210502	River Mile 1.6			5	5	5				5	5	5	5
65	"	"	"			5A	5A	5A				5A	5A	5A	5A
74	27	2210599	Unknown		5	5		5	5	5				5	5
		22106	Root River												
64	30	2210601	South 33 River Mile 6.1			5	5	5				5	5	5	5
65	"	"	"			5A	5A	5A				5A	5A	5A	5A
61	21	2210602	At Racine River Mile 5.2	*	2D	2D		2D				2D			
63-74	"	"	"	*	1										
64[a]	"	"	"	*	1					2B 11C					
65	"	"	"	*	1					2D					
66	"	"	"	*	1					2A					
67	"	"	"	*	1	5		5		5B 2C		2B			
68	"	"	"	*	1	5		5		2BD 5C					
69	"	"	"	*	1	5ACD 2B		5ACD 2B		2C					
70	"	"	"	*	1	5		5		9B 2C	2B				
71	"	"	"	•	1	5B-D 2A		2AB 5CD		5BC 2D					
72	"	"	"	*	1	5ACD 9B		5ACD 9B		5AC 9B 2D					
73	"	"	"	*	1	5		5A-C 2D		5D					
74	"	"	"	•	1	2A-C				2A-C					
61	27	2210603	Marquette Street Bridge in Racine	*		5B-D		5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
62-68	"	"	"	*		5		5	5	5		5	5	5	5
69-71	"	"	"	*		5		5	5	5		5	5	5	5
72	"	"	"	•		5		5	5	5		5	5	5	5

[a]Four times in July only. (11C)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2210501															
2210502	5	5	5			5			5	5	5				
"	5A	5A	5A			5A			5A	5A	5A				
2210599	5		5	5	5	5	5					9		9	9
2210601	5	5	5			5			5	5	5				
"	5A	5A	5A			5A			5A	5A	5A				
2210602	2D		2D						2D						
"															
"															
"															
"															
"	2B		2B						2B						
"															
"															
"															
"															
"															
"															
"															
2210603	5B-D		6	6	6	6	6		5B-D						
"	5		6	6	6	6	6		5						
"	5		5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD			5						
"	5		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD			5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73-74	27	2210603	(Continued)	*		5		5	5	5		5	5	5	
75	"	"	"			5		5	5	5		5	5	5	
74	27	2210699	Unknown		2BD 5C	2BD 5C		2BD 5C	2BD 5C	2BD 5C					2BD 5C
		22107	Pike River												
64	30	2210701	At South 32 River Mile 1.8		5B 2D	5	5	5				5	5	5	5
65	"	"	"			5C	5C	5C				5C	5C	5C	5C
71-74	21	2210702	Near Racine 42-38-49 X 87-51-38	*	1										
71	"	"	"	*	1	5C 9D		5C 9D		2D					
72	"	"	"	*	1	5BD 9A 4C		5BD 9A 4C		9AD 5B 4C	2B				
73	"	"	"	*	1	5		5A-C		5D					
74	"	"	"	•	1	5A-C				5A-C					
		22108	Pike Creek												
64	30	2210801	At 43rd Street	*	2D	2C 5D	2C 5D	2C 5D				2C 5D	2C 5D	2C 5D	2C 5D
65	"	"	"	*		5A	5A	5A				5A	5A	5A	5A
		22109	Waukegan River												
68	05	2210901	Eastern R.R. Bridge 42-21-05 X 47-49-05	*		2BC 8D	5B 8CD	5BC 8D		2BD		5BC 8D	5BC	2BC 5D	5BC 8D
69	"	"	"	*		5A-C 2D	8ABD 5C	5				5	5	5A 2B-D	5A 5B-D
70	"	"	"	*		2BC	5D 8BC	5B-D				5B-D	5B-D	5B-D	5B-D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2210603			2AC 5BD	2AC 5BD	2AC 5BD	2AC 5BD			5						
"				2ACD 5B	2ACD 5B	2ACD 5B			5						
2210699	2BD 5C		2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C								
2210701	5	5	5			5			5	5	5				
"	5C	5C	5C			5C			5C	5C	5C				
2210702															
"															
"															
"															
"															
2210801	2C 5D	2C 5D	5D			5D			2C 5D	5D	5D				
"	5A	5A	5A			5A			5A	5A	5A				
2210901	5BC 8D		5BC 8D	5B-D		5BC 8D			5BC 8D	2B 5CD	2B 5CD		5B-D		
"	8A 5B-D		8A 5B-D	5ABD		8A 5B-D			5	5	5		5		
"	5B-D		5B-D	2B-D		5B-D			5B-D	2B 5C	2B 5C		2B 5C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	05	2210901	(Continued)	*		5AB	5AB	5AB				5AB	5AB	2A 5B	
72	"	"	"	*		2CD	2AC 5D	2AC 5D		2A		2A	2A	2CD	2A
73	"	"	"	*			2BD 5C	2BD 5C							
74	"	"	"	*		5B 8CD	2A 8B-D	5B 8CD				5B 8CD	5B 8CD	5C	
75	"	"	"			5AB 8CD	5AB 8CD	5AB 8CD				5AB 8CD	5AB 8CD		
76	"	"	"			5A	5A	2A				5A	5A		
		22110	Pettibone Creek												
68	05	2211001	In North Chicago 42-18-54 X 87-50-35	*		5BD 2C	5B 8CD	5B 2C 8D		5A 2D		5B 8CD	5B 8CD	5BD	5B 8CD
69	"	"	"	*		5A-C 2D	8A 5B-D	8A 5B-D				5	8A 5B-D	5ABD 2C	8A 5B-D
70	"	"	"	*		5AD 8BC	5A 8B-D	5A 8B-D				5AD 8BC	5A 8B-D	5B-D	5A 8B-D
71	"	"	"	*		5AB	5AB 2C	5AB 2C				5AB 2C	5AB 2C	2A 5B	5AB 2C
72	"	"	"	*		5AB 2C	5	5				2A	2A	2ACD 5B	5
68	05	2211002	Near Harbor 42-18-30 X 87-50-00	*		2B 8D	5BC 8D	5BC 8D		5B		5BC 8D	5BC 8D	5B 2C 8D	5BC 8D
69	"	"	"	*		5A-C 2D	5	5				5	5	5ABD 2C	5
70	"	"	"	*		2AD 8B 5C	5ACD 8B	5AD 8B 2C		2BC		5AD 8B 2C	5AD 8B 2C	2ACD 8B	5ADC 2B
71	"	"	"	*		5A 2B-D	2C	2C				2C	2C		2C
72	"	"	"	*		5ACD 2B	5ACD 2B	5ACD 2B				2A	2A	6	5ACD 2B
73	"	"	"	*		2A	5A-C 2D	2AD 5BC							5A-C 2D
74	"	"	"	*		5AB 8CD	5A 8B-D	5B 8CD				2A 8B-D	2A 8B-D	2A 5C	5A 8B-D
75	"	"	"			5AB 8CD	5AB 8CD	5AB 8CD				5AB 8CD	5AB 8CD		5AB 8CD
76	"	"	"			5A	5A	5A				5A	5A		5A

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2210901	5AB		5AB	2A 5B		5AB			2AC 5D	5AB	5AB		5AB		
"	2AC 5D		2AC 5D	2AC 5D		2AC 5D			2AC 5D	2C 5D	2C 5D	2C 5D	2C 5D		
"	2BD 5C		2BD 5C	2BD 5C		2BD 5C			2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		
"	2A 8B-D		2A 8B-D	2A 8B-D		2A 5D 8BC			2A 8B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		
"	5AB 8CD		5AB 8CD	5AB 8CD		5AB 8CD			5AB 8CD	5	5	5	5		
"	5A		5A	5A		5A			5A	2A	2A	2A	2A		
2211001	5B 8CD		5BC 8D	2B-D		5BC 8D			5BC 8D	2B 5CD	5B-D		5B 8CD		
"	8A 5B-D		5	5B		5			5	5ABD	5ABD 2C		5		
"	5A 8B-D		5AD 8BC	2D 5C		5AD 8BC			5AD 8BC	5AC 8B 2D	5AD 8BC		5ACD 8B		
"	5AB 2C		5AB 2C	5AB		5AB 2C			5AB 2C	5B 2C	5AB 2C		5AB 2C		
"	5		5	5		5			5ACD 2B	5	5	5CD	5		
2211002	5BC 8D		5BC 8D	5BC 8D		5BC 8D			5BC 8D	5B-D	5B-D		5BC 8D		
"	5		5	5		5			5	5ACD 2B	5ACD 2B		5		
"	5ACD 8B		5AD 8B 2C	2AC 8B 5D		5AD 8B 2C			5AD 8B 2C	5A-C 2D	5AC 8B 2D		5ACD 8B		
"	2C		2C	2C		2C			2C	2C	2C		2C		
"	5ACD 2B		5ACD 2B	5ACD 2B		5ACD 2B			5ACD	5ACD 2B	5ACD 2B	5ACD	2A 5B-D		
"	5A-C 2D		5AC 2D	5BCA 2D		5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		
"	5A 8B-D		5A 8B-D	5A 8B-D		5A 8B-D			5A 8B-D	5	5	5	5		
"	5AB 8CD		5AB 8CD	5AB 8CD		5AB 8CD			5AB 8CD	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		
"	5A		5A	5A		5A			5A	5A	5A	5A	5A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		22111	Indiana Harbor Canal												
60	01	2211101	Dickey Road River Mile 1.0			10	10	10	10	10		10	10	10	10
61	"	"	"			10	10	10		10		10	10	10	10
62	"	"	"			10	10	10	10	10		10	10	10	10
63	"	"	"			10	10	10		10		10	10	10	10
64	"	"	"			10	10	10	10	10		10	10	10	10
65	"	"	"					10CD		10CD				10CD	10CD
65	23	"	"	•		10		10		10				10	10
66	"	"	"	*		10		10		10				10	10
66	19	"	"	*		10		10		10			10CD	10	10
66-69	01	"	"	*		8	8	8		8		8	8	8	8
67	23	"	"	*		10		10		10				10	10
67	19	"	"	•		10AB		10AB		10AB			10AB	10AB	10AB
68	23	"	"	•		10		10		10				10	10
69	"	"	"	•		10AB		10AB		10AB			10AB	10AB	10AB
70	01	"	"	•		5D 8A-C	8	8		8		8	8	5D 8A-C	8
71	"	"	"	*		8	8A	8		8		8A	8A	8	8
72	"	"	"	*		8A-C 5D		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D
73	"	"	"	*		5AB 8CD		5AB 8CD		5AB 8CD				5AB 8CD	5AB 8CD
74-75	"	"	"	*		5		5		5				5	5
73	01	2211102	Youngstown Steel Plant at Mouth	*		5AB 8CD		5AB 8CD		5AB 8CD				5AB 8CD	5AB 8CD
74-75	"	"	"	*		5		5		5				5	5
		22112	Burns Ditch												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2211101	10		10	10		10			10	10	10	10			
"	10		10	10		10			10	10	10	10			
"	10		10	10		10			10	10	10	10			
"	10		10	10		10			10	10	10	10			
"	10		10	10		10			10	10	10	10			
"	10CD		10CD	10CD	10CD	10CD		10CD			10CD				
"	10		10	10	10						10				
"	10		10	10	10				10		10				
"	10		10	10	10	10		10	10		10				
"	8		8			8			8						
"	10		10	10	10	10		10	10		10				
"	10AB		10AB	10AB	10AB	10AB		10AB	10AB		10AB				
"	10		10	10	10	10		10	10		10				
"	10AB		10AB	10AB	10AB	10AB			10AB		10AB				
"	8		8			8			8						
"	8		8			8			8						
"	8A-C 5D		8A-C 5D			8A-C 5D			8A-C 5D			2C			
"	5AB 8CD		5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD			5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD		2D
"	5		5	5	5	5			5	5	5	5	5		5
2211102	5AB 8CD		5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD			5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD		2AD 5C
"	5		5	5	5	5			5	5	5	5	5		5

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
60-65	01	2211201	Near Ogden Dunes			10	10	10		10		10	10	10	10
66-69	01	2211202	Truck Bridge River Mile 1.0	*		8	8	8		8		8	8	8	8
70	"	"	"	*	8	8	8	8		8		8	8		8
71	"	"	"	*		8	8A	8		8		8A 2D	8A	8	8
72	"	"	"	*		8A-C 5D		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D
73	"	"	"	*		5AB 8CD		5AB 8CD		5AB 8CD				5AB 8CD	5AB 8CD
74-75	"	"	"	*		5		5		5				5	5
66-68	01	2211203	At Portage	*		8	8	8		8		8	8	8	8
69-70	"	"	"	*	8	8	8	8		8		8	8	8	8
71	"	"	"	*	8	8	8A	8		8		8A	8A	8	8
72	"	"	"	*		8A-C 5D	8A-C 5D	8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D
73	"	"	"	*		5AB 8CD		5AB 8CD	2C	5AB 8CD				5AB 8CD	5AB 8CD
74-75	"	"	"	*		5		5		5				5	5
71	36	2211299	Near Mouth Exact Location Unknown					2AC							
		22113	Trail Creek flow 1.9 m^3/s (68.3 cfs)												
73	01	2211301	Franklin St. Bridge in Michigan City	*		5AB 8CD		5AB 8CD		5AB 8CD				5AB 8CD	5AB 8CD
74	"	"	"	*		5		5		5				5	5
75	"	"	"	*		5		5		5				5	5
69	01	2211302	US-12 Bridge in Michigan City			8	8	8		3		8	8	8	8
70	"	"	"		8	8	8	8		8		8	8	8	8
71	"	"	"		8A-C 5D	8A-C 5D	8A	8A-C 5D		8A-C 5D		8A	8A	8A-C 5D	8A-C 5D
72	"	"	"			8A-C 5D		8A-C 5D		8A-C 5D				8A-C 5D	8A-C 5D
69-74	21	"	"		1										

[a]1975 only. 2C in 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2211201	10		10						10						
2211202	8		8			8			8						
"	8		8			8			8						
"	8		8			8			8						
"	8A-C 5D		8A-C 5D			8A-C 5D			8A-C 5D						
"	5AB 8CD		5AB 8CD	5AB 8CD		5AB 8CD			5AB 8CD						
"	5		5	5		5			5						5[a]
2211203	8		8			8			8						
"	8		8			8			8						
"	8		8			8			8			2C 5AD	2C 5AD		
"	8A-C 5D		8A-C 5D			8A-C 5D			8A-C 5D			2D	2D		
"	5AB 8CD		5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD			5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD		2A 5BC
"	5		5	5	5	5			5	5	5	5	5		
2211299													2AC		
2211301	5AB 8CD		5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD			5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD	5AB 8CD		2D 5A-C
"	5		5	5	5	5			5	5	5	5	5		
"	5		5	5	5	5			5	5	5	5	5		5
2211302	8		8			8			8						
"	8		8			8			8						
"	8A-C 5D		8A-C 5D			8A-C 5D			8A-C 5D			5D	5D		
"	8A-C 5D		8A-C 5D			8A-C 5D			8A-C 5D			8A-C 5D	8A-C 5D		
"															

RIVER BASIN GROUP 2.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		22114	Galien River												
67	06	2211401	Red Arrow Hwy Bridge 41-48-26 X 86-42-58			2D		2D	2D	2D		2D	2D	2D	2D
74	"	"	"	*		5	5	5	5	5		5	5	5	5
75	"	"	"			2A	2A	2A	2A	2A		2A	2A	2A	2A
72	06	2211402	Near Mouth at New Buffalo			5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
73	"	"	"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5AB 2D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2211401			2D	2D		2D	2D		2D		2D				
"		5	5	5	5	5	5		5	2C	2C	2C	2C		
"		2A	2A	2A	2A	2A	2A		2A						
2211402	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C			2C	2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2C	2C	2C	2C		

Evaluation and Summary of Data for River Basin Group 2.2

This river basin group, which includes only one hydrologic area, covers 1,732 km^2 (666 mi^2) in Indiana, 156 km^2 (60 mi^2) in Illinois, 432 km^2 (166 mi^2) in Michigan, and 3,336 km^2 (1,283 mi^2) in Wisconsin. Of the 14 tributaries included on the DAM for this river basin group, all but three have data adequate for making annual loading caluclations for at least some parameters. Seven of the 14 rivers were classified as major tributaries, all of which have adequate water quality data for loading calculations. Only five streams in this river basin group (three of which are major tributaries) have been gauged. A number of tributaries draining highly polluted industrial areas in the Chicago area have excellent water quality records but are not gauged at all or are gauged at locations not useful for loading calculation purposes.

The Milwaukee River, one of the largest rivers in the complex, has inadequate data for a number of parameters. Many of the tributaries in this complex have relatively detailed data available on heavy metals. Because of the highly industrialized nature of this area, it would be expected that this complex is a major contributor of heavy metals to the Great Lakes. The Menomonee River is being studied in detail as part of Task C of the PLUARG study and a large amount of data, including runoff event data, will be available.

Hydrologic Area 2.2.1 - Chicago-Milwaukee Complex. The Chicago-Milwaukee Complex is the only hydrologic area in River Basin Group 2.2. Of the 14 tributaries identified in this complex, only three had insufficient data for calculation of loadings.

Sauk Creek was monitored only in 1964 and part of 1965 on a monthly basis for a number of parameters including silica, nitrate, and total phosphorus. The only flow data available are a few instantaneous samples near the mouth.

The Milwaukee and Menomonee Rivers have been grouped together on the DAM because they join just before they flow into Lake Michigan. Station 221030<u>1</u> on the Milwaukee River has been gauged since 1914 and some water quality data have also been obtained there. Some monthly data collected during 1973 and 1974 for nutrients and chloride are available for this station. Only one other station, (221030<u>2</u>) was found to have useful loading data for the Milwaukee River. Some monthly measurements were made in 1964 for total phosphorus, nitrate, silica, and chloride. Limited heavy metal measurements were made at station 221030<u>1</u> in 1973 and 1974.

Station 221030<u>3</u>, the upper most station identified for the mouth area of the Menomonee River, has been monitored extensively for water quality parameters. Except for a few minor gaps, monthly analyses of suspended solids and chlorides were made between 1962 and 1975. Between 1962 and 1970 nutrients were measured quarterly. Nutrient analyses were made on a less than monthly basis between 1970 and 1975 at this station. A continuous flow record is available since 1961 at station 221030<u>5</u>. No significant water chemistry data are available at this station, however. Station 221030<u>6</u> has monthly information available on a number of parameters including suspended solids and chloride with quarterly data on nutrients, all from 1962 through 1968. Between 1969 and 1975 loading

data are available on a mostly monthly basis at this station.

The Menomonee River is one of the four U.S. rivers being studied under the Task C Pilot Watershed Study of PLUARG. As part of this study detailed monitoring of the Menomonee River is being conducted during 1975, 1976, and 1977. Stations 2210304, 97, and 98 are being monitored at a biweekly frequency for parameters of interest to PLUARG. In addition, runoff events are to be monitored in detail at station 2210304. This station is reported to be the station closest to the mouth free from lake effects. The sampling frequency during the runoff events will be dependent on the characteristics of the flow event, although samples will be taken every half-hour for nutrient analysis. In addition to the nutrients sampling, heavy metals, pesticides, and refractory organics will be measured during runoff events. Regular monitoring for heavy metals, refractory organics, and pesticides is done on a generally quarterly basis as part of this study.

Oak Creek has been gauged on a continuous basis since 1963 at station 2210501. Water chemistry data on this tributary, however, are sparse. During 1964 and 1965 there were some monthly measurements made of some nutrients and chloride. The only recent data were monthly measurements of suspended solids and nutrients made during 1974. Only a limited amount of pesticide, refractory organics, and heavy metal data are available and these measurements were not taken periodically over an annual cycle.

The Root River also has a continuous flow gauge located approximately eight kilometers (five miles) upstream from the mouth at station 2210602. Water quality data are available from the early 1960's at both station 2210601 and 03. Station 2210603 contains the most extensive record, with monthly and quarterly analyses. The period of record extends between 1962 and 1975. The only phosphorus form measured since 1969 has been total phosphorus. No data were found for the Root River on pesticides, heavy metals, or refractory organics.

The Pike River is another stream in this complex which has a discharge gauge located relatively close to its mouth, with records available since 1971. Few water quality data are available except some monthly measurements of nutrients and chloride during 1964.

Both the Waukegan River and Pettibone Creek are intermittant streams and drain similar areas. They have an extensive water quality record dating back to 1968. However, there are no flow data available for their river mouth areas. Extensive sampling and analysis have occurred for some nutrients, chloride, and heavy metals, including some biweekly measurements. Generally though, the sampling frequency was less than monthly over an annual cycle.

The Indiana Harbor Canal also has a great deal of water quality data available for its river mouth sections. However, there are no flow data available. A number of biweekly measurements were made for nitrate, total phosphorus, and chloride in the late 1960's. Some biweekly and monthly measurements of these parameters were also made in the 1970's. A considerable amount of heavy metals data is available, including monthly to biweekly sampling for 1973 through 1975.

Burns Ditch has been monitored for suspended solids, nitrate, total phosphorus, and chloride extensively since the mid-1960's with samples collected for the most part on a biweekly basis. Flow data, however, are relatively scarce. Instantaneous flow measurements were made on a biweekly basis in 1969, 1970, and 1971 at station 2211203. Significant heavy metal data are available between 1973 and 1975 at this same station. Despite the extensive chemical record for a number of parameters, the lack of flow data would greatly complicate the estimation of loadings from this tributary. The flow pattern of Burns Ditch is also quite complex as it is linked up with the Little Calumet River and a number of canals in the industrialized Chicago-Gary area.

Trail Creek has had some biweekly monitoring for suspended solids, nitrate, total phosphorus, and chlorides, as well as some monthly measurements of these and other parameters. Flow measurements were made on a biweekly basis during most of 1970 and 1971, but these are the only flow data that were found for the river mouth area of this tributary. Although Trail Creek flows through the industrialized Michigan City area, the only heavy metals data available are some biweekly measurements made during 1972.

The Galien River is the easternmost tributary in this complex. Monthly data on suspended solids, nutrient, and chloride data are available for 1974. There have been some monthly measurements of parameters of interest during other years, but not over the entire annual cycle. Again, there are no flow data available on the river mouth area.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 2.3

River Basin Group 2.3 encompasses an area of 33,556 km^2 (12,956 mi^2). This river basin group contains five hydrologic areas, and is shown in Figure 13. Maps and descriptions of these five hydrologic areas follow.

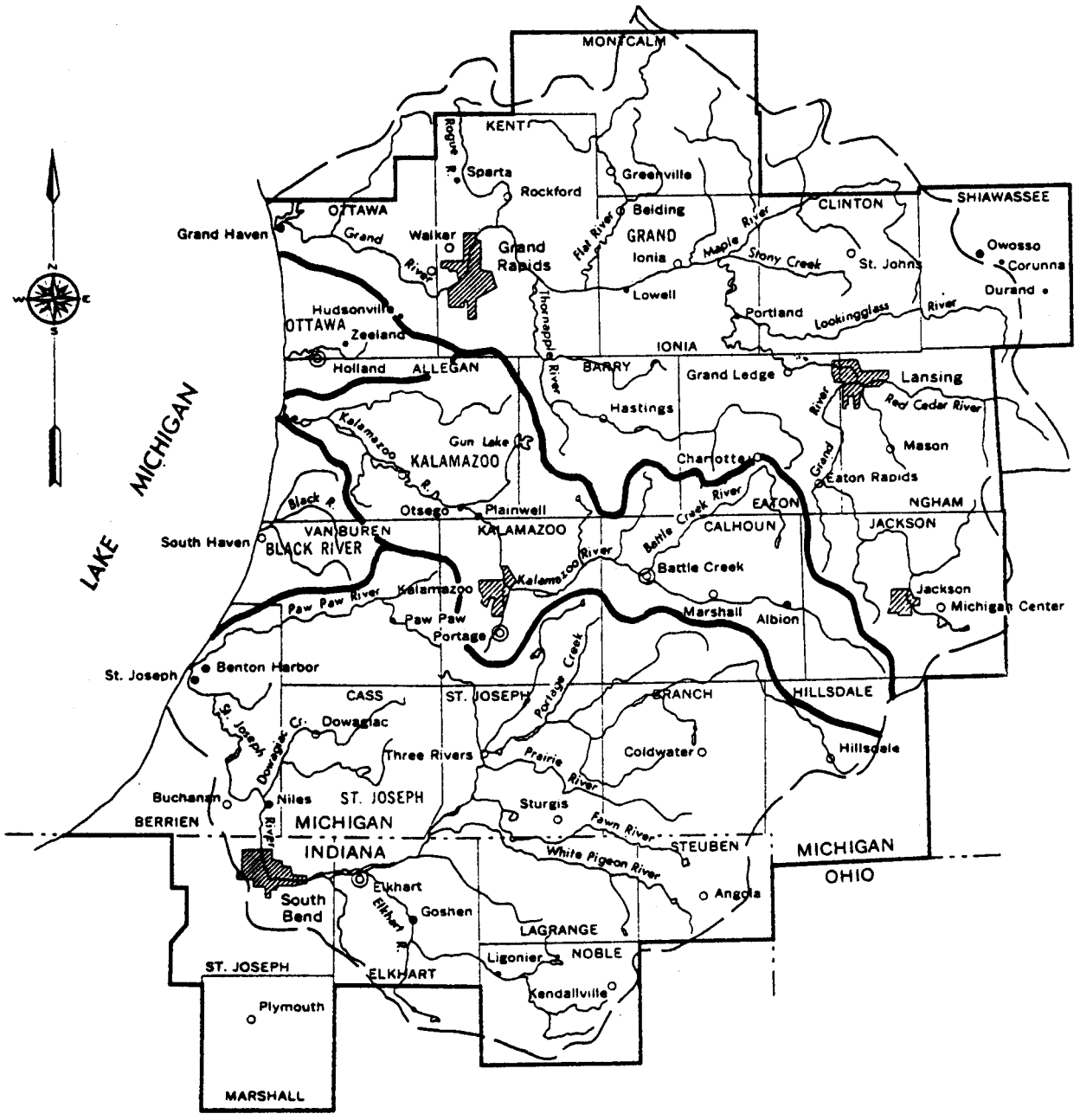
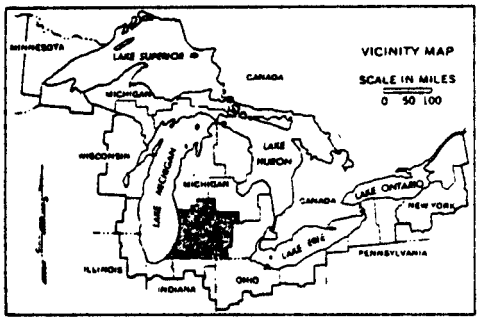


Figure 13

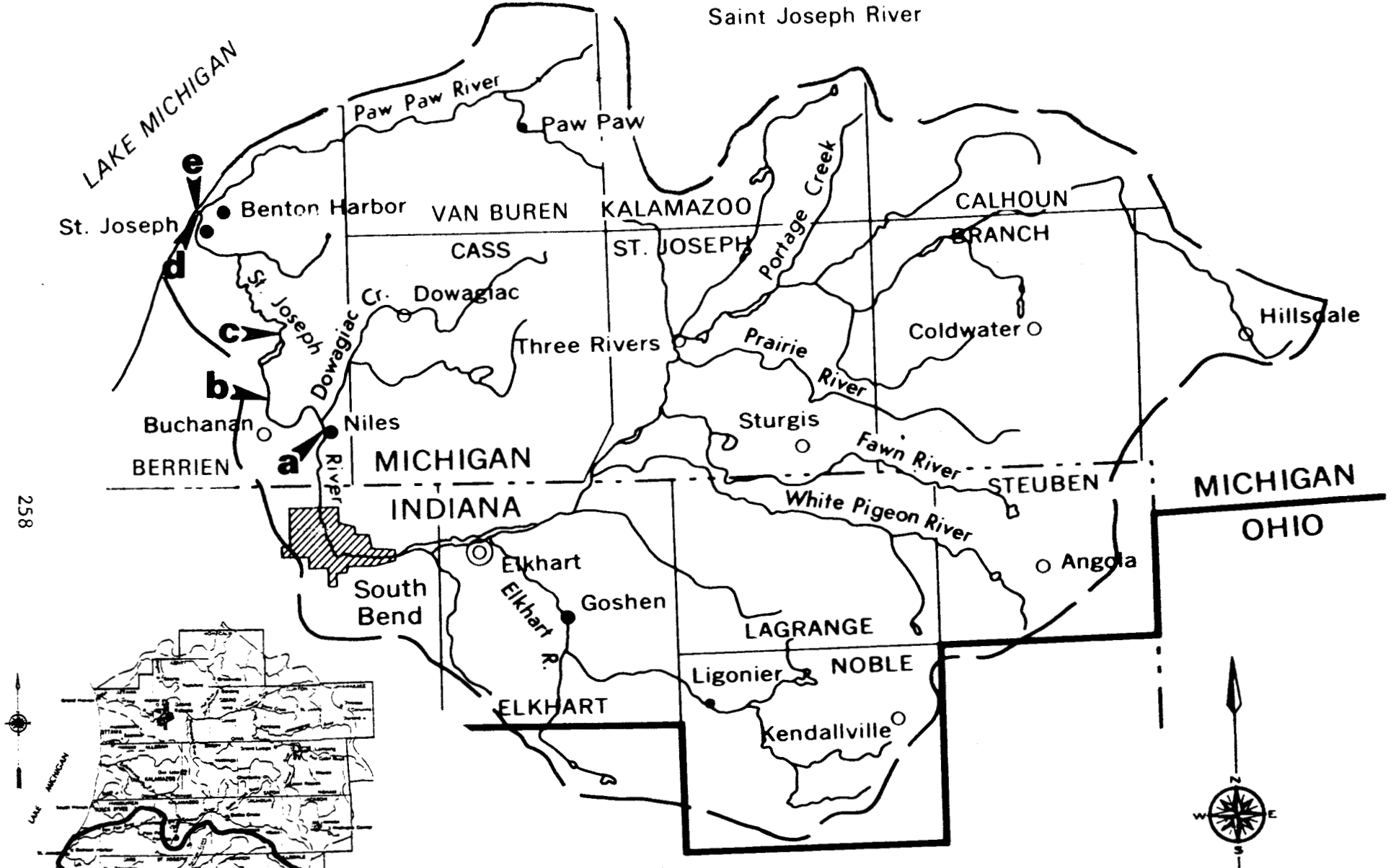
RIVER BASIN GROUP 2.3

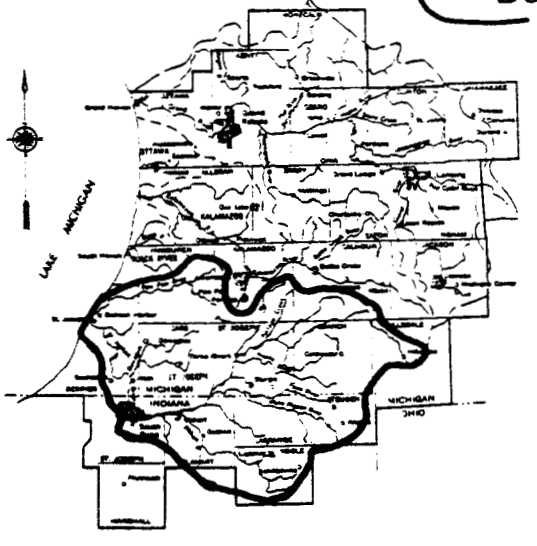


SCALE IN MILES

0 5 10 15 20 25

Hydrologic Area 2.3.1
Saint Joseph River





Vicinity Map-RBG 2.3

Hydrologic Area 2.3.1
St. Joseph River

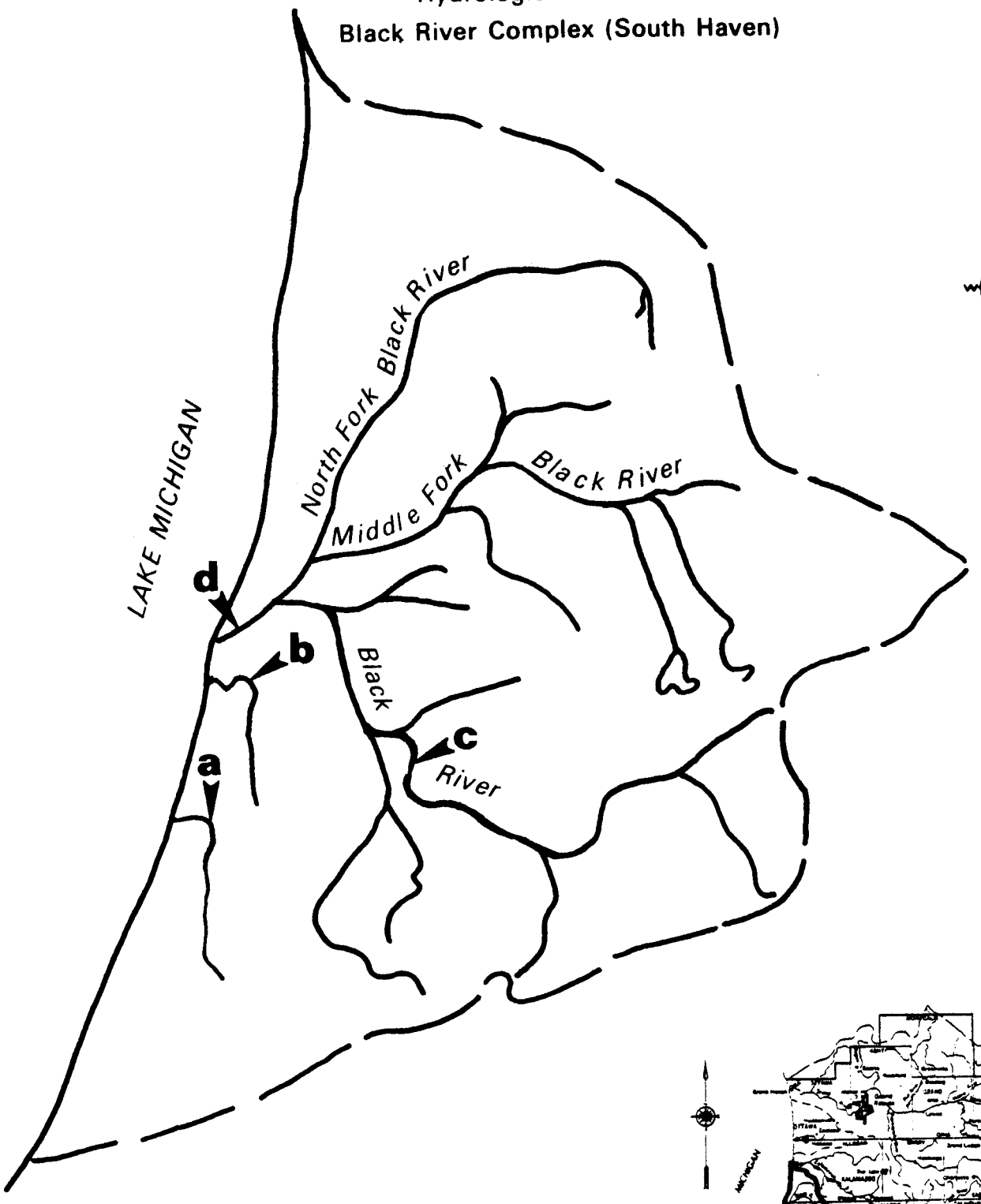
The St. Joseph River drains an area of 1,211,000 hectares (2,992,000 acres). Sixty-four percent of the area is located in the southwest corner of the State of Michigan with the remaining 36 percent in Indiana. The St. Joseph River has a mean annual discharge of 88.8 m^3/s (3,136 cfs). Major tributaries to the St. Joseph River are the White Pigeon River, the Prairie River, and the Elkhart River. The Basin has very little relief and contains few wetlands. Approximately 20 percent of the area is forested, 60 to 70 percent devoted to agriculture, and 10 percent urbanized. Most of the bedrock is made of sandstone with some areas of shale in the southern portion. The overlying material is made of silt and clay near the shore with sand, gravel and glacial till scattered throughout the remaining area. Over 34 industries and 14 municipalities use the surface waters of the St. Joseph River for waste assimilation. Cities such as South Bend, Indiana (Pop.: 125,580), Elkhart, Indiana (Pop.: 43,152), Benton Harbor, Michigan (Pop.: 16,481), Niles, Michigan (Pop.: 12,988), and St. Joseph, Michigan (Pop.: 11,042) are the major population centers in this area.

Station Key

Station Location	DAM River and Station Numbers
Saint Joseph River	23101
a	2310101
b	2310102
c	2310103
d	2310104
e	2310105

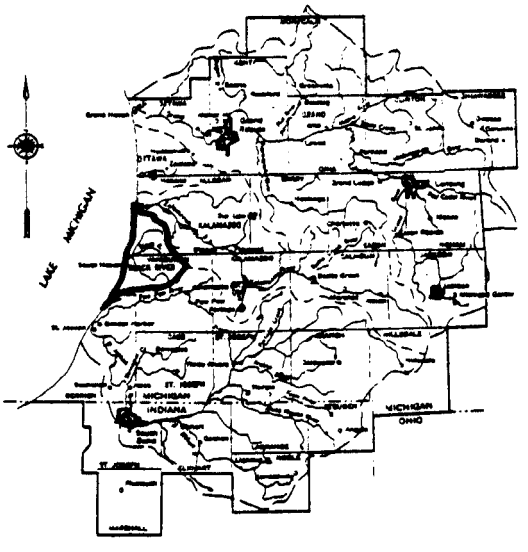
Hydrologic Area 2.3.2

Black River Complex (South Haven)



SCALE IN MILES

0 5 10



Vicinity Map-RBG 2.3

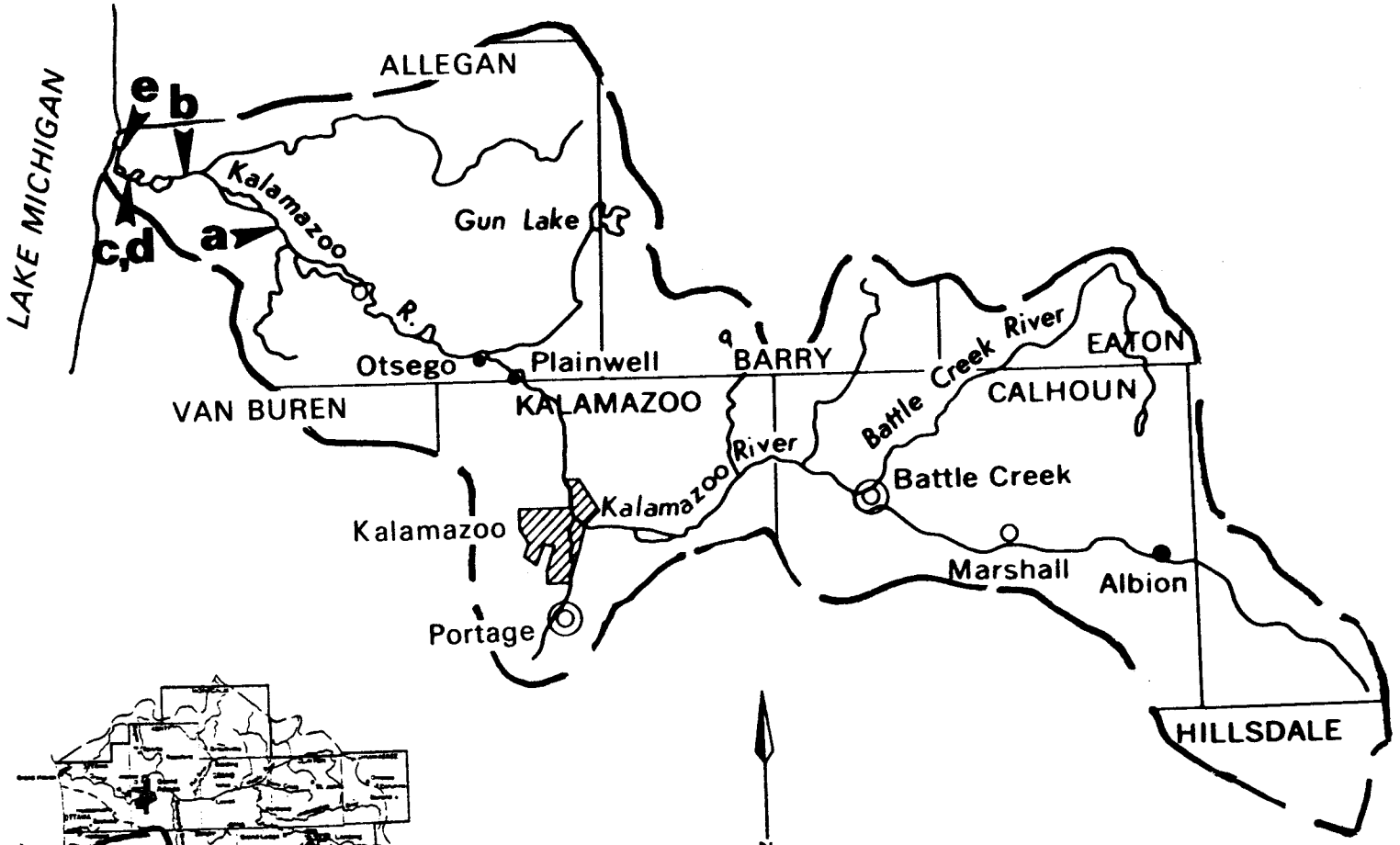
Hydrologic Area 2.3.2
Black River Complex (South Haven)

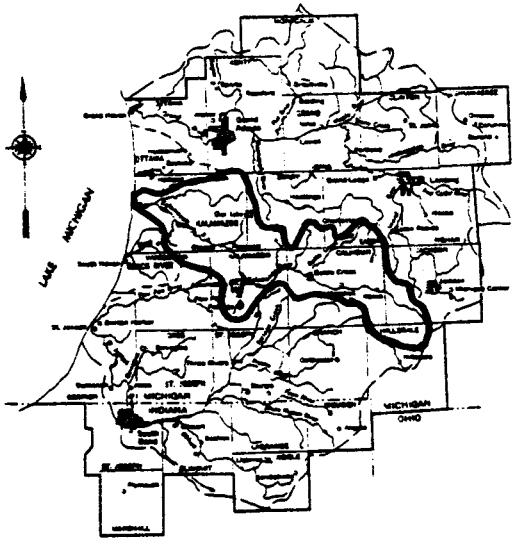
The Black River complex encompasses an area of 93,000 hectares (229,000 acres). The area is located in the southwestern portion of the State of Michigan. The major river in the area is the Black River, which has a mean annual discharge of 2.8 m^3/s (99 cfs). The area is very flat with few wetlands. Roughly 20 percent of the area is forested, 60 to 70 percent utilized in agriculture and another 5 percent (approximately) is urbanized. The bedrock is composed mostly of limestone. The overlying material is mostly silt and clay. The water quality of the river is generally good with the only major population centers at South Haven (Pop.: 6,471) and Bangor (Pop.: 2,050), Michigan.

Station Key

Station Location	DAM River and Station Numbers
Brandywine	23201
a	2320101
Rogers Creek	23202
b	2320201
Black River	23203
c	2320301
d	2320302

Hydrologic Area 2.3.3
Kalamazoo River





Vicinity Map-RBG 2.3

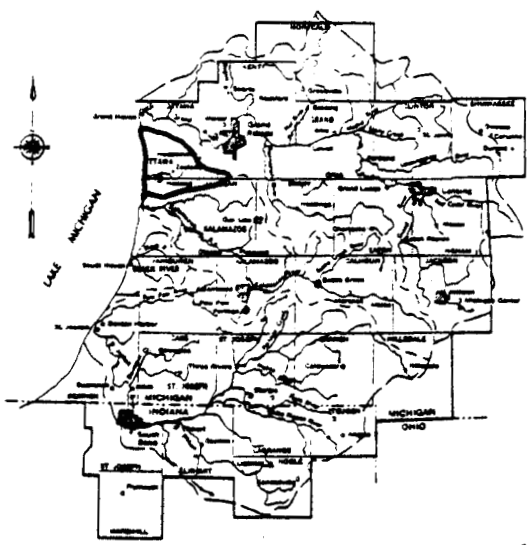
Hydrologic Area 2.3.3
Kalamazoo River

The Kalamazoo River drains an area of 520,000 hectares (1,285,000 acres). The area is located in the southwest portion of the State of Michigan. The Kalamazoo River has a mean annual discharge of 38.6 m^3/s (1,363 cfs). Major tributaries to the Kalamazoo are the Rabbit River and Battle Creek. The entire region has generally rolling topography with prairie, swamp and hilly sections alternating at frequent intervals. There are significant wetlands in the area. Approximately 20 percent of the area is forested, another 60 to 70 percent devoted to agriculture, and 10 percent urbanized. The bedrock is composed mostly of sandstone. The surface formations are silt and clay near the coast, glacial till and sand and gravel. Due to numerous small lakes and high infiltration, the runoff peaks are not severe and the streams have relatively high baseflows. There are 16 municipal wastewater treatment facilities serving approximately 182,000 people that use surface waters of the Kalamazoo River Basin for waste assimilation. In addition 37 industries use the surface waters for the same purpose. The Cities of Kalamazoo (Pop.: 85,555), Battle Creek (Pop.: 38,931), Portage (Pop.: 33,590), and Albion (Pop.: 12,112) represent the major industrial and municipal pressure areas.

Station Key

Station Location	DAM River and Station Numbers
Kalamazoo River	23301
a	2330101
b	2330102
c	2330103
d	2330104
e	2330105

Hydrologic Area 2.3.4
Black River Complex (Ottawa Co.)



SCALE IN MILES
0 5 10

Vicinity Map-RBG 2.3

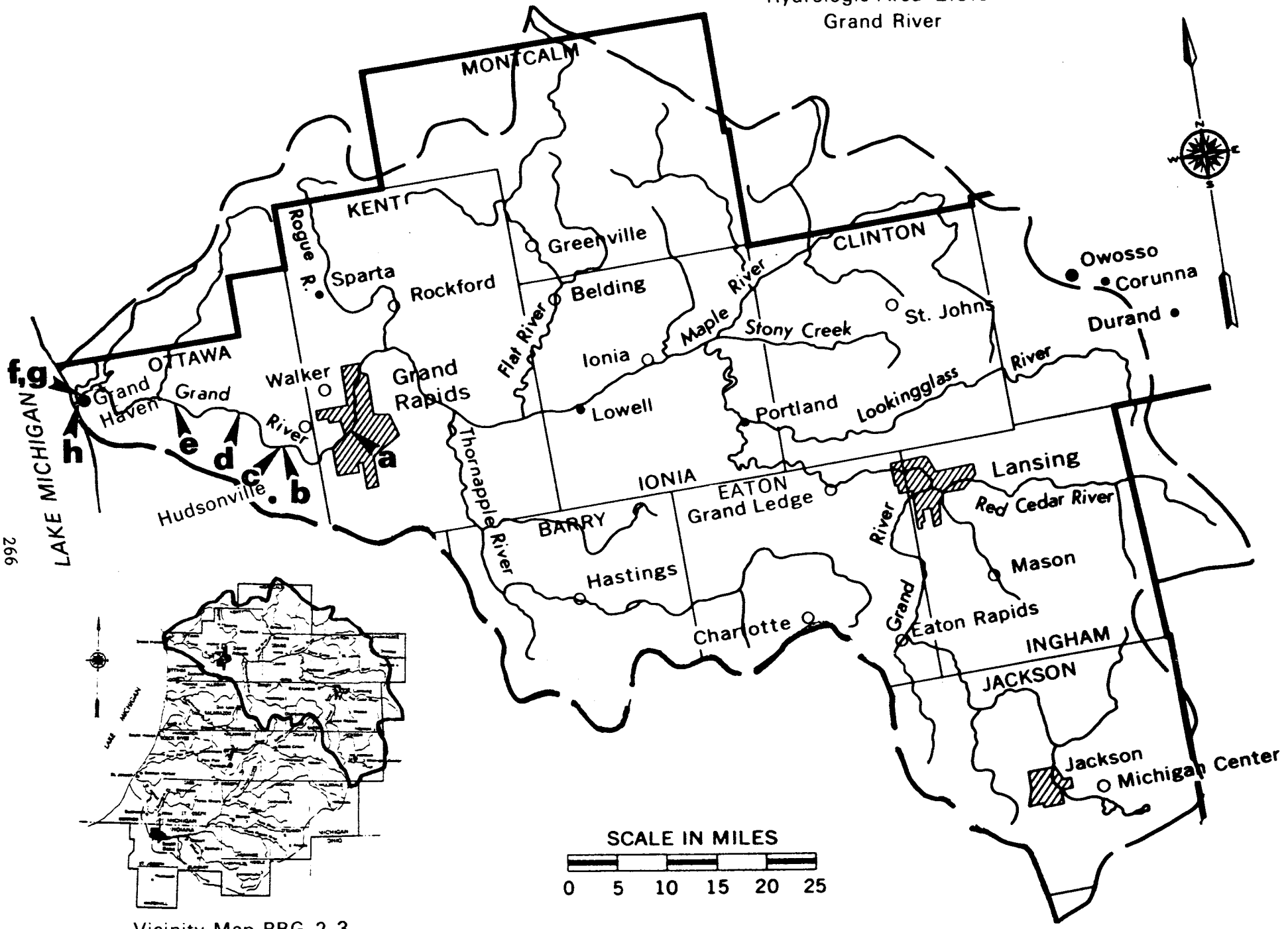
Hydrologic Area 2.3.4
Black River Complex (Ottawa Co.)

The Black River complex covers 66,000 hectares (163,000 acres) in the southwest section of Michigan. The major tributary in the area is the Black River (ungauged). The area has a rolling topography with few wetlands. About 20 percent of the area is forested, 60 percent devoted to agriculture, and 10 percent urbanized. The bedrock is composed of sandstone. The overlying material is silt and clay along the coast and glacial till throughout the rest of the area. The major industrial area surrounds the City of Holland (Pop.: 26,337). The only other important area of human pressure is the City of Zeeland (Pop.: 4,734).

Station Key

Station Location	DAM River and Station Numbers
Black River	23401
a	2340101
b	2340102
c	2340103
d	2340104
e	2340105
f	2340106
g	2340107
h	2340108
i	2340109
j	2340110
Pine Creek	23402
k	2340201

Hydrologic Area 2.3.5
Grand River



Vicinity Map-RBG 2.3

Hydrologic Area 2.3.5
Grand River

The Grand River Basin covers an area of 1,466,000 hectares (3,623,000 acres) in the southwest portion of Michigan. The Grand River has a mean annual discharge of 99.2 m^3/s (3,503 cfs). Major tributaries to the Grand River are the Flat River, the Thornapple River, and the Looking Glass River. The topography varies from flat to rolling with some wetlands. Approximately 20 percent of the area is forested, 60 to 70 percent agriculturalized, and about 10 percent urbanized. The bedrock is composed of sandstone. Bedrock is covered by glacial till with some silt and clay near the shore of Lake Michigan. The agriculture land use includes a considerable number of orchards and vineyards. Over 60 industrial and 60 municipal establishments use the surface waters for waste assimilation. Metal processing industries are especially common. The Cities of Jackson (Pop.: 45,484), Lansing (Pop.: 131,546), East Lansing (Pop.: 47,540), Grand Rapids (Pop.: 197,649) , Wyoming (Pop.: 56,560), and East Grand Rapids (Pop.: 12,565) represent the major municipal and industrial loading areas in this basin.

Station Key

Station Location	DAM River and Station Numbers
Grand River	23501
a	2350101
b	2350102
c	2350103
d	2350104
e	2350105
f	2350106
g	2350107
h	2350108

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 2.3.1 St. Joseph River												
		23101	St. Joseph River												
30-74	21	2310101	In Niles River Mile 44.0		1										
67	06	2310102	Seven Miles Below Berrien Springs		2C	2C	2C			2C		2C	2C	2C	2C
68	"	"	"		2C	2C	2C			2C		2C	2C	2C	2C
69	"	"	"		2BC	2BC			2BC	2BC		2BC	2BC	2BC	2BC
70	"	"	"		2BD	2BD	2BD	2BD		2BD		2BD	2BD	2BD	2BD
71	"	"	"		2BC	2BC	2C	2C	2C	2C		2D	2C	2C	2C
72	"	"	"			5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
73	"	"	"			5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B	5A 2B	5A 2B	5A 2B
71-74	06	2310103	US-31 Bridge												
73[b]	42	2310104	US-33 Bridge			2B 11C 8D[c]								2B 8D[c] 11C	
74[b]	"	"	"			8AB[c] 11C								8AB[c]	
63	06	2310105	C&O Railroad Bridge Near Mouth		5B-D	8BD 5C		8BD 5C		8BD 5C		2BC		8BD 5C	8BD 5C
64	"	"	"		5ABD 2C	5AC 8BD		5ACD 8B		5ACD 8B		2AD		5AC 8BD	5ACD 8B
65	"	"	"		5ABD	2A		2A						2A	
66	"	"	"		5AB 2D										
67	"	"	"		5A 8B-D	5A 8B-D	2C	2A 5B 8CD	8CD	2B 5C 8D		2C	2C	5A 8B-D	5A 8B-D
68	"	"	"		5	5	2C	5	5	5		2B-D	2B-D	5	5
69	"	"	"		5	5	5AD 2BC	5	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5	5	5	5	5	5		2ABD 5C	2ABD 5C	5	5
72	"	"	"		5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
73	"	"	"		2BC 5D	5	5	5	5	5		5	5	5	5ABD
74	"	"	"		5	5	5	5	5	5		5	5	5	5

[a] Five samples taken over 1971-1974.

[b] 11C--twice weekly.

[c] Some weekly samples.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2310101															
2310102	2C		2C	2C		2C	2C		2C				2C		
"	2C		2C	2C		2C	2C		2C						
"	2BC		2BC	2BC		2BC	2BC		2BC				2BC		
"	2BD		2BD	2BD		2BD	2BD		2BD				2BD		
"	2C	2C	2C	2C	2C	2C	2C		2C		2C		2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C		2C		2C		
"	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B						
2310103														[a] 9	[a] 9
2310104		2B 8D[c] 11C	2B 8D[c] 11C			2B 8D[c] 11C									
"		8AB[c] 11C	8AB[c] 11C			8AB[c] 11C									
2310105	8B 5CD		8BD 5C	8BD 5C			8BD 5C		8BD 5C		2BC				
"	5		5AC 8BD	5A-C 8D			5AC 8BD		5ACB 8D		2A				
"	2A		2A	2A			2A		2A						
"															
"	5A 8B-D		5AC 8B	5AC 8B			5AC 8B		2A 8B-D		2CD				
"	5ABD 8C		5	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD 2C	5	5		5	5AB 2C	5ABD 2C		5D		
"	5	5C 2D	5	5	2AB	5	5		5		5AB 2CD		2AD		
"	5	5	5	5	2AD 5BC	5	5		5	2B	2C	2D	2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C		2C		2C		
"	5	5	5	5	5	5	5		5	2C	2C		2C		
"	5	5	5	5	5	5	5		5	2C	2C		2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
75	06	2310105	(Continued)		2A	2A 5BC	2A 5B	2A 5BC	2A 5BC	2A 5BC		2A 5BC	2A 5BC	2A 5BC	2A 5BC
71	36	2310199	Near Mouth Exact Location Unknown					2AB 5CD							
			HYDROLOGIC AREA 2.3.2 Black River Complex (South Haven)												
		23201	Brandywine Creek												
63-73	06	2320101	Near South Haven			6									
		23202	Rogers Creek												
63-73	06	2320201	Near South Haven			6									
		23203	Black River												
66-74	21	2320301	4.9 Miles N.W. of Bangor		1										
67	"	"	"		2C	2C		2C				2C			
63	06	2320302	Dykman Avenue Near Mouth	*		8BD 5C		8BD 5C		8BD 5C		2BC		8BD 5C	8BD 5C
64	"	"	"	*		5AC 8BD		5ACD 8B		5ACD 8B		2AD		5AC 8BD	5ACD 8B
65	"	"	"	*		5		5ABD 2C		5AD 2CD				5	5ACD 2B
66	"	"	"	*	5C 2D	8AB 5C 2D		8AB 5C 2D		8AB 5C 2D		2C		8AB 5CD	8AB 2CD
67	"	"	"	*	5A 8B-D	5A 8B-D		5AB 8CD	8CD	2A-C 8D				5AC 8BD	5AC 8BD
68	"	"	"	*	5	5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*	5	5	5A 2B	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2310105	2A 5BC	2A 5BC	2A 5BC	2A 5BC	2A 5BC	2A 5BC	2A 5BC		2A 5BC						
2310199													2AB 5CD		
2320101															
2320201															
2320301															
"	2C								2C						
2320302	8BD 5C		8BD 5C	8BD 5C			8BD 5C		8BD 5C		2BC				
"	5		5AC 8BD	5A-C 8D			5AC 8BD		5ACD 8B		2A				
"	5ABD 2C		5AD 2BC	5AD 2BC			5ABD 2C		5ABD 2C						
"	8AB 5C 2D		8AB 5C 2D	8AB 5C 2D			8AB 5C 2D		8AB 5C 2D						
"	5A 8B-D		5A 8B 2C	5A 8B 2C			5A 8B 2C		5A 8B-D		2CD				
"	5		2A 5B-D	5	2B-D	5B-C	5B-C		5		2B-D				
"	5		5	5	5ABD	5	5		5	5AB 2C	5ABD 2C		5ABD 2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	06	2320302	(Continued)	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	6	5	5
72	"	"	"	*	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
73	"	"	"	*	5B-D	5	5	5	5	5		5	5	5	5ABD 2C
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	5A	5A	5A	5A	5A		5A	5A	5A	5A
			HYDROLOGIC AREA 2.3.3 Kalamazoo River												
		23301	Kalamazoo River												
29-74	21	2330101	Highway 89, Six Miles East of Fenville		1										
71	06	2330102	Near New Richmond			2C		2C		2C			2C	2C	2C
63	06	2330103	M-31 Highway		8BD 5C	8BD 5C		8BD 5C		8BD 5C		2BC		8BD 5C	8BD 5C
64	"	"	"		5AC 8BD	5AC 8BD		5ACD 8B		5ACD 8B		2AD		5ACD 8BD	
65	"	"	"		5	5		5ABD 2C		5AD 2BC		2BC		5	5ACD 2B
66	"	"	"		8AB 5CD	8AB 5CD		8AB 5CD		8AB 5C 2D		2C		8AB 5CD	5ABD 2C
67	"	"	"		8	8		5AB 8CD	8CD	2A-C 8D				8	8
68	"	"	"		5	5		5ACD 8B	5ACD 8B	5ACD 8B		2B-D	2B-D	5	5
69	"	"	"		5	5	5AD 2BC	5	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5A-C 2D	5	5	5	5	5		6	2ABD 5C	5	5
72	"	"	"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"		5B-D	5	5	5	5	5		5	5	5	5ABD
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		5A	5A-C	5AB 2C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2320302	5	5AC	5	5	2AB	5	5		5		5AB 2CD		5AB 2CD		
"	5	5	5	5	2ACD 5B	5	5		5			2D	2C		
"	5A-C	5	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	2C	2C		2C		
"	5	5	5	5	5	5	5		5	2CD	2D		2D		
"	5	5	5	5	5	5	5		5	2C	2C		2C		
"	5A	5A	5A	5A	5A	5A	5A		5A						
2330101															
2330102			2C	2C		2C	2C		2C			2C	2C		
2330103	8BD 5C		8BD 5C	8BD 5C			8BD 5C		8BD 5C		2BC				
"	5		5AC 8BD	5A-C 8D			5AC 8BD		5ACD 8B		2A				
"	5ABD 2C		5AD 2BC	5AD 2BC			5ABD 2C		5ABD 2C						
"	8AB 5C 2D		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	5A 8B-D		8AB 2C	8AB 2C			8AB 2C		5A 8B-D		2CD				
"	5		5	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD 2C	5	5		5	5AB 2C	5ABD 2C		5ABD 2C		
"	5	5CD	5	5	2A 2B	5	5		5		5AB 2CD		5AB 2CD		
"	5	5	5	5	2ACD 5B	5	5		5			2D	5C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5	5	5	5	5	5	5		5	2D	2D		2D		
"	5	5	5	5	5	5	5		5	2C	2C		2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
65	32	2330104	River Mile 25 Near M-31			10CD	10CD						10CD	10CD	
66	"	"	"			10AB	10AB						10AB	10AB	
67	21	"	"		2BC	2BC		2BC				2BC			
71-74	06	2330105	42-39-37 X 86-12-00												
71	36	2330199	Near Mouth Exact Location Unknown					2AB 5CD							
			HYDROLOGIC AREA 2.3.4 Black River (Ottawa Co.)												
		23401	Black River												
67	06	2340101	96th Avenue 42-46-38 X 86-01-00		2D	2D			2D	2D		2D	2D	2D	2D
72	"	"	"			2D	2D	2D	2D	2D		2D	2D	2D	2D
72	18	"	"												
73	"	"	"												
60-74	21	2340102	Near Zeeland 42-46-40 X 86-01-06		1										
67	"	"	"		1	2BC		2BC				2BC			
72	"	"	"		1	2ABD 5C		2ABD 5C							
73	"	"	"		1	6		6							
72	18	2340103	Butternut Drive 42-48-00 X 86-06-30												
73	"	"	"	*											
73	06	2340104	River Ave. Bridge			5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
74	"	"	"			5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
72	18	2340105	On Lake Macatawa 42-48-00 X 86-07-00			2CD							2C 5D	2CD	
73	06	2340106	42-46-58 X 86-08-35			2B		2B						2B	
72	18	2340107	42-47-00 X 86-09-00			2CD							2C 5D	2CD	
72	18	2340108	42-46-00 X 86-10-00			2D							2D	2D	

[a]Five samples from 1971-74.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2330104	10CD		10CD	10CD		10CD	10CD		10CD		10CD				
"	10AB		10AB	10AB		10AB	10AB		10AB		10AB				
"	2BC								2BC						
2330105														9[a]	9[a]
2330199													2AB 5CD		
2340101	2D		2D	2D		2D	2D		2D						
"	2D	2D	2D	2D	2D	2D	2D		2D			2D	2D		
"			5D	5D	5D	5D	5D								
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D								
2340102															
"	2BC								2BC						
"															
"															
2340103			5D	5D	5D	5D	5D								
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C	5A-C								
2340104	5B-D		5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C	2C	2CD		
"	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C						
2340105	2CD		2C 5D	2C 5D		2C 5D	2C 5D								
2340106	2B		2B	2B		2B	2B		2B						
2340107	2CD		2C 5D	2C 5D		2C 5D	2C 5D								
2340108	2D		2D	2D		2D	2D								

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67-73	06	2340109	On Lake Macatawa 42-46-37 X 86-10-51			9		2B[a]				2B[b]		2B[a]	
63	06	2340110	At Mouth	*		8BD 5C		8BD 5C		8BD 5C		2BC		8BD 5C	8BD 5C
64	"	"	"	*		5AC 2BD		5ACD 8B		5		2AD		5AC 8BD	5ACD 8B
65	"	"	"	*		5		5ABD 2C		5ABD 2C		2BC		5	5ACD 2B
66	"	"	"	*		8AB 5CD		8AB 5CD		8AB 5C 2D		2C		8AB 5CD	8AB 5CD
67	"	"	"	•		8		5AB 8CD	8CD	2AB 5C 8D				8	8ABD 5C
68	"	"	"	*		5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*		5	5	5	5	5		5	5	5	5
70	"	"	"	*		5A-C 2D	5	5	5	5		5	5	5	5
71	"	"	"	*		5	5	5	5	5		6	6	5	5
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5AC 2BD
73	"	"	"	•	5B-D	5	5	5	5	5		5	5	5	5ABD 2C
74	"	"	"	•		2D	2D	2D	2D	2D		2D	2D	2D	2D
		23402	Pine Creek												
72	12	2340201	At Lakewood Blvd. 42-48-00 X 86-08-30												
73	"	"	"												
		23403	Pigeon River (No Data Found)												

[a] March 1973 only.

[b] April 1967 only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2340109	9		2B[a,b]	2B[a]		2B[a,b]	2B[a,b]		2B[a]						
2340110	8B 5CD		8BD 5C	8BD 5C			8BD 5C		8BD 5C		2BC				
"	5		5AC 8BD	5A-C 8D			5AC 8BD		5ACD 8B						
"	5ABD 2C		5AD 2BC	5AD 2BC			5ABD 2C		5ABD 2C						
"	8AB 5C 2D		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	5A 8B-D		8AB 2C	8AB 2C			8AB 2C		5A 8B-D		2CD				
"	5		2A 5B-D	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD	5	5		5	5AB 2C	5ABD 2C		5ABD 2C		
"	5	5CD	5	5	2AB	5	5		5		5AB 2CD		5AB 2CD		
"	5	5	5	5	2ACD 5B	5	5		5			2D	2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C		
"	5	5	5	5	5	5	5		5	2D	2D	2C	2D		
"	2D	2D	2D	2D	2D	2D	2D		2D					2B	2B
2340201			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 2.3.5 Grand River												
		23501	Grand River flow: 99.2 m^3/s (3,503 cfs)												
30-74	21	2350101	Near Fulton Street in Grand Rapids		1										
70	06	2350102	End of 10th Avenue			2C	2C	2C		2C				2C	2C
70	06	2350103[a]	At 2289 Begole Street			11C	2C	2C		2C				11C	11C
70	06	2350104[a]	68th Avenue Bridge			11C	2C	2C		2C				11C	11C
70	06	2350105[a]	At Riverside Park			11C	2C	2C		2C				11C	11C
68	03	2350106	Grand Haven Power Plant A				5D						5D	5D	
69	"	"	"				5B-C						5B-C	5B-C	
68	41	2350107	Railroad Bridge 43-03-56 X 86-14-02			5CD				5CD				5CD	2C 5D
69-70	"	"	"			5				5				5	5
71	"	"	"			5				5				5	5
72	"	"	"			5				5				5	5
73	"	"	"			5AC 2B				5AC 2B				5AC 2B	5AC 2B
74	"	"	"			5	5CD			5				5	5
75	"	"	"			5	5			5				5	5
63	06	2350108	At Mouth	*	8B-D	8BD 5C		8BD 5C		8BD 5C		2BC		8BD 5C	8BD 5C
64	"	"	"	*	8ABD 5C	5AC 8BD		5ACD 8B		5ACD 8B		2AD		5AC 8BD	5AC 8BD
65	"	"	"	*	8A 5B-D	5		5ABD 2C		5AD 2BC		2BC		5	5ACD 2B
66	"	"	"	*	8AB 5CD	8AB 5CD		8AB 5CD		8AB 5C 2D		2C		8AB 5CD	8AB 5CD
67	"	"	"	*	8	8		5AB 8CD	8CD	2A-C 8D				8ABD 5C	8ABD 5C
68	"	"	"	*	5	5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*	5	5	5ABD 2C	5	5	5		5	5	5	5
69	32	"	"	*	2C 8D	4C 9D							4C 9D	4C 9D	
70	"	"	"	*	2A										

[a] 11C. Intensive sampling August 25-27, 1970.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2350101															
2350102	2C		2C	2C		2C	2C		2C				2C		
2350103	11C		2C	2C		2C	2C		2C						
2350104	11C		2C	2C		2C	2C		2C						
2350105	11C		2C	2C		2C	2C		2C						
2350106	5D	5D	5D				5D		5D						
"	5B-C	5B-C	5B-C				5B-C		5B-C						
2350107	5CD					5D									
"	5					5									
"	5					2A 5B-D									
"	5		2A	2A		5					2A				
"	5AC 2B					5AC 2B									
"	5		5	5		5	5B-D		2A 5B-D		5CD	5D			
"	5		5	5		5	5		5A-C		5CD	5			
2350108	8BD 5C		8BD 5C	8BD 5C			8BD 5C		8BD 5C		2BC				
"	5		5AC 8BD	5A-C 8D			5AC 8BD		5ACD 8B						
"	5ABD 2C		5AD 2BC	5AD 2BC			5ABD 2C		5ABD 2C						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	5A 8B-D		8AB 2C	8AB 2C			8AB 2C		5A 8B-D		2C				
"	5		2A 5B-D	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD 2C	5	5		5	5AB 2C	5ABD 2C		5ABD 2C		
"	4C 9D		2C 8D			2C 8D									
"		8A-C				8A-C									

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	06	2350108	(Continued)	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5A-C 2D	5	5	5	5	5		6	6	5	5
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5BC 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5AB 2CD
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	5AB 2C	5AB	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
71	36	2350199	Near Mouth Exact Location Unknown					2AB 5CD							
		23502	Norris Creek		(No Data Found)										

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2350108	5	5C-D	5	5	2A 5B	5	5		5		5AB 2CD		2AD		
"	5	5	5	5	2ACD 5B	5	5		5		2D	2D	2C	2B-D	
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C	2B	2B
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2D	2D	2C	2D		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C	2B	2B
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C						
2350199													2AB 5CD		

Evaluation and Summary of Data for River Basin Group 2.3

This river basin group consists of five hydrologic areas in two states, 4,407 km^2 (1,695 mi^2) in Indiana and 29,279 km^2 (11,261 mi^2) in Michigan. Of the ten tributaries included on the DAM, all but four had adequate data to consider loading calculations. Long-term flow and water quality records are available, mainly on a monthly sampling basis for all of the four major tributaries. There has been very little attempt to measure the lake inputs during runoff events or high flows in this river basin group. Because the major tributaries drain a combination of highly agricultural and urbanized land, it was recommended in the preliminary report to conduct more detailed monitoring on the Grand River, the largest tributary in this river basin group. As a result of the completion of Subactivity 2.2 of Task D of PLUARG, the Grand River will have detailed data (daily sampling over a one year period). All four of the major tributaries in this hydrologic area are gauged, although the flow data will likely be complicated by the existence of impoundments near the river mouth and, in some cases, the location of the gauging stations. No data were found on heavy metals, pesticides, or refractory organics for this river basin group.

Hydrologic Area 2.3.1 - St. Joseph River. The St. Joseph River is one of the largest rivers in Lake Michigan and in the Great Lakes Basin. It has been gauged since 1930, although the gauging station is located approximately 70 river kilometers (44 miles) upstream from the mouth and is above the confluence of several major tributaries. The St. Joseph has a relatively long history of regular water quality measurements. Monthly data on suspended solids, nutrients, and chloride are available for most seasons since 1968 at station 2310105. In the mid-1960's seasonal biweekly measurements were made. Limited heavy metal data are available, mostly as a result of one or two analyses per year. Very little pesticide or refractory organics data are available for the St. Joseph River. Although the chemical record is relatively good, the lack of a gauging station near the river mouth may be a limiting factor in loading calculations. There are also numerous dams on the river which may complicate these calculations.

Hydrologic Area 2.3.2 - Black River Complex (South Haven). Of the three tributaries identified for this complex, only the Black River was found to have significant data available. The Black River has been gauged since 1966 at a station (2320301) located about 10 river kilometers (six miles) upstream from the mouth. The gauging station is above the confluence of a number of major tributaries and thus may not truly reflect the total discharge to Lake Michigan. Chemical data collected for the Black River near the river mouth are relatively extensive. Biweekly to monthly monitoring has occurred since 1963 at station 2320302. A number of major parameters have been monitored, including suspended solids, chloride, and some nutrients. Since 1970, most of these parameters have been monitored on an essentially monthly basis, although there were some years when the monthly sampling was not carried out over the entire annual cycle. Some heavy metal data were obtained on a one or two samples per year basis. No pesticide or refractory organics data were found for the Black River mouth area. Instantaneous discharge measurements were usually made at station 2320302 when water quality samples were obtained. Because of the large number of instantaneous flow measurements taken since 1966 it may be possible to correlate the instantaneous flow measurements at the river mouth with the gauging station data upstream in order to obtain a continuous record at the mouth.

Hydrologic Area 2.3.3 - Kalamazoo River. The Kalamazoo River is gauged approximately 16 river kilometers (nine miles) upstream from Lake Michigan at station 2330101. At least one major tributary joins the Kalamazoo below this station. The river also widens into a number of lakes below the gauging station where most of the water quality data were collected. Data have been collected at station 2330103 on a relatively regular basis since 1963, with some bimonthly sampling during the 1960's. In general, there is a long period with monthly data for suspended solids, nutrients, and chloride. Some heavy metal data are also available at this station with usually one or two samples collected per year since 1969. A few data were collected between 1971 and 1974 for pesticides and refractory organics. Instantaneous flow measurements were made at the time of most of the sample collections for chemical analyses.

Hydrologic Area 2.3.4 - Black River (Ottawa County). Although the Black River has been gauged since 1960 the gauging station is located closer to the headwaters than to the mouth and is above the confluence of many of the major tributaries of the Black River. The Black River also widens near its mouth to form Lake Macatawa at the City of Holland, Michigan, which further complicates the flow record. A number of stations have been included on the DAM along Lake Macataw. Because of the presence of this lake and the backwater flow effects from Lake Michigan, accurate loading estimates from the Black River will be difficult to obtain.

The most detailed water quality record was found at station 2340110, located where Lake Macatawa discharges into Lake Michigan. Since 1968, essentially monthly monitoring has been conducted for key loading parameters at this station. There have also been some measurements of heavy metals on a grab type basis. Between 1963 and 1968 there was a considerable amount of monitoring done for dissolved reactive phosphorus, nitrate, ammonia, and suspended solids. During this time biweekly measurements were made at various times with emphasis on the spring season. As is the case with many of the western Lake Michigan near-mouth stations, lake effects will likely complicate interpretation of the loading data.

Pine Creek, a small tributary included in this hydrologic area, was monitored during 1972 and 1973 for nitrogen species and total and dissolved reactive phosphorus. Some biweekly data are available during the spring of 1973 for these parameters. No data were found for the Pigeon River located north of the Black River.

Hydrologic Area 2.3.5 - Grand River. The Grand River is one of the largest tributaries in the Great Lakes Basin. Its substantial watershed drains both important urban and agricultural areas. A continuous flow gauge, situated in Grand Rapids (station 2350101) and in operation since 1930 is located approximately 65 river kilometers (40 miles) upstream from the mouth. Even though a number of tributaries join the river below this station, most of the watershed is monitored by this gauge. Lake effects are known to extend many miles upstream of the mouth. There is also a number of dams and a lake-like widening at the mouth that will also influence flow. Most of the chemical data reported on the DAM have been collected below the widening of the river near its confluence with Lake Michigan and thus may be subject to lake effects.

Stations 2350107 and 08 are located close to the river mouth and both have

considerable amounts of water quality data collected on them (mainly on a monthly basis). Some of these data were collected over the same years, so it may be possible to compare the records of these two stations. Between 1963 and 1968 the sampling strategy varied between monthly and biweekly for a number of parameters at station 2350108. Biweekly measurements were made for total phosphorus and silica in 1970 at this same station over the winter, spring, and summer seasons. Since 1970 suspended solids, nutrients, and chloride have been monitored on a generally monthly basis. Some grab samples for heavy metals, pesticides, and refractory organics were also taken.

Based in part on a recommendation from the Preliminary Report of this project, the Grand River is being monitored on a daily basis for important loading parameters beginning in the spring of 1976. While there has been an excellent long-term monthly monitoring program on the Grand, there has not been a monitoring program which specifically measures input during high flow periods. This new PLUARG study of the Grand River is designed to provide data on the input of the Grand River to Lake Michgian during such times. A number of other PLUARG studies on this river, in conjunction with the daily monitoring program, should provide further insight into the importance of nutrient inputs contributed during high flows by the Grand River. The Grand River is similar to a number of other tributaries on the eastern shore of Lake Michigan (such as the St. Joseph, Kalamazoo, and Muskegon Rivers). If input during high flows is found to be important for key loading parameters, it may provide insight into means by which monthly data can be used to provide a new estimate of loading with respect to the contribution of high flow events on these other tributaries.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 2.4

River Basin Group 2.4 drains an area of 34,545 km^2 (13,338 mi^2), shown in Figure 14. This river basin group contains eight hydrologic areas. Maps and descriptions of these hydrologic areas follow.

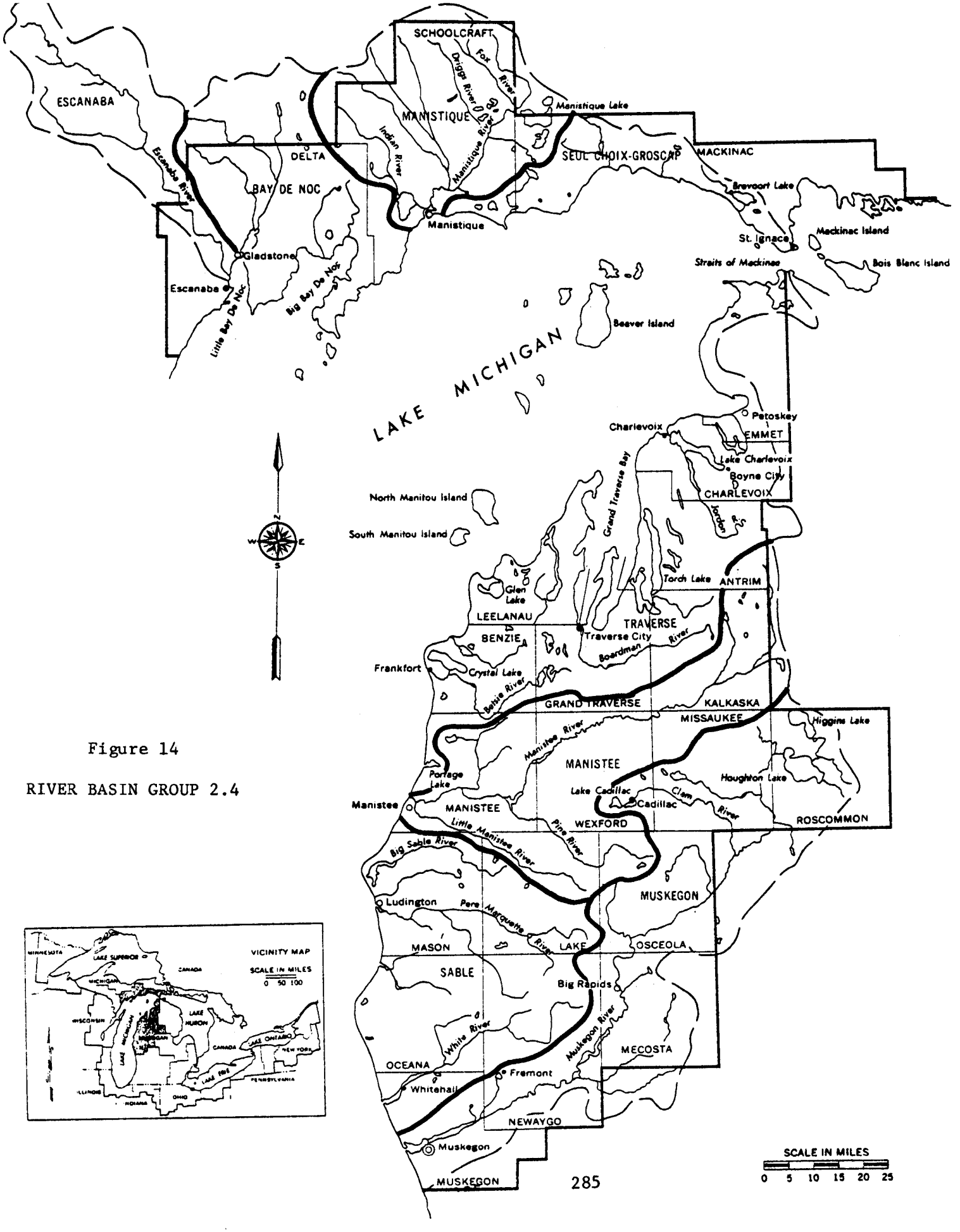
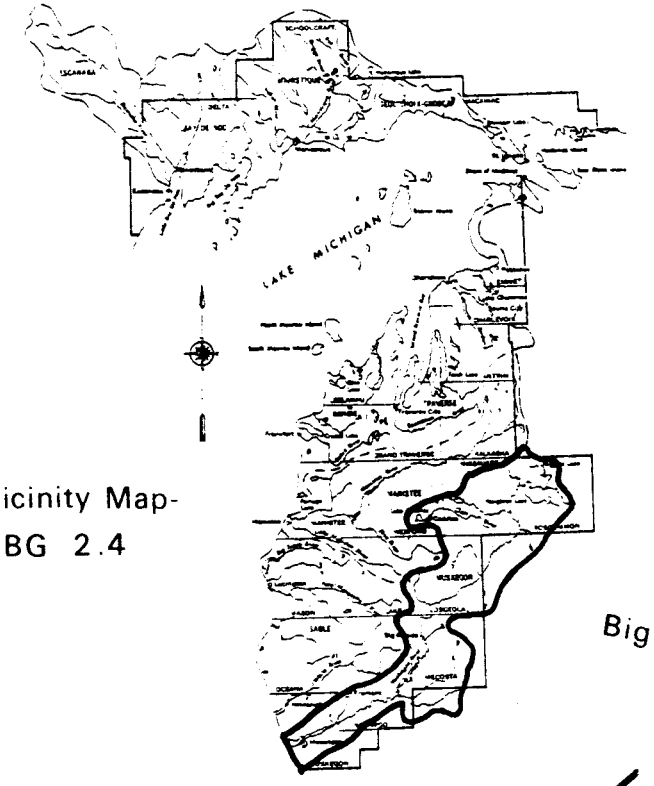


Figure 14

RIVER BASIN GROUP 2.4

Hydrologic Area 2.4.1
Muskegon River



Vicinity Map-
RBG 2.4

Lake Cadillac
Cadillac
Clam River
Houghton Lake
Higgins Lake
WEXFORD
MISSAUKEE
ROSCOMMON
OSCEOLA
Big Rapids
Muskegon River
MECOSTA
Fremont
NEWAYGO
LAKE MICHIGAN
Muskegon
MUSKEGON
a
b
c
d
e
f
g
h
i
j

SCALE IN MILES
0 5 10 15 20 25

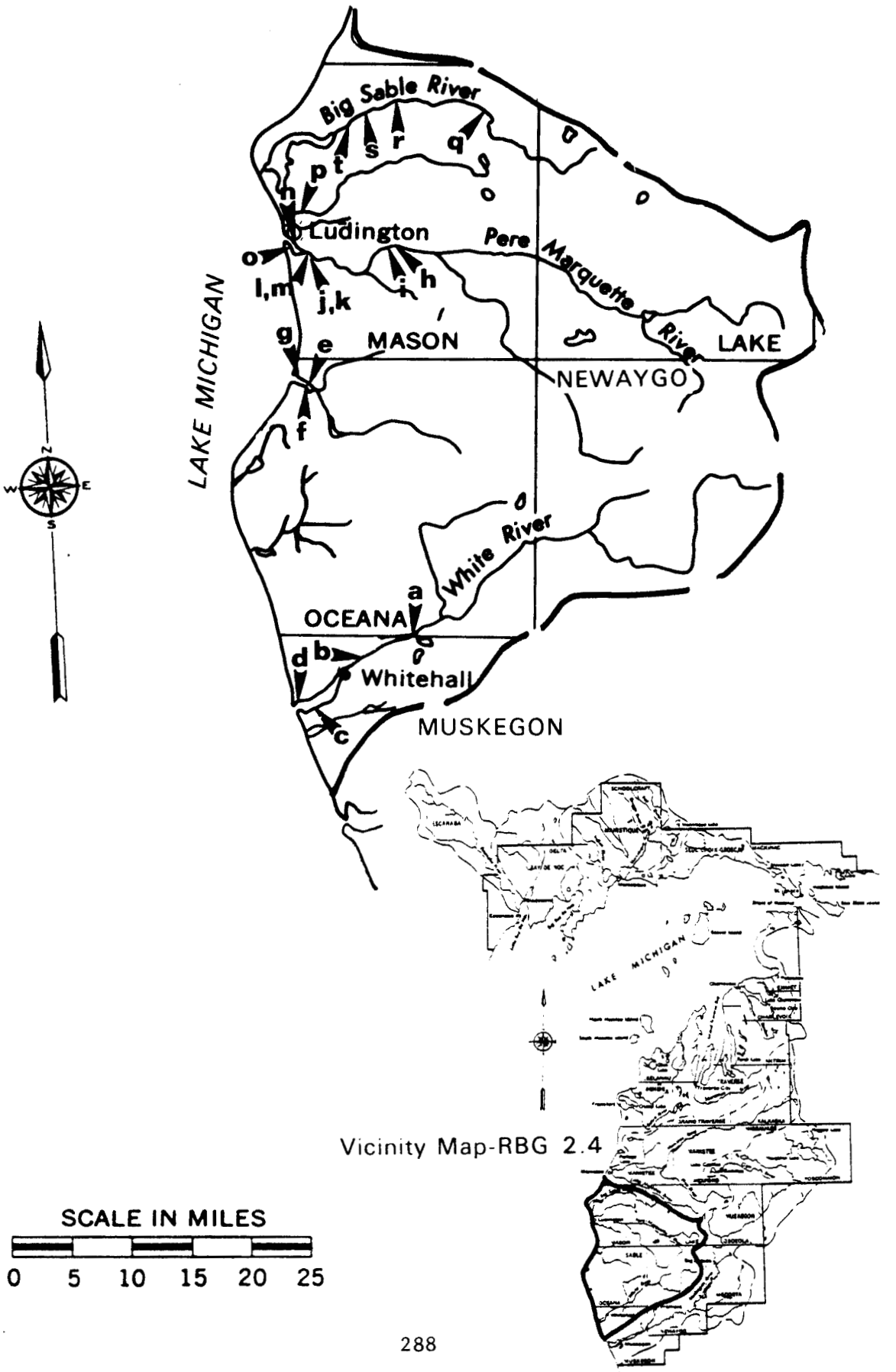
Hydrologic Area 2.4.1
Muskegon River

The Muskegon River drains an area of 685,000 hectares (1,692,000 acres). This area is located in the northwest portion of Michigan's Lower Peninsula. The Muskegon River has a mean annual discharge of 54.9 m^3/s (1,939 cfs). Major tributaries to the Muskegon River are the Little Muskegon River and the Clam River. The area hs a rolling topography with some wetlands. Approximately 50 percent of the area is forested. About 25 percent of the area is devoted to agriculture and another 5 percent urbanized. The bedrock is composed of sandstone. The material covering the bedrock is composed of silt and clay near the shoreline, sand and gravel in the central area, and glacial till over the remainder. The economy is based to a large extent upon manufacturing, although there is some agriculture and extraction of natural resources such as sand, gravel and oil. Over 20 industries and 9 municipalities use the surface waters of the Muskegon River for wastewater assimilation. The cities of Muskegon (Pop.: 44,631), Big Rapids (Pop.: 11,995), Cadallic (Pop.: 9,990), and Fremont (Pop.: 3,465) represent the important urbanized areas.

Station Key

Station Location	DAM River and Station Numbers
Black Creek	24101
a	2410101
b	2410102
c	2410103
d	2410104
Muskegon River	24102
e	2410201
f	2410202
g	2410203
h	2410204
i	2410205
Bear Creek	24104
j	2410401

Hydrologic Area 2.4.2
Sable Complex



Vicinity Map-RBG 2.4

SCALE IN MILES

0 5 10 15 20 25

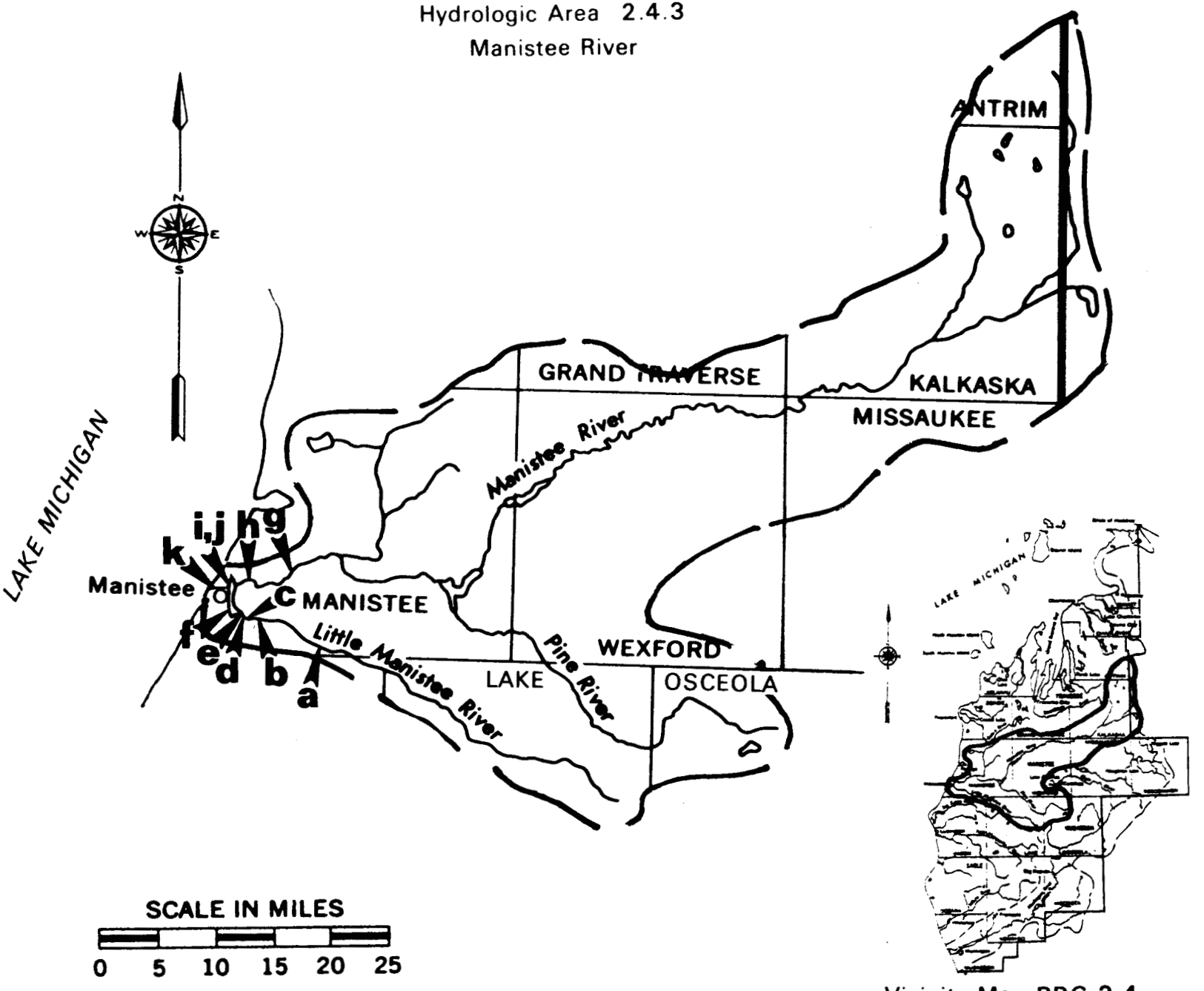
Hydrologic Area 2.4.2
Sable Complex

The Sable Complex encompasses an area of 503,000 hectares (1,242,000 acres). This area is located in the northwest section of Michigan's Lower Peninsula. The major rivers and their mean annual discharges are the White River (11.4 m^3/s; 403 cfs), the Pentwater River (ungauged), the Pere Marquett River (18.1 m^3/s; 639 cfs), and the Big Sable River (4.0 m^3/s; 141 cfs). The topography is rolling with significant wetlands in lowlying areas. About 50 percent of the area is forested (including portions of the Manistee National Forest), 20 to 30 percent devoted to agriculture and 5 percent located in urban areas. The bedrock is composed of sandstone. The overlying material is composed of silt and clay along the shore, glacial till in the central areas and sand and gravel in the remaining portions. There is some manufacturing and mineral extraction (sand and gravel, salt, salines) in the complex. Approximately 7 municipal and 7 industrial wastewater treatment plants discharge into rivers in this complex. The cities of Ludington (Pop.: 9,021), Whitehall (Pop.: 3,017), and Scottville (Pop.: 1,202) are the major population centers in the area.

Station Key

Station Location	DAM River and Station Numbers
White River	24202
a	2420201
b	2420202
c	2420203
d	2420204
Pentwater River	24205
e	2420501
f	2420502
g	2420503
Pere Marquette River	24206
h	2420601
i	2420602
j	2420603
k	2420604
l	2420605
m	2420606
n	2420607
o	2420608
Lincoln River	24207
p	2420701
Big Sable River	24208
q	2420801
r	2420802
s	2420803
t	2420804

Hydrologic Area 2.4.3
Manistee River



Vicinity Map-RBG 2.4

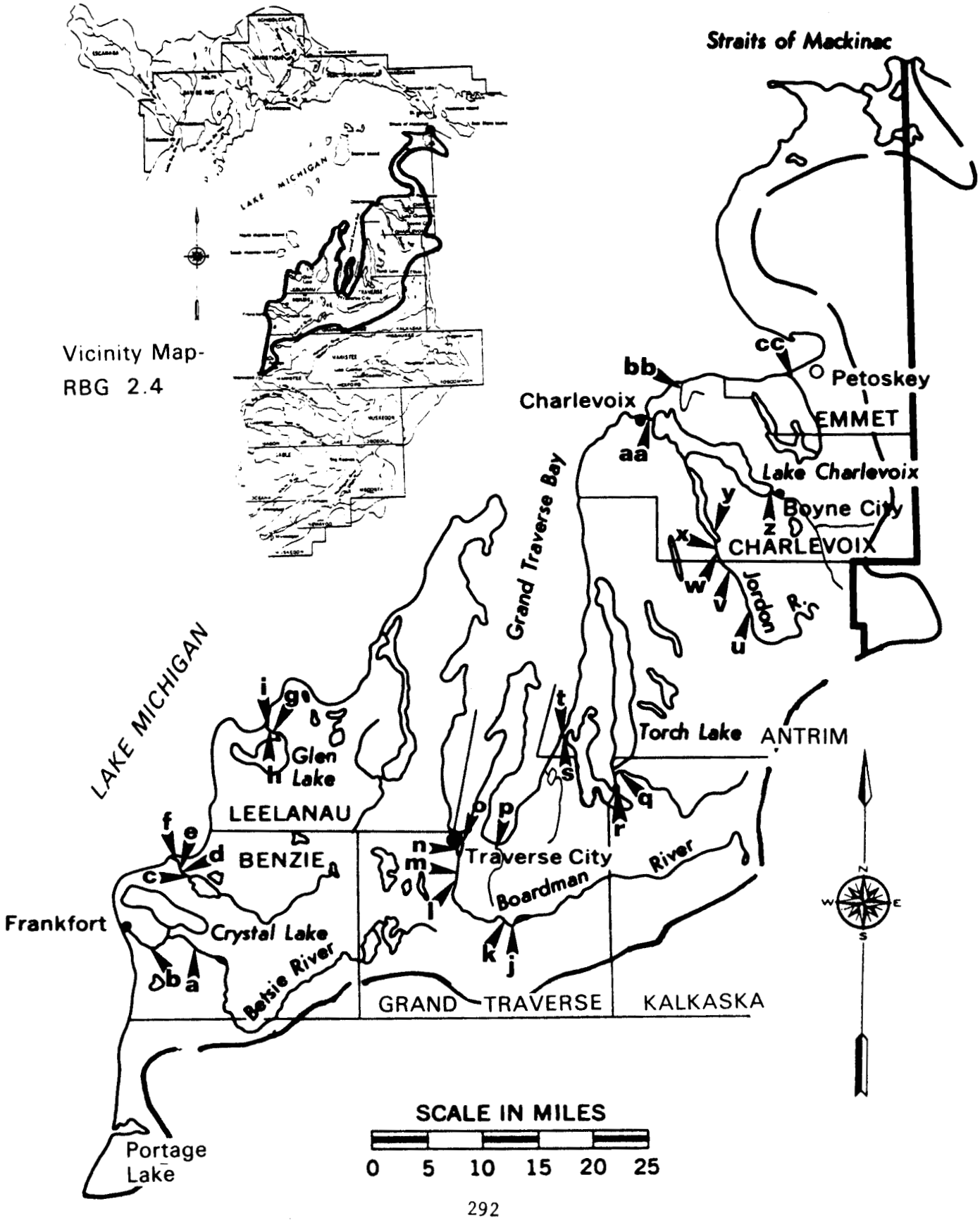
Hydrologic Area 2.4.3
Manistee River

The Manistee River drains an area of 520,000 hectares (1,284,000 acres). The area is located in the northwest portion of Michigan's Lower Peninsula. The Manistee River has a mean annual discharge of 56.1 m^3/s (1,981 cfs). Major tributaries to the Manistee River are the Little Manistee River and the Pine River. The topography varies from a flat to morainic terrain. The drainage pattern is well defined. Approximately 60 to 70 percent of the area is forested (including portions of the Manistee National Forest and Fife Lake State Forest), 20 to 30 percent devoted to agriculture, and another 5 percent urbanized. The bedrock is composed of sandstone. The overlying material is composed of glacial till, sand and gravel, with some areas of silt and clay. Only one municipal and six industrial wastewater treatment plants discharge into the area surface waters. The city of Manistee (Pop.: 7,723) is the only major urban center in this area.

Station Key

Station Location	DAM River and Station Numbers
Little Manistee River	24301
a	2430101
b	2430102
c	2430103
d	2430104
e	2430105
f	2430106
Manistee River	24302
g	2430201
h	2430202
i	2430203
j	2430204
k	2430205

Hydrologic Area 2.4.4
Traverse Complex



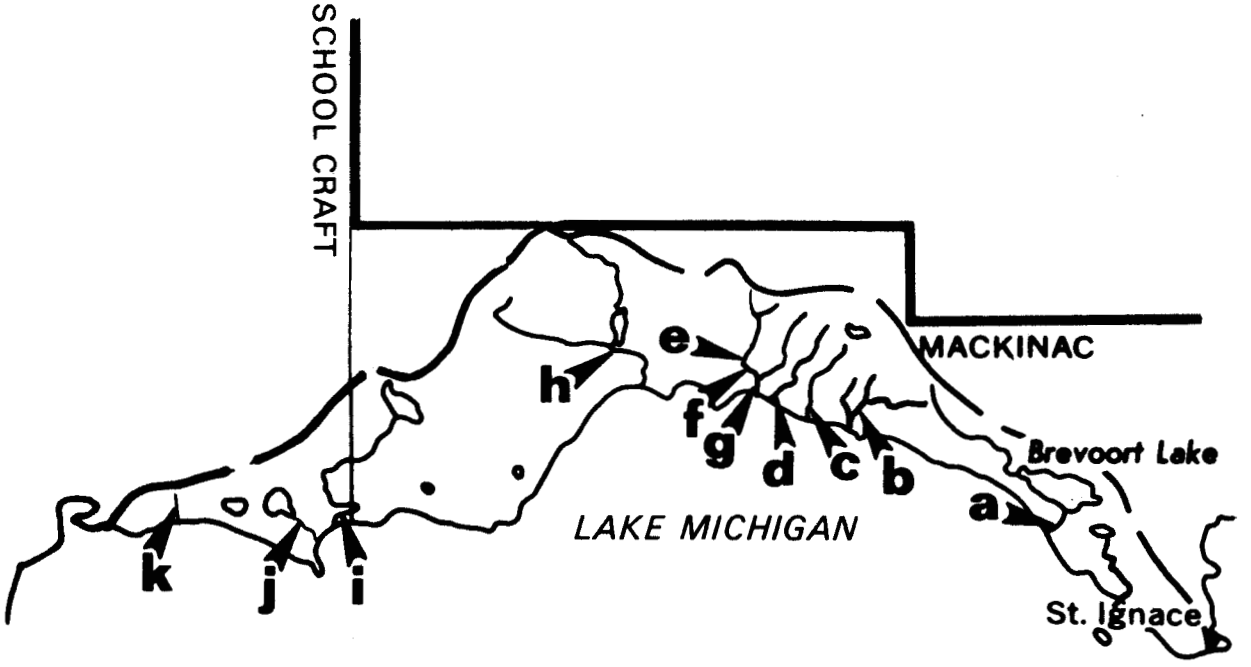
Hydrologic Area 2.4.4
Traverse Complex

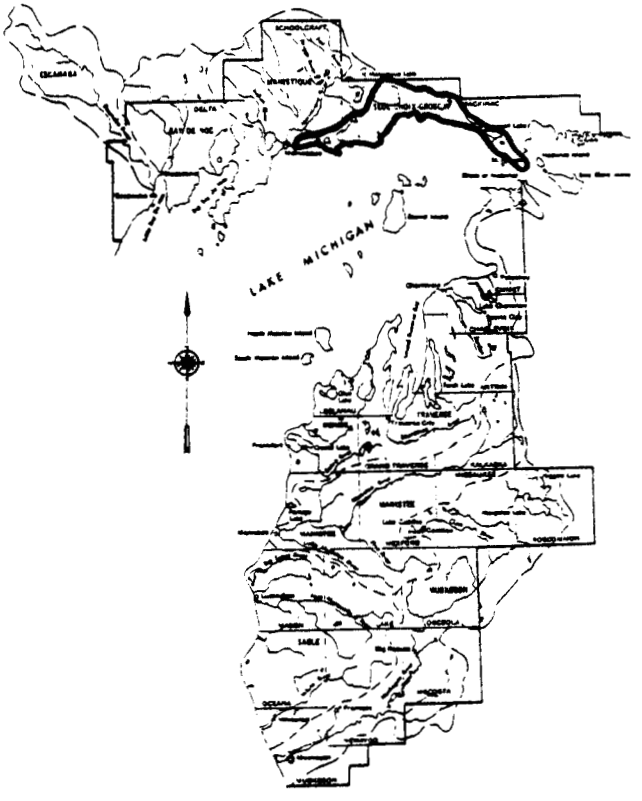
The Traverse Complex covers 683,000 hectares (1,698,000 acres). This complex is located in the northwest corner of Michigan's Lower Peninsula. The major rivers and their mean annual discharges are: the Betsie River (ungauged), the Platt River (ungauged), the Boardman River (5.4 m^3/s; 191 cfs), and the Pine River (ungauged) at Lake Charlevioux. Major tributaries to the Pine River are the Jordan and the Boyne Rivers. The ungauged Elk River, which enters Grand Travers Bay at Elks Rapids is also an important tributary to Lake Michigan. The area has a rolling morainic topography. There are few important wetland areas. Approximately 60 to 70 percent of the area is forested (including portions of the Fife Lake State Forest and the Osable State Forest), an additional 20 to 30 percent devoted to agriculture, and another 5 percent urbanized. The bedrock is composed of sandstone with some dolomite along the shore areas. The overlying material is composed of glacial till, sand and gravel, and some areas of silt and clay. The economy is based upon manufacturing, agriculture (including a large number of orchards), and the extraction of materials such as sand, gravel, shale, and stone. Other resources such as oil, limestone, dolomite, and salt are present in various formations in the underlying structure. Approximately 9 municipalities and 15 industries discharge treated wastewater into the area surface waters. The largest population centers in the area are Traverse City (Pop.: 18,480), Charlevoix (Pop.: 3,519), Petosky (Pop.: 6,341), and Boyne City (Pop.: 2,969).

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Betsie River	24402	Mitchell Creek	24407
a	2440201	p	2440701
b	2440202	Elk River	24410
Platte River	24403	q	2441001
c	2440301	r	2441002
d	2440302	s	2441003
e	2440303	t	2441004
f	2440304	Pine River	24412
Crystal River	24404	u	2441201
g	2440401	v	2441202
h	2440402	w	2441203
i	2440403	x	2441204
Boardman River	24406	y	2441205
j	2440601	z	2441206
k	2440602	aa	2441207
l	2440603	Susan Creek	24413
m	2440604	bb	2441301
n	2440605	Bear River	24414
o	2440606	cc	2441401

Hydrologic Area 2.4.5
Seul Croix-Groscup Complex





Vicinity Map-RBG 2.4

SCALE IN MILES

0 5 10 15 20 25

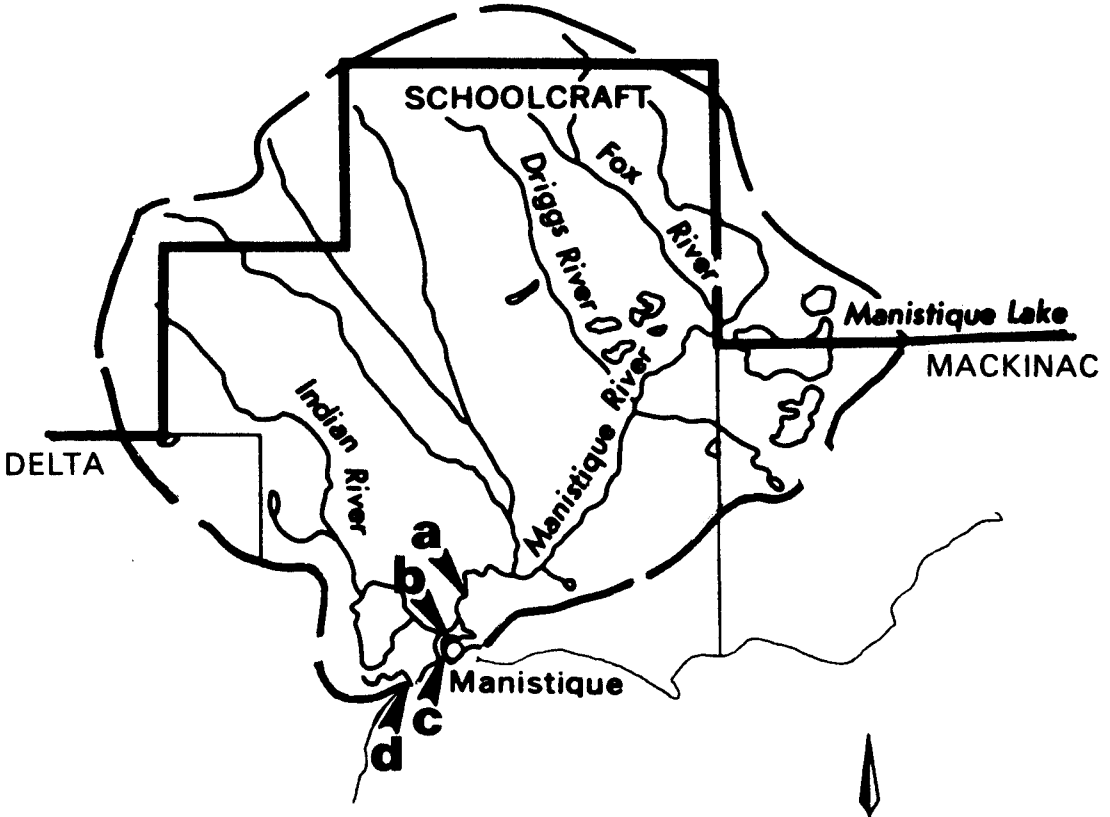
Hydrologic Area 2.4.5
Seul-Choix Groscap Complex

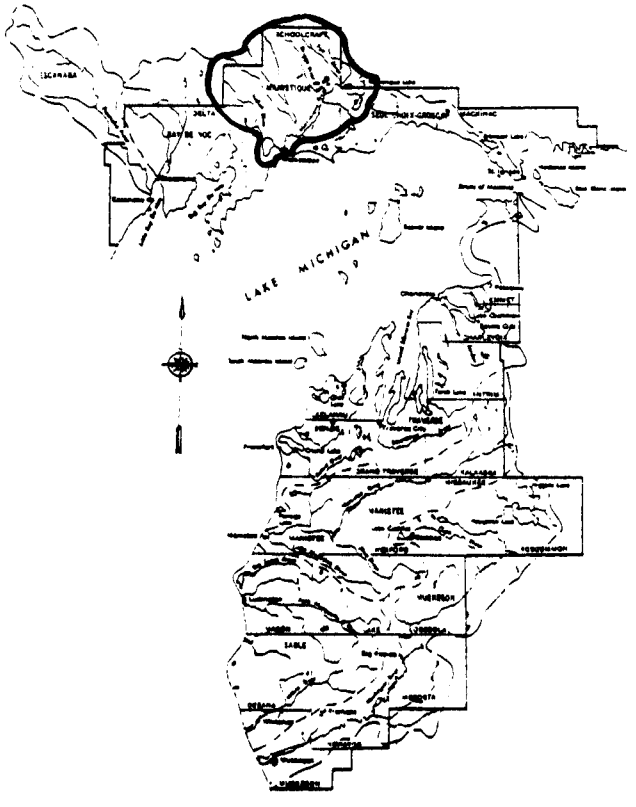
Seul Choix-Groscap Complex encompasses an area of 124,000 hectares (352,000 acres). This area is located in the Southeast portion of Michigan's Upper Peninsula. The major tributary in the area is the Black River, which has a mean annual discharge of 0.8 m^3/s (28 cfs). Approximately 10 other small streams also drain into Lake Michigan from this area. The area is generally flat. There are few wetland areas. Approximately 80 percent of the area is forested (including portions of Mackinaw State Forest), an additional 10 percent devoted to agriculture, and 4 percent found in urbanized areas. The bedrock is composed of dolomite. Overlying material consists of silt and clay, sand and gravel, with some regions of glacial till. There are no major industrial areas or population centers in this hydrologic area.

Station Key

Station Location	DAM River and Station Numbers
Brevoort River	24503
a	2450301
Paquin Creek	24504
b	2450401
Davenport Creek	24505
c	2450501
E. Branch Black River	24506
d	2450601
Black River	24507
e	2450701
f	2450702
g	2450703
Millecoquins River	24508
h	2450801
Milakokia River	24509
i	2450901
Bulldog Creek	24510
j	2451001
Marblehead Creek	24511
k	2451101

Hydrologic Area 2.4.6
Manistique River





SCALE IN MILES

0 5 10 15 20 25

Vicinity Map-RBG 2.4

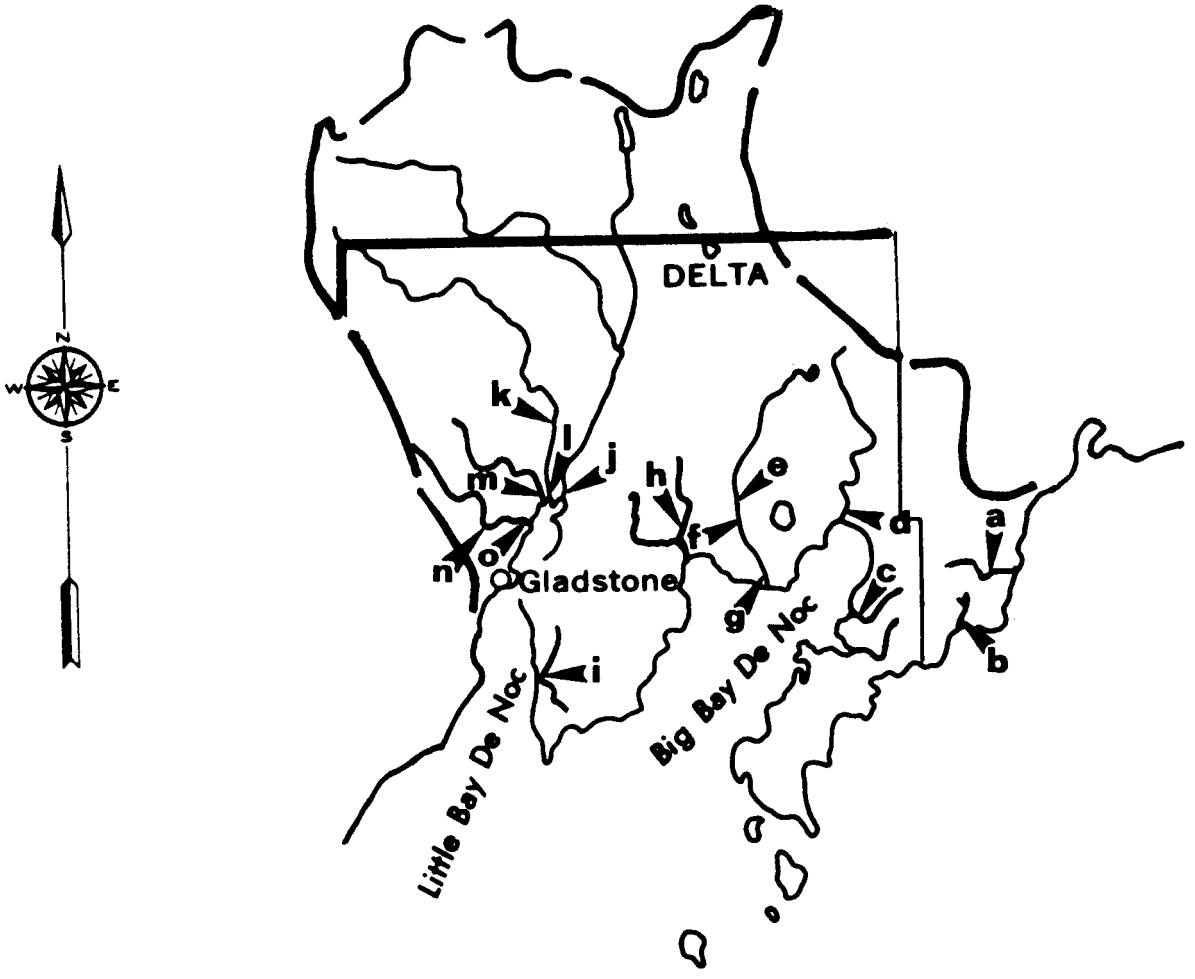
Hydrologic Area 2.4.6
Manistique River

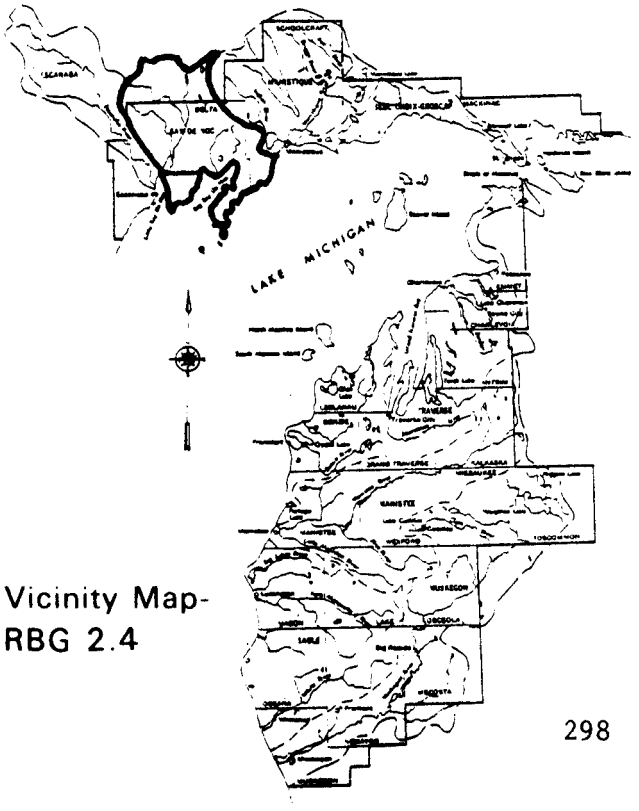
The Manistique River drains an area of 375,000 hectares (926,000 acres). The area is found in the southeast portion of Michigan's Upper Peninsula. The Manistique River has a mean annual discharge of 39.7 m^3/s (1,402 cfs). Major tributaries to the Manistique River are the Fox River, the Driggs River, and the Indian River. The area is very flat with a weakly defined drainage pattern so that wetland type areas are common. Approximately 80 percent of the area is forested. Roughly 10 percent of the area is devoted to agriculture and about 5 percent consists of isolated urban areas. The bedrock is composed of dolomite in the southern portions and shale in the north. The surface material consists of silt and clay with scattered areas of glacial till. Only one municipal and one industrial wastewater treatment plant discharges into the areas surface waters. Both are located near the city of Manistique (Pop.: 4,324).

Station Key

Station Location	DAM River and Station Numbers
Manistique River	24601
a	2460101
b	2460102
c	2460103
Thompson Creek	24602
d	2460201

Hydrologic Area 2.4.7
Bay De Noc Complex





Vicinity Map-
RBG 2.4

SCALE IN MILES
0 5 10 15 20 25

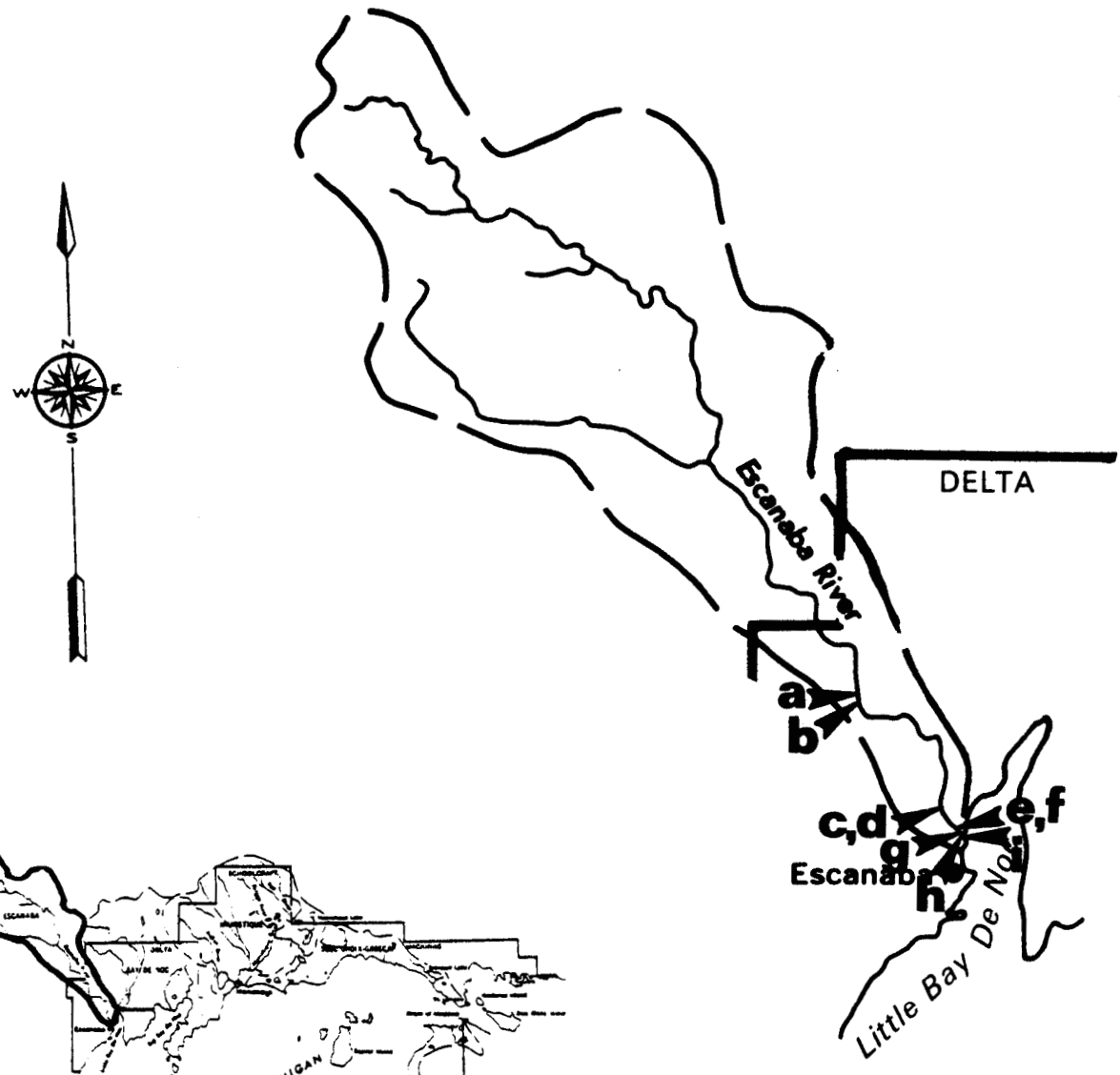
Hydrologic Area 2.4.7
Bay De Noc Complex

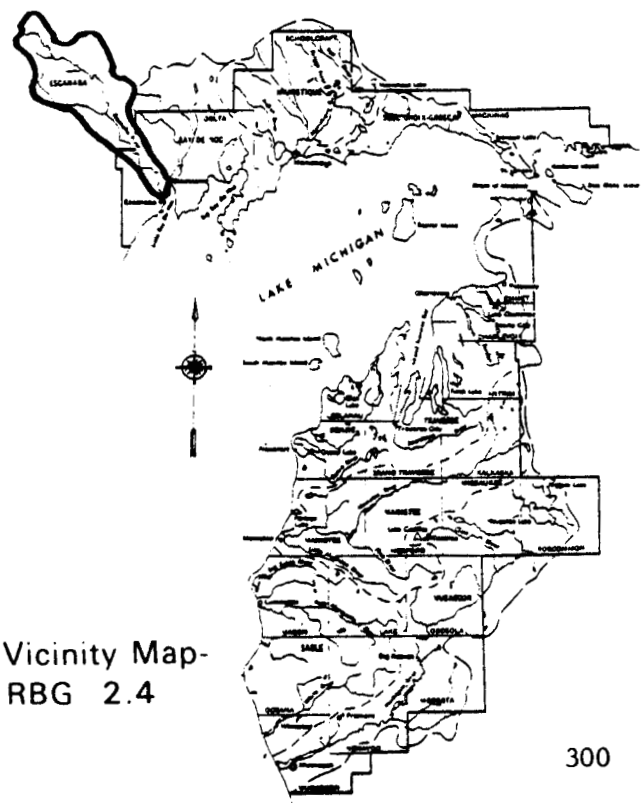
The Bay De Noc Complex covers 310,000 hectares (765,000 acres). The area is located in the southeast portion of Michigan's Upper Peninsula. The major tributaries in the area are the Sturgeon River, which has a mean annual discharge of 5.9 m^3/s (208 cfs), the White Fish River, the Rapid River, and the Days River (all ungauged). The area is also drained by many other small streams. The topography is flat and the drainage pattern weakly defined. There are few wetland areas. Approximately 70 to 80 percent of the area is forested (including portions of the Hiawatha Forest), 10 percent devoted to agriculture, and 5 percent urbanized. The bedrock consists of shale throughout most of the area with some dolomite in the southeast portion. The overlying material has regions of silt and clay, sand and gravel, and glacial till distributed throughout. There are no major industrial or municipal waste water effluents coming into any of these tributaries except for the Rapid River which receives one municipal discharge. Water quality in this region is generally good. The City of Gladstone (Pop.: 5,237) is the only major population center in the complex.

Station Key

Station Location	DAM River and Station Numbers
Bursaw Creek	24701
a	2470101
Parent Creek	24702
b	2470201
Valentine Creek	24704
c	2470401
Fishdam River	24705
d	2470501
Sturgeon River	24706
e	2470601
f	2470602
g	2470603
Ogontz River	24707
h	2470701
Squaw Creek	24711
i	2471101
Whitefish River	24712
j	2471201
Rapid River	24713
k	2471301
l	2471302
Tocoosh River	24714
m	2471401
Days River	24715
n	2471501
o	2471502

Hydrologic Area 2.4.8
Escanaba River





Vicinity Map-
RBG 2.4

SCALE IN MILES

0 5 10 15 20 25

Hydrologic Area 2.4.8
Escanaba River

The Escanaba River basin covers 237,000 hectares (586,000 acres). The area is located in the south central portion of Michigan's Upper Peninsula. The Excanaba River has a mean annual discharge of 25.4 m^3/s (897 cfs). The area is flat in the southern portions and rolling in the north. Approximately 70 to 80 percent of the area is forested and includes portions of the Menominee State Forest, the Escanaba River State Forest, and the Michigamme State Forest. About 10 percent of the area is agriculturalized and another five percent urbanized. The bedrock is composed mostly of igneous and metamorphic rock with some shale near the shoreline. The overlying material is composed of glacial till, silt and clay, with sand and gravel near the shore. Two municipalities and two industries used the basins surface waters for treated waste assimilation. The city of Gwinn (Pop.: 1,054) is the only major population center in the area.

Station Key

Station Location	DAM River and Station Numbers
Escanaba River	24801
a	2480101
b	2480102
c	2480103
d	2480104
e	2480105
f	2480106
g	2480107
h	2480108
i	2480109

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 2.4.1 Muskegon River												
		24101	Black Creek												
72	06	2410101	At Evanston Road 43-12-54 X 86-05-42	•		2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C	2BD 5C	2BD 5C	2BD 5C
73	"	"	"	•		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
75	06	2410102	Milliron Road 43-12-18 X 86-9-20	•		2D	2D	2D	2D	2D		2D	2D	2D	2D
72	18	2410103	US-31 Bridge												
73	"	"	"												
71	06	2410104	Near Mouth 43-10-07 X 86-17-28			2D	2D	2D	2D	2D		2D	2D	2D	2D
72	"	"	"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"			5	5	5A-C 2D	5	5		5	5	5	5ABD 2C
74	"	"	"			5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C
		24102	Muskegon River flow: 54.9 m^3/s (1,939 cfs)												
09-14	21	2410201	At Newaygo River Mile 39.9	*	1										
16-19	"	"	"	*	1										
30-74	"	"	"	*	1										
73	21	2410202	Near Bridgeton 43-19-05 X 86-02-11			2D	2D	2D				2D	2D		
74	"	"	"		5C 2D	5C 2D	5C 2D	5C 2D	2CD	2CD	2CD	5C 2D	5C 2D	5C 2D	
72	06	2410203	US-31 Bridge	*	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C	2BD 5C	2BD 5C	2BD 5C
73	"	"	"	*	5B-D	5	5	5	5	5		5	5	5	5
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
74	21	"	"	*	2A 5BC	2A 5BC	2A 5BC	5BC		2A 5BC	2A 5BC	5BC	2A 5BC	2A 5BC	
75	06	"	"		5A	5A-C	5AB 2C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2410101	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C		2C		2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2D	2D		2D		
2410102	2D	2D	2D	2D	2D	2D	2D		2D	2D	2D	2D	2D		
2410103			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
2410104	2D	2D	2D	2D	2D	2D	2D		2D		2D	2D	2D		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C		
"	5	5	5	5	5	5	5		5	5D	5D	2C	2C 5D		
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C			2C	2C		
2410201															
"															
"															
2410202	2D								2D						
"	5C 2D	5C 2D	5C 2D		5C 2D	5C 2D			5C 2D	2C	2C	2C	2C		
2410203	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C		2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A 5BC	2A 5BC	2A 5BC		2A 5BC	2A 5BC			2A 5BC	2A-C	2A-C	2A-C	2A-C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	18	2410204	43-16-30 X 86-12-30												
73	"	"	"												
63	06	2410205	At Mouth	•	8B-D	8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*	8BD 5AC	8BD 5AC		8B 5ACD		5ACD 8B		2AD		8BD 5AC	5ACD 8B
65	"	"	"	*	5	5		5ABD 2C		5AC 2BD		2A-C		5	2AB 5CD
66	"	"	"	*	8AB 2CD	8AB 2CD		5		8AB 5C 2D		2C		8AB 5CD	8AB 5CD
67	"	"	"	*	8	8		5AB 8CD	8CD	2A-C 8D		2CD		8ABD 5C	8ABD 5C
68	"	"	"	*	5	5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*	5	5	8AD 2BC	5	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		2A-C	2A-C	5A-C 2D	5A-C 2D
72	"	"	"	*	5A-C 2D	5	5	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	•	5C 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5A 2B-D
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"		5AC 2B	5AC 2B	5AC 2B	5AC 2B	5AC 2B	5AC 2B		5AC 2B	5AC 2B	5AC 2B	5AC 2B
71	36	2410299	Near Mouth Exact Location Unknown					2AB 5CD							
		24103	Cedar Creek (No Data Found)												
		24104	Bear Creek												
65-74	21	2410401	Near Muskegon		1										
67	"	"	"		2C	2C		2C				2C			
71	"	"	"		5D	5D		5D							
72	"	"	"		5	5		5							

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2410204			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
2410205	8B-D		8B-D	8B-D			8BC 5D		8B-D		2BC				
"	5		5A-C 8D	5A-C 8D			8BD 5AC		5ACD 8B		2A				
"	5		5ACD 2B	5ACD 2B			5ACD 2B		5ACD 2B		2A-C				
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD		2C				
"	5A 8B-D		8AB 2C	8AB 2C			8AB 2C		5A 8B-D		2CD				
"	5		2A 5B-D	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD 2C	5	5		5	5AB 2C	5ABD 2C		5ABD 2C		
"	5	5CD	5	5	2AB	5	5		5		5AB 2CD		5AB 2CD		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	2AC 5B	5A-C 2D	5A-C 2D		5A-C 2D				2C	2B-D	2B-D
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C	2B	2B
"	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	2D	2D	2C	2D		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C	2B	2B
"	5AC 2B	5AC 2B	5AC 2B	5AC 2B	5AC 2B	5AC 2B	5AC 2B		5AC 2B						
2410299													2AB 5CD		
2410401															
"	2C								2C						
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	21	2410401	(Continued)		5A-C	5A-C		5A-C							
		24105	Green Creek	(No Data Found)											
			HYDROLOGIC AREA	2.4.2				Sable Complex							
		24201	Duck Creek	(No Data Found)											
		24202	White River	flow: 11.4 m^2/s (403 cfs)											
57-74	21	2420201	Near Whitehall		1										
67	"	"	"		1	2BC		2BC				2BC			
71	"	"	"		1	5D		5D							
72	"	"	"		1	5		5							
73	"	"	"		1	5A-C		5A-C							
74	"	"	"		1	2AD 5BC									
72	06	2420202	Northbound US-31 Bridge	*		2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C	2BD 5C	2BD 5C	2BD 5C
72	18	"	"	*											
73	"	"	"	*											
73	06	"	"	*	5A-D	5	5	5A-C 2D	5	5		5	5	5	5
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"			5AC	5AB 2C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2410401															
2420201															
"	2BC								2BC						
"															
"															
"															
"															
2420202	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C		2C	2C	2C		
"			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	2420203	White Lake 43-22-22 X 86-24-08			2B							2B		
63	06	2420204	At Mouth	*	8B-D	8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*	5AC 8BD	5AC 8BD		5AC 8BD		5AC 8BD		2AD		5AC 8BD	5ACD 8B
65	"	"	"	*	5	5		5ABD 2C		5AC 2BD		2BC		5	5AC 2BD
66	"	"	"	*	8AB 5CD	8AB 5CD		8AB 5CD		8AB 5C 2D		2C		8AB 5CD	8AB 5CD
67	"	"	"	*	8B-D	8		5B 8AC	8CD	2C 8D				8B-D	8
68	"	"	"	*	5	5		2A	5	5		6	6	5	5
69	"	"	"	*	5	5	5AD 2BC	5A-C	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	2AD 5BC	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A	5B-D 2A		2B-D	2B-D	5B-D 2A	5B-D 2A
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5CD	5ACD 2B	5ACD 2B	5AC 2BD	5ACD 2B	5ACD 2B		5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B
71	36	2420299	Near Mouth Exact Location Unknown					2AB 5CD							
		24203	Flower Creek	(No Data Found)											
		24204	Stony Creek	(No Data Found)											
		24205	Pentwater River												
72	18	2420501	Southeast of Pentwater 43-46-00 X 86-24-30												
73	"	"	"												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2420203	2B		2B			2B	2B								
2420204	8BC 5D		8B-D	8B-D			8BC 5D		8BD		2BC				
"	5		5ACD 8B	5ACD 8B			5AC 8BD		5ACD 8B		2A				
"	5		5ACD 2B	5ACD 2B			5		5ACD 2C						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	8B-D 5A		8AB 2C	8AB 2C			5C 2A 8B		5ABD 8C		2CD				
"	5		5	5		5B-D	5B-D		5		6				
"	5		5	5		5	5		5	5AB 2D	5ABD 2C	5AD 2B	5ABD 2C		
"	5	5CD	5	5		5	5		5		5AB 2CD	5AB 2C	5AB 2CD		
"	5B-D 2A	5BD 2A	5	5		5B-D 2A	5B-D 2A		5B-D 2A	2C	2C	2C	2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C		
"	5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B		5ACD 2B	5ACD 2B		5ACD 2B	2C	2C	2C	2C		
2420299													2AB 5CD		
2420501			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	18	2420502	Pentwater Lake 43-46-06 X 86-25-12			2C 5D	5D						2C 5D	2C 5D	
63	06	2420503	At the Mouth	*		8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*		5AC 8BD		5ACD 8B		5ACD 8B		2AD		5AC 8BD	5ACD 8B
65	"	"	"	*		5ACD 2B		5AD 2BC		5AC 2BD		2AC		5ACD 2B	2ABD 5C
66	"	"	"	*		8AB 5CD		8AB 5CD		8AB 5C 2D		2C		8AB 5CD	8AB 5CD
67	"	"	"	*		8		5AB 8CD	8CD	2ABC 8D				8ABD 5C	5AC 8BD
68	"	"	"	*		5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*		5	5AD 2C	5	5	5		5	5	5	5
70	"	"	"	*		5	5	5	5	5		5	5	5	5
71	"	"	"	*		5	5	5	5	5		6	6	5	5
72	"	"	"	•		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*		5A	5A	5A	5A	5A		5A	5A	5A	5A
		24206	Pere Marquette River flow: 18.1 m^3/s (639 cfs)												
70	06	2420601	Scottville Road Bridge 43-56-40 X 86-16-48	*	2B 5C	2BC	2C	2C	2C	2BC				2BC	2BC
71	"	"	"	*	5A 2B-D	5A 2B-D		5A 2B-D	6	6		6	6	5A 2B-D	6
72	"	"	"	*	6	6	2CD	6	6	6		6	6	6	6
73	"	"	"	*	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
39-74	21	2420602	At Scottville		1										
67	"	"	"	*	1	5D		5D							
68	"	"	"	*	1	11B[a] 1D 5AC		5A-C							
69-73	"	"	"	*	1	1									
74	"	"	"	*	1	1		5BC 2D							

[a]Continuous record in May.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2420502	2C 5D		2C 5D	2C 5D		2C 5D	2D	2C 5D							
2420503	8B-D		8B-D	8B-D			8BC 5D		8B-D		2BC				
"	5		5AC 8BD	5A-C 8D			5AC 8BD		5ACD 8B		2A				
"	5ACD 2B		5ACD 2B	5ACD 2B			5ACD 2B		5AD 2BC						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	5A 8B-D		8AB 2C	8AB 2C			8AB 2C		5A 8B-D		2CD				
"	5		2A 5B-D	5	2B-D	5B-D	5B-D		5	2C	2B-D				
"	5		5	5	5ABD	5	5		5		2AC 5D		2C 5D		
"	5		5	5	2AB	5	5		5		2BD		2B-D		
"	5	5CD	5	5	2ACD 5B	5	5		5	2C	2C		2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5A	5A	5A	5A	5A	5A	5A		5A						
2420601	2B		5C	2C		2BC	2BC		5C						
"	6	6	5A 2B-D	5A 2B-D	6	5A 2B-D	5A 2B-D		5A 2B-D		2A				
"	6	6	6	6	6	6	6		6	2D	2D	2D	2D		
"	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
2420602															
"															
"															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	06	2420603	N. Channel at Pere Marquette 43-55-42X86-25-01		2B	2B		2B	2B	2B			2B	2B	2B
71	"	"	"		5A 2BC	6		6	6	6		6	6	6	6
72-73	"	"	"			2BC	2BC	2BC	2BC	2BC		2BC	2BC	2BC	2BC
72	18	2420604	Junction US-31, US-10 Bridge												
73	"	"	"												
70	06	2420605	S. Channel at Pere Marquette 43-55-58X86-25-00		2B	2B		2B	2B	2B				2B	2B
71	"	"	"		5A 2BC	6		6	6	6		6	6	6	6
72	"	"	"		2BC	2BC	2C	2BC	2BC	2BC		2BC	2BC	2BC	2BC
73	"	"	"		2BC	2BC	2B	2BC	2BC	2BC		2BC	2BC		2BC
72	18	2420606	US-31, Two Miles South of US-10												
73	"	"	"												
72	18	2420607	Pere Marquette Lake 43-56-00 X 86-26-00			2C 5D	5D						2C 5D	2C 5D	
63	06	2420608	At Mouth	*	8B-D	8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*	5ACD 8B	5AC 8BD		5ACD 8B		5ACD 8B		2AD		8BD 5AC	5ACD 8B
65	"	"	"	*	5	5		5ABD 2C		8B 5C 2D		2A-C		5	2AB 5CD
66	"	"	"	*	8AB 5CD	8AB 5CD		8ABD 5C	8CD	2ABC 8D		2C		8AB 5CD	8AB 5CD
67	"	"	"	*	8	8		5AB 8CD	5	5		2CD		8	8
68	"	"	"	*	5	5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*	5	5	5AD 2C	5	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5A-C 2D	5	5	5	5	5		6	6	5	5
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5BC	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
71	36	2420699	Near Mouth Exact Location Unknown					2AB 5CD							

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2420603	2B	2B	2B	2B		2B	2B		2B						
"	6	6	6	6	6	6	6		6		2A				
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC						
2420604			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
2420605	2B		2B	2B		2B	2B		2B						
"	6	6	6	6	6	6	6		6		2A				
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC						
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC						
2420606			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
2420607	2C 5D		2C 5D	2C 5D		2C 5D		2C 5D							
2420608	8B-D		8BC 5D	8BC 5D			8B-D		8B-D		2BC				
"	5		8BD 5AC	5A-C 8D			5AC 8BD		5ACD 8B		2A				
"	5		5ACD 2B	5ACD 2B		5	2A		5ABD 2C						
"	8AB 5CD		8AB 5CD	8AB 5CD		2A	8AB 5CD		8AB 5CD						
"	5A 8B-D		8AB 2C	8AB 2C			8AB 2C		5A 8B-D						
"	5		5	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD	5	5		5	5AB 2C	5ABD 2C				
"	5	5CD	5	5	2AB	5	5		5		5AB 2CD		5AB 2CD		
"	5	5	5	5	2ACD 5B	5	5		5		2C		2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	2C	2C		2C		
2420699													2AB 5CD		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24207	Lincoln River												
68	06	2420701	Lakewood River 43-58-51 X 86-25-08			2B 5CD							2B 5CD	2B 5CD	2B 5CD
		24208	Big Sable River flow: 4.0 m^3/s (141 cfs)												
67	06	2420801	Freesoil Rd. Bridge 44-06-20 X 86-07-05			2D		2D	2D	2D		2D	2D	2D	2D
42-73	21	2420802	Near Freesoil 44-07-13 X 86-16-48		1[a]										
65	"	"	"		1	2D		2D							
67	"	"	"		1	2BC		2BC				2BC			
68	"	"	"	*	1	2C 5D		2C 5D							
69-72	"	"	"	*	1	5		5							
73	"	"	"	*	1	5A-C		5A-C							
68	06	2420803	Quarterline Road 44-06-06 X 86-16-36	*	2B 5CD	2B 5CD							2B 5CD	2B 5CD	2B 5CD
73	"	"	"	*	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D			5B-D	5B-D	5B-D
74	"	"	"	*	5A-C 2D	5	5	5	5	5			5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A			2A	2A	2A
68	06	2420804	1.5 Miles up from Hamlin Lake			2B 5CD							2B 5CD	2B 5CD	2B 5CD
		24209	Gurney Creek (No Data Found)												

[a]Discontinued in 1973.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2420701	2B 5CD		2B 5CD	2B 5CD		2B 5CD	2B 5CD								
2420801	2D		2D	2D		2D		2D							
2420802															
"															
"	2BC								2BC						
2420803	2B 5CD		2B 5CD	2B 5CD					5CD						
"	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
2420804	2B 5CD		2B 5CD	2B 5CD		2B 5CD	2B 5CD		5CD						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 2.4.3 Manistee River												
		24301	Little Manistee River flow: 4.9 m^3/s (174 cfs)												
56-74	21	2430101	Near Freesoil River Mile 7.4	*	1										
62	"	"	"	*	1	1D									
63-64	"	"	"	*	1	1									
65	"	"	"	*	1	2D		2D							
67	"	"	"	*	1	2BC 1D		2BC				2BC			
68	"	"	"	*	1	1		2C 5D							
69-73	"	"	"	*	1	1		5							
74	"	"	"	*	1	1		5A-C 2D							
63	20	2430102	Bridge T21N, R16W, Sec. 21			2D		2D				2D	2D		
67	06	2430103	Water Street Bridge 44-12-32 X 86-16-37	*	2D	2D								2D	
68	"	"	"	*	5	5							5	5	5
69	"	"	"	•									2B	2B	2B
73	"	"	"	*	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"	*	2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
67	06	2430104	Near Mouth T21N, R16W, Sec. 20			2D								2D	
68	"	"	"			5							5	5	5
72	18	2430105	Little Manistee Lake 44-12-30 X 86-16-30												
73	"	"	"												
72	18	2430106	In Manistee Lake 44-13-30 X 86-18-00			2C 5D	5D						2C 5D	2C 5D	

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2430101															
"															
"															
"															
"	2CD								2CD						
"															
"															
"															
2430102	2D	2D							2D		2D				
2430103															
"	5		5	5		5	5		5CD						
"	2B		2B	2B		2B			2B						
"	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
2430104															
"	5		5	5		5	5		2C 5D						
2430105			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
2430106	2C 5D		2C 5D	2C 5D		2C 5D		2C 5D							

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24302	Manistee River	flow: 56.1 m^3/s (1,981 cfs)											
51-74	21	2430201	Near Manistee 44-16-14 X 86-11-56		1										
67	"	"	"		1	2BC		2BC				2BC			
68	"	"	"	•	1	2C 5D		2C 5D							
69-72	"	"	"	*	1	5		5							
73	"	"	"	•	1	5A-C		5A-C							
74	"	"	"	*	1			2D 5A-C							
72	18	2430202	M-55 Bridge												
73	"	"	"												
73	06	"	"		5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
75	35	"	"			5C	5C	5C				5C	5C	5C	
72	18	2430203	Near Mouth 44-15-30 X 86-19-00			2C 5D	5D						2C 5D	2C 5D	
73	21	2430204	Washington Street 44-15-54 X 86-19-25				2D					2D	2D		
63	06	2430205	Maple Street Bridge	•	2A 8B-D	8B-D		8B-D		8B-D		8B-D		8B-D	8B-D
64	"	"	"	•	5AC 8BD	5AC 8BD		5ACD 8B		5A 8BCD		2AD		5AC 8BD	5AC 8BD
65	"	"	"	*	5	5		5ABD 2C		5AC 2BD		2BC		5	2AB 5CD
66	"	"	"	*	8AB 5CD	8AB 5CD		8AB 5CD		8AB 5C 2D		2C		8AB 5CD	5AD
67	"	"	"	•	5A 8B-D	8		5AB 8CD	8CD	2A-C 8D				8	8
68	"	"	"	*	5	5		5	5	5		2B-D	2B-D	5	5
69	"	"	"	*	5	5	5AD 2BC	5	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	6	5	5
72	"	"	"	*	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5B-D	5	5	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2430201															
"	2BC								2BC						
"															
"															
"															
"															
2430202			5D	5D	5D	5D	5D								
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D								
"	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
"	5C		5C		5C	5C	5C		5C	5C	5C	5C			
2430203	2C 5D		2C 5D	2C 5D		2C 5D		2C 5D							
2430204	2D		2D						2D						
2430205	8BC 5D		8B-D	8B-D			8BC 5D		8B-D		2BC				
"	5		5AC 8BD	5A-C 8D			8BD 5AC		5CD 2B		2A				
"	5		5ACD 2B	5ACD 2B			5		5ABD 2C		2C				
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	8		8AB 2C	8AB 2C			8AB 2C		5A 8B-D		2CD				
"	5		2A 5B-D	5	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD	5	5		5	5AB 2C	5ABD 2C		2C 5D		
"	5	5CD	5	5	2AB	5	5		5		5AB 2CD		5AB 2CD		
"	5	5	5	5	2ACD	5	5		5	2C	2C	2CD	2C	2BC	2BC
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C	2B	2B
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	06	2430205	(Continued)	*	5A-C 2D	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2AB 5C	2AB 5C	2AB 5C	2AB 5C	2AB 5C		2AB 5C	2AB 5C	2AB 5C	2AB 5C
71	36	2430299	Near Mouth Exact Location Unknown					2AB 5CD							
			HYDROLOGIC AREA 2.4.4 Traverse Complex												
		24401	Richley Creek (No Data Found)												
		24402	Betsie River												
68	06	2440201	Bridge Near Mouth 44-37-18 X 86-10-10			2D								2C	
73	"	"	"	*		2D	2D	2D	2D	2D		2D	2D	2D	2D
74	"	"	"	*	5AC 2D	5	5	5	5	5		5	5	5	5
75	"	"	"	*		2AC	2AC	2AC	2AC	2AC		2AC	2AC	2AC	2AC
68	06	2440202	River Road Southwest			2C		2C	2C	2C		2C	2C	2C	2C
		24403	Platte River												
68	06	2440301	At Outlet of Platte Lake			2C								2C	
70	"	"	"			5D	5D			5D				5D	5D
71	"	"	"			2A 5B-D	2A 5B-D			2A 5B-D				2A 5B-D	2A 5B-D
72	"	"	"			5A-C 2D	5A-C 2D			5A-C 2D				5A-C 2D	5A-C 2D
73	"	"	"			5A-C 2D	5A-C 2D			5A-C 2D				5A-C 2D	5A-C 2D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2430205	5	5	5	5	5	5	5		5	2C	2C	2C	2C	2C	2C
"	2AB 5C	2AB 5C	2AB 5C	2AB 5C	2AB 5C	2AB 5C	2AB 5C		2AB 5C						
2430299													2AB 5CD		
2440201															
"	2D		2D	2D	2D	2D	2D		2D						
"	5		5	5	5	5	5		5	2C	2C	2C	2C		
"	2AC		2AC	2AC	2AC	2AC	2AC		2AC						
2440202	2C		2C	2C		2C	2C		2C		2C				
2440301															
"	5D		5D	5D		5D								5D	5D
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D								2A 5B-D	2A 5B-D
"	5A-C 2D		5A-C 2D	5A-C 2D		5A-C 2D	2B							5	5
"	5A-C		5A-C 2D	5A-C 2D		5A-C 2D	2AD 5BC							2A	2A

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	06	2440301	(Continued)			2ABD 5C	2ABD 5C			2ABD 5C				2ABD 5C	2ABD
75	"	"	"			2A	2A			2A				2A	
73	03	2440302	M-22 Bridge			2D		2D					2D	2D	
74	"	"	"			2B		2B					2B	2B	
73	03	2440303	River Mile 1.0			2D		2D					2D	2D	
74	"	"	"			2B		2B					2B	2B	
68	06	2440304	At Mouth			2C		2C	2C	2C		2C	2C	2C	2C
73	03	"	"			2D		2D					2D	2D	
74	"	"	"			2B		2B					2B	2B	
		24404	Crystal River												
68	06	2440401	River Mile 1.0			2CD							2CD	2CD	2CD
68	06	2440402	Fisher Lake Road			2C		2C	2C	2C		2C	2C	2C	2C
68	06	2440403	M-22 Bridge			2CD							2CD	2CD	2CD
69	"	"	"			2B							2B	2B	2B
		24405	Belangers Creek	(No Data Found)											
		24406	Boardman River	flow: 5.4 m^3/s (191 cfs)											
68	06	2440601	At Browns Bridge 44-38-17 X 85-31-08			2C								2C	
73	"	"	"	*	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2440301	2ABD 5C		2ABD 5C	2ABD 5C		6	2ABD 5C								
"	2A		2A	2A		2A	2A								
2440302	2D	2D	2D	2D		2D	2D								
"	2B	2B	2B	2B		2B	2B								
2440303	2D	2D	2D	2D		2D	2D								
"	2B	2B	2B	2B		2B	2B								
2440304	2C		2C	2C		2C	2C		2C		2C				
"	2D	2D	2D	2D		2D	2D								
"	2B	2B	2B	2B		2B	2B								
2440401	2CD		2CD	2CD		2CD	2D								
2440402	2C		2C	2C		2C	2C		2C		2C				
2440403	2CD		2CD	2CD		2CD	2D								
"	2B		2B	2B		2B			2B						
2440601															
"	5B-D		5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C	2C	2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	06	2440601	(Continued)	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
52-74	21	2440602	Near Mayfield	*	1										
61-74	"	"	"	*	1	1									
65	"	"	"	*	1	1		2D							
67	"	"	"	*	1	1		2BC				2BC			
68	"	"	"	*	1	1		2BD							
69	"	"	"	*	1	1		5							
70	"	"	"	*	1	1		5AB							
71-73	"	"	"	*	1	1		5							
72	18	2440603	South of Boardman Lake 44-42-30 X 85-37-30												
73	"	"	"												
67	06	2440604	River Mile 4.0			2D								2D	
68	"	"	"			5							5	5	5
68	06	2440605	8th St., Traverse City			2C		2C	2C	2C		2C	2C	2C	2C
63	06	2440606	Park St., Traverse City 44-45-52 X 83-37-06	*	8B-D	8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*	5	5ABD 8C		5		5ABD 8C		2AD		5	5
65	"	"	"	*	5A-C 2D	5A-C 2D		5AB 2CD		5AB 2CD		2C		5A-C 2D	5AB 2CD
66	"	"	"	*	8AB 5CD	8AB 5CD		8AB 5CD		5AC 8B 2D				8AB 5CD	5AD 2C
67	"	"	"	*	5A 8B-D	5A 8B-D		5AB 8CD	2B 8CD	2AC 8D				5A 8B-D	5A 8B-D
68	"	"	"	*	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		2B-D	2B-D	5ACD 8B	5ACD 8B
69	"	"	"	*	5	5	2BC 5AD	5ABD 2C	5ABD 2C	5		5	5	5	5ABD 2C
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	6	5	5
72	"	"	"	*	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5B-D	5	5	5	5	5		5	5	5A-C 2D	5
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2440601	5		5	5	5	5	5		5	2C	2C	2C	2C		
"	2A		2A	2A	2A	2A	2A		2A						
2440602															
"															
"															
"	2BC								2BC						
"															
"															
"															
"															
2440603			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5A-C 2D	5A-C 2D								
2440604															
"	5		5	5		5	5								
2440605	2C		2C	2C		2C	2C		2C		2C				
2440606	8B-D		8BC 5D	8BC 5D			8B-D		8B-D		2BC				
"	5		5ABD 8C	5ABD 8C			5ABD 8C		5		2A				
"	5AB 2CD		5AB 2D	5AB 2D			5AB 2D		5AB 2CD						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	5A 8B-D		5A 8B 2C	5A 8B 2C			5A 8B 2C		5A 8B-D		2CD				
"	5ACD 8B		5ACD 8B	2A 8B 5CD	2B-D	5CD 8B	5CD 8B		5		2B-D				
"	5		5	5	5ACD	5	5		5		2A		2C		
"	5	5C 2D	5	5	2A 5B	5	5		5						
"	5	5	5	5	6	5	5		5	2C	2C	2C	2C	2B-D	2B-D
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C	2B	2B
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	5	5	5	5	5	5	5		5	2C	2C	2C	2C	2C	2C

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
75	06	2440606	(Continued)		2A	2AC	2AC	2AC	2AC	2AC		2AC	2AC	2AC	2AC
71	36	2440699	Near Mouth Exact Location Unknown					2AB 5CD							
		24407	Mitchell Creek												
68	06	2440701	US-31 Bridge			2C		2C	2C	2C		2C	2C	2C	2C
		24408	Yuba Creek	(No Data Found)											
		24409	Tebeco Creek	(No Data Found)											
		24410	Elk River												
68	06	2441001	Arwood Road			2C		2C	2C	2C		2C	2C	2C	2C
68	06	2441002	Torch Lake Raod			2C		2C	2C	2C		2C	2C	2C	6
72	06	2441003	US-31 Bridge	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*		5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
71-74	06	2441004	Dam in Elk Rapids												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2440606	2AC	2AC	2AC	2AC	2AC	2AC	2AC		2AC						
2440699													2AB 5CD		
2440701	2C		2C	2C		2C	2C		2C		2C				
2441001	2C		2C	2C		2C	2C		2C		2C				
2441002	2C		2C	2C		2C	2C		2C		2C				
2441003	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	2C	2C		2C		
2441004														9	9

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24411	Inwood Creek	(No Data Found)											
		24412	Pine River	(Outlet from Lake Charlevoix)											
67	06	2441201	Old State Rd. Bridge 45-03-38 X 85-04-09		2D	2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"		2D	2D	2D	2D	2D	2D		2D	2D	2D	
73	"	"	"	*	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		5B-D	5B-D	5B-D	5B-D
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
66-74	21	2441202	Near East Jordan 45-06-09 X 85-05-53	*	1	1									
67	"	"	"	*	1	1		2BC 5D				2BC			
68-73	"	"	"	*	1	1		5							
67	06	2441203	Rogers Road Bridge 45-07-57 X 85-07-26		2D	2D								2D	
68	"	"	"		5AC 2BD	5AC 2BD		2C	2C	2C		2C	5AC 2BD	5AC 2BD	5AC 2D
72	18	"	"												
73	"	"	"												
74	06	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
67	06	2441204	Near Mouth of Jordan River			2D								2D	
68	"	"	"			5AC 2BD							5AC 2D	5AC 2BD	5AC 2BD
73	06	2441205	Bridge St., E. Jordan 45-09-12 X 85-07-41		2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
68	06	2441206	Boyne River At Lake Road Bridge			2C		2C	2C	2C		2C	2C	2C	2C
72	"	"	"												
73	"	"	"	*		2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
74	"	"	"	*	5A-C 2D	5	5	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2441201	2D		2D	2D		2D	2D		2D						
"	2D		2D	2D		2D	2D		2D						
"	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C		2C		
"	5	5	5	5	5	5	5		5	2C	2C		2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
2441202															
"	2BC								2BC						
"															
2441203															
"	5AC 2BD		5AC 2D	5AC 2D		5AC 2D	5AC 2D								
"			5D	5D	5D	5D	5D								
"			5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D	5AC 8B 2D								
"	5	5	5	5	5	5	5		5	2C	2C		2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
2441204	5AC 2BD		5AC 2D	5AC 2D		5AC 2D	5AC 2D								
"															
2441205	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		2B 5CD	2C	2C		2C		
2441206	2C		2C	2C		2C	2C		2C		2C				
"			5D	5D	5D	5D	5D								
"		2B 5CD	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		2B 5CD	2C	2C		2C		
"		5	5	5	5	5	5		5	2C	2C		2C		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA									
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
75	06	2441206	(Continued)			2A	2A	2A	2A	2A		2A	2A	2A	2A
63	06	2441207	US-31 Bridge at Mouth 45-19-08 X 85-15-31	*		8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*		5AD 8BC		5AD 8BC		5AD 8BC		2AD		5AD 8BC	5ACD 8B
65	"	"	"	*		5		5		5AB 2D		2C		5	5AB 2CD
66	"	"	"	*		8AB 5CD		8AB 5CD		5ACD 8B				8AB 5CD	8A 5B-D
67	"	"	"	*		5A 8B-D		5A 8B-D	2B 8CD	2C 8D				5A 8B-D	5A 8B-D
68	"	"	"	*		8A 5B-D		8A 5B-D	8A 5B-D	8A 5B-D		2B-D	2B-D	8AB 5CD	5
69	"	"	"	*		5	5AD 2BC	5	5	5		5	5	5	5
70	"	"	"	*		5	5	5	5	5		5A-C 2D	5A-C 2D	5	5
71	"	"	"	*		5	5	5	5	5		6	6	5	5
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*		5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B	5A 2B	5A 2B	5A 2B
		24413	Susan Creek												
63-73	06	2441301	Near Big Rock Point	*		6									
		24414	Bear River												
60-62	06	2441401	Lake St. in Petosky 45-22-35 X 84-57-35			6									
63-72	"	"	"	*	9	6									
71	"	"	"	*			2D	2D	2D	2D		2D	2D	2D	
73-74	"	"	"	*		9									

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2441206		2A	2A	2A	2A	2A	2A		2A						
2441207	8B-D		8B-D	8B-D			8B-D		8B-D		2BC				
"	5AD 8BC		5ABD 8C	5ABD 8C			5AD 8BD		5AB 8CD						
"	5AB 2CD		5AB 2D	5AB 2D			5AB 2D		5AB 2CD						
"	5ACD 8B		8AB 5CD	8AB 5CD			5ACD 8B		8AB 5CD						
"	5A 8B-D		5A 2C 8B	5A 2C 8B			5A 2C 8B		5A 8B-D		2CD				
"	8A 5B-D		8A 5B-D	8A 5B-D	2B-D	5B-D	5B-D		8A 5B-D		2B-D				
"	5		5	5	5ABD	5	5		5			2C			
"	5	5C 2D	5	5	2A 5B	5	5		5						
"	5	5	5	5	6	5	5		5	2C	2C		2CD		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D				2C		
"	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B						
2441301															
2441401															
"															
"	2D	2D	2D	2D	2D	2D	2D		2D		2D	2D	2D		
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24415	Sucker Creek	(No Data Found)											
		24416	Carp Lake River	(No Data Found)											
			HYDROLOGIC AREA 2.4.5 Seul Choix-Groscap Complex												
		24501	Moran River	(No Data Found)											
		24502	Pte Aux Chenes River	(No Data Found)											
		24503	Brevoort River												
64	20	2450301	US-2 Bridge			2A		2A				2A	2A		
		24504	Paquin Creek												
64	20	2450401	US-2 Bridge			2A		2A				2A	2A		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2450301	2A	2A	2A						2A		2A				
2450401	2A	2A	2A						2A		2A				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24505	Davenport Creek												
64	20	2450501	US-2 Bridge			2A		2A				2A	2A		
		24506	East Branch Black River												
64	20	2450601	At Mouth			2A		2A				2A	2A		
		24507	Black River	flow: 0.8 m^3/s (28 cfs)											
51-74	21	2450701	Near Garnet River Mile 3.5	*	1	1									
67	"	"	"	*	1	1		2C				2C			
64	20	2450702	Old Weir Site T43N, R8W, Sec. 30			2A		2A				2A	2A		
67	06	2450703	US-2 Bridge					2D	2D	2D		2D	2D		
68	"	"	"			5C		5C	5C	5C		5C	5C	5C	5C
		24508	Millecoquins River												
64	20	2450801	County Road 930 Bridge			2A		2A				2A	2A		
		24509	Milakokia River												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2450501	2A	2A	2A						2A		2A				
2450601	2A	2A	2A						2A		2A				
2450701															
"	2C								2C						
2450702	2A	2A	2A						2A		2A				
2450703	2D		2D	2D		2D	2D		2D		2D				
"	5C		5C	5C		5C	5C		5C		5C				
2450801	2A	2A	2A						2A		2A				

RIVER BASIN GROUP 2.4

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
64	20	2450901	County Road P-432 Bridge			2A		2A				2A	2A		
		24510	Bulldog Creek												
64	20	2451001	County Road P-432 Bridge			2A		2A				2A	2A		
		24511	Marblehead Creek												
64	20	2451101	US-2 Bridge			2A		2A				2A	2A		
65	"	"	"			2D		2D				2D	2D		
			HYDROLOGIC AREA 2.4.6 Manistique River												
		24601	Manistique River flow: 39.7 m^3/s (1,402 cfs)												
38-74	21	2460101	Near Manistique 41-01-50 X 86-09-40		1										
67	"	"	"		1	2BC		2BC				2BC			
71	"	"	"		1	2D									
72-73	"	"	"		1	5									
74	"	"	"		1	5A-C 2D									
64	20	2460102	US-2 Bridge			2B			2B			2B	2B		
68	"	"	"			5C		5C	5C	5C		5C	5C	5C	5C
71	"	"	"												
72	"	"	"												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2450901	2A	2A	2A						2A		2A				
2451001	2A	2A	2A						2A		2A				
2451101	2A	2A	2A						2A		2A				
"	2D	2D	2D						2D		2D				
2460101															
"	2BC								2BC						
"															
"															
"															
2460102	2B	2B	2B						2B		2B				
"	5C		5C	5C		5C	5C		5C		5C				
"														2B-D	2B-D
"														2B	2B

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	2460103	Railroad Ferry Slip Near Mouth		2D			2D	2D	2D		2D	2D		
69	"	"	"		5	2A 5B-D	5ACD 2B	5	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5A-C 2D	5	5	5	5	5		6	6	5	5
72	"	"	"			5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"		2D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		5A-C	2C 5AB	2C 5AB	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
71	36	2460199	Near Mouth Exact Location Unknown					2AC							
		24602	Thompson Creek												
64	20	2460201	US-2 Bridge			2B		2B				2B	2B		
			HYDROLOGIC AREA 2.4.7 Bay De Noc Complex												
		24701	Bursaw Creek												
64	20	2470101	County Road P-435 T40N, R17W, Sec. 23			2B		2B				2B	2B		
65	"	"	"			2D		2D				2D	2D		
		24702	Parent Creek												
64	20	2470201	County Road P-435 Bridge			2B		2B				2B	2B		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2460103	2D		2D	2D			2D		2D	2D	2D		2D		
"	5		5	5	5ABD	5	5		5						
"	5	5CD	5	5	5AB 2C	5	5		5						
"	5	5	5	5	2ACD 5B	5	5		5	2C	2C		2C		
"	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD				2C		
"	2A 5B-D	2A 5B	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D						
"	5	5B-D	5	5	5	5	5		5				2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						
2460199													2AC		
2460201	2B	2B	2B						2B		2B				
2470101	2B	2B	2B						2B		2B				
"	2D	2D	2D						2D		2D				
2470201	2B	2B	2B						2B		2B				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24703	Garden Creek	(No Data Found)											
		24704	Valentine Creek												
64	20	2470401	County Road 483 Bridge			2B		2B				2B	2B		
		24705	Fishdam River												
64	20	2470501	US-2 Bridge			2B		2B				2B	2B		
65	"	"	"			2C		2C				2C	2C		
		24706	Sturgeon River	flow: 5.9 m^3/s (208 cfs)											
66-74	21	2470601	Near Nahma Junction 45-56-35 X 86-41-20		1										
67	"	"	"		1	2C		2C				2C			
71	"	"	"		1	2AD									
72	"	"	"		1	5									
73	"	"	"		1	5AC 2BD									
74	"	"	"		1	5AC 2BD									
63	20	2470602	US-2 Bridge			5AC		5AC				5AC	5AC		
64	"	"	"			2B		2B				2B	2B		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2470401	2B	2B	2B						2B		2B				
2470501	2B	2B	2B						2B		2B				
"	2C	2C	2C						2C		2C				
2470101															
"	2C								2C						
"															
"															
"															
"															
2470602	5AC	5AC	5AC						5AC		5AC				
"	2B	2B	2B						2B		2B				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	2470602	(Continued)		2D	2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"		2D	2D		2D	2D	2D		2D	2D	2D	
67	06	2470603	USFS Bridge Near Nahma 45-50-03 X 86-40-07					2D	2D	2D		2D	2D		
68	"	"	"			5C	5	5C	5C	5C		5C	5C	5C	2C
		24707	Ogontz Creek												
64	20	2470701	US-2 Bridge			2B		2B				2B	2B		
		24708	Little River		(No Data Found)										
		24709	Big River		(No Data Found)										
		24710	Martin Creek		(No Data Found)										
		24711	Squaw Creek												
64	20	2471101	County Road 513 Bridge			2B		2B				2B	2B		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2470602	2D		2D	2D		2D	2D		2D		2D				
"	2D		2D	2D		2D	2D		2D		2D				
2470603	2D		2D	2D			2D		2D		2D				
"	5C		5C	5C		5C	5C		5C		5C				
2470701	2B	2B	2B						2B		2B				
2471101	2B	2B	2B						2B		2B				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24712	Whitefish River												
63	20	2471201	US-2 Bridge			5BC		5AB				5AB	5AB		
64	"	"	"			2AB		2AB				2AB	2AB		
65	"	"	"			2C		2C				2C	2C		
67	06	"	"			2C		2C	2C	2C		2C	2C	2C	
68	"	"	"			5C		5C	5C	5C		5C	5C	5C	5C
69	"	"	"			2A 5B-D	2AB 5CD	5	5	5		5	5	5	5
70	"	"	"			5	5	5	5	5		5	5	5	5
71	"	"	"			5	5	5	5	5		6	6	5	2A 5B-D
72	"	"	"			2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
73	"	"	"			2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"			5	5	5	5	5		5	5	5	5
75	"	"	"			5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
63	19	2471299	Exact Location Unknown					4CD	4CD	4CD					
71	36	"	"					2AC							
		24713	Rapid River												
67	06	2471301	US-41 Bridge			2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"			2D	2D	2D	2D	2D		2D	2D	2D	
64	20	2471302	US-2 Bridge			2A		2A				2A	2A		5C
68	06	"	"			5C		5C	5C	5C		5C	5C	5C	5C
63	19	2471399	Exact Location Unknown					4CD	4CD	4CD					

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	ORGANICS REFRACTORY
												TOTAL	DIS-SOLVED		
2471201	5AB	5AB	5AB						5AB		5AB				
"	2AB	2AB	2AB						2AB		2AB				
"	2C	2C	2C						2C		2C				
"	2C		2C	2C			2C		2C	2C	2C		2C		
"	5C		5C	5C		5C	5C		5C		5C				
"	5		5	5	5BD	5	5		5		2A				
"	5	5CD	5	5	5AB 2C	5	5		5						
"	5	5	5	5	2ACD 5B	5	5		5	2C	2C	2BC	2C		
"	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C		2C			2B	2B
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2D	2D				
"	5	5B-D	5	5	5	5	5		5		2C				
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						
2471299		4CD	4CD	4CD	4CD		4CD		4CD						
"													2AC		
2471301	2D		2D	2D		2D	2D		2D		2D				
"	2D		2D	2D		2D	2D		2D		2D				
2471302	2A	2A	2A						2A		2A				
"	5C		5C	5C		5C	5C		5C						
2471399		4CD	4CD	4CD	4CD		4CD		4CD						

RIVER BASIN GROUP 2.4

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		24714	Tacoosh River												
64	20	2471401				2A		2A				2A	2A		
		24715	Days River												
67	06	2471501	Unnamed County Road T41N, R22W, Sec. 29			2D	2D	2D	2D	2D		2D	2D	2D	2D
62	20	2471502	US-2 Bridge			5D		5D				5D	5D		
63	"	"	"			5AB		5AB				5AB	5AB		
64	"	"	"			2B		2B				2B	2B		
			HYDROLOGIC AREA 2.4.8 Escanaba River												
		24801	Escanaba River		flow: 25.4 m^3/s (897 cfs)										
50-74	21	2480101	At Cornell	*	1										
67	"	"	"	*	1			2BC				2BC			
68	"	"	"	*	1	2A		2A							
69	"	"	"	*	1	5BC 2AD		5BC 2AD							
70	"	"	"	*	1	2B 5AC		2B 5CD							
71	"	"	"	*	1	2BD		2BD							
72	"	"	"	*	1	2B 5ACD		2B 5ACD							
73	"	"	"		1	5BC 2AD		5BC 2AD							
72	06	2480102	County Road 519 T41N, R23W, Sec. 32			2C									

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
2471401	2A	2A	2A						2A		2A				
2471501	2D		2D	2D		2D	2D		2D						
2471502	5D	5D	5D								5D				
"	5AB	5AB	5AB						2B		5AB				
"	2B	2B	2B						2B		2B				
2480101															
"	2BC								2BC						
"															
"															
"															
"															
"															
"															
2480102															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	06	2480102	(Continued)		2B 5D	2BC 5D	2BC 5D	2BC 5D	2BC 5D	2BC 5D		2BC 5D	2BC 5D	2BC 5D	2BC 5D
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
64	20	2480103	Near Mouth T39N, R23W, Sec. 1			2B		2B				2B	2B		
67[a]	06	2480104	Spillway of Dam 1 River Mile 1.84			9	11C	11C	11C	11C		11C	11C	9	9
68-74	"	"	"			9								9	9
75	"	"	"			9	2C	2C	2C	2C				9	9
67-68	06	2480105	Railroad Bridge Near Wells 44-47-00 X 87-04-08	*		9								9	9
69	"	"	"	*	5	2A 5B-D	2AB 5CD	5	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	2D 5A-C	5	5	5	5	5		6	2ABD 5C	5	2A 5B-D
72	"	"	"	*		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"	*	2D	2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B		2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B
74	"	"	"	*		9								9	9
75	"	"	"			9	2C	2C	2C	2C				9	9
67-74	06	2480106	Abandoned County Road 45-46-59 X 87-04-08			9								9	9
75	"	"	"			9	2C	2C	2C	2C				9	9
67-72	06	2480107	At US-2			9								9	9
73	"	"	"		2D	9	2D	2D	2D	2D			2D	9	9
74	"	"	"		5	5	5	5	5	5			5	5	5
75	"	"	"		5A-C	5A-C	5AB 2C	5A-C	5A-C	5A-C			5A-C	5A-C	5A-C
67-74	06	2480108	Down from US-2 45-47-30 X 87-04-35			9								9	9
75	"	"	"			9	2C	2C	2C	2C				9	9
67	06	2480109	At Mouth 45-46-35 X 87-03-55			9								9	9
63[c]	19	2480199	Exact Location Unknown					4CD	4CD	4CD					
64[c]	"	"	"					4AB	4AB	4AB					
71	"	"	"					2AC							

[a] Two day intensive sample, August 23 and 24, 1967. (11C)

[b] 1972 only.

[c] Weekly from June 12, 1963 to May 6, 1964.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
2480102	2BC 5D	2BC	2BC 5D	2BC 5D	2BC 5D	2BC 5D	2BC 5D		2BC 5D	2D	2D				
"	5	5B-D	5	5	5	5	5		5		2C		2D		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						
2480103	2B	2B	2B						2B		2B				
2480104			11C	11C		11C	11C		11C		11C				
"															
"	2C		2C	2C	2C	2C	2C								
2480105															
"	5		5	5	2A 5BD	5	5		5		2A				
"	5	5B-D	5	5	5A-C	5	5		5						
"	5	5	5	5	5B 2ACD	5	5		5	2C	2C		2C		
"	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD						
"	2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B	2ACD 5B		2ACD 5B						
"															
"	2C		2C	2C	2C	2C	2C								
2480106															
"	2C		2C	2C	2C	2C	2C								
2480107														2B	2B
"			2D	2D	2D	2D	2D		2D	2D	2D				
"		5B-D	5	5	5	5	5		5		2C		2C		
"	2C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						
2480108															
"	2C		2C	2C	2C	2C	2C								
2480109															
2480199		4CD	4CD	4CD	4CD			4CD	4CD			4CD			
"		4AB	4AB	4AB	4AB			4AB	4AB			4AB			
"													2AC		

Evaluation and Summary of Data for River Basin Group 2.4

This river basin group includes eight hydrologic areas, comprising 34,679 km^2 (13,338 mi^2) in Michigan. Of the 61 tributaries included on the DAM for this river basin group, 15 were found to have at least one year of monthly data and 12 were found to have long-term chemical records. Of the 15 major tributaries in this area, only the Sturgeon River was judged to have inadequate data for loading calculation purposes. Thirteen of the tributaries in the river basin group had continuous flow data available. Because of the lake-like expanses found near the mouths of most of the tributaries in this river basin group interpretation of the actual discharge may be difficult. Very few data are available for Hydrologic Area 2.4.5. However, this is a very small complex with no major tributaries. Very little heavy metal, pesticide, or refractory organic data are available for this river basin group.

Hydrologic Area 2.4.1 - Muskegon River. This hydrologic area is drained by the Muskegon River as well as a number of small tributaries, some of which were monitored. Black Creek, which was found to have the most data available of these small tributaries, was monitored at a number of stations during the 1970's (although the frequency of monitoring generally has been less than monthly over an annual cycle). Becuase Muskegon Lake is interconnected with Lake Michigan, rivers flowing into Muskegon Lake are considered tributary to Lake Michigan and included on the DAM.

The Muskegon River is by far the most important tributary in this hydrologic area. A continuous discharge gauge is located about 65 kilometers (40 miles) upstream from the mouth (station 2410201) but below the confluence of the major tributaries. This station probably represents the flow of 80 percent of the drainage area. As is the case for many of the tributaries to the eastern shore of Lake Michigan, the Muskegon River widens out into a lake-like body at the river mouth created by the inundation of the old river mouth area by high lake levels. The effect Muskegon Lake has on pollutant transport will complicate the measurement and estimation of loadings from this tributary. Station 2410203, located above Muskegon Lake, and Station 2410205, located at the outlet of Muskegon Lake into Lake Michigan were found to have the most extensive records of water quality data available. Some useful loading data are available on a monthly basis during 1973 and 1974 at station 2410503. Station 2410205 has been monitored since 1963 and the available data include some biweekly measurements of suspended solids, dissolved reactive phosphorus, nitrate, ammonia, and chloride. Beginning in 1969 approximately monthly sampling was initiated for key loading parameters at this station. Heavy metals, pesticides, and refractory organics were analyzed one or two times per year during the 1970's at this station.

Hydrologic Area 2.4.2 - Sable Complex. Of the nine tributaries identified in this hydrologic area four were found to have sufficient data available for loading calculations. The White River, the southernmost tributary in the complex, has a gauging station approximately 19 kilometers (12 miles) upstream from its mouth. The river widens near its inlet into Lake Michigan forming White Lake. Most of the available water quality data have been collected above White Lake at station 2420202, and at the outlet of Lake Michigan at station 2420204. It is likely that Lake Michigan has a significant effect on the outflow from White Lake. This may complicate interpretation of the data particularly from station 2420204.

The Pentwater River also forms a lake-like expanse near its mouth (Pentwater Lake). Most of the river mouth data collected for this river have been collected at the outlet of Pentwater Lake as it joins Lake Michigan at station 2420503. During the mid-1960's relatively intensive measurements were made for suspended solids, nitrate, ammonia, dissolved reactive phosphorus, and chloride. Several biweekly measurements were made, including a few during the spring period. Beginning in 1968 monitoring was conducted generally on a monthly basis and included total phosphorus analysis. Some grab samples of heavy metals were taken between 1969 and 1972. No pesticide, refractory organics, or discharge data were found for the river mouth area of the Pentwater.

The Pere Marquette River is another major tributary in this complex. It is gauged approximately 16 river kilometers (10 miles) upstream from its mouth. Some chemical data are available for a station slightly upstream from the gauging station (2420601). Quarterly to monthly measurements were made at this station between 1970 and 1974 for a number of key loading parameters, including nutrients and suspended solids.

The Pere Marquette River also forms an embayment at the river mouth called Pere Marquette Lake. The most extensive data have been collected at station 2420608 at the outlet of Pere Marquette Lake. During the mid-1960's some biweekly measurements of key loading parameters were made, including sampling during the spring period. In 1968 this sampling strategy was changed to monthly and parameters such as total kjeldahl nitrogen and total phosphorus were added. Sampling frequency was somewhat less than monthly during 1972 and 1973 at this station. Heavy metal data are available at this station for the 1970's, although they were collected on a once or twice per year basis. No pesticide or refractory organic data were found for this tributary which drains a predominantly forested area.

The Lincoln River flows into Lake Michigan between the Pere Marquette River and the Big Sable River. Some nutrient data were collected on this tributary, but they are probably insufficient for loading calculations.

The Big Sable River was gauged from 1942 to 1973 (at which time it was discontinued) at a station (2420802) which is located approximately 26 river kilometers (16 miles) upstream from the mouth. Compared to other tributaries in this complex there are relatively few water quality data available on the Big Sable. During 1973 and 1974, essentailly monthly samples were collected and analyzed for nutrients at a station located above Hamlin Lake (station 2420803), which is formed by the Big Sable River near its confluence with Lake Michigan. No data are available for the outlet of the Big Sable River to Lake Michigan.

Hydrologic Area 2.4.3 - Manistee River. The Little Manistee and the Manistee Rivers flow into Manistee Lake near Lake Michigan. Although the Little Manistee is properly a tributary to the Manistee River, they have been considered separately on the DAM because they converge close to Lake Michigan and because data are available for both tributaries. The Little Manistee River has been gauged since 1956 at a station located about 12 river kilometers (seven miles) upstream from the confluence with Manistee Lake at station 2430101. A considerable amount

of water quality data are available at a station (2430103) just above the confluence of the Little Manistee with Manistee Lake. Monthly data are available for a number of key loading parameters in 1968, 1973, and 1974 at this station. Some monthly measurements were made in 1968 at station 2430104 for loading parameters. There also were a number of parameters monitored in Manistee Lake itself in 1972 and 1973. Very little heavy metal, pesticide, and refractory organics data are available for the Little Manistee.

The Manistee River has been gauged since 1951 at a station located only a few kilometers from the confluence of the Manistee River with Manistee Lake. Water quality data have been collected on the Manistee River above the confluence with Manistee Lake (station 2430202) and also at the outlet of Manistee Lake where it joins Lake Michigan (station 2430205). At station 2430202, some monthly data were collected during the 1970's for parameters of concern. The most extensive data available are from station 2430205, where biweekly measurements were made of nitrate, ammonia, dissolved reactive phosphorus, suspended solids, and chlorides in the mid-1960's. Beginning in 1968, generally monthly measurements were made for the loading parameters mentioned above as well as for total kjeldahl nitrogen and total phosphorus. Some measurements were made of heavy metals, pesticides, and refractory organics during 1971, 1972, and 1974 on a one or two samples per year basis at stations 2430202 and 2430205.

Hydrologic Area 2.4.4 - Traverse Complex. Of the 16 tributaries identified for inclusion in this complex, 11 were found to have either no data or data that were insufficient for loading calculation purposes. The Betsie River has some short-term water quality data available, but it has no useful discharge data. Some monthly monitoring was conducted for nutrients, chloride, and suspended solids during 1974. Instantaneous flow measurements were also made at that time.

The Platte River has been studied at a number of stations near its mouth, although the water quality data were not collected at the same frequency over any complete annual cycle. All of the stations are located below Platte Lake, a widening of the river near Lake Michigan. There are no discharge data available for this tributary.

The Boardman River has been gauged since 1952 at a station located about 16 river kilometers (10 miles) upstream from the mouth. The water quality data record for the Boardman is relatively good. During the mid-1960's a number of biweekly measurements were made at station 2440606 for different nutrients and suspended solids, including some measurements during the spring period. Beginning in 1969, generally monthly measurements were made at this same location for key nutrients and suspended solids, as well as a number of other parameters. Spot tests were also made for heavy metals, pesticides, and refractory organics between 1971 and 1974. Thus, there are adequate data available to estimate loadings from the Boardman River.

The Elk River drains Elk Lake and flows a short distance into Grand Traverse Bay. Some data are available for the Elk River between Elk Lake and Torch Lake and at the outlet of Elk Lake itself near the confluence with the bay. Although they include some monthly nutrient analyses, they generally do not cover an annual cycle for any given year at a frequency that is sufficient for loading calculation purposes. No flow data are available for this tributary.

The Pine River is the outlet of Lake Charlevoix into Lake Michigan. Draining into Lake Charlevoix are the Jordan and Boyne Rivers. Stations on these tributaries have been included under the Pine River. At station 2441202 on the Jordan River, continuous flow measurements have been made since 1966. However, this station is a considerable distance upstream from Lake Michigan. Chemical measurements, including some monthly nutrient analyses, have been made at a number of other stations on the Jordan River. The Boyne River has been monitored near the outlet into Lake Charlevoix (station 2441206). Some monthly data are available for this station, including data for nutrients, chlorides, and suspended solids. There is also a considerable amount of monitoring data available for the Pine River between Lake Charlevoix and Lake Michigan at station 2441207. Some biweekly data, including measurements in the spring are available for the mid-1960's and for 1973. Data were collected on generally a monthly basis between 1969 and 1971. Very little heavy metal, pesticide, or refractory organics data were found for this tributary.

Hydrologic Area 2.4.5 - Seul Choix-Groscap Complex. This complex is the smallest in size in River Basin Group 2.4. None of the 11 tributaries identified for this complex were found to have sufficient water quality data for loading estimations. All of the loading data identified were collected prior to 1970. The Black River is the largest tributary in this complex and has been gauged since 1951. There were a number of chemical analyses made at the mouth of this river in the late 1960's, but they were not of sufficient regularity to be of use in loading calculations. Due to the relatively undeveloped character of this complex, pollutional loadings are probably very small.

Hydrologic Area 2.4.6 - Manistique River. The Manistique River has been gauged since 1938 at a station approximately 32 river kilometers (20 miles) from the mouth. Water quality data are available at station 2460103 located at the mouth of the Manistique River. Monthly analyses of nutrients and suspended solids were made over a number of years. Instantaneous flow measurements were also made at station 2460103. Some grab-type analyses of heavy metals, pesticides, and refractory organics were made at stations 2460102 and 03.

Hydrologic Area 2.4.7 - Bay De Noc Complex. Of the 15 tributaries identified for this complex, only the Whitefish River was found to have sufficient river mouth data for loading calculations. The Sturgeon River has been gauged at station 2470601 located less than 10 river kilometers (6 miles) from the mouth since 1966. Some measurements have been made in the mouth area of the Sturgeon for parameters of interest to loading estimations, but they have been made generally only once or twice per year and usually in the summer or fall period.

The most extensive water quality data found in this complex is that for the Whitefish River. Beginning in 1969 at station 2471201 generally monthly analyses were made of parameters of interest including total and dissolved reactive phosphorus. In 1963 weekly measurements were made of suspended solids, chlorides, and a number of nutrients on the Whitefish at station 2471299. A few scattered heavy metal, pesticide, and refractory organics data are also available. Unfortunately, no flow data were found for the Whitefish River, and despite the relatively regular sampling program over a number of years the lack of flow data will makes reasonable loading calculations difficult.

A considerable amount of data were collected on the Rapid and Days Rivers in the 1960's, but none were collected on a regular basis over an annual cycle. No flow data are available for these two small tributaries.

Hydrologic Area 2.4.8 - Escanaba River. The Escanaba River, which discharges into Little Bay De Noc, has been gauged since 1950 at station 2480101, located approximately 25 river kilometers (16 miles) upstream from the mouth. The Escanaba River has a long-term, near-mouth water quality data record. Monthly data were collected at a number of different stations in close proximity to each other in the 1970's. These data include measurements of total and dissolved reactive phosphorus, nitrogen species, silica, and suspended solids. Samples of the Escanaba were taken at station 2480199 on a weekly basis between June 12, 1963 and May 6, 1964. These weekly samples were analyzed for silica, nitrogen species, total soluble phosphorus, and heavy metals. There are very few data available for pesticides and refractory organics. There have not been any chemical measurements at frequencies higher than monthly since the 1963-1964 study.

IDENTIFICATION AND EVALUATION OF LAKE HURON DATA

BASIN DESCRIPTION

The United States portion of the Lake Huron Basin drains an area of 41,917 km^2 (16,184 mi^2). The hydrologic boundaries of this basin are divided into two river basin groups, shown in figure 15. River Basin Group 3.1 and 3.2 drain areas of 21,075 km^2 (8,137 mi^2) and 20,842 km^2 (8,047 mi^2) respectively. This Basin is located entirely in the State of Michigan.

Soils in the Lake Huron Basin vary widely. In the northern portion the soils are low in lime content, low in fertility, and subject to severe drainage restrictions. Soils in the southern portion of the basin range from lacustrine clays to outwashes of nearly pure sand and contain a large variety of mineral materials. About 50 percent of the total land base in the southern portion of the Basin is subject ot some problem with drainage or flooding. Approximately 38 percent of the area is devoted to agriculture with potato, beef, and dairy cattle production being the primary resources developed. About 49 percent of the area is covered by forests. Beech, birch, maple, and hemlock are the major forest types covering the northern portion of the basin and parts of the mid-portion as well as the Lake Huron shore area. A wide band of jack, red, and white pine stretches accross the central portion of the northern area of the basin, bordered by areas of spruce and fir to the south.

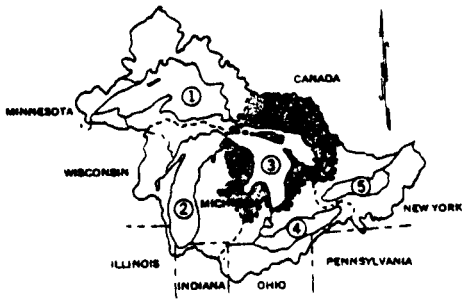
Mineral deposits found in the northern portion of the Lake Huron Basin include gypsum, petroleum and natural gas, sand and gravel, shale, and limestone. Minerals found in the southern portion include clay, peat, petroleum and natural gas, salt, sand and gravel and limestone. In addition, cements and lime are manufactured from both local and imported raw materials and saline products (bromine, calcium compounds, iodine, magnesium and potash) are extracted or manufactured from natural brines, and are the most important minerals produced from an economic standpoint.

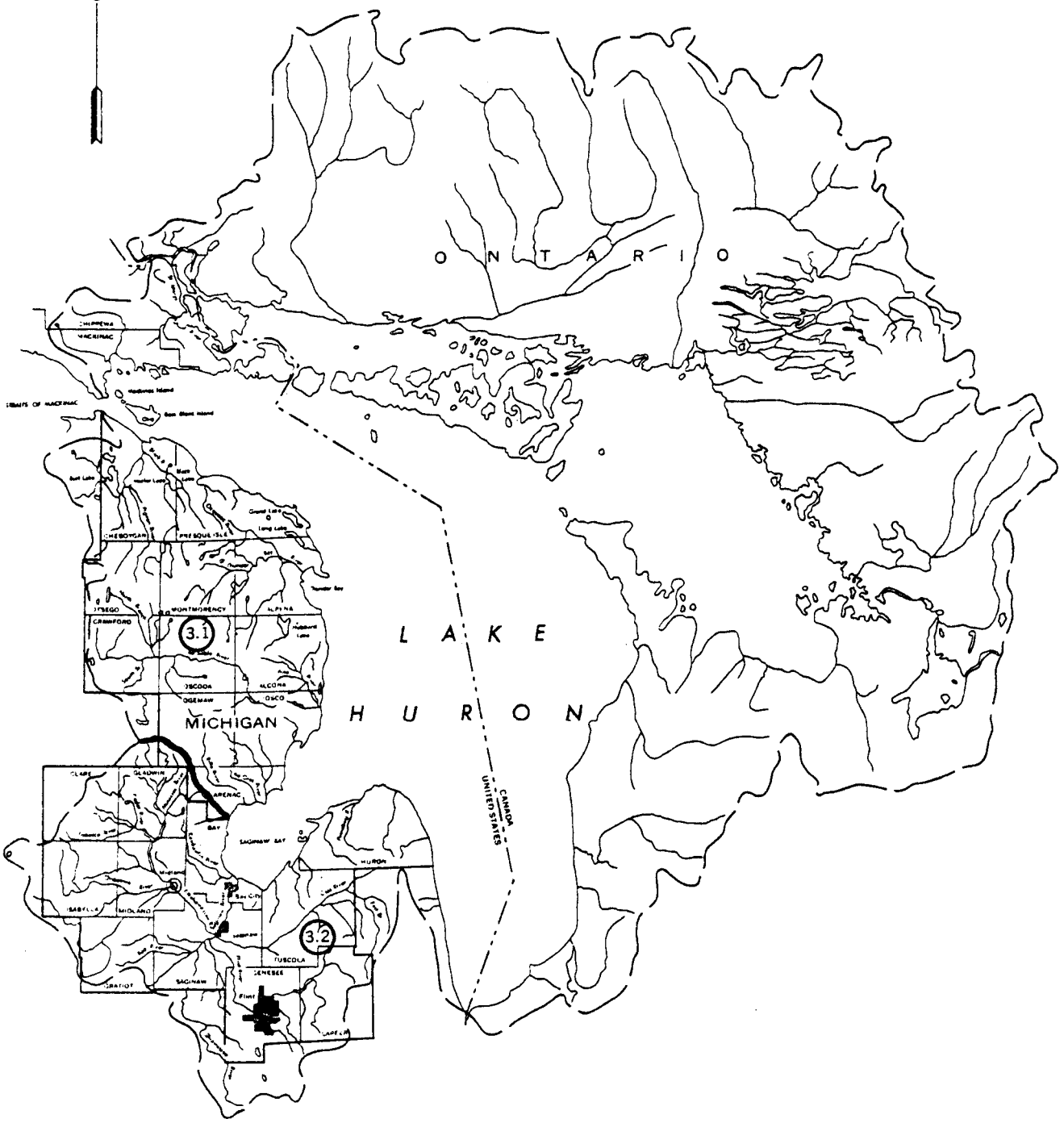
Based on the 1970 census, approximately 1,200,000 people live within the Huron Basin. Over 61 percent of the people living within river basin group 3.2 live in the urban areas associated with the cities of Flint, Saginaw, and Bay City. Major urban centers in River Basin Group 3.1 are the cities of Cheboygan, Rogers City, and Alpena.

The Lake Huron Basin has over 84,170 hecares (208,000 acres) of inland lakes

Figure 15

LAKE HURON BASIN, 3
River Basin Groups 3.1, 3.2





SCALE IN MILES
0 10 20 30 40 50

and approximately 12,880 kilometers (8,000 miles) of streams and rivers. The nature, availability and quality of the water resources present differ between the northern and southern parts of the basin. In River Basin Group 3.1 there is an abundance of surface water resources. Though not generally long or steep, streams drain over 17,350 km^2 (6,700 mi^2) in the upper part of the basin. Relatively stable streams include the Au Sable, the Black, and the Rifle Rivers. In the southern part of the basin the streams drain mostly urbanized land, such as the areas of Flint and the Saginaw valley, and agricultural land, often with extensive artificial drainage. Flows are unstable and water quality tends to be poor due to turbidity and municipal, industrial, and agricultural wastes. Inland lakes are not plentiful except near the headwaters, and surface water resources are often of poor quality. Flow of the lower Saginaw River is significantly effected by the raising and the lowering of Saginaw Bay.

Water quality is generally good throughout River Basin Group 3.1, although there are localized reaches of sutstandard water quality receiving the effluent of municipal primary treatment plants and/or industrial discharges. The Saginaw River in River Basin Group 3.2 has suffered from poor water quality in recent years partly because of tributary inflows carrying sizeable waste loads of chlorides and nutrients. The Saginaw River discharges considerable quantities of nutrients from industrial, municipal, and agricultural sources into the Saginaw Bay and in warm weather excessive algal blooms have occured.

Stream bank erosion in the Lake Huron region is widespread with 2,740 kilometers (1,700 miles) of streambanks subject to erosion. The overall contribution of sediment derived from streambank erosion is a minor part of the total sediment resulting from all types of erosion in the basin. Erosion currently plays, and will continue to play, an important role in degrading water quality.

EVALUATION AND SUMMARY OF LAKE HURON DATA

The U.S. Lake Huron drainage basin has been divided into nine hydrologic areas comprising 42,078 km^2 (16,184 mi^2) in Michigan. About 25 percent of the 88 tributaries included on the DAM for this basin had water quality data sufficient for annual loading estimates. However, only four tributaries in the whole basin were found to have gauging stations strategically located for loading calculation purposes. Also, a number of the major tributaries (as identified in table 4) in the basin do not have adequate water quality data for loading calculation purposes.

Most of the long-term data available for Lake Huron were collected as part of monthly sampling programs. Recent data were collected in support of the Upper Lakes Reference Group Study as well as some specialized studies in which weekly to biweekly measurements have been made. The data base is weakest for the lower portions of Lake Huron. Both water quality data and flow data are lacking in this region. The Saginaw River has been studied quite extensively and has a long-term data base. In addition, some detailed analyses have recently been conducted and others are planned to be continued. Total soluble phosphorus as well as dissolved reactive and total phosphorus have been collected for the Saginaw River mouth area. Unfortunately, there is no gauging station at the mouth area of the Saginaw and discharge estimates must be based on a flow model

which utilizes upstream gauging stations.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 3.1

River Basin Group 3.1 encompasses an area of 21,075 km^2 (8,137 mi^2), shown in figure 16. This river basin group contains six hydrologic areas. Maps and descriptions of these hydrologc areas follow.

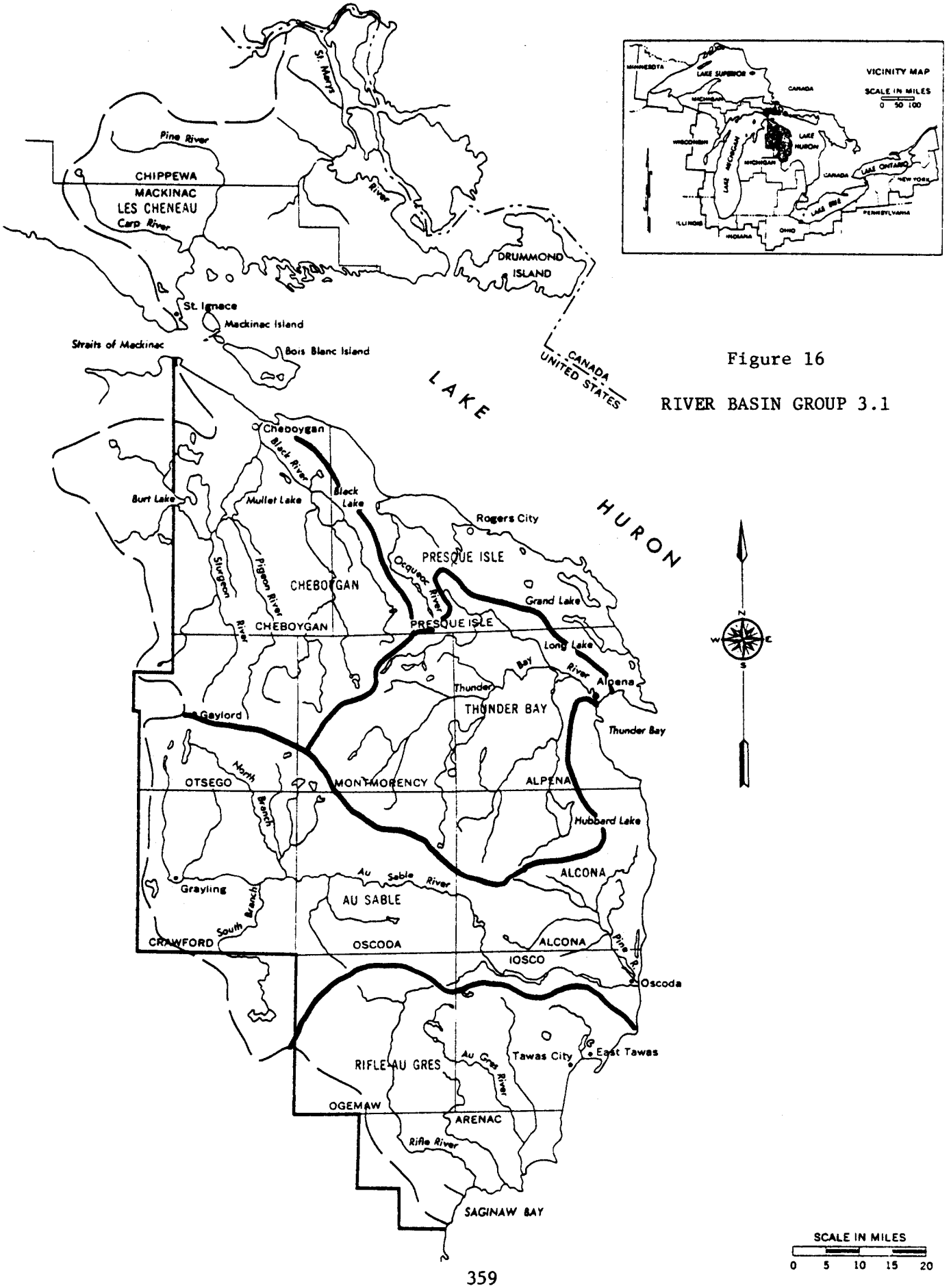
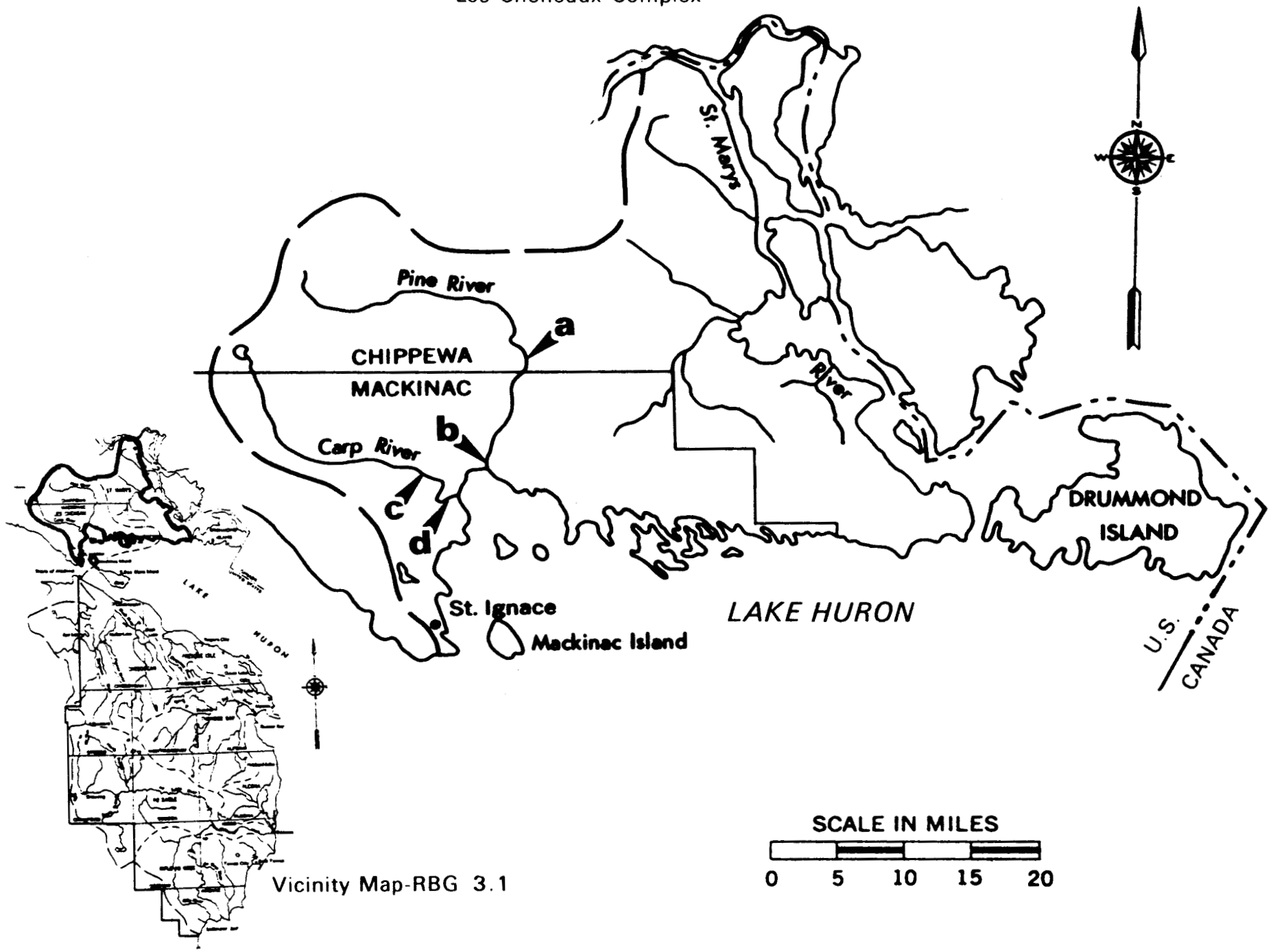


Figure 16

RIVER BASIN GROUP 3.1

Hydrologic Area 3.1.1
Les Cheneaux Complex



Vicinity Map-RBG 3.1

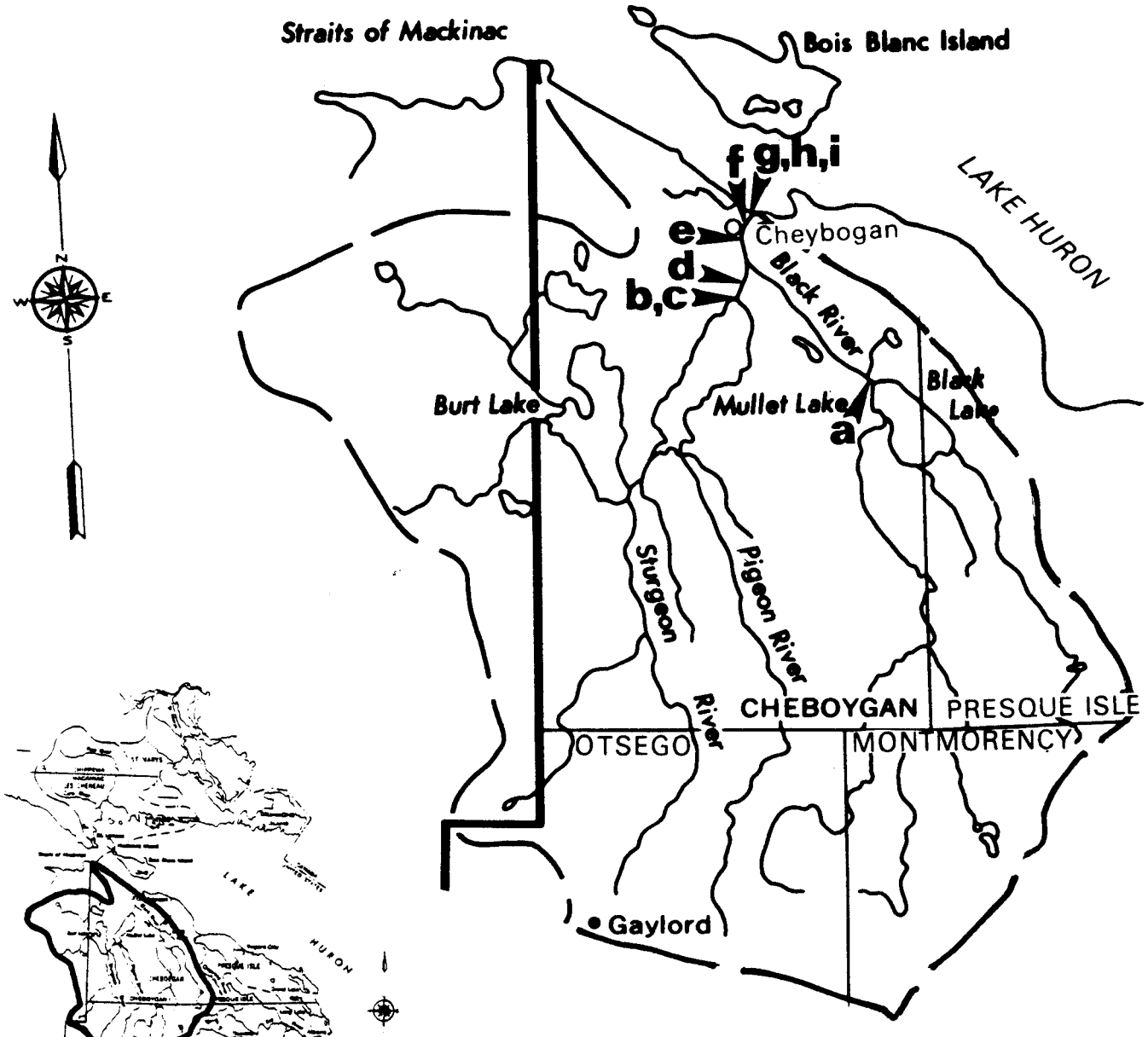
Hydrologic Area 3.1.1
Les Cheneaux Complex

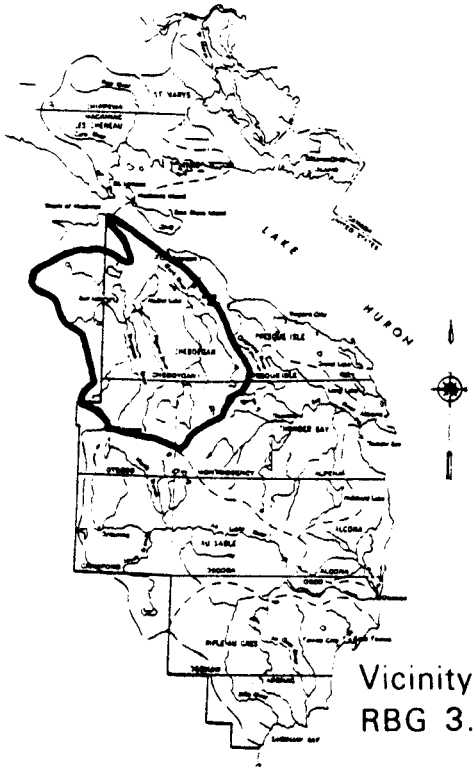
The Les Cheneaux Complex encompasses an area of 364,000 hectares (901,000 acres). The area is located in the southeast portion of Michigan's Upper Peninsula. The important tributaries in the area are the Munuscong, the Pine, and the Carp Rivers all of which are ungauged. The topography varies from flat to gently rolling. Wetland areas are common. Approximately 80 to 90 percent of the area is forested including portions of the Hiawatha National Forest and the Munuscong State Forest. Less than 10 percent of the area is devoted to agriculture and only a few percent of the area is urbanized. The bedrock is composed of dolomite in southern areas with bands of shale, and igneous and metamorphic rock in the more northern areas. The overlying material is silt and clay. This sparsely populated area has only one industrial and one municipal wastewater point discharge of any significance. The cities of Sault St. Marie (Pop.: 15,136) and St. Ignace (Pop.: 2,892) represent the areas of greatest human pressure in the complex.

Station Key

Station Location	DAM River and Station Numbers
Pine River	31110
a	3111001
b	3111002
Carp River	31111
c	3111101
d	3111102

Hydrologic Area 3.1.2
Cheyboygan River





Vicinity Map-
RBG 3.1

SCALE IN MILES
0 5 10 15 20

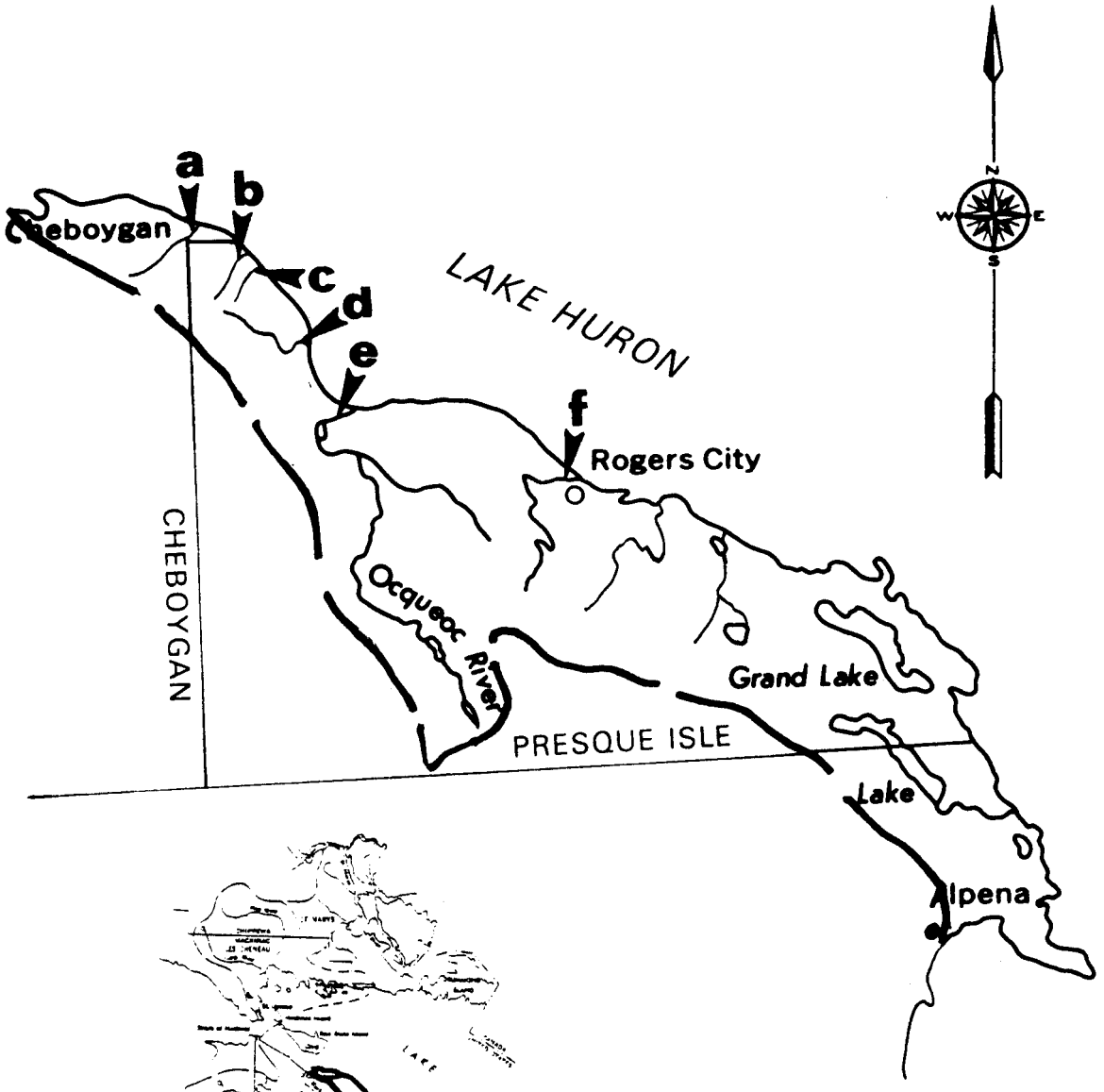
Hydrologic Area 3.1.2
Cheboygan River

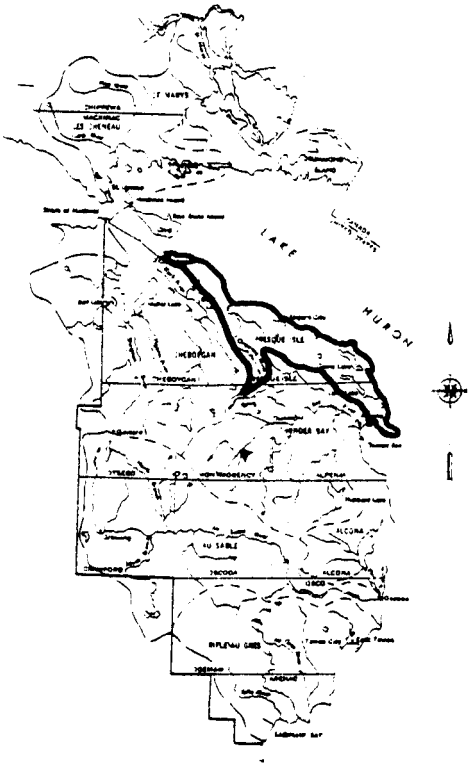
The Cheboygan River drains an area of 409,000 hectares (1,010,000 acres). The complex is located in the northeast portion of Michigan's Lower Peninsula. The Cheboygan River has a mean annual discharge of 22.9 m^3/s (809 cfs). Major tributaries to the Cheboygan River are the Sturgeon River, the Pigeon River and the Black River. The terrain consists of steep rolling hills. Lakes and swamps are relatively common. A large percentage of the area is forested including portions of the many wetlands found in the area. Roughly 15 percent of the area is devoted to agriculture, and less than 5 percent is urbanized. The bedrock consists of shale near the shoreline and sandstone throughout the rest of the area. The bedrock is covered by silt and clay in the shore zone and a combination of sand, gravel, and glacial till throughout the remaining area. Limestone, dolomite, salt, and petroleum formations exist in the region. At least one industrial and one municipal wastewater treatment plant uses the basin surface water for waste assimilation. The cities of Cheboygan (Pop.: 5,553), and Gaylord (Pop.: 3,012) represent the largest urbanized sections in this area.

Station Key

Station Location	DAM River and Station Numbers
Cheboygan River	31203
a	3120301
b	3120302
c	3120303
d	3120304
e	3120305
f	3120306
g	3120307
h	3120308
i	3120309

Hydrologic Area 3.1.3
Presque Isle Complex





SCALE IN MILES

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Vicinity Map-RBG 3.1

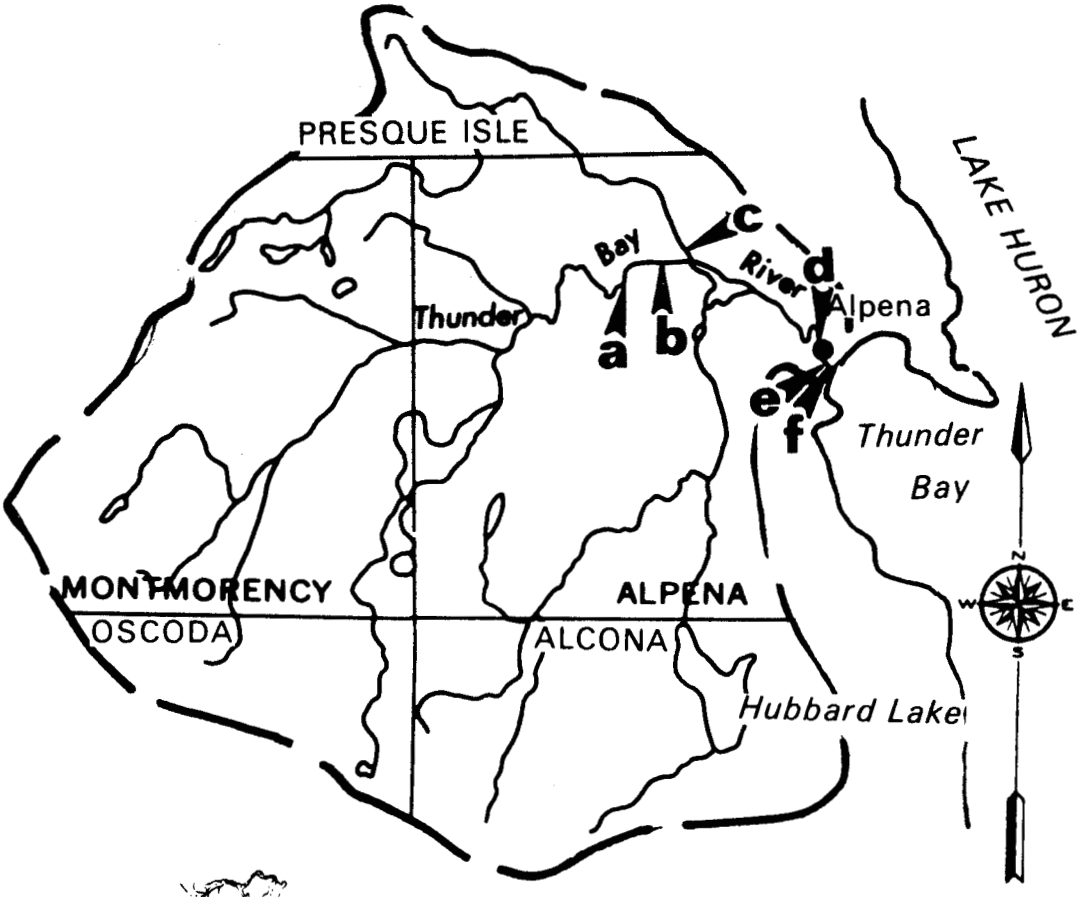
Hydrologic Area 3.1.3
Presque Isle Complex

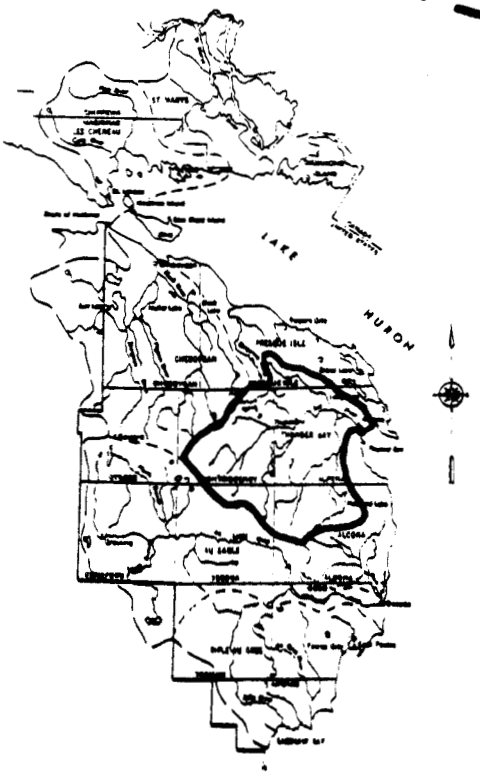
The Presque Isle complex encompasses an area of 145,000 hectares (358,000 acres) in the northeast section of Michigan's Lower Peninsula. The most significant tributary in the area is the Ocqueoc River, which has a mean annual discharge of 4.7 m^3/s (166 cfs). The area is generally flat with many wetlands. Approximately 70 to 80 percent of the area is forested (including portions of the Black Lake State Forest), 10 to 20 percent of the area devoted to agriculture, and 4 percent urbanized. The bedrock is composed mostly of shale and limestone. The bedrock is covered by silt and clay near the shore and glacial till over the rest of the region. Salt, oil, and limestone formations are present in the area. The largest urban center is Rogers City (Pop.: 4,275). It does not, however, contribute any untreated wastewater discharges. There are extensive limestone outcroppings along the Lake Huron shoreline. Ports along the shore, such as Calcite, Michigan, lead the Great Lakes Region in limestone export.

Station Key

Station Location	DAM River and Station Numbers
Greene Creek	31302
a	3130201
Mulligan Creek	31303
b	3130301
Schmidts Creek	31304
c	3130401
Carp Creek	31305
d	3130501
Ocqueoc River	31306
e	3130601
Trout River	31307
f	3130701

Hydrologic Area 3.1.4
Thunder Bay River





SCALE IN MILES

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Vicinity Map-RBG 3.1

Hydrologic Area 3.1.4
Thunder Bay River

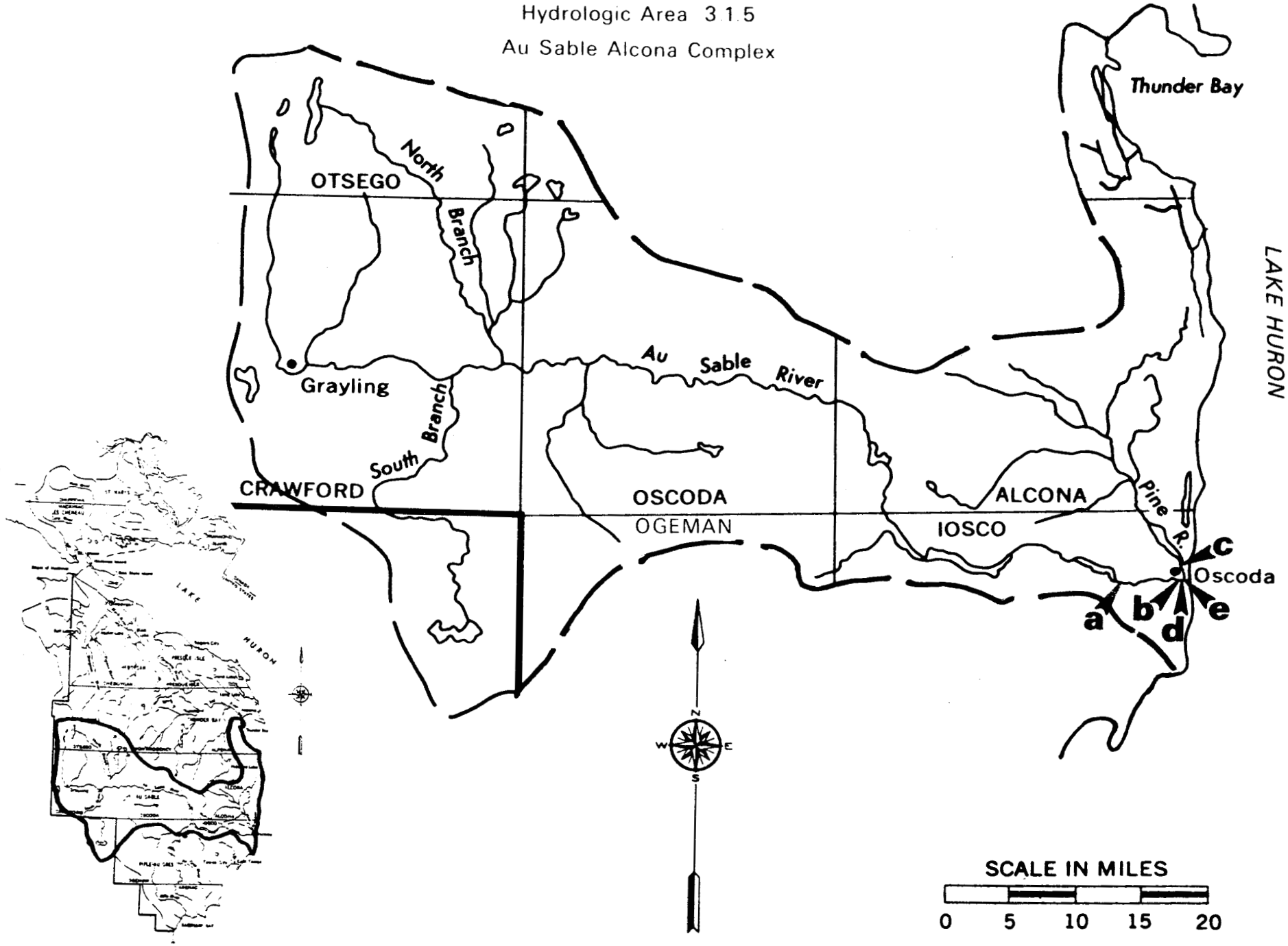
The Thunder Bay River drains an area of 327,000 hectares (808,000 acres) in the northeast portion of Michigan's Lower Peninsula. The major tributary, the Thunder Bay River, has a mean annual discharge of 13.2 m^3/s (466 cfs). The topography is generally flat in the eastern portions with some wetlands. Steep hills dominate the western region. Approximatley 60 percent of the area is forested including portions of the Alpena and Black Lake State Forests. Roughly 20 percent of the land is used for agriculture and another 4 percent urbanized. The bedrock is composed of shale in the northern portion and sandstone in the south. The overlying material consists of silt and clay along the shore with glacial till, sand, and gravel scattered throughout the rest of the area. Some extraction of materials such as shale, sand, and gravel occur in the area. Limestone, dolomite, and oil formations also exist in the area. One municipality and two industries use surface waters of the Thunder Bay River basin for waste assimilation. The city of Alpena (Pop.: 13,805) represents the heaviest zone of human pressure upon the area's surface waters.

Station Key

Station Location	DAM River and Station Numbers
Thunder Bay River	31401
a	3140101
b	3140102
c	3140103
d	3140104
e	3140105
f	3140106

Hydrologic Area 3.1.5

Au Sable Alcona Complex



Vicinity Map-RBG 3.1

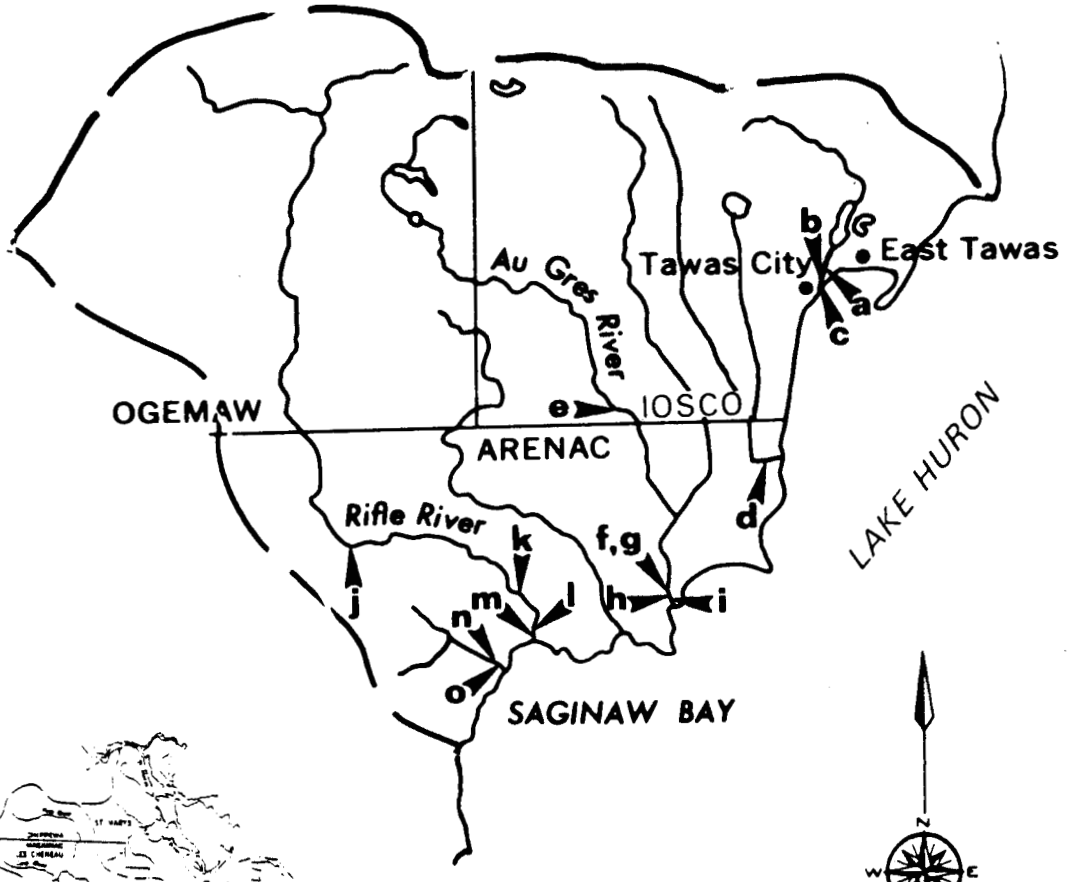
Hydrologic Area 3.1.5
Au Sable - Alcona Complex

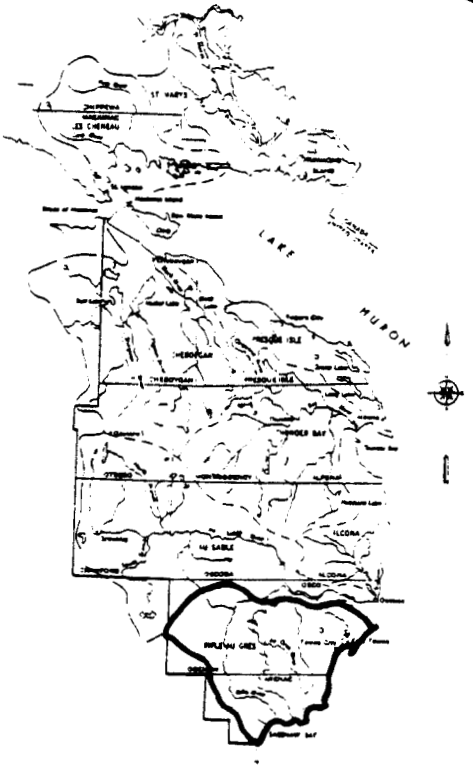
The Au Sable-Alcona Complex covers 576,000 hectares (1,422,000 acres). This area is located in the northeast section of Michigan's Lower Peninsula. The major tributary in the area is the Au Sable River, which has a mean annual discharge of 27.8 m^3/s (982 cfs). The major tributary to the Au Sable is the Pine River which enters only a few miles from the mouth of the Au Sable. The topography varies from flat near the shore to steep hills in the western portions. Approximately 60 to 70 percent of the area is forested including portions of the Au Sable and Pigeon River State Forests as well as sections of the Huron National Forest. About 20 percent of the area is devoted to agriculture and about 4 percent is urbanized. The bedrock is composed principally of sandstone. Overlying material is composed of silt and clay near the shore with scattered areas of sand, gravel, and glacial till. The headwaters of the Au Sable drain a number of marl swamps which contribute to the fertility of the river. There are three municipal wastewater discharges in the area all of which have some form of treatment. The city of Graling (Pop.: 2,143) and the unincorporated area of Au Sable-Oscoda (Pop.: 3,475) represent the most highly developed regions in this area.

Station Key

Station Location	DAM River and Station Numbers
Au Sable River	31504
a	3150401
b	3150402
c	3150403
d	3150404
e	3150405
f	3150406

Hydrologic Area 3.1.6
Rifle-Au Gres Complex





Vicinity Map-RBG 3.1

SCALE IN MILES

0 5 10 15 20

Hydrologic Area 3.1.6
Rifle-Au Gres Complex

The Rifle-Au Gres Complex encompasses an area of 287,000 hectares (709,000 acres). This complex is located in the northeastern portion of Michigan's Lower Peninsula. The important rivers in the area and their mean annual discharges are the Au Gres (2.8 m^3/s, 99 cfs), and the Rifle (8.7 m^3/s, 307 cfs). The Complex is generally flat and wetlands are relatively common. Approximately 70 to 80 percent of the area is forested (including portions of the Huron National Forest), about 15 percent devoted to agriculture, and only a few percent is urbanized. The bedrock is composed mostly of limestone. The bedrock is covered by silt and clay along the lakeshore and glacial till throughout the rest of the area. Material such as sand and gravel, oil, gypsum, limestone, and dolomite are extracted from the area. The cities of East Tawas (Pop.: 2,372) and Tawas (Pop.: 1,666) represent the two largest urbanized areas in this complex.

Station Key

Station Location	DAM River and Station Numbers
Tawas River	31601
a	3160101
b	3160102
c	3160103
Whitney Drain	31602
d	3160201
Au Gres River	31603
e	3160301
f	3160302
g	3160303
h	3160304
i	3160305
Rifle River	31605
j	3160501
k	3160502
l	3160503
m	3160504
Pine River	31606
n	3160601
o	3160602

RIVER BASIN GROUP 3.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	TYPE OF DATA												
				OWDC STA	DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		HYDROLOGIC AREA 3.1.1 LES CHENEAUX COMPLEX														
		31101	Unnamed Tributary south of Six Mile Point (No Data Found)													
		31102	Charlotte River (No Data Found)													
		31103	Little Munuscong River (No Data Found)													
		31104	Munuscong River (No Data Found)													
		31105	Gogomain River (No Data Found)													
		31106	Unnamed Tributary from Carlton Lake (No Data Found)													

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS TOTAL	HEAVY METALS DIS-SOLVED	PESTICIDES	REFRACTORY ORGANICS

RIVER BASIN GROUP 3.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31107	Unnamed Tributary east of Albany Point (No Data Found)												
		31108	McKay Creek (No Data Found)												
		31109	Unnamed Tributary into Pontchartrain Shores (No Data Found)												
		31110	Pine River												
74	35	3111001	Mackinaw Trail 46-10-55 x 84-35-00			2A 5B-D		2A 5B-D							
75	"	"	"			2C		2C							
68	06	3111002	Near the mouth			5C		5C	5C	5C		5C	5C	5C	5C
69	"	"	"			2A 5B-D	5ACD 2B	5	5	5		5	5	5	2A 5B-D
70	"	"	"			5	5	5	5	5		5	5	5	5
71	"	"	"			2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		6	6	2A 5B-D	2A 5B-D
72	"	"	"			2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C
73	"	"	"		2D	2A-C 5CD	2AC 5B-D	2AC 5B-D	2AC 5B-D	2AC 5		2AC 5B-D	2AC 5B-D	2AC 5B-D	2AC 5B-D
74	"	"	"		8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 2B	5ACD 2B	5ACD 2B
75	"	"	"		5A 2BC	5AB 2C	5AB 2C	5A-C	5AB 2C	5AB 2C		5A-C	5AB 2C	5A-C	5AB 2C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
3111001	5BD 2C		2A 5B-D	2A 5B-D		2A 5B-D			2A 5B-D		2A 5B-D				
"			2C			2C			2C						
3111002	5C		5C	5C		5C	5C		5C		5C				
"	5		5	5	5ABD	5	5		2A 5B-D		2A				
"	5		5	5	5A 2BC	5	5		5						
"	2A 5B-D	5CD	2A 5B-D	2A 5B-D	5B 2ACD	2A 5B-D	2A 5B-D		2A 5B-D	2C	2C		2C		
"	2AD 5B	2AD 5B	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C	2ABD 5C		2ABD 5C		2C		2C		
"	2AC 5B-D	2AC 5B-D	2AC 5B-D	2AC 5B-D	2AC 5B-D	2AC 5B-D	5AC 5B-D		2AC 5B-D	2CD	5CD		2C	2C	
"	5ACD 2B	5ACD 8B	5ACD 2B	5ACD 2B	5ACD 2B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	6
"	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C		5AB 2C	5AB 2C	5AB 2C		2AB	2AB	2AB

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31111	Carp River												
74	35	3111101	At Campground 5 miles northeast of Moran			2B-D		2B-D						2B-D	
67	06	3111102	At Mackinac Trail Bridge T42N, R3W, Section 19			2D		2D	2D	2D		2D	2D	2D	2D
70	"	"	"			2D	2D	2D	2D	2D		2D	2D	2D	
		31112	Martineau Creek (No Data Found)												
		31113	Unnamed Tributary Draining Hay Lake (No Data Found)												
		31114	Hoban Creek (No Data Found)												
			HYDROLOGIC AREA 3.1.2 CHEYBOYGAN RIVER												
		31201	Mill Creek (No Data Found)												
		31202	Little Black River (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3111101	2CD		2B-D	2B-D	2B-D		2B-D		2B-D		2B-D				
3111102	2D		2D	2D		2D	2D		2D		2D				
"	2D		2D	2D		2D	2D		2D		2D				

RIVER BASIN GROUP 3.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31203	Cheboygan River Flow: 22.9 m^3/s (809 cfs)												
42-74	21	3120301	Black R. near Cheboygan 47-29-59 x 84-19-36	*	1[a]										
71	"	"	"		1	5D									
72	"	"	"		1	5									
73	"	"	"		1	5									
74	"	"	"		1	5A-C									
42-74	21	3120302	Cheboygan R. near Cheboygan 45-34-38 x 84-29-15	*	1										
67	"	"	"		1	2B		2B				2B			
71	"	"	"		1	5D									
72	"	"	"		1	5									
73	"	"	"		1	5									
74	"	"	"		1	5A-C									
75-76	03	3120303	Cheboygan River at outlet of Mullett Lake			6		6						6	
65	18	3120304	Above Cheboygan 45-35-46 x 84-28-41			5		5	5	5		5	5	5B-D	2B 5CD
65	18	3120305	At Cheboygan 45-38-45 x 84-28-16	*		5		5	5	5			5	5B-D	5CD
73	06	3120306	Cheboygan River at U.S. -23 Bridge	*		2D	2D	2D	2D	2D		2D	2D	2D	2D
74	"	"	"	*	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2A	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
63	06	3120307	1000 feet up from mouth	*	8B-D	8B-D		8B-D		8B-D		6		8B-D	8B-D
64	"	"	"	*	5	5A 8B-D		5		5A 8B-D		2D		5	5ACD 8B
65	"	"	"	*	5	5		5		8AB 2CD		2C		5	2ACD 5B
66	"	"	"	*	8	8		8AB 5CD		8AB 2CD				8AB 5CD	5AD 2C
67	"	"	"	*	8	8		8	2B 8CD	2B 8CD				8	8
68	"	"	"	*	8A 5B-D	8B 5B-D		8AB 5CD	8AB 5CD	8AB 5CD		6	6	8A 5B-D	5

[a] Discontinued in 1974

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
3120301															
"															
"															
"															
"															
3120302															
"	2B								2B						
"															
"															
"															
"															
3120303	6	6	6	6		6	6		6						
3120304	5	2B 5CD	5	5	5	5	5		5		5				
3120305	5	2B 5CD	5	5	5	5	5		5		5				
3120306	2D	2D	2D	2D	2D	2D	2D		2D		2D				
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5ACD 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	
3120307	8B-D		8B-D	8B-D			8B-D		8B-D		6				
"	5		5AD 8BC	5AD 8BC			5A 8B-D		5						
"	5		5ABD 2C	5ABD 2C			5		5						
"	5ACD 8B		5ACD 8B	5ACD 8B			5ACD 3B		5ACD 2CD						
"	8		2C 8AB	2C 8AB			8AB		8		2CD				
"	8		8A 5B-D	8A 5B-D	6	5B-D	5B-D		8A 5B-D		6				

RIVER BASIN GROUP 3.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	06	3120307	(Cont.) "	*	5	5	2C 5AD	5B-D	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	6	5	5
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		5A-C 2D	5A-C 2D
73	"	"	"	*	5B 2CD	5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD		5AB 2CD		5AB 2CD	2D
74	"	"	"	*											
74	21	3120308	Lincoln Street Bridge 45-38-44 x 84-28-21			2D	2D	2D					2D		
63-68	18	3120309[a]	45-39-15 x 84-28-05	*		9		9		9		9		9	9
		HYDROLOGIC AREA 3.1.3 PRESQUE ISLE COMPLEX													
		31301 Elliots Creek (No Data Found)													
		31302 Greene Creek													
75	20	3130201	At M-23 Bridge near mouth		4CD	4CD	4CD	4CD					4CD		
76[b]	"	"	"		4A	4A	4A	4A					4A		
		31303 Mulligan Creek													
75	20	3130301	At M-23 Bridge near mouth		4CD	4CD	4CD	4CD					4CD		
76	"	"	"		4A	4A	4A	4A					4A		

[a] Data taken from OWDC Catalog of information on water data, 1974

[b] Sampling program to continue through July, 1976

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3120307	5		5	5	5ABD	5	5		5				2CD		
"	5	5CD	5	5	5AB	5	5		5						
"	5	5	5	5	6	5	5		5	2C	2C		2BC	6	6
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2C	2C		2BC	2B	2B
"	5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD	5AB 2CD		5	2D	2D		2D	2D	2D
"														2C	2C
3120308	2D		2D						2D						
3120309	9		9	9		9	9		9						
3130201	4CD	4CD	4CD	4CD	4CD	4CD			4CD						
"	4A	4A	4A	4A	4A	4A			4A						
3130301	4CD	4CD	4CD	4CD	4CD	4CD			4CD						
"	4A	4A	4A	4A	4A	4A			4A						

RIVER BASIN GROUP 3.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31304	Schmidt's Creek												
75	20	3130401	At M-23 Bridge near mouth		4CD	4CD	4CD	4CD					4CD		
76[a]	"		"		4A	4A	4A	4A					4A		
		31305	Carp Creek (Black Mallard River)												
75	20	3130501	At M-23 Bridge near mouth		4CD	4CD	4CD	4CD					4CD		
76[a]	"	"	"		4A	4A	4A	4A					4A		
		31306	Ocqueoc River												
73	06	3130601	At M-23 Bridge near mouth	*	5D	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"	*	5AC 8B 2D	2ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"	*	2A-C	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
75	20	"	"	*	4CD	4CD	4CD	4CD					4CD		
76[a]	"	"	"	*	4A	4A	4A	4A					4A		
		31307	Unnamed Tributary at Forty Mile Point (No Data Found)												

[a]Sampling program to continue through July, 1976.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3130401	4CD	4CD	4CD	4CD	4CD	4CD			4CD						
"	4A	4A	4A	4A	4A	4A			4A						
3130501	4CD	4CD	4CD	4CD	4CD	4CD			4CD						
"	4A	4A	4A	4A	4A	4A			4A						
3130601	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD		2C	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	2A-6	6
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	2AB
"	4CD	4CD	4CD	4CD	4CD	4CD			4CD 4A						
"	4A	4A	4A	4A	4A	4A			4A						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31308	Trout River												
75	20	3130801	At M-23 Bridge near mouth		4CD	4CD	4CD	4CD					4CD		
76[a]	"	"	"		4A	4A	4A	4A					4A		
		31309	Swan River (No Data Found)												
		31310	Little Trout River (No Data Found)												
		31311	Unnamed Tributary from Grand Lake (No Data Found)												
		31312	Long Lake Creek (No Data Found)												
			Hydrologic Area 3.1.4 THUNDER BAY RIVER												
		31401	Thunder Bay River flow 13.2 m^3/s (466 cfs)												

[a]Sampling program to continue at least through July, 1976.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3130801	4CD	4C D	4CD	4CD	4CD	4CD			4CD						
"	4A	4A	4A	4A	4A	4A			4A						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
45-74	21	3140101	Mainstream 4 Miles up from North Branch 45-07-40 X 83-38-30	*	1										
73	06	3140102	At Herron Road T32N, R6E, Sec. 36	*	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
74	"	"	"	*	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD		8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD
75	"	"	"	*	5A	5A	5A	5A	5A	5A		5A	5A	5A	5A
45-74	21	3140103	North Branch 1.5 Miles up from Mainstream 45-08-55 X 83-36-35	*	1										
73	06	3140104	Dam above 9th Street T31N, R8E, Sec. 22		5D	5D	5D	5D	5D	5D	5D		5D	5D	5D
74	"	"	"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
63-68	18[a]	3140105	Near Mouth 45-93-34 X 83-25-39	*		9	9	9		9		9		9	
65	18	3140106	At Mouth			5		2BD	2B-D	2BD		2BD	2BD	2B-D	2CD
			HYDROLOGIC AREA 3.1.5 Au Sable - Alcona Complex												
		31501	Unnamed Tributary from Devil's Lake (No Data Found)												
		31502	Devil's River (No Data Found)												
		31503	Black River (No Data Found)												

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3140101															
3140102	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	2C	2C		2C		
"	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD	8B 5ACD		8B 5ACD	2C	2C		2C	2B	
"	5A	5A	5A	5A	5A	5A	5A		5A						
3140103															
3140104	5D	5D	5D	5D	5D	5D	5D		5D	5D	5D		5C	5D	5D
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2A
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	
3140105	9		9	9		9	9		9						
3140106	2BD	2D	2B-D	2BD	2BD	2BD	2BD		2BD		2BD				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31504	Au Sable River												
73	06	3150401[a]	At Rea Road Bridge T24N, R8E Sec 35	•	2D										
74	"	"	"		5AC 2D 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2A-C	8B	8B 2C	8B	2C	2C		2C	2C	2C	2C
73	06	3150402	Mill Street Bridge T23N, R9E, Sec 3			2D	2D	2D	2D	2D		2D	2D	2D	2D
73	06	3150403[a]	M-171 Br. Van Etten Cr. 44-26-26 x 83-20-30		2D										
74	"	"	"		5AC 2D 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
63	18	3150404	Near Oscoda 44-24-27 x 83-20-30			5		2BD	2BD	2BD		2BD	2BD	9	2B 5C
58	06	3150405	U.S. 23 Bridge	•	2C 5D										
59	"	"	"	*	5A-C 2D										
60	"	"	"	*	5ACD 2B										
61	"	"	"	*	5A-C										
62	"	"	"	*	5AB										
63	"	"	"	•	5A 8B-D	8B-D		8B-D		8B-D		2BC		8B-D	8B-D
64	"	"	"	*	5A 8B-D	5A 8B-D		8		8 8B-D		2D		8	5A8B-D
65	"	"	"	*	5	5		5ABD 5		5				5ABD 2C	5ABD 2C
66	"	"	"	•	8AB 5CD	8AB 5CD		8AB 5CD		5A-C 2D				8AB 5CB	8AB3CD
67	"	"	"	*	8	8		8	8B-D	8B-D				8	8
68	"	"	"	•	8AB 2CD	8AB 2CD		8AB 2CD	8AB 2CD	8AB 2CD		6	6	8AB 2CD	5
69	"	"	"	•	5	5	5AB 2BD	5BD	5	5		5	5	5	5
70	"	"	"	•	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5				6	6	5	5
72	"	"	"	•		5	5	5A-C 2D				5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5A-C 2D	5		5A-C 2D				5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
74	"	"	"	•		2A									

[a]ULRG loading calculations to be based on these two stations.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3150401				2D			2D								
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2AC
"	5A 8B 2C	5A 8B 2C	5A 8B 2C	5A 8B 2C	5A 8B 2C	5A 8B 2C	5A 8B 2C		5A 8B 2C	5A 8B 2C	5A 8B 2C		2AB	2AB	
3150402	2D	2D	2D	2D	2D	2D	2D		2D	2D	2D				
3150403				2D			2D			2D					
"	2A 5CD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	2A-C	2A-C	2A-C	2AC
"	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B	2B	2B	2AB	
3150404	2BD	2D	2BD	2BD	2BD	2BD	2BD		2BD		2BD				
3150405															
"															
"															
"															
"															
"	8B-D		8B-D	8B-D			8B-D		8B-D		2BC				
"	5A 8B-D		5A 8B-D	5A 8B-D			5A 8B-D		5A 8B-D		2D				
"	5		5ABD 2C	5ABD 2C			5		5ABD 2C		2B				
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	8		8AB 2C	8AB 2C			8AB		8		2CD				
"	8AB 5CD		8AB 5CD	8AB 5CD	6	8B 5CD	8B 5CD		8AB 5CD		6				
"	5		5	5	5ABD	5	5						2D		
"		2BC 5D	5	5	5B 2AD	5	5		5						
"			5	5	6	5	5		5	2C	2C		2C	2BD	2BD
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C	2B	2B
"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5C 2D	5C 2D		2C	2C	2C
"														2C	2C

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
63-68	18[a]	3150406	At mouth 44-24-25 x 83-19-30	*		9	9	9				9		9	
			Hydrologic Area 3.1.6. Rifle-Au Gres Complex												
		31601	Tawas River												
73	06	3160101	At Bank Alongside US-23 T22N, R7E, Sec 36		5D	5D	5D	5D	5D	5D		5D	5D	5D	5D
74	"		"		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5ACD 8B	5A2C 8B	5A2C 8B	5A2C 8B
63	06	3160102	At U.S. 23 Bridge in Tawas	*	8B-D	8B-D		8B-D		8B-D		6		8B-D	8B-D
64	"	"	"	*	5A 8B-D	5A 8B-D		5A 8B-D		5		2D		8D-B	8D-B
65	"	"	"	*	5	5		5		5AB 2CD				5	5
66	"	"	"	*	8AB 5CD	8AB 5CD		8AB 5CD		5				8AB 5CD	8AB 2C
67	"	"	"	*	8	8		8	8CD	8CD				8	8
68	"	"	"	*	5	5		5	5	5		6	6	5	8AB 5CD
69	"	"	"	*	5	5	5A 2BCD	5	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	6	5	5
72	"	"	"	*	2AB	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
63-68	18[a]	3160103	In Tawas 44-15-35 x 83-31-37	*		9	9	9				9		9	

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3150406	9		9	9		9	9	9							
3160101	5D	5D	5D	5D	5D	5D	5D		5D	5D	5D				
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2AC
"	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B		2AB	2AB	
3160102	8		8B-D	8B-D			8		8B-D		6				
"	5		5AB 8CD	5AB 8CD			5		5AB 8CD						
"	5		5BD 2AC	5BD 2AC			5		5						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	8		8AB 2C	8AB 2C			8AB 2C		8		2BC				
"	5		5	5	6	5B-D	5B-D		5		6				
"	5		5	5	5ABD	5	5		5				2D		
"	5	5CB	5	5	5B 2A	5	5		5						
"	5	5	5	5	6	5	5		5	2C	2C		2CD		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2CD	2CD		2C	2D	
3160103	9		9	9		9	9		9						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		31602	Whitney Drain												
73	06	3160201	US-23 Near Mouth	*	2C 5D	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"	*	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B
		31603	Au Gres River flow 2.9 m^3/s (99 cfs)												
50-74	21	3160301	4.4 Miles S.W. of Nation City 44-10-26 x 83-44-36	*	1										
73	06	3160302	US-23 Bridge	*		2D	2D	2D	2D	2D		2D	2D	2D	2D
74	"	"	"	*	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2A	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B
65	18	3160303	At Au Gres 42-02-53 x 83-41-13			5		2B	2B	2B		2B	2B	5BC	2B 5C
72	36	3160304	End of Main Street At Mouth			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"		5B-D	5	5	5	5	5		5	5	5	5
73	03	3160305[a]	At Mouth			8		8					8		
74	03	" [a]	"			8		8					8		
		31604	Big Creek (No Data Found)												
		31605	Rifle River flow 8.7 m^3/s (307 cfs)												

[a] Weekly samples also taken at irregular intervals.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3160201	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	2C	5CD		2B	2B	2B
"	5ACB 8B	5ACB 8B	5ACB 8B	5ACB 8B	5ACB 8B	5ACB 8B	5ACB 8B		5ACB 8B	5ACB 8B	5ACB 8B		6	6	2AC
"	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B		2AB	2AB	
3160301															
3160302	2D	2D	2D	2D	2D	2D	2D		2D		2D				
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2AB
"	5A2C 8B	5A2C 8B	5A2C 8B	5ACD 8B	5A2C 8B	5A2C 8B	5ACD 8B		5A2C 8D	5A2C 8D	5A2C 8B		2AC	2AC	
3160303	2B		2B	2B		2B	2B		2B		2B				
3160304	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5	5	5	5	5	5	5		5	5CD	5CD	5C	2C	2C	2C
3160305		8	8	8		8	8		8						
"		8	8	8		8	8		8						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
36-74	21	3160501	Old M-70 Bridge near Sterling 44-04-21x84-01-12.	•	1										
67	"	"	"		1	2C		2C				2C			
63-68	18	3160502[a]	44-02-05 X 83-50-45	*		9	9	9				9		9	
63	06	3160503	Near Mouth	•	8BD 5C	8BD 5C		8BD 5C		8BD 5C		2BD		8BD 5C	8BD 5C
64	"	"	"	*	5A 8B-D	5A 8B-D		5AB 8CD		5AD 8BC		2AD		5A 8B-D	5AB 8BC
65	"	"	"	*	5A-C 2D	5A-C 2D		5AB 2CD		2AD 5BC		5C		5A-C 2D	5A-C 2D
66	"	"	"	•	8AB 5CD	8AB 5CD		8AB 5CD		5AC 8B 2D				8AB 5CD	8A 5C-D
67	"	"	"	*	5A 8B-D	5A 8B-D		5A 8CD	8CD	2A-C 8D		2CD		8	5A 8B-D
68	"	"	"	•	8A 5B-D	5		5ACD 8B	5ACD 8B	5ACD 8B		2B-D	2B-D	8A 5B-D	5
69		"	"	*	5	5	5AD 2BC	5ABD 2C	5ABD 2C	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		6	6	2A 5B-D	2A 5B-D
72	"	"	"	*	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-c 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5B-D	5	5	5	5	5		5	5	5	5
74	"	"	"	*	5AD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2A	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B
73	03	3160504	At the Mouth			8		8					8		
74	"	"	"			8		8					8		
		31606	Pine River												
63	06	3160601	At Standish (near mouth) 43-59-07 x 83-53-16	•		8BD 5C		8BD 5C		8BD 5C		2BD		8BD 5C	8BD 5C
64	"	"	"	*		5A 8B-D		5AB 8CD		5AD 8BC		2AD		5A 8B-D	5ACD8B
65	"	"	"	*		2D		2CD		5BD		5C		2D	2D

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3160501															
"															
3160502	9		9	9		9	9		9						
3160503	8BD 5C		8BD 5C	8BD 5C			8BD 5C		2BD						
"	5AB 2CD		5AB 8CD	5AB 8CD			5AB 2CD		5AB 8CD		2A				
"	5A-C 2D		5A-C 2D	5A-C 2D			5A-C 2D		5A-C 2D						
"	5AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		5A 8B-D						
"	5A 8B-D		5A2C 8B	5A2C 8B			5A8B 2C		5						
"	5		2A 2B-D	5	2B-D	5	5		5		2B-D				
"	5		5	5	5ABD	5	5		5		2A		2D		
"	5	5CD	5	5	2A 5B	5	5		5						
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	6	2A 5B-D	2A 5B-D		2A 5B-D	2C	2C		2CD		
"	8A-C 2D	8A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	8A-C 2D	8A-C 2D		5A-C 2D		2C		2C		
"	5	5	5	5	5	5	5		5	5C 2D	5CD		2C	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B		2AB	2AB	
3160504	8	8	8			8	8		8		8				
"	8	8	8			8	8		8		8				
3160601	8BD 2C		8BD 5C	8BD 5C			8BD 5C		8BD 5C		2BD				
"	5ABD 8C		5AB 8CD	5AB 8CD			5AB 8CD		5AB 8CD		2A				
"	5A-C 2D		5A-C 2D	2A			5A-C 2D		5AB 2CD						

RIVER BASIN GROUP 3.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
66	06	3160601	At Standish (near mouth) 43-59-07x83-53-15	•		8AB 5CD		8AB 5CD		8AB 5C2D				8AB 5CD	8A5B-D
67	"	"	"	*		5A 8BCD		5AB 8CD	8CD	2A-C 8D				5A 8B-D	5A 8B-D
68	"	"	"	*		5		2A 5B-D	2A 5B-D	2A 5B-D		2B-D	2B-D	5	5
69	"	"	"	•		5	5AD 2BC	5ABD 2C	5ABD 2C	5		5	5	5	5
70	"	"	"	•		5	5	5	5	5		5	5	5	5
71	"	"	"	•		5	5	5	5	5		6	6	5	5
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5D	5	5	5	5	5		5	5	5	5
74	"	"	"	•	2A8B 5CD	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	8A 5B-D
75	"	"	"	*	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B
63-68	18	3160602[a]	43-59-06x83-51-45	*		9	9	9				9		9	
		31607	Sagining River (No Data Found)												

[a]Taken directly from the OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
(Cont.) 3160601	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	5A 8B-D		5A8B 2C	5A8B 2C			5A8B 2C		5A 8B-D		2C-D				
"	5		5BD	2A 5B-D	2B-D	5B-D	5B-D		5		2B-D				
"	5		5	5	5ABD	5	5		5		2A		2D		
"	5	2BC 5D	5	5	5B	5	5		5				2CD		
"	5	5	5	5	6	5	5		5	2C	2C		2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D						
"	5	5	5	5	5	5	5		5	5CD	5CD		2C	5C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B			5A2C 8B	5A2C 8B	5A2C 8B		2AB	2AB	
3160602	9		9	9		9	9		9						

Evaluation and Summary of Data for River Basin Group 3.1

This river basin group includes six hydrologic areas comprising 21,156 km^2 (8,137 mi^2) in Michigan. Of the 41 tributaries included on the DAM for this river basin group, 15 were judged to have sufficient water quality data to consider annual loading calculations. Eight of the nine major tributaries (as listed in table 4) in this river basin group have been monitored, and seven of these have adequate data for loading estimates. Only four of the major streams are gauged, and none of the minor tributaries are gauged. While there are generally monthly data available for those tributaries with long-term records, a number of recent specialized studies have collected data from several tributaries in this river basin group on a weekly to biweekly basis. Some heavy metal, pesticide and refractory organics data were found, but the data are inadequate for loading calculation purposes. The Au Sable River, one of the largest tributaries in this river basin group, lacks a gauging station near the river mouth. Seven of the tributaries were also monitored, but as part of the ULRG study. Of those major tributaries that are either ungauged or unmonitored, all are located in the northern part of Lake Huron and drain relatively remote forested areas.

Hydrologic Area 3.1.1 - Les Cheneaux Complex. Of the 14 tributaries in this complex, significant loading data were found only for the Pine River. Unfortunately, the Pine River is not gauged. Since 1968, considerable monthly monitoring has been conducted near the mouth for nutrients and suspended solids. The most recent and detailed data were obtained as part of the ULRG study, which did include some instantaneous flow measurements. Data on heavy metals, pesticides, and refractory organics are available only on a quarterly basis during 1974. The lack of continuous flow data on the Pine River is a major factor restricting interpretation of the loading from this tributary.

Other than the Carp River, for which there are some nutrient data, none of the tributaries in this hydrologic area have been monitored. Even though a very large percentage of this basin is currently ungauged and unmonitored, the water quality of this area would be expected to be very good due to the lack of substantial development.

Hydrologic Area 3.1.2 - Cheyboygan River. The Cheyboygan River drains a relatively large area of River Basin Group 3.1. The hydrology of this area is complicated by the fact that the major tributaries join the main stem through a number of large inland lakes. Three of these lakes, Mullet Lake, Burt Lake, and Black Lake, are among the largest inland lakes in Michigan. The Black River joins the Cheyboygan River approximately midway between Mullet Lake and Lake Huron. Since this junction occurs so close to the mouth, a sampling station (3120201) at the outlet of Black Lake has been included on the DAM. Long-term flow data are available at this station.

A long-term discharge record is also available for the main stem of the Cheyboygan between Mullet Lake and the mouth of the Black River. In the main stream below Mullet Lake a number of stations have been monitored over the years. Because of the large number of stations in this small stretch of water a comparison of data collected at these stations could provide insight into data quality. An analysis of the effects of point sources or estuarine influences

on loading calculations could also possibly be made.

A considerable amount of suspended solids data exist for the Cheyboygan River, with some biweekly data available from as early as 1963. Total and dissolved reactive phosphorus have been sampled primarily on a monthly basis, although biweekly measurements were obtained during the spring of 1974 and 1975. There are also some biweekly dissolved reactive phosphorus data available for the spring, summer, and fall seasons in the mid-1960's.

Considerable nitrogen and silica data are available from 1963 through 1975. Chloride data are available at about the same frequency and time span as dissolved reactive phosphorus. Some data on heavy metals, pesticides, and refractory organics are available, although the frequency of measurement is low.

The ULRG station (3120305) is located far enough upstream to avoid lake effects, although the Cheyboygan wastwater treatment plant discharge is located downstream from this station. No data were found on either of the two minor tributaries identified in this hydrologic area.

Hydrologic Area 3.1.3 - Presque Isle Complex. The major tributary in this hydrologic area is the Ocqueoc River. This river has been sampled as part of the ULRG study for a number of parameters including nutrients, suspended solids, and chlorides. Biweekly sampling was conducted in the spring of 1974 and 1975. In addition to ULRG data, weekly measurements of total phsophorus, nitrogen species, silica, and chloride, as well as several other parameters, were made in 1975 continuing through 1976.

There has also been some significant water quality sampling of several minor tributaries in this hydrologic area. Nutrients (except for dissolved reactive phosphorus) as well as several other parameters including discharge have been measured on a weekly basis for nearly a year at the outlets of Greene Creek, Mulligan Creek, Schmidt's Creek, Carp Creek, and the Trout River. These data are some of the most detailed to be found for relatively small tributaries draining undeveloped land. Six of the 12 tributaries in this complex will have weekly data available over a 12 month period by July, 1976.

Hydrologic Area 3.1.4 - Thunder Bay River. The Thunder Bay River has the second largest mean discharge in River Basin Group 3.1. A long-term discharge record is available from two gauging stations, both of which are located a considerable distance upstream, above the confluence of major branches. There are a significant amount of water quality data available near the gauging stations as well as near the river mouth. Most of the detailed water chemistry data have been obtained since 1973.

Station 3140102, located above the confluence of the North Branch of Thunder Bay River, has generally monthly data for most major loading parameters considered in this study. Biweekly data are available during the spring period of 1975 at this station.

Another station, located near the mouth of the river (station 3140104) contains a similar record for water quality parameters over the same period

of time. Although this ULRG station is located near the mouth of the Thunder Bay River, it is reported to be far enough upstream to avoid lake effects. This station is not able to monitor the effects of the Alpena wastewater treatment plant discharge and several industrial discharges located just downstream. Instantaneous flow data were obtained at this station concurrently with water sample collection. Biweekly sampling was conducted at this station during 1974 and 1975. There is some limited information for heavy metals, pesticides, and refractory organics at this location which is actually in the impoundment above the dam, a fact which might complicate interpretation of the data.

Hydrologic Area 3.1.5 - Au Sable-Alcona Complex. There is a relatively long period of record for the Au Sable River, the major tributary in this river basin group. However, there are no continuous gauging stations located in the vicinity of the river mouth, with the closest gauging station being 117 kilometers (73 miles) upstream.

There have been a considerable amount of data collected at the US 23 bridge near the mouth (station 3150405), including biweekly data in the mid-1960's for nutrients and other parameters. The sampling frequency for these parameters decreased during the 1970's, with monitoring generally conducted on a monthly basis. There have also been some grab samples obtained for heavy metals, pesticides, and refractory organics at this station. Although located close to the mouth and subject to lake effects, this station is far enough downstream to include almost all of the industrial and municipal dishcarges. Instantaneous flow measurements generally taken concommitantly with chemical or physical data are available for this station over most of the period of record.

During 1973, 1974, and 1975 stations at the Rea Road Bridge (3150401) and at the Pine River (3150403) near the confluence of the Pine with the Au Sable were sampled as part of the ULRG study. It should be noted that the Pine River forms an impoundment, Van Etten Lake, above its confluence with the Au Sable. The stretch of river between Van Etten Lake and the Au Sable is called Van Etten Creek. Station 3150401 was selected because it was the farthest downstream site where flow could be determined and a sample could be obtained free of lake water effects. However, municipal treatment plant discharges occur downstream from both of these stations.

The ULRG stations on the Au Sable were monitored in the same manner as the other Lake Huron ULRG stations. However, in some cases data were collected at the main stream station at a higher seasonal frequency than at the Pine River station.

There are several other near-mouth stations on the Au Sable which have been sampled, although not on a regular basis. Since some data are from the 1960's they may be useful in ascertaining trends. Several other tributaries drain into Lake Huron as part of the Alcona Complex. No water quality data were found for these tributaries.

Hydrologic Area 3.1.6 - Rifle - Au Gres Complex. Seven tributaries were included on the DAM for this hydrologic area. The Tawas River, which drains Tawas Lake and a number of small tributaries in the northern part of the hydrologic area has been monitored extensively over the years and a long-term record exists.

Biweekly measurements of dissolved reactive phosphorus, chlorides, ammonia, nitrate, and suspended solids were made as far back as 1963. Generally, however, monitoring was conducted on a monthly basis. Total phosphorus had been measured approximately monthly since 1968 at the US 23 bridge station (3160102). Unfortunately, there is no continuous flow record to accompany these data, although instantaneous flow measurements were made at the time the stream was sampled. As part of the ULRG study a new station (3160101) was established far enough upstream to avoid dilution effects from Lake Huron, although the Tawas City wastewater treatment plant is located downstream from this station.

Whitney Drain, which drains the east branch of the Au Gres River, was also sampled near its mouth as part of the ULRG investigation. The sampling pattern followed the standard ULRG monitoring schedule, including biweekly sampling during the spring period for most parameters. No continuous flow record is available, although some instantaneous stream flow measurements were made.

While the Au Gres River has a continuous discharge record dating back to 1970, the gauge is located approximately 20 river kilometers (12 miles) upstream from the mouth and is above the confluence of a major tributary. Most water quality measurements were made during the 1970's, with the most useful data for loading calculations collected in conjunction with the ULRG study at station 3160302. In addition, two stations near the mouth (3160304 and 05) have monthly or biweekly data available collected in 1973. These two sets of data could be compared to give insight into data quality and other aspects of data interpretation.

The Rifle River has been monitored for flow continuously since 1936. The station is located approximately 32 river kilometers (19 miles) upstream, although there are no major tributaries below this point. The Rifle River has been sampled at a station near the mouth (station 3160503) since the early 1960's and some nutrient data are available on a biweekly basis during certain seasons. This station was also used as an ULRG station. During 1973 and 1974 biweekly measurements were made of silica, nitrate, and total and dissolved reactive phosphorus (among other parameters) at station 3160504. Comparison of 1973 and 1974 data for stations 3160503 and 04 may prove to be useful for interpretive purposes.

The Pine River in the southern portion of the watershed has been monitored since 1963. The only flow measurements found, however, were taken in 1973 in support of the ULRG study. In addition to biweekly sampling of key nutrients, suspended solids, and other parameters during the spring of 1974 and 1975 as part of the ULRG effort, some biweekly sampling has occured as early as 1963. In recent years, the Pine River was normally sampled on a monthly basis. Heavy metal, pesticide, and refractory organics data are available, mostly in connection with the ULRG study.

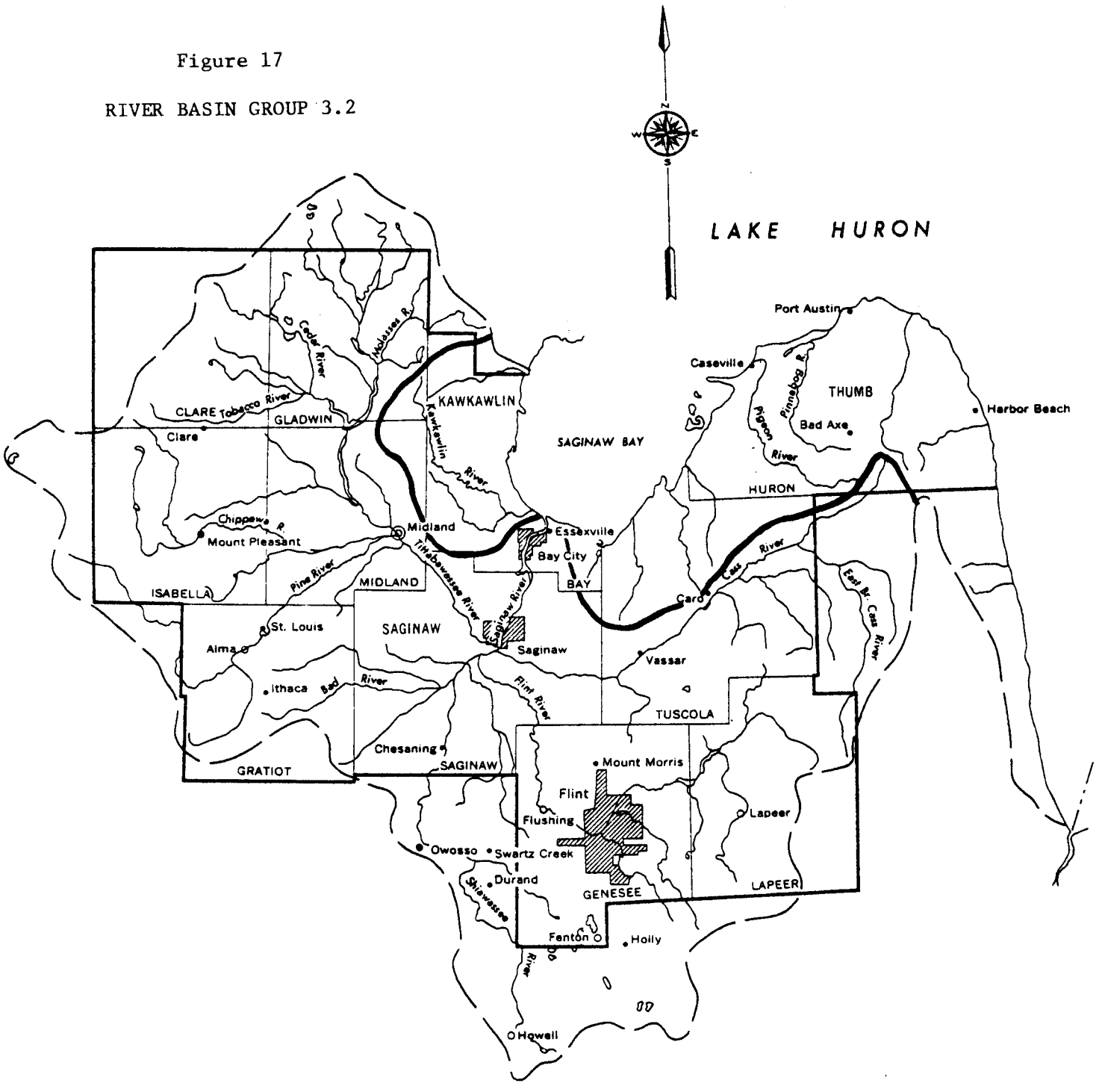
No data are available for the Sagining River which drains into Saginaw Bay.

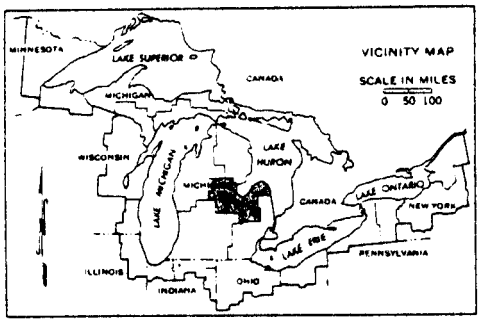
DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 3.2

River Basin Group 3.2 drains an area of 20,842 km^2 (8,047 mi^2), shown in Figure 17. This river basin group contains 3 hydrologic areas. Maps and descriptions of these hydrologic areas follow.

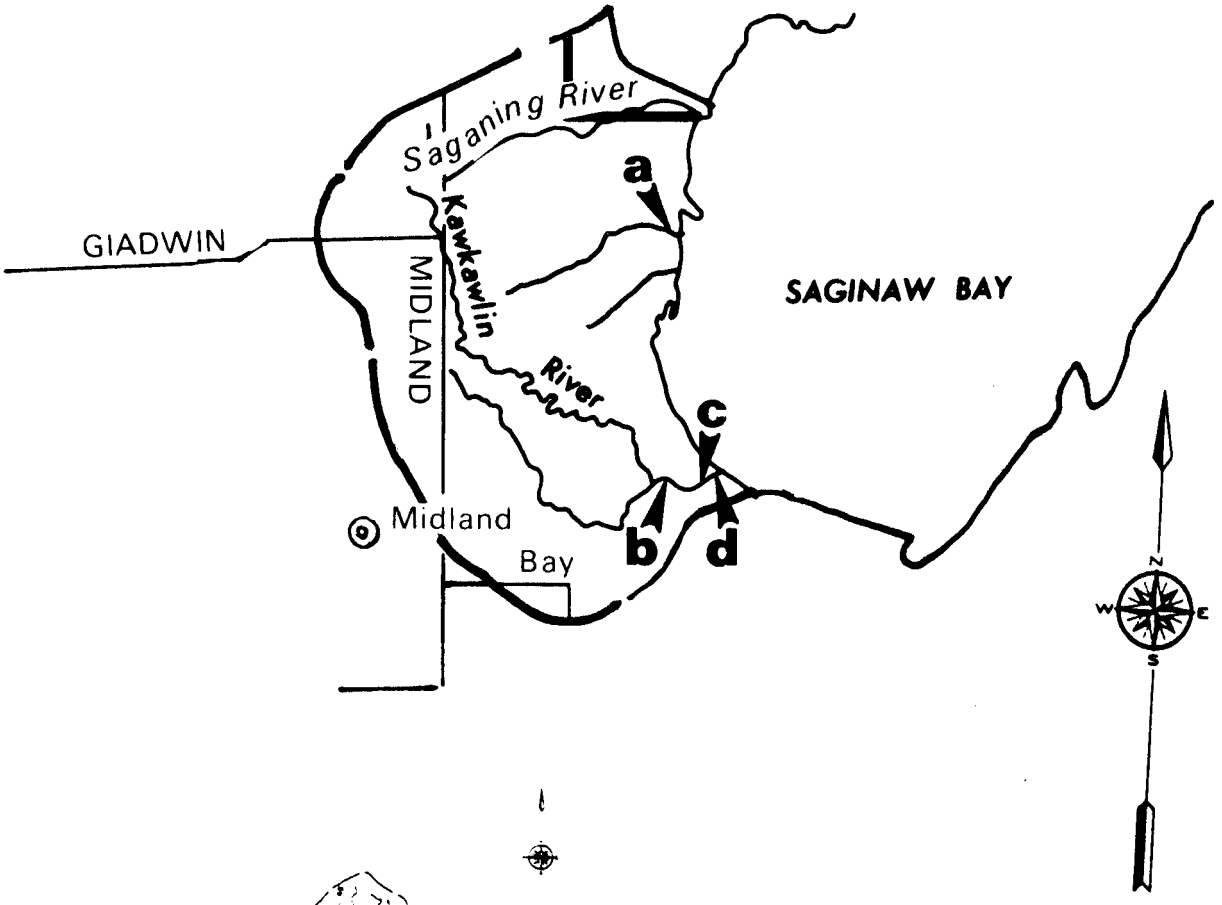
Figure 17

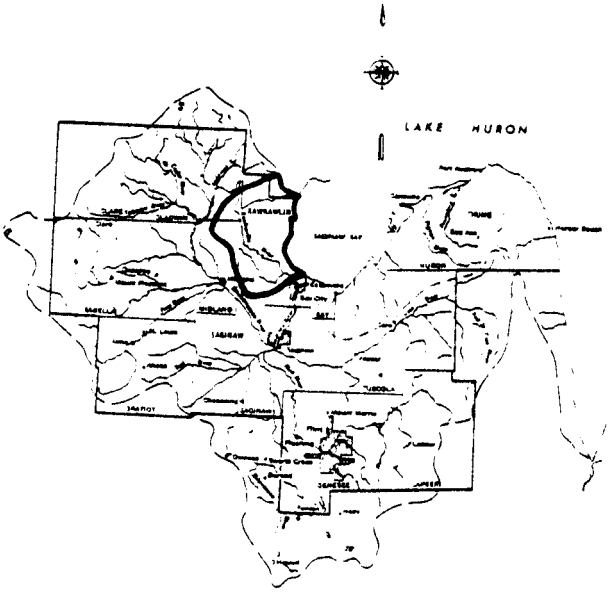
RIVER BASIN GROUP 3.2





Hydrologic Area 3.2.1
Kawkawlin Complex





Vicinity Map-RBG 3.2

SCALE IN MILES
0 5 10 15 20

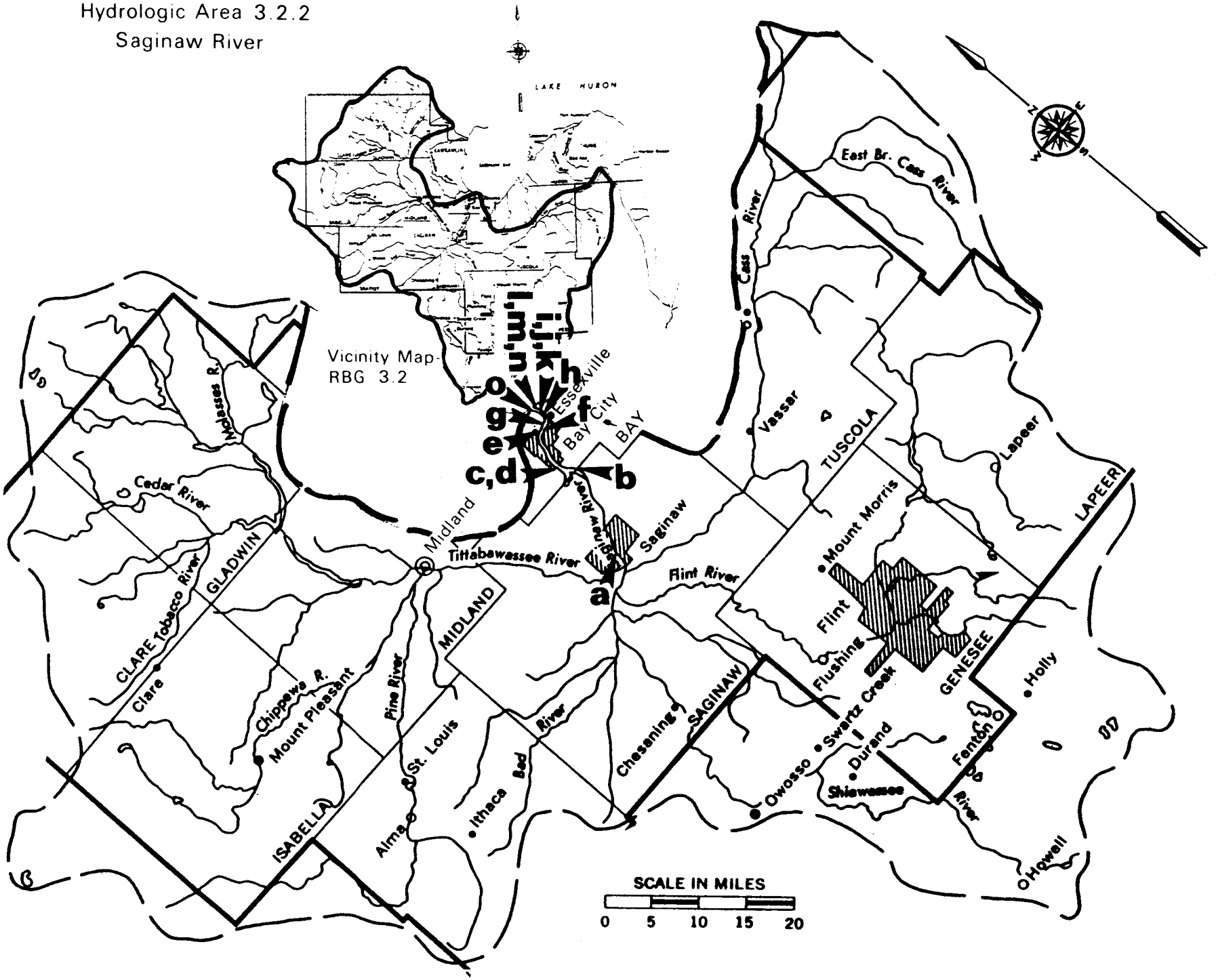
Hydrologic Area 3.2.1
Kawkawlin Complex

The Kawkawlin Complex encompasses an area of 100,000 hectares (248,000 acres) in the Saginaw Bay area of Michigan's Lower Peninsula. Important rivers in the area are the Kawkawlin River, which has a mean annual discharge of 1.6 m^3/s (57 cfs), and the Pine River (ungauged). The area is generally flat with some wetlands. Only about 10 percent of the area is forested, roughly 50 percent is devoted to agriculture, and about 15 percent urbanized. The bedrock is composed of sandstone. Overlying material consists of silt and clay near the shoreline and glacial till over the remaining area. The economy is based on manufacturing and agriculture with some oil extraction. Generally the waters are not influenced by human activities. The cities of Pinconing (Pop.: 1,320) and Kawkawlin are the only areas of industrial activity.

Station Key

Station Location	DAM River and Station Numbers
Pinconning River	32102
a	3210201
Kawkawlin River	32106
b	3210601
c	3210602
d	3210603

Hydrologic Area 3.2.2
Saginaw River



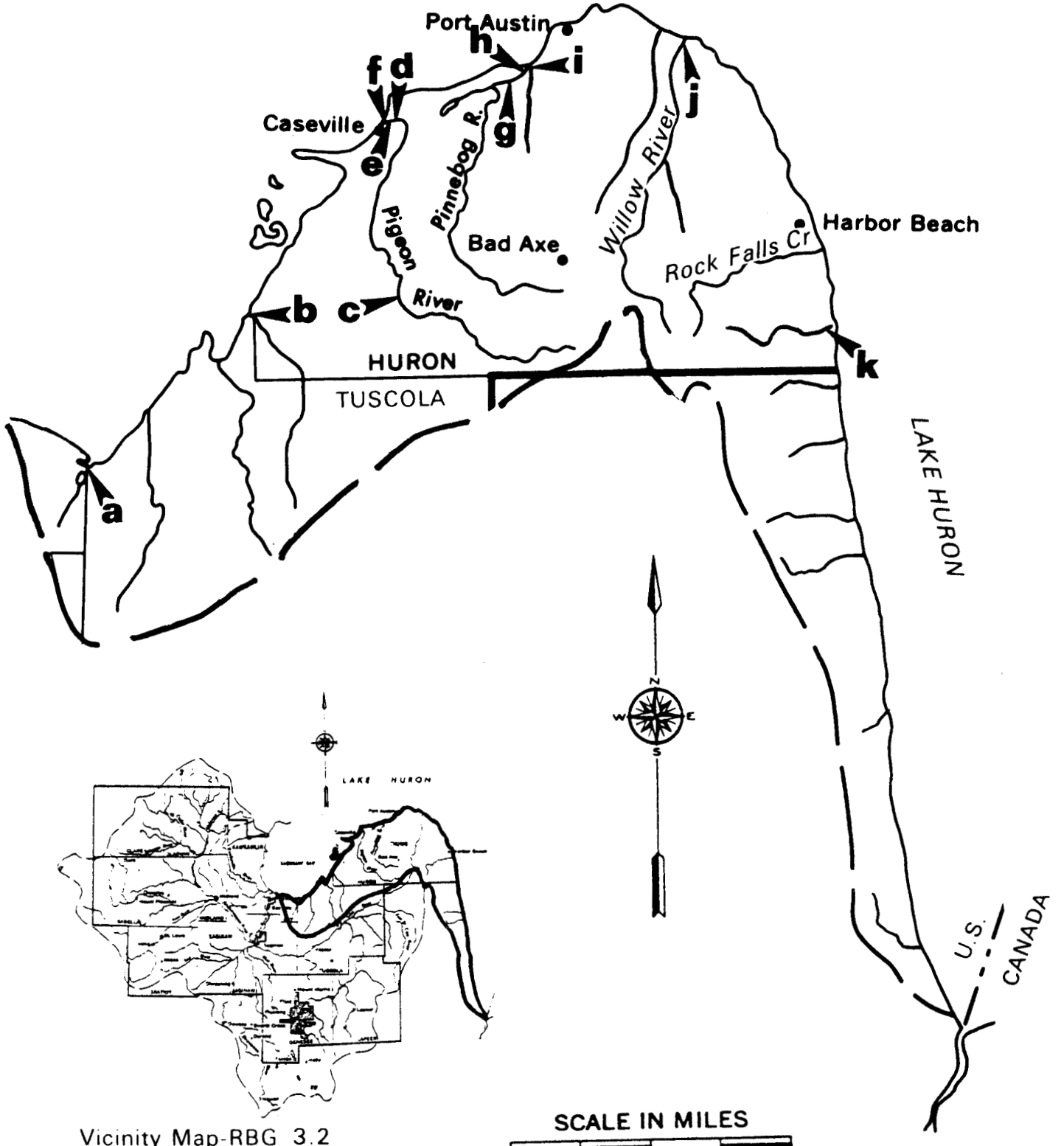
Hydrologic Area 3.2.2
Saginaw River

The Saginaw River drains an area of 1,617,000 hectares (3,995,000 acres). The area is located in the east central portion of Michigan's Lower Peninsula. Generally only maximum flows are measured at the river mouth of the Saginaw River. Major tributaries to the Saginaw River are the Cass River, Flint River, Shiawassee River, and the Tittabawassee River. The topography is mostly flat, with rolling hills in the west. Approximately 25 percent of the area is forested, about 60 percent is agriculturized, and about 10 percent is urbanized. The bedrock is composed mostly of limestone. The soil is generally composed of a silt and clay combination with glacial till in some areas. The economy is based heavily on manufacturing with some agriculture and mining of natural resources such as oil, sand and gravel, salt, peat, and clay. The cities of Saginaw, Bay City and Flint are all heavy industrial areas and subject the surface waters to heavy wastewater loadings. A large number of municipalities and industries use the surface waters of ths Saginaw River and its tributaries for waste assimilation. The cities of Flint (Pop.: 193,317), Saginaw (Pop.: 91,849), Bay City (Pop.: 49,449), Midland (Pop.: 35,176), Mount Pleasant (Pop.: 20,504), and Owosso (Pop.: 17,179) are the most highly developed urban centers in this area.

Station Key

Station Location	DAM River and Station Numbers
Saginaw River	32201
a	3220101
b	3220102
c	3220103
d	3220104
e	3220105
f	3220106
g	3220107
h	3220108
i	3220109
j	3220110
k	3220111
l	3220112
m	3220113
n	3220114
o	3220115

Hydrologic Area 3.2.3
Thumb Complex



Vicinity Map-RBG 3.2

Hydrologic Area 3.2.3
Thumb Complex

The Thumb Complex encompasses an area of 367,000 hectares (907,000 acres). The area is located in the east central portion of Michigan's Lower Peninsula. Important tributaries from the area and their mean annual discharges are the Pigeon River (0.9 m^3/s; 32 cfs), the Willow River (1.3 m^3/s; 46 cfs), the Pinnebog River (ungauged), and the Sebewaing River (ungauged). The area is flat with many additional small streams draining into Lake Huron. The area is also characterized by many man-made drains crossing over the countryside. Less than 20 percent of the area is forested, about 60 percent is agriculturalized, and 5 percent is urbanized. Bedrock is composed of sandstone. Overlying material contains glacial till as well as a silt and clay mixture. The economy is based mainly upon agriculture, although there is some manufacturing. At least 5 municipalities and one industry discharge significant amounts of wastewater to the surface waters of the area. The cities of Bad Axe (Pop.: 2,999), and Pigeon (Pop.: 1,174) are the most highly developed centers in this sparsely populated area. Large portions of this complex are extensively drained by tile systems.

Station Key

Station Location	DAM River and Station Numbers
Quanicassee River	32301
a	3230101
Sebewaing River	32307
b	3230701
Pigeon River	32310
c	3231001
d	3231002
e	3231003
f	3231004
Pinnebog River	32311
g	3231101
h	3231102
Taft Drain	32312
i	3231201
Willow River	32316
j	3231601
White River	32323
k	3232301

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 3.2.1 Kawkawlin Complex												
		32101	White Feather Creek (No Data Found)												
		32102	Pinconning River												
67	06	3210201	At the Mouth			2BC		2BC	2BC	2BC				2BC	2BC
72	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5D	5	5	5	5	5		5	5	5	5
74	"	"	"	*	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B
		32103	Johnson Drain (No Data Found)												
		32104	Tebo Drain												
		32105	Railroad Drain												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3210201	2BC		2BC	2BC	2BC	2BC	2BC		2BC						
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C		
"	5	5	5	5	5	5	5		5	2D 5C	5CD		2C	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B	5A2C 8B		5A2C 8B	5A2C 8B	5A2C 8B		2AB	2AB	

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32106	Kawkawlin River												
65	18	3210601	Near Kawkawlin 43-39-14x83-56-39			5		9	9	9		9	9	9	2CD
63-68	"	3210602[a]	At State Park Road 43-39-06x83-53-52	*		9	9	9				9		9	
63	06	"	"	*	8B-D	8B-D		8B-D		8B-D		6		8B-D	8B-D
64	"	"	"	*	5A 8B-D	5A 8B-D		5A 8B-D		5A 8B-D				5A 8B-D	5A 8B-D
65	"	"	"	*	5ABD	5ABD		5ABD		5ABD		5C		5ABD	5ABD
66	"	"	"	*	8AB 5CD	8AB 5CD		8		5				8	8AB 5CD
67	"	"	"	*	8	8		8	2A 8B-D	2A 8B-D				8	8
68	"	"	"	*	8AB 5CD	5		8AB 5CD	8AB 5CD	8AB 5CD		6	6	5	5
69	"	"	"	*	5	5	5AD 2B	5B-D	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	5	5	5
72	"	"	"	*	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"	*	5	5	5	5	5	5		5	5	5	5
74	"	"	"	*	5AD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		2A	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
73	03	3210603	At Mouth			8		8					8		
74	"	"	"			8		8					8		
			Hydrologic Area 3.2.2 Saginaw River												
		32201	Saginaw River												
42-74	21	3220101	River Mile 20.3 43-24-36x83-57-47	*	9[b]										
67	"	"	"		1	2B		2B				2B			
73	06	3220102	Below Cheboyganing Creek River Mile 9.85		2B 5C	2B 5C	2C	2B 5C	2C	2C		2C	2C	2B 5C	2B 5C

[a] Taken directly from OWDC Catalog of Information on Water Data, 1974.

[b] Sampled irregularly during high water periods

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
3210601	9	2D	2BD	2BD	2BD	2BD	2BD		9		2BD		2C		
3210602	9		9	9		9	9		9						
"	8B-D		8B-D	8B-D			8B-D		8B-D		6				
"	5A 8B-D		5A 8B-D	5A 8B-D			5A 8B-D		5A 8B-D		2D				
"	5ABD		5ABD	5ABD			5ABD		5ABD						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	8		8AB 2C	8AB 2C			8AB 2C		8		2CD				
"	5		5	5	6	5B-D	5B-D		8AB 5CD						
"	5		5	5	5ABD	5	5		5		6		2D		
"			5	5	2A 5B				5						
"			5	5	6				5	2C	2C	2C	2CD		
"			5A-C 2D	5A-C 2D	5A-C 2D				5A-C 2D		2C	2C	2C		
"	5CD	5CD	5	5	5	5CD	5CD		5	5CD	5CD	5C 2D	2CD	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	
3210603		8	8	8		8	8		8		8				
"		8	8	8		8	8		8		8				
3220101															
"	2B								2B						
3220102	2B 5C		2B 5C	2B 5C	2B 5C	2B 5C	2B 5C		2BC					2C	2C

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
65	06	3220103	Third Street Bridge River Mile 4.99		2CD			2CD		2CD					2CD
73	06	3220104	At Midland Street Bridge River Mile 4.98	*	5C	5C 2D	2CD	5C 2D	2CD	2CD		2CD	2CD	5C 2D	5C 2D
74	"	" [a]	"	*	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B		8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B
75	"	"	"		2A	8AB 2C	8AB 2C	8AB 2C	8AB 2C	8AB 2C		8AB 2C	8AB 2C	8AB 2C	8AB 2C
57	18	3220105	Near Mouth 43-36-50 x 83-52-06											2D	2D
58	"	"	"			2D								5D	5D
59	"	"	"			2A								2A	2A
60	"	"	"			5D								5D	5D
61	"	"	"			5A 2B								5A 2D	5A 2D
62	"	"	"			2AD								2AD	2AD
63	"	"	"			5A 2D								5A 2D	5A 2D
64	"	"	"			5AD								5AD	5AD
65	"	"	"		8	8AB 9CD		8A-C 9D	5A 2C 8BD	5AC 8BD		5AD 8B 2C	8	5A 8B 9CD	5A 2B 9CD
66	"	"	"			2AC		2C						2AC	2AC
69	"	"	"			5C	5C	5C		5C			5C	2C	
63	06	3220106	At Consumer Power intake near mouth 42-38-25 x 83-50-46.	*	8B-D	8B-D		8B-D		8B-D		6		8B-D	8B-D
64	"	"	"	*	5AB 8CD	5A 8B-D		5A 8B-D		5A 8B-D		2D		5A 8B-D	5A 8B-D
65	"	"	"	•	5ABD	5		5AD 2BC		5ABD		2C		5ABD	5ABD
66	"	"	"	*	8AB 5CD	8AB 5CD		8AB 5CD		8AB 5CD				8AB 5CD	5ACD
67	"	"	"	*	8	8		8	2B 8CD	2B 8CD				8	8
68	"	"	"	*	8AB 5CD	8AB 5CD		8A 5B-D	8A 5B-D	8A 5B-D		6	6	8AB 5CD	5
69	"	"	"	*	5	5	5ACD	5	5	5		5	5	5	5
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5	5	5	5	5	5		6	6	5	5
72	"	"	"	*	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD
73	"	"	"	*	5	5	5	5	5	5		5	5	5	5
65	06	3220107	At Belinda Street Bridge River Mile 3.72		2CD			2CD		2CD					2CD

[a] Three times per month in the Spring (11B).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
3220103	2CD		2CD	2CD		2CD	2CD		2CD		2CD				
3220104	5C 2B	2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		2CD	2D		2C			
"	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B	8ACD 11B		8ACD 11B	8BC 5AD	5ACD 8B		6	6	
"	8AB 2C	8AB 2C	8AB 2C	8	8AB 2C	8AB 2C	8		8AB 2C				2AB	2AB	
3220105															
"															
"															
"															
"															
"															
"															
"															
"	8	5BD 2C	5A 8B-D	2A 5D 8BC	2A 8B 5CD	5AC 2BD			8A-C 9D		5A 8B-D		2CD		
"			2C	2C	2C	2C			2C						
"	5C	5C	5C	5C	5C	5C	5C		5C		5C				
3220106	8B-D		8B-D	8B-D			8B-D		8B-D		6				
"	5AB 8CD		5AB 8CD	5AB 8CD			5AB 8CD		5AB 8CD						
"	5ABD		5ABD	5ABD			5ABD		5ABD						
"	8AB 5CD		8AB 5CD	8AB 5CD			8AB 5CD		8AB 5CD						
"	8		8AB 2C	8AB 2C			8AB 2C		8		2CD				
"			8	8	6	5B-D	5B-D		2AB 5CD						
"			5	5	5ABD	5	5		5	5AB	5BD 2AC		5		
"		5CD	5	5	5B 2A				5	2CD	5ABD 2C		5		
"		5	5	5	6				5	2C	2C		2CD		
"		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD				5AC 2BD		2C	2C	2C	2C	2C
"		5	5	5	5				5	5CD	5CD		5C	2C	
3220107	2CD		2CD	2CD		2CD	2CD		2CD		2CD				

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	06	3220107	(cont) "		2B 5C	2B 5C	2C	2B 5C	2C	2C		2C	2C	2B 5C	2BC
71	06	3220108	At Bay Harbor Marina 43-37-33 x 83-50-35												
72	"	"	"												
73	"	"	"			2C	2C			2C		2C	2C	2C	2C
73	06	3220109	0.75 Miles up from Coast Guard St. 43-37-33 x 83-50-35		2B 9C	2B 9C	2C	2B 9C	2C	2C		2C	2C	9B 2C	2BC
65	06	3220110	Detroit and Mackinac Railroad Bridge		2CD			2CD		2CD					2CD
73	"	"	"			2C	2C			2C		2C	2C	2C	2C
65	18	3220111	Near Mouth 43-38-32 x 83-50-54			9CD		2CD		2CD				9CD	9CD
66	"	"	"			9C		2C						2C	2C
63-68	18	3220112[a]	43-38-07 x 83-50-40	*		9	9	9				9		9	9
73	06	3220113	0.5 Miles above Mouth		2B 9C	2B 9C	2C	2B 9C	2C	2C		2C	2C	2B 9C	2BC
73	03	3220114	At Mouth			8		8					8		
74	"	"	"			8		8					8		
70	21	3220115	Near Alpen Beach 43-38-47 x 83-56-57												
68	3	3220199	Unknown												
76	18	3220104[b]	At Midland Street Bridge												
74	18	3220108[b]	Dow Water Intake			11	11	11	11	11			11	11	
75	18	"	"			11	11	11	11	11			11	11	
			HYDROLOGIC AREA 3.2.3 Thumb Complex												
		32301	Quanicassee River												
73	03	3230101	At Mouth			8		8					8		
74	"	"	"			8		8					8		

[a] Taken directly from OWDC Catalog of Information on Water Data, 1974.

[b] Additional data out of downstream sequence.

[c] Samples taken five times per week, to continue through December 1976.

[d] Sampling conducted approximately every three weeks. Several samples per week taken during March through June for analysis of nutrients.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
3220107	2B 2C		2B 5C	2B 5C	2B 5C	2B 5C	2B 5C		2BC			2C		2C	2C
3220108														2BC	2B 5C
"															2C
"	2C		2C	2C		2C	2C		2C						
3220109	2B 9C		2BC	2BC		2BC	2BC		2BC					2C	2C
3220110	2CD		2CD	2CD		2CD	2CD		2CD		2CD				
"	2C		2C	2C		2C	2C		2C						
3220111 .	2CD		2CD	2CD	2CD	2CD			2CD		2CD		2CD		
"									2C						
3220112	9		9	9		9	9		9						
3220113	2B 9C		2BC	2BC		2BC	2BC		2BC					2C	2C
3220114		8	8	8		8	8		8		8				
"		8	8	8		8	8		8		8				
3220115												2D	2D		
3220199									2C 9D						
3220104					11B[c]	11B[c]		11B[c]	11B[c]			9B			
3220108		11	11	11	11	11	11	11	11	11	11	11	11		
"		11	11	11	11	11	11	11	11	11	11				
3230101		8	8	8		8	8		8		8				
"		8	8	8		8	8		8		8				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32302	Drain at Oakhurst (No Data Found)												
		32303	Drain North at Bay Park (No Data Found)												
		32304	Drain Midway Between Bay Park and Thomas (No Data Found)												
		32305	Drain At Thomas (No Data Found)												
		32306	Wiscoggin Drain (No Data Found)												
		32307	Sebewaing River												
63-68	18	3230701[a]	Near Mouth 43-44-03 x 83-27-30	*		9	9	9				9			9
73	06		"		2D	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"		2A 5CD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 3B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3230701	9		9	9		9	9								
"	5CD	5CD	5CD	5ACD	5CD	5CD	5CD		5CD	5ACD	5AB		2C	2C	
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32308	Shebeon Creek (No Data Found)												
		32309	Mud Creek (No Data Found)												
		32310	Pigeon River flow: 0.9 m^3/s (32 cfs)												
52-74	21	3231001	Near Kilmanagh Road 43-45-49 x 83-14-46	*	1										
67	"	"			1	2BC		2BC				2BC			
73	06	3231002	At M-25 Bridge Near Mouth	*	5D	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"	*	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
67	18	3231003	Near Mouth 43-56-37 x 83-16-23			5B 2C		5B 2C	5B 2C	5B 2C				5B	5B 2C
73	03	3231004	At Mouth			8		8					8		
74	"	"	"			8		8					8		
		32311	Pinnebog River												
74	06	3231101	At M-25 near Mouth		8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD		2A 8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD
75	"	"	"		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B
67	06	3231102	At Port Crescent Road 44-00-05 x 83-03-20			2C		2C	2C	2C		2C	2C	2C	2C
73	"	"	"		5D	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	5CD
74	"	"	"		5A 2B	5A	5A	5A	5A	5A		5A	5A	5A	5A

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
3231001															
"	2BC								2BC						
3231002	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	2CD	5C 2D		2C	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	
3231003			5B 2C	5B 2C	5B 2C	5B 2C	5B 2C		5B 2C						
3231004		8	8	8		8	8		8		8				
"		8	8	8		8	8		8		8				
3231101	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD	2A 8B 5CD			2A 8B 5CD	8B 5CD			6	2BC	2C
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B			5A 2C 8B	5A 2C 8B			2B	2AB	
3231102	2C		2C	2C		2C	2C		2C		2C				
"	5CD	5CD	5CD	5CD	5CD	5CD	5CD		5CD	5CD	5CD	2CD	2CD	2CD	2A
"	5A	5A	5A	5A	5A	5A	5A		5A	5A	5A				

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32312	Taft Drain												
74	06	3231201	At M-25 Bridge			8B 5CD	8B 5CD	8B 5CD	8B 5CD	8B 5CD		8B 5CD	8B 5CD	8B 5CD	8B 5CD
		32313	Bird Creek (No Data Found)												
		32314	Baranski Drain/Graup Creek (No Data Found)												
		32315	New River (No Data Found)												
		32316	Willow River												
67	06	3231601	At US-25 Bridge Near Mouth	*		2C		2C	2C	2C			2C	2C	2C
70	"	"	"	*		2D	2D	2D	2D	2D			2D	2D	
73	"	"	"	*	2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		5C 2D	5C 2D	5C 2D	5C 2D
74	"	"	"	*	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B
75	"	"	"		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
3231201	8B 5CD	8B 5CD	8B 5CD	8B 5CD	8B 5CD	8B 5CD	8B 5CD		8B 5CD	8B-D	8B-D		2C	2C	2C
3231601	2C		2C	2C		2C	2C		2C		2C				
"	2D		2D	2D		2D	2D		2D		2D				
"	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		5C 2D	5C 2D	5C		2C	2C	2C
"	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B	5ACD 8B		5ACD 8B	5ACD 8B	5ACD 8B		6	6	2C
"	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B	5A 2C 8B		5A 2C 8B	5A 2C 8B	5A 2C 8B		2AB	2AB	

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32317	Diamond Creek (No Data Found)												
		32318	Ocka Creek (No Data Found)												
		32319	Spring Creek (No Data Found)												
		32320	Rock Falls Creek (No Data Found)												
		32321	Unnamed Triburary at Point North of Purdy Bay (No Data Found)												
		32322	Elm Creek (No Data Found)												
		32323	White River												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	3232301	At US-25 Bridge			2C		2C	2C	2C		2C	2C	2C	2C
		32324	White Rock Creek (No Data Found)												
		32325	Unnamed Tributary at Huron-Sanilac County Line (No Data Found)												
		32326	Mill Creek (No Data Found)												
		32327	Benhke Creek (No Data Found)												
		32328	Unnamed Tributary Between Benhke and Elk Creeks (No Data Found)												
		32329	Elk Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
	2C		2C	2C		2C	2C		2C		2C				

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32330	Indian Creek (No Data Found)												
		32331	Big Creek (No Data Found)												
		32332	Cherry Creek (No Data Found)												
		32333	Forester Creek(No Data Found)												
		32334	Miller Creek (No Data Found)												
		32335	Lieus Creek (No Data Found)												
		32336	McKenzie Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		

RIVER BASIN GROUP 3.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		32337	Mill Creek (No Data Found)												
		32338	Birch Creek (No Data Found)												
		32339	Burtch Creek (No Data Found)												
		32340	Milwaukee Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		

Evaluation and Summary of Data for River Basin Group 3.2

This river basin group includes three hydrologic areas comprising 20,922 km^2 (8,047 mi^2) in Michigan. Of the 47 tributaries included in this river basin group, seven were judged to have sufficient water quality data to consider annual loading calculations. Of the four major tributaries identified in this river basin group (table 4), all have been adequately monitored for loading calculation purposes. However, no streams in this entire river basin group were found to have gauging stations located in their river mouth areas. Very little water quality or water quantity data are available on the minor streams. Many of the streams have been monitored on a monthly basis for a number of years, and there are also some biweekly data as a result of ULRG and other detailed studies. The Saginaw River is being monitored in detail as part of a special project by U.S. EPA, and some high frequency data, including daily sampling, are expected to be obtained in the future for this tributary. A long-term chemical record is available only for the Saginaw and Kawkawlin Rivers. Hydrologic Area 3.2.3, which drains the thumb area of Michigan, represents a relatively large and basically unmonitored and ungauged drainage area. Because this area is heavly farmed, it could be an important source of land-derived pollutants to Lake Huron.

Hydrologic Area 3.2.1 - Kawkawlin Complex. Of the six tributaries identified for this complex, only two, the Pinconning and Kawkawlin Rivers, were found to have river mouth loading data available. Some scattered data are available for the Pinconning River for 1967, but most of the data were collected in support of the ULRG study from 1973 through 1975.

A relatively long-term water quality record was found for the Kawkawlin River. Some biweekly measurements in the early 1960's were made for certain nutrients, although the normal sampling pattern has been monthly. Station 3210602 was used as an ULRG station, and monthly to biweekly measurements made. Biweekly measurements of several key loading parameters were also made at station 3210603, slightly downstream from station 3210602, during 1973 and 1974. Becuase of the overlapping and independent sample collection at these two stations it might be possible to do some comparative interpretations of the data. In particular, it would be useful to examine the biweekly nutrients data during the spring runoff period for these two stations. Loading calculations will be limited by the lack of a near-mouth gauging station. Because of the large amount of agriculture in this complex it might be expected that land runoff contributions of pollutants are high in this hydrologic area.

Hydrologic Area 3.2.2 - Saginaw River. The Saginaw River Basin is the largest hydrologic area in the Lake Huron Basin. A relatively long-term record of water quality data is available for the mouth area of the Saginaw. The usefulness of this data for estimation of river mouth loadings is, however, limited by the lack fo a gauging station near the river mouth of the Saginaw. The main stem of the Saginaw River is relatively short and a number of major tributaries drain most of the area including the Tittabawassee River, the Flint River, and the Shiawassee River. Many of these tributaries are gauged near their confluence with the main stem of the Saginaw River. For this reason a model has been developed which combines Saginaw River tributary gauging station records with estimates of contributions from ungauged areas to compute the flow for the

Saginaw River as it flows into Saginaw Bay. Thus, means are available to estimate flow at the river mouth. Station 3220106 is probably the station closest to Saginaw Bay which is free from lake (bay) effects.

A considerable amount of suspended solids, chloride and nutrients data are available for the main stem of the Saginaw. Biweekly data for important loading parameters are available as early as 1963. Consistent monthly data are also available over a period of several years. What is probably the lowermost station not subject to lake effects (3220104) was monitored as part of ULRG during 1973, 1974 and 1975.

As part of a special study by U.S. EPA to model Saginaw Bay total phosporus, total soluble phosphorus and total nitrogen as well as some other parameters are to be measured five days per week for approximately one year beginning in March 1976 at station 3220104. Also, there was a considerable amount of data collected during periods of 1974 and 1975 as part of this study, with some of the data collected several times per week. These data are being collected specifically to obtain loading information with emphasis on high flow periods. Further, in a separate study biweekly nutrient data were collected during a two-year period (1973 and 1974) at a station very close to the Bay (station 3220114).

Heavy metals, pesticides and refractory organics have been measured on a relatively infrequent basis, mostly in recent years. Some heavy metals were measured on a monthly basis in 1969 and 1970.

In summary, there is a good data base available for the Saginaw, some of which was collected independently at similar times and stations and should be useful for comparison purposes. The major drawback is the absense of a gauging station on the main stem. This is overcome somewhat by the existance of the tributary discharge model mentioned above.

Hydrologic Area 3.2.3 - Thumb Complex. This complex contains a large number of rather ill-defined surface drains which enter Lake Huron. The Thumb area is extensively underdrained and nearly all of the land used for agricultural purposes has some type of land drainage system. Forty-one tributaries were identified for inclusion on the DAM for this complex, only seven of which were found to have been monitored.

The Quanicasse River in the western portion of the complex was monitored at its mouth rather intensely in 1973 and 1974. Unfortunately, no discharge data are available. Data on nutrients and other parameters were obtained on a biweekly basis.

The Sebewaing River was sampled as part of the ULRG study in 1973, 1974 and 1975. Also, some water quality measurements were made on an irregular basis from 1963 to 1968 at the ULRG station.

The Pigeon River, one of the larger rivers of the complex, has a gauging station located approximately 24 kilometers (15 miles) upstream from the mouth.

The Pigeon River was sampled for water chemistry near the mouth (station 3231002) as part of the ULRG study. Biweekly sampling was conducted during the spring of 1974 and 1975 at this station. Also, at another near-mouth station (station 3231002), biweekly monitoring was conducted for silica, nitrate, ammonia, total phosphorus, and dissolved reactive phosphorus, as well as several other parameters. Due to the close proximity of station 3231002) and station 3231004 and because sampling frequencies at these stations overlap, a comparison to these two sets of data may facilitate interpretation.

The Pinnebog River has been sampled at two locations. Station 3231101 was part of the ULRG program and the frequency of monitoring and parameters measured follow the ULRG pattern. The second station for which data are available (station 3231102) is located closer to the mouth. Some grab samples were obtained in 1967. In 1973 and 1974 this station was monitored generally on a monthly basis. No continuous flow data are available. Estimates of flow were made at the time water samples were collected for analysis.

Taft Drain, which joins the Pinnebog River near its mouth also has data available for 1974. This station was sampled as part of the ULRG study.

The Willow River is another relatively large tributary in this complex. It was monitored on a grab basis during 1967 and 1970 near the river mouth. From 1973 through 1975 this station was also monitored as part of the ULRG study. Biweekly sampling for key loading parameters was conducted during the spring of 1974 and 1975. The only flow data available are instantaneous measurements made at the time water quality samples were collected. The only other tributary monitored in this complex is the White River. The data found for this tributary are not sufficient to permit estimates of loading.

In general, there are few loading data available for this complex. Even though most of the streams in this complex are relatively small there is a very large number of tributaries draining into Lake Huron. Collectively, they could be a significant source of contaminants to the lake. The irregular drainage of the basin will greatly complicate determination of loadings from this area. Further, there is only one continuous gauging station over the whole complex and it is located too far upstream to be used as a reliable estimate of the quantity of water delivered to the lake. Since this area drains a large amount of agricultural land, loadings could potentially be high.

IDENTIFICATION AND EVALUATION OF LAKE ERIE DATA

BASIN DESCRIPTION

The Lake Erie Basin covers portions of five of the eight Great Lakes Basin States. From a hydrologic standpoint the basin includes not only the Lake proper and its tributaries, but also Lake St. Clair, the St. Clair River, and the Detroit River. At the outlet, the basin is defined to extend below the mouth of Tonawanda Creek, a tributary of the Niagara River.

The United States portion of the Lake Erie Basin covers an area of 55,581 km^2 (21,460 mi^2). Fifty-four percent of the area is located in Ohio, 27 percent in Michigan, 11 percent in New York, 6 percent in Indiana, and the remaining 2 percent is located in Pennsylvania. The Lake Erie Basin is divided into four river basin groups as shown in Figure 18. River Basin Groups 4.1, 4.2, 4.3, and 4.4 cover areas of 13,468 km^2 (5,200 mi^2), 26,843 km^2 (10,364 mi^2), 8,425 km^2 (3,253 mi^2), and 6,838 km^2 (2,640 mi^2), respectively.

Most of the Lake Erie Basin lies within the eastern lake section of the Central Lowland physiographic province. Glaciation of the entire basin has created morainal hills of moderate relief in the Michigan area, the extensive lake plains bordering the lake system and much of the Maumee Basin, and mature till-covered uplands of the Appalachian region. The basin divide has altitudes over 300 meters (1,000 feet), with the greatest altitude reaching 700 meters (2,300 feet) in the Cattaraugus Creek watershed of New York. Prominant physiographic features include the Maumee Lake Plain, which was called the Great Black Swamp before it was drained, the inland Portage Escarpment along the southeastern shore of Lake Erie, and the deeply incised headwater valleys of Pennsylvania and New York.

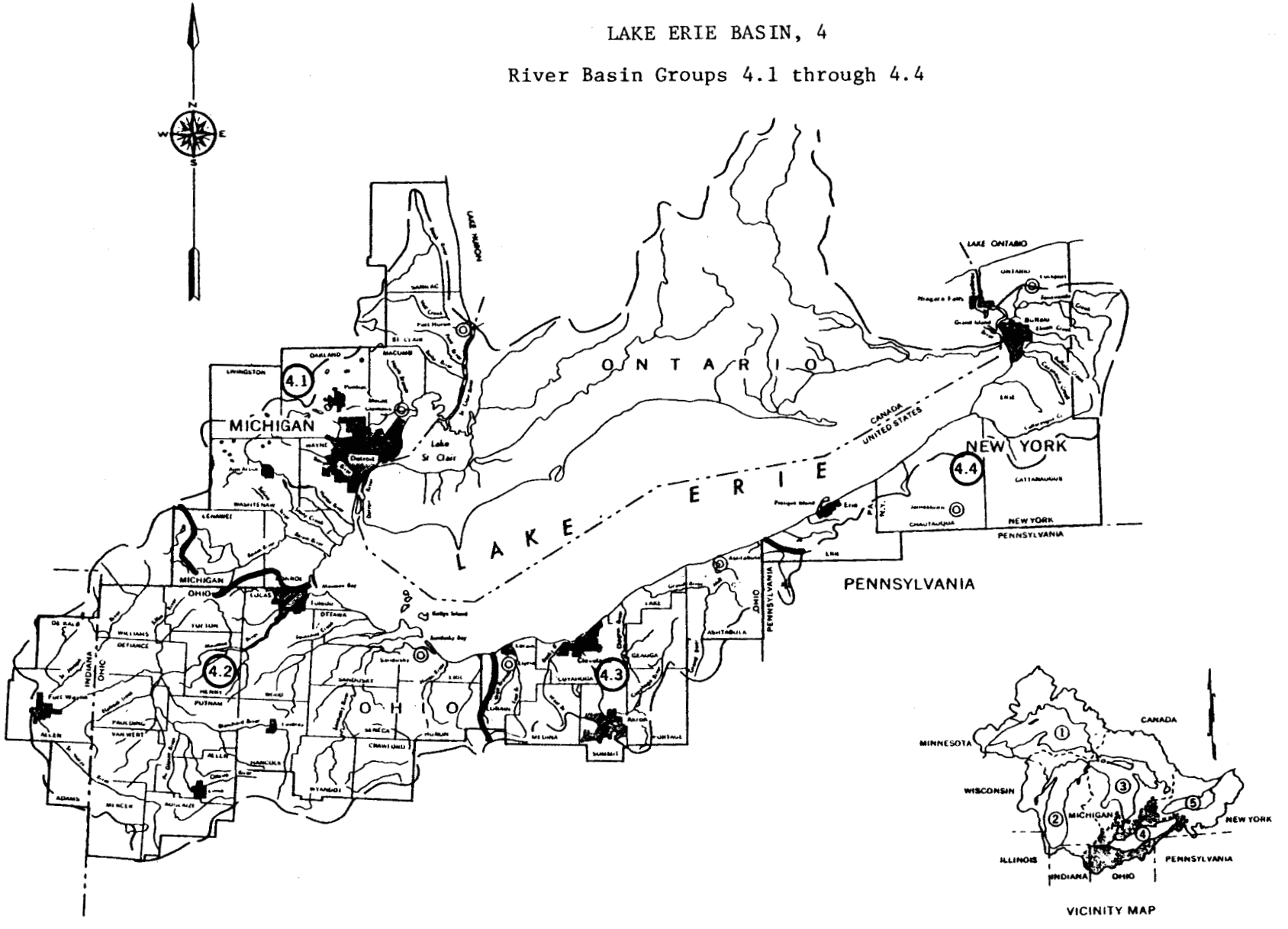
Bedrock exposures are increasingly prominant toward the eastern part of the basin. The drift overlying the bedrock is dominantly fine-grained throughout most of the basin except in Michigan and local areas in New York and Ohio. Mineral deposits in these areas consist of coarse-grained materials which contain significant groundwater resources. The lake plain areas are underlain by deposits of clay, silt, and fine sand of low permeability. Similarly, clay till mantles most of the bedrock upland of the Appalachian Plateau region. Poor drainage is serious in northern Ohio and Erie County, Pennsylvania, or where the soils have been developed from sandstone or shale.

About one-fifth of the region is covered by forest. The most common trees are oak, ash, maple, elm, and hickory. Most of the forested land consists of small woodlots. Approximately 59 percent of the area is devoted to agriculture and another 15 percent is urbanized.

Figure 18

LAKE ERIE BASIN, 4

River Basin Groups 4.1 through 4.4



Mineral resources are primarily nonmetallic, consisting largely of oil and gas, sand and gravel, salt, gypsum, clay, and peat. Large salt deposits are located in the western portion of the basin, while clay production dominates the lake shore region.

Area streams and lakes reflect poor natural drainage conditions, especially in the west. High dissolved solid concentrations and generally low water quality in some stream reaches are due to municipal and industrial wastes and agricultural runoff. Low dissolved oxygen concentrations and high algae growths also characterize much of the surface water resources in the Lake Erie Basin. Streams in the east are typically short and straight-coursed as they drain from the Niagara and Portage Escarpments to Lake Erie. The Maumee River has the largest drainage area of any stream in the Great Lakes Basin and contributes more sediment to Lake Erie than any other single tributary.

EVALUATION AND SUMMARY OF LAKE ERIE DATA

The four river basin groups defined for the U.S. Lake Erie drainage basin have been divided into 20 hydrologic areas, including 14,794 km^2 (5,690 mi^2) in Michigan, 30,386 km^2 (11,687 mi^2) in Ohio, 1,323 km^2 (509 mi^2) in Pennsylvania, and 5,959 km^2 (2,292 mi^2) in New York. Only about 25 percent of the 128 tributaries included in this lake basin were found to have water quality data sufficient to consider estimating loadings. Of these, only 20 were gauged at a near-mouth station. Twenty-one of the 26 streams identified in Table 4 as major Great Lakes tributaries in this lake basin have been monitored at least monthly for water quality parameters.

The Maumee River, which dominates tributary loading from the U.S. Lake Erie drainage basin has an excellent water quality and quantity record covering a relatively long period of time. Of the major tributaries identified in this basin, those that represent the most significant discharge generally have very good records of tributary loading data. However, many smaller tributaries lack adequate data for loading estimations. Also, a number of major Lake Erie tributaries have little or no dissolved reactive phosphorus data available on them. Several tributaries have significant heavy metal or pesticide data, although essentially no refractory organics data were found for any of the tributaries.

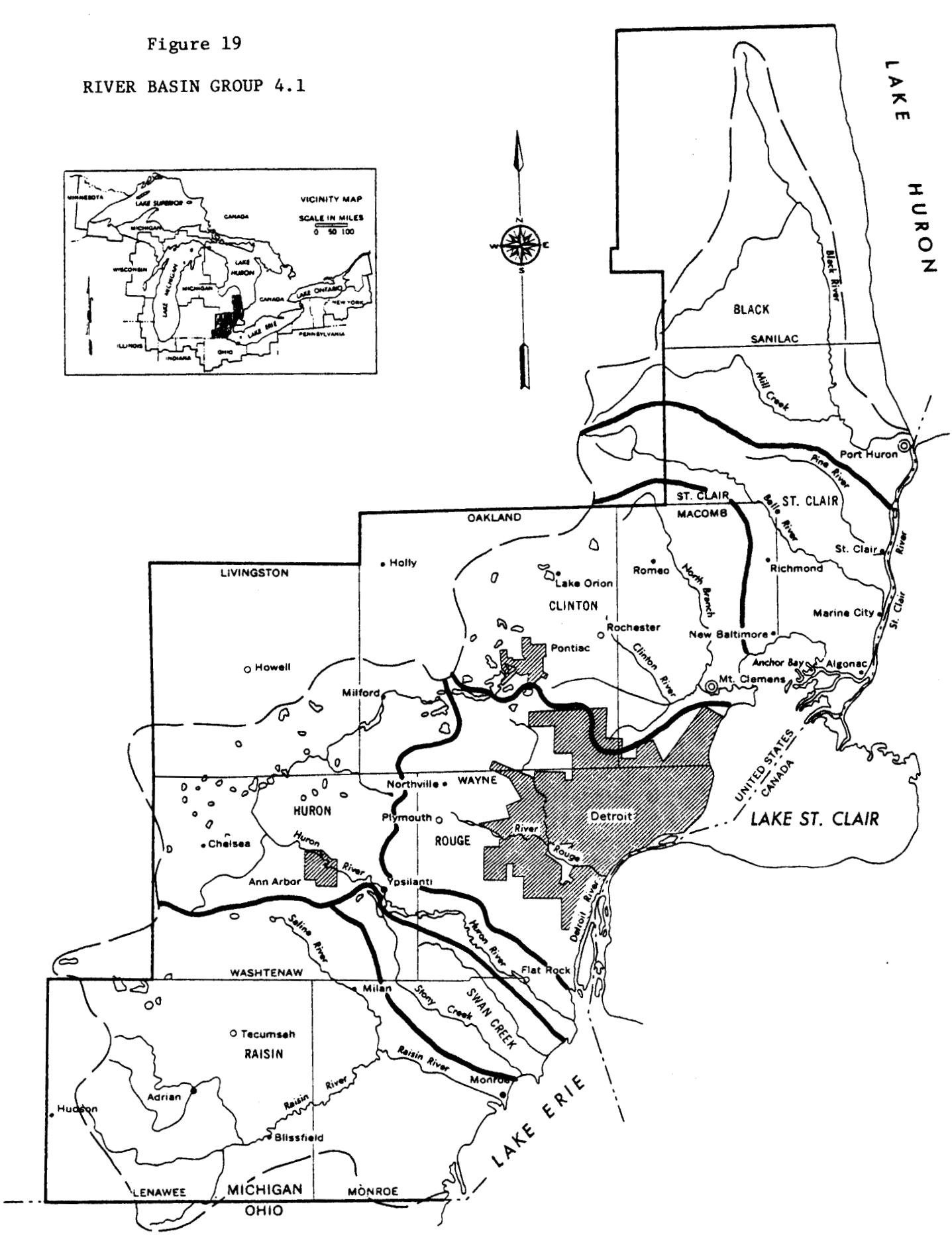
The Lake Erie Wastewater Management Study (LEWMS) of the Army Corps of Engineers has provided some of the most detailed loading data for any of the Great Lakes. As part of this study, the input of tributary loadings from a number of streams in River Basin Groups 4.2, 4.3 and 4.4 during a series of storm runoff events in the spring of 1975 was determined. Three streams, including the Maumee River, were sampled in detail over a total of ten runoff events, four others were sampled during two runoff events, and two additional tributaries were sampled for a total of three and five runoff events, respectively.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 4.1

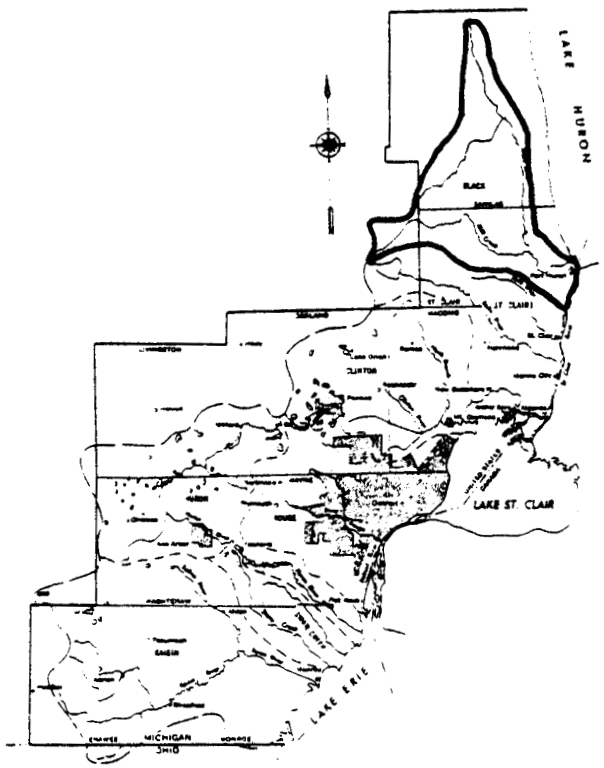
River Basin Group 4.1 covers an area of 13,468 km^2 (5,200 mi^2), shown in Figure 19. This river basin group contains seven hydrologic areas. Descriptions and maps of these hydrologic areas follow.

Figure 19

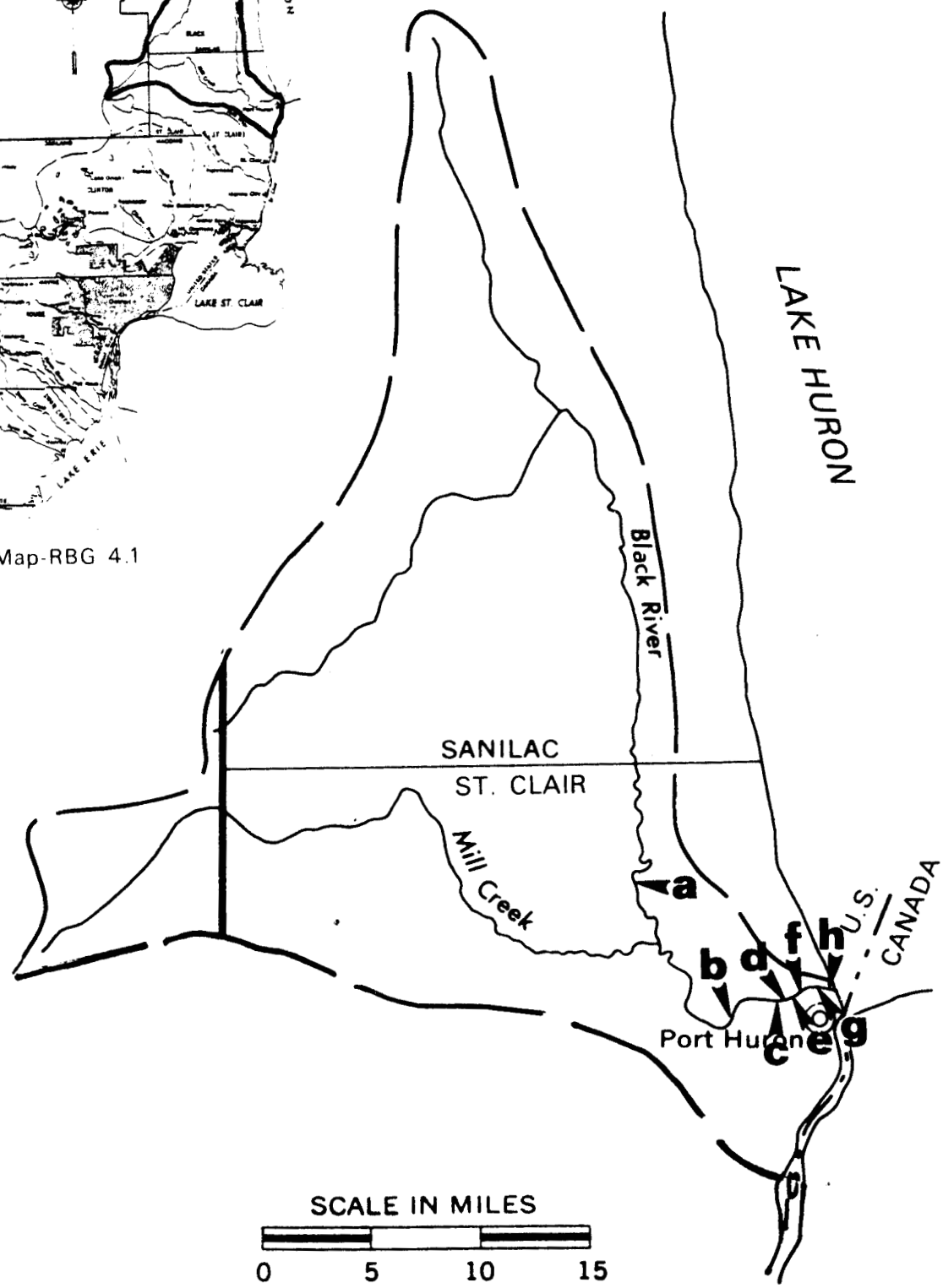
RIVER BASIN GROUP 4.1



Hydrologic Area 4.1.1
Black River



Vicinity Map-RBG 4.1



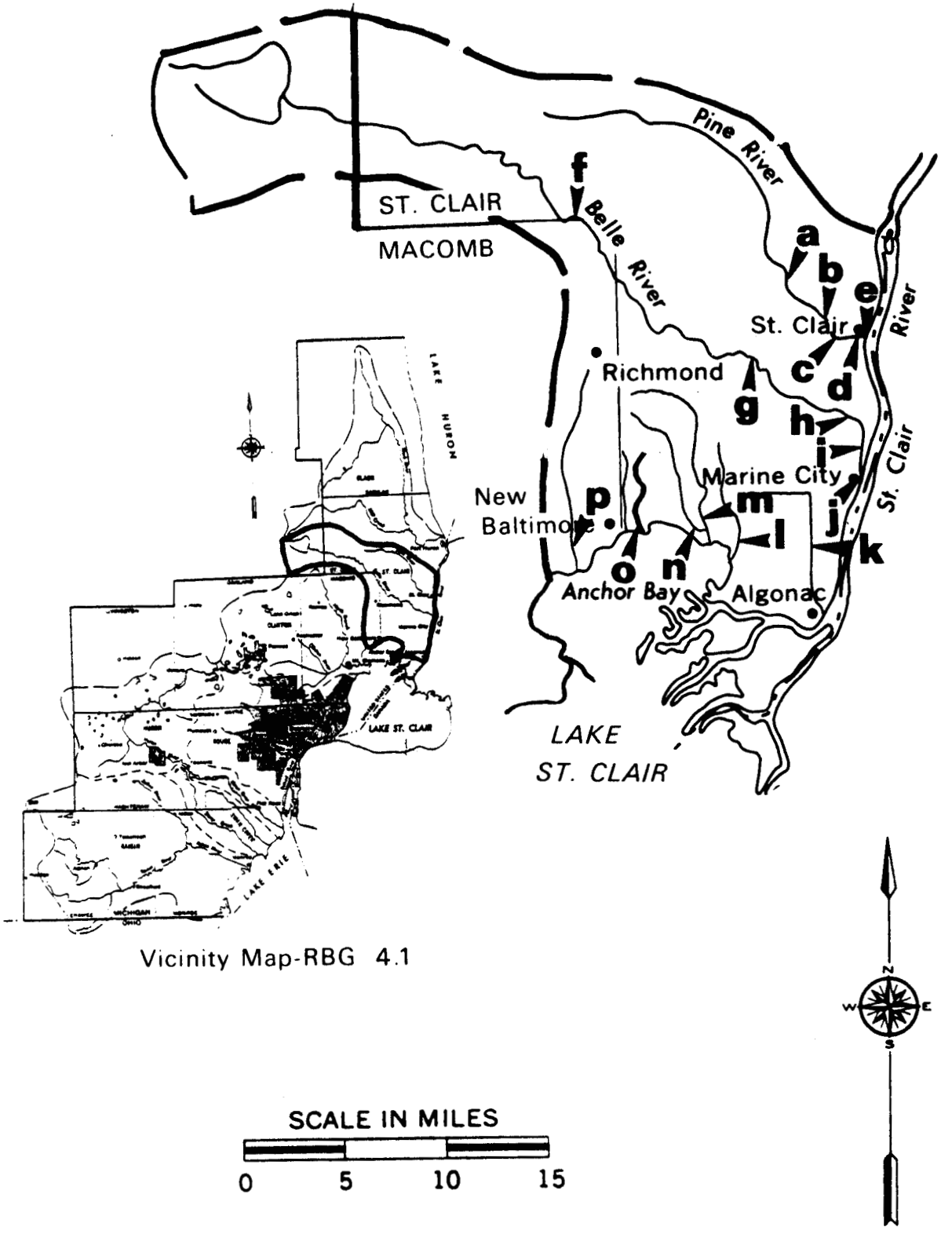
Hydrologic Area 4.1.1
Black Creek (St. Clair)

The Black River encompasses an area of 180,000 hectares (446,000 acres). In the east central portion of Michigan's Lower Peninsula the Black River has a mean annual discharge of 7.8 m^3/s (275 cfs). An important tributary to the Black River is Mill Creek. The area is generally flat and has a significant amount of wetlands. Approximately 20 percent of area exists as scattered forested areas, about 60 percent is utilized in agriculture, and 10 percent is urbanized. The bedrock consists primarily of sandstone. The material covering the bedrock is composed of silt and clay near the shore and glacial till throughout the rest of the basin. Important gas fields and salt formations exist in the area. Approximately three major municipalities and four major industries use the surface waters of this area for waste assimilation. The cities of Port Huron (pop.: 35,794), and Marysville (pop.: 5,610) are the major population centers in the area.

Station Key

Station Location	DAM River and Station Numbers
Black River	41101
a	4110101
b	4110102
c	4110103
d	4110104
e	4110105
f	4110106
g	4110107
h	4110108

Hydrologic Area 4.1.2
St. Clair Complex



Vicinity Map-RBG 4.1

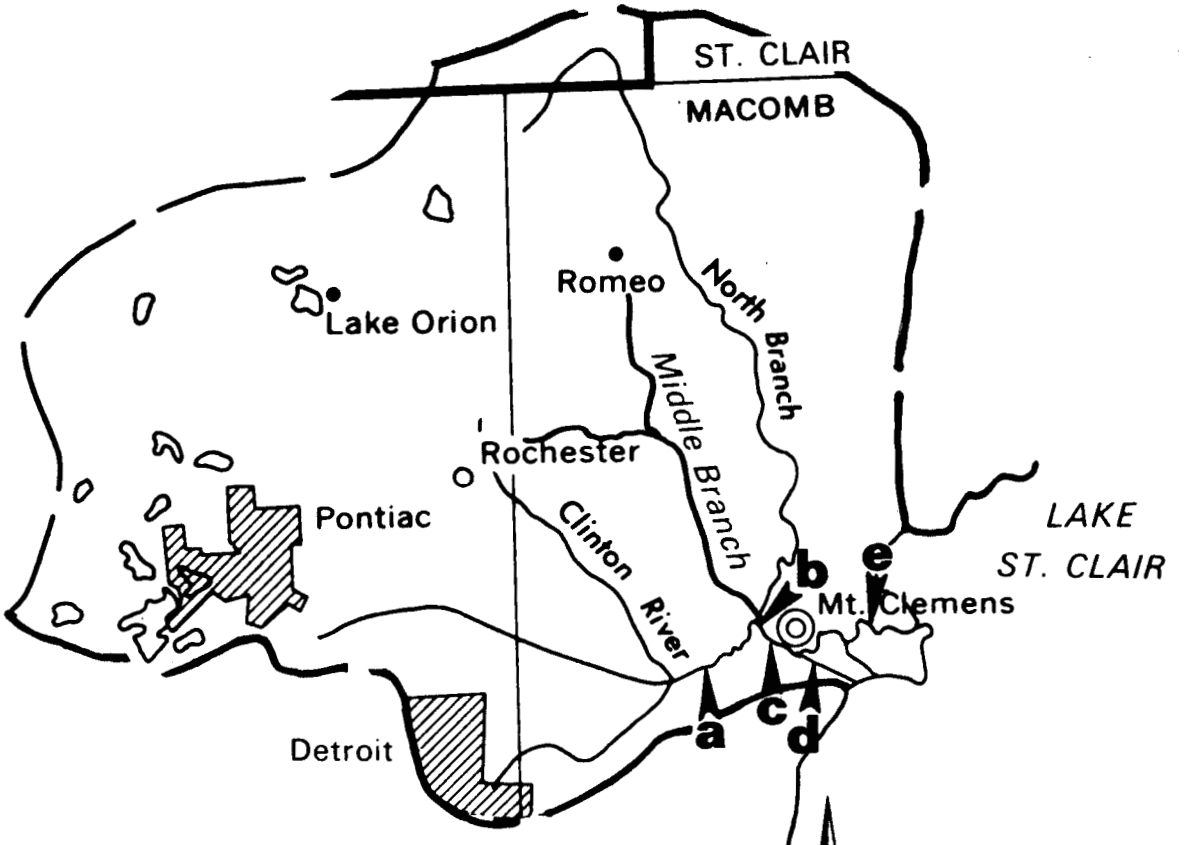
Hydrologic Area 4.1.2
St. Clair Complex

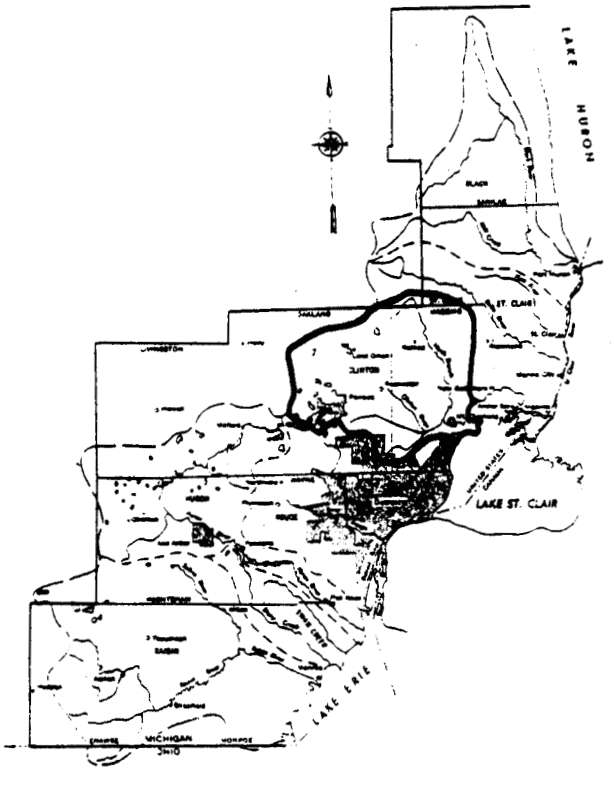
The St. Clair Complex includes 155,000 hectares (383,000 acres) in the southeast portion of Michigan's Lower Peninsula. The major rivers draining the area are the Pine River (ungaged), and the Belle River, which has a mean annual discharge of 2.3 m^3/s (81 cfs). Both of these rivers drain into the St. Clair River. There are a number of other small streams that also provide drainage for this complex. This area is generally flat with few wetlands. Approximately 15 percent of the area is forested, 60 percent devoted to agriculture, and 15 percent urbanized. The bedrock is composed principly of sandstone. The overlying material is composed of silt, clay and glacial till. Several municipalities and industries use the area's rivers for waste assimulation. The cities of St. Clair (pop.: 4,770), Marine City (pop.: 4,567), New Baltimore (pop.: 4,142), and Richmond (pop.: 3,234) are the areas of greatest human pressure on the Complex.

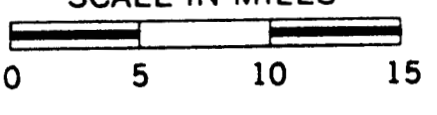
Station Key

Station Location	DAM River and Station Numbers
Pine River	41201
a	4120101
b	4120102
c	4120103
d	4120104
e	4120105
Belle River	41202
f	4120201
g	4120202
h	4120203
i	4120204
j	4120205
Marsh Drain	41203
k	4120301
Beaubien Creek	41204
l	420401
Swan Creek	41205
m	4120501
n	4120502
Marsac Creek	41206
o	4120601
Salt River	41207
p	4120701

Hydrologic Area 4.1.3
Clinton River







Vicinity Map-RBG 4.1

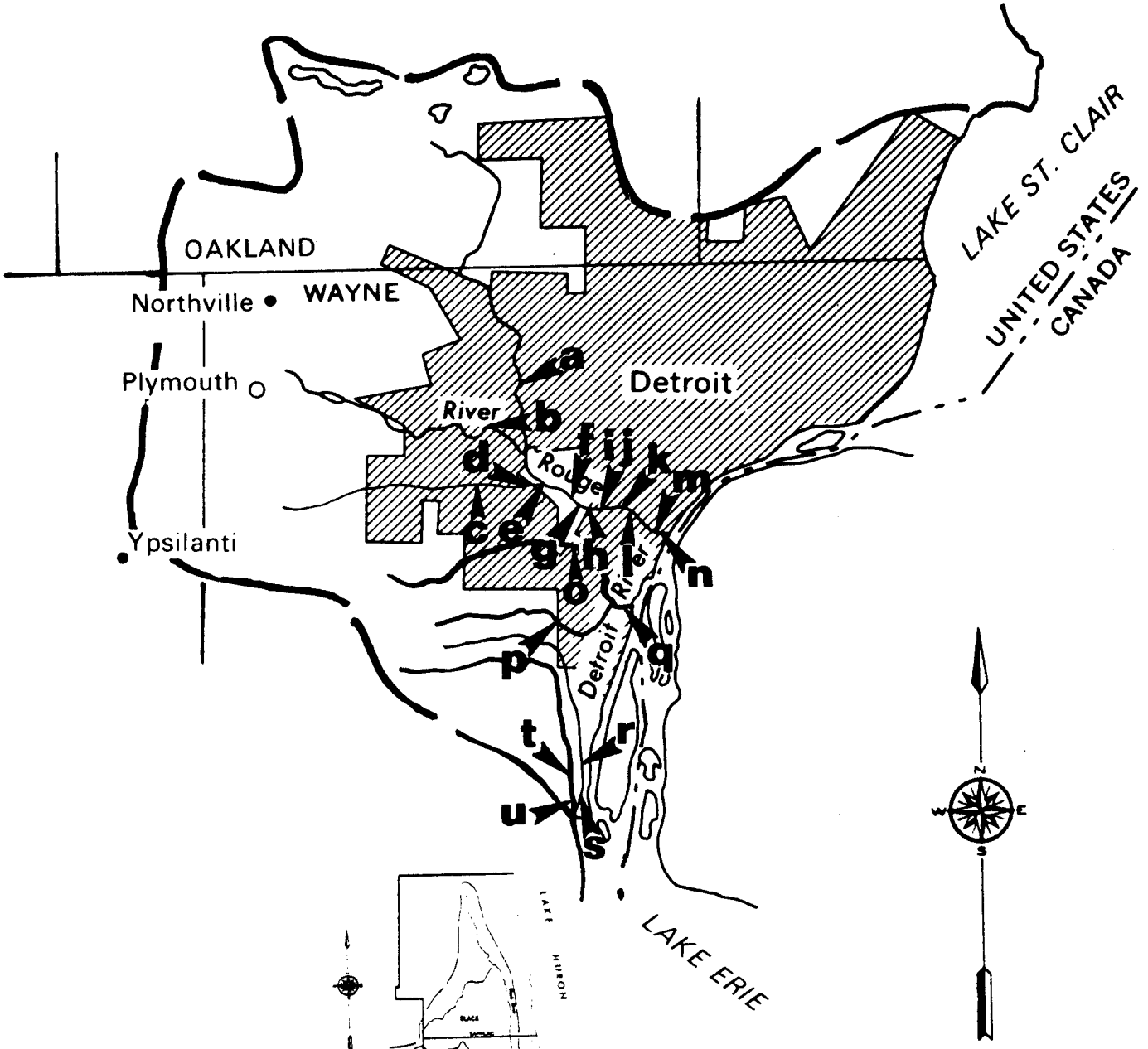
Hydrologic Area 4.1.3
Clinton River

The Clinton River drains an area of 155,000 hectares (383,000 acres). The area is located in the southeast portion of Lake Michigan's Lower Peninsula. The Clinton River has a mean annual discharge of 14.3 m^3/s (505 cfs) and drains into Lake St. Clair. Major tributaries to the Clinton River are the North Branch, Paint Creek, and Red Run. There are several additional small streams that also provide drainage for the area. The topography varies from flat to rolling with few wetlands. About 15 percent of the area is forested, 50 percent agriculturalized, and 20 percent found in highly developed metropolitan areas. The bedrock is composed primarily of sandstone. The surface material consists of silt, clay and glacial till. Heavy industrial development, to a large extent associated with the automotive industry, is a major influence on the water quality of this area. A considerable amount of the area's municiple waste is treated by Detroit Water Services and discharged to the Rouge River in Hydrologic Area 4.1.4. However, there still is significant municiple and industrial discharge into the surface waters. The Clinton River is characteristically sluggish (as many of the streams draining into the western portion of Lake Erie) and carries a high silt load. Cities of Pontiac (pop.: 85,279), Mt. Clements (pop.: 20,476), and Rochester (pop.: 7,054) are the major concentrated population centers in the area.

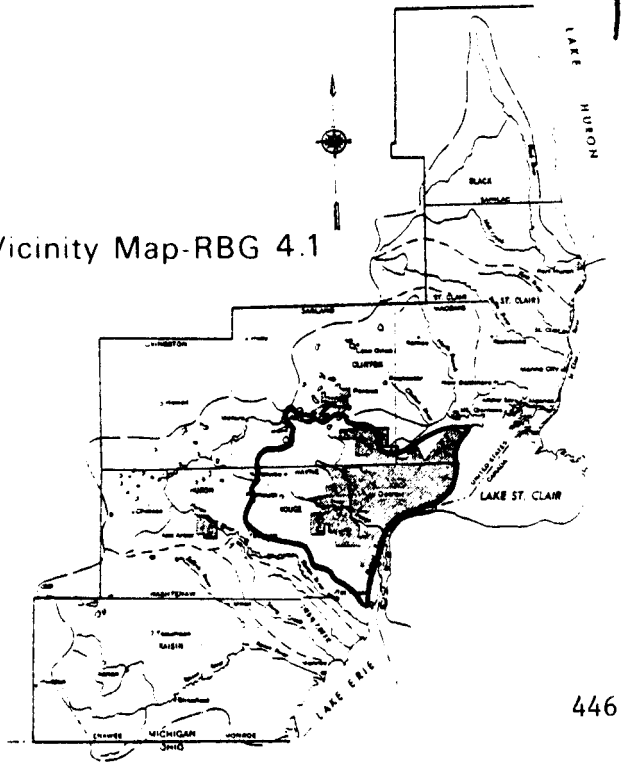
Station Key

Station Location	DAM River and Station Numbers
Clinton River	41301
a	4130101
b	4130102
c	4130103
d	4130104
e	4130105

Hydrologic Area 4.1.4
Rouge Complex



Vicinity Map-RBG 4.1



SCALE IN MILES

0 5 10 15

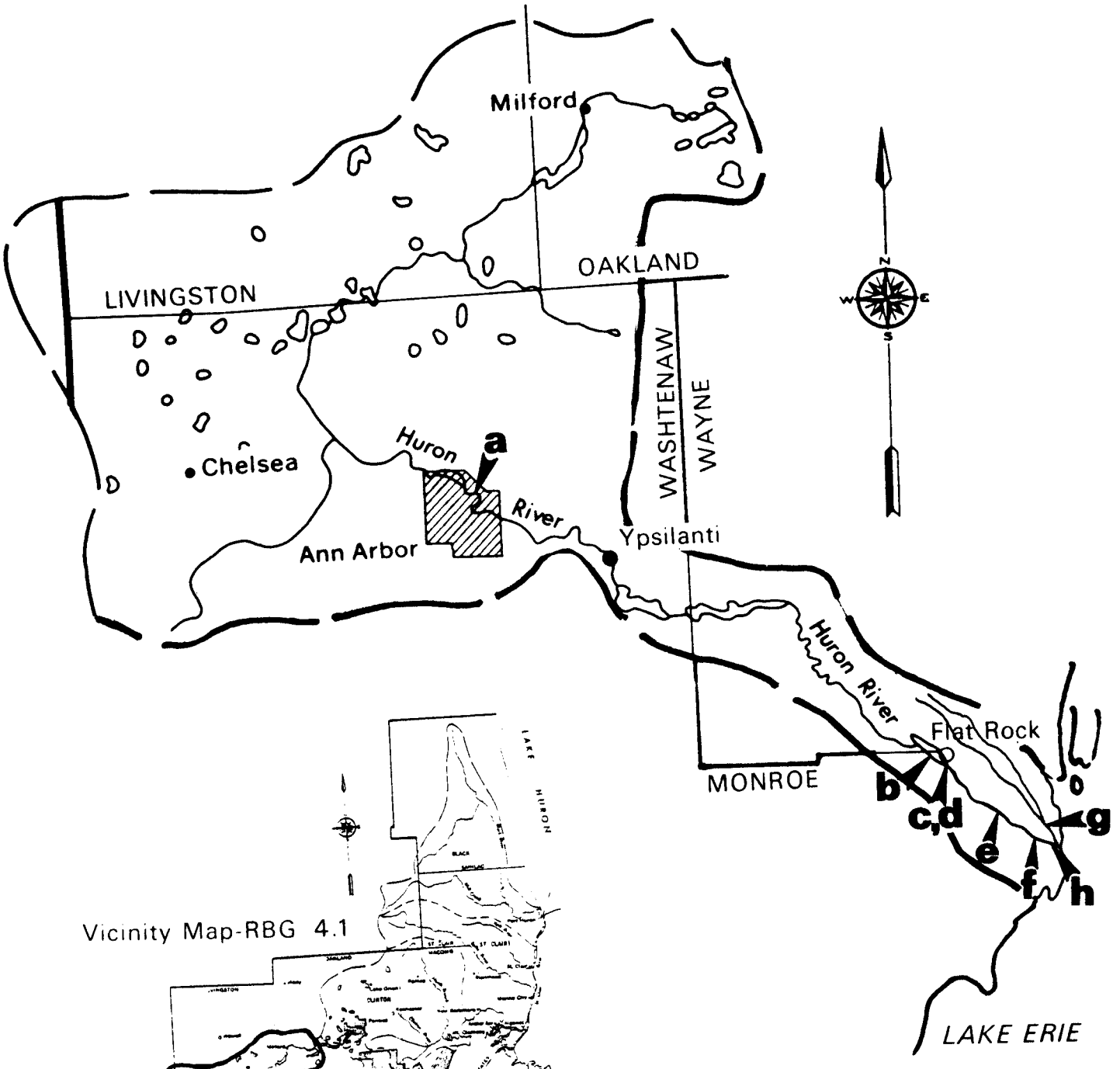
Hydrologic Area 4.1.4
Rouge Complex

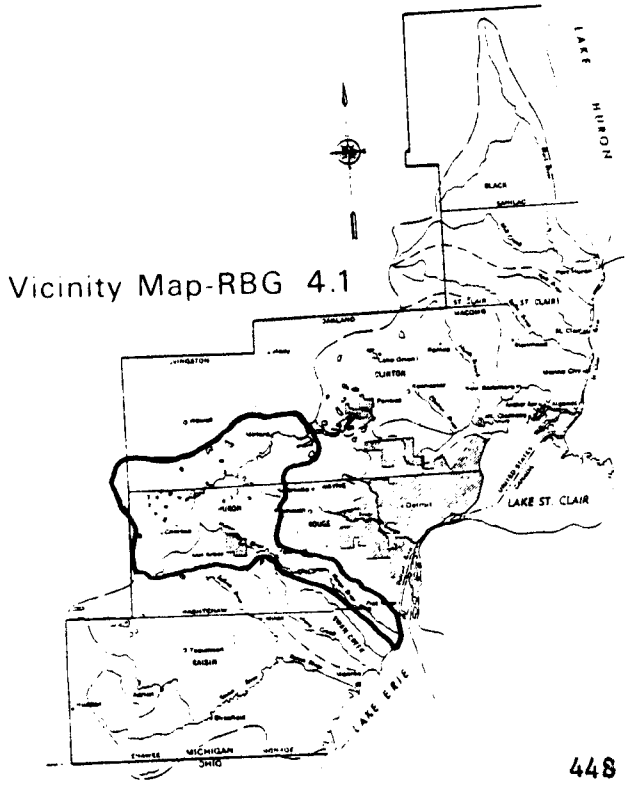
The Rouge Complex encompasses an area of 189,000 hectares (468,00 acres). The Complex is located in the southeast portion of Michigan's Lower Peninsula. The major tributary in the area is the Rouge River, which has a mean annual discharge of approximately 6.4 m^3/s (226 cfs). Major tributaries to the Rouge River are the Upper, Middle, and Lower Rouge Rivers. The area is generally flat with few wetlands. Approximately 15 percent of the area is forested, another 20 percent devoted to agriculture, and over 50 percent consists of the highly developed Detroit Metropolitan Area. Bedrock is composed of sandstone and shale. The overlying material consists of silt and clay with some glacial till. Heavy industry, to a large extent associated with the automobile industry, effects the water quality of this Complex. There is some peat, clay, salt, and sand and gravel extracted from the area. A large number of major industries and numerous combined sewer overflows discharge wastewater into the surface waters of this Complex. The Rouge River drains much of metropoliaton Detroit (approximate population 3,000,000), subjecting the river to severe human pressure.

Station Key

Station Location	DAM River and Station Numbers
Rouge River	41401
a	4140101
b	4140102
c	4140103
d	4140104
e	4140105
f	4140106
g	4140107
h	4140108
i	4140109
j	4140110
k	4140111
l	4140112
m	4140113
n	4140114
Ecorse River	41402
o	4140201
p	4140202
q	4140203
Frank and Poet Drain	41403
r	4140301
s	4140302
Brownstown/Marsh Creek	41404
t	4140401
u	4140402

Hydrologic Area 4.1.5
Huron River





Vicinity Map-RBG 4.1

SCALE IN MILES

0 5 10 15

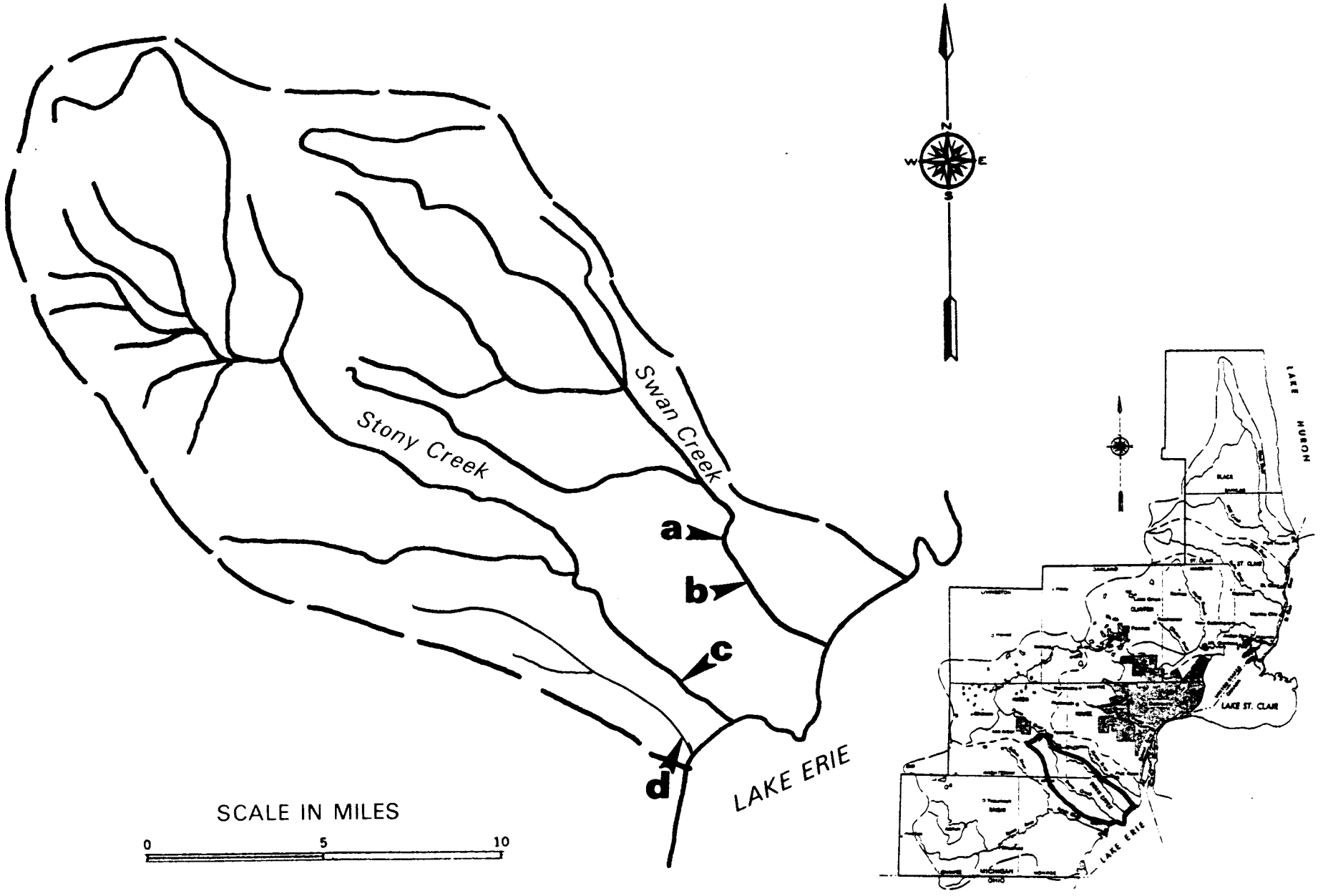
Hydrologic Area 4.1.5
Huron River

The Huron River drains an area of 220,000 hectares (543,000 acres). The area is located in the southeast portion of Michigan's Lower Peninsula. The Huron River has a mean annual discharge of 12.6 m^3/s (445 cfs). Major tributaries to the Huron River are Mill Creek, and the Portage River. Topography varies from flat to rolling with relatively few wetlands. Approximately 20 percent of the area is forested, 60 percent devoted to agriculture and 15 percent urbanized. Bedrock is composed mostly of sandstone with some shale in the eastern portion. The overlying material is composed principally of silt and clay in the east with glacial till in the west. Several municipalities and industries discharge significant amounts of treated wastewaters into the surface waters of this area. The cities of Ann Arbor (pop.: 99,797), Ypsilanti (pop.: 29,538), and Flat Rock (pop.: 5,643) are the major developed and industrialized regions within this area.

Station Key

Station Location	DAM Rivers and Station Numbers
Huron River	41501
a	4150101
b	4150102
c	4150103
d	4150104
e	4150105
f	4150106
g	4150107
h	4150108

Hydrologic Area 4.1.6
Swan Creek Complex



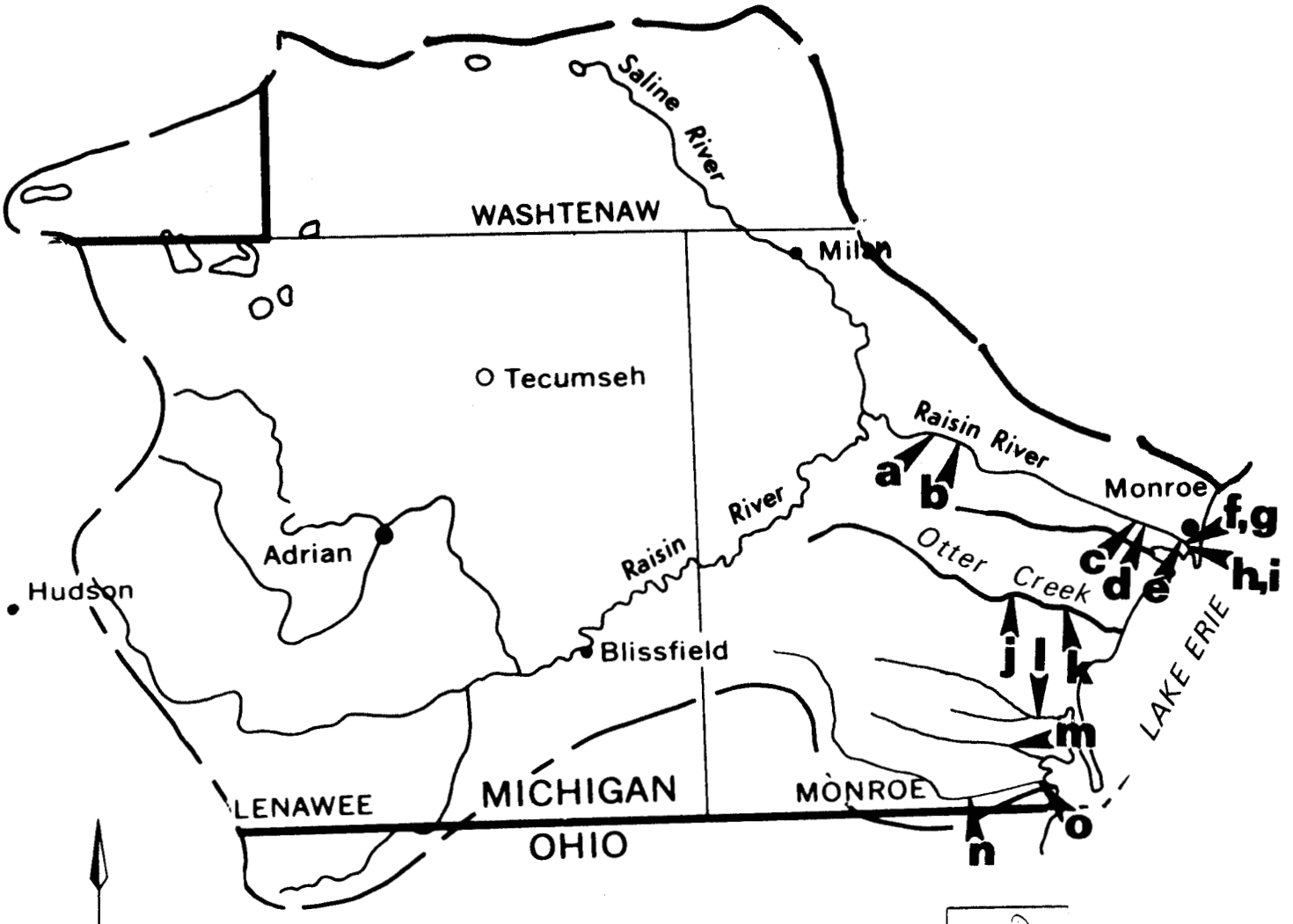
Hydrologic Area 4.1.6
Swan Creek Complex

The Swan Creek Complex encompasses an area of 74,000 hectares (182,000 acres) in the southeast portion of Michigan's Lower Peninsula. Important streams draining the area are; Swan Creek, Stoney Creek, and Sandy Creek, all of which are ungaged. The topography is very flat with relatively few wetlands. Approximately 15 percent of the area is forested, about 60 percent devoted to agriculture and about 10 percent urbanized. The bedrock is compossed mostly of shale. The bedrock is covered by a combination of silt and clay. Swan Creek and Stoney Creek each have a municipal wastewater discharge flowing into them. The cities of Woodland Beach (pop.: 2,249) and Detroit Beach (pop.: 2,053) are the only urbanized areas in this region.

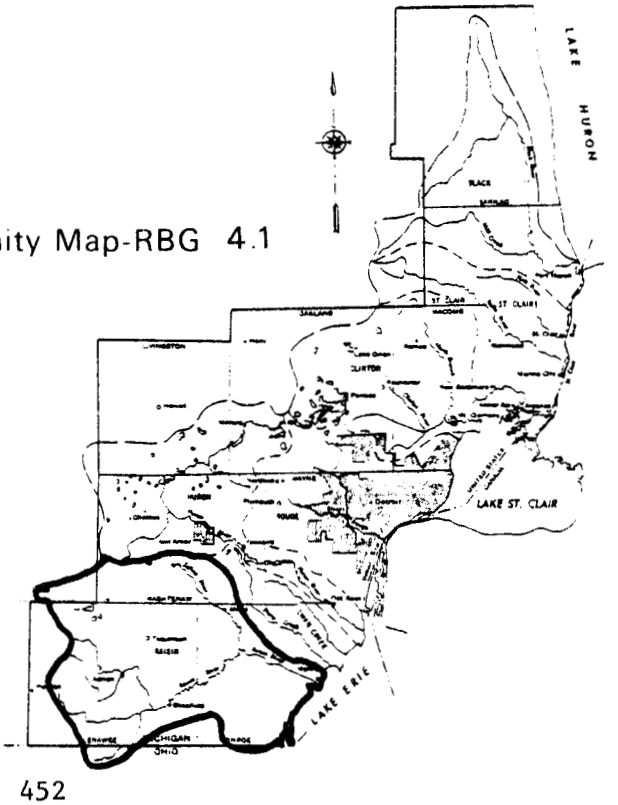
Station Key

Station Location	DAM Rivers and Station Numbers
Swan Creek	41601
a	4160101
b	4160102
Stoney Creek	41602
c	4160201
Sandy Creek	41603
d	4160301

Hydrologic Area 4.1.7
Raison River



Vicinity Map-RBG 4.1



SCALE IN MILES

0 5 10 15

Hydrologic Area 4.1.7
Raisin River

The Raisin River covers an area of 326,000 hectares (805,000 acres). Ninety-eight percent of this area is located in the southeast corner of Michigan's Lower Peninsula with remaining 2 percent in the State of Ohio. The Raisin River has a mean annual discharge of 19.5 m^3/s (689 cfs). Major tributaries to the Raisin River are the Saline River, the Macon River, the South Branch of the Raisin River, and Black Creek. The topography is generally flat with relatively few wetlands. Approximately 20 percent of the area is forested, about 60 percent devoted to agriculture, and about 15 percent urbanized. The principle bedrock composition is dolomite in the east, shale in the central regions, and sandstone in the west. The overlying material principly consists of silt and clay, with glacial till in some areas. A number of municipalities and industries use the areas surface waters for waste assimilation. The cities of Monroe (pop.: 23,894), Adrian (pop.: 20,382), and Tecumseh (pop.: 7,120) represent the major population centers within the area.

Station Key

Station Location	DAM Rivers and Station Numbers
River Raisin	41701
a	4170101
b	4170102
c	4170103
d	4170104
e	4170105
f	4170106
g	4170107
h	4170108
i	4170109
Otter Creek	41703
j	4170301
k	4170302
Yetter Drain/Bay Creek	41705
l	4170501
Little Lake Creek	41706
m	4170601
Halfway Creek	41707
n	4170701
o	4170702

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		HYDROLOGIC AREA 4.1.1 Black River (Michigan)													
		41101	Black River	flow: 7.8 m^3/s (275 cfs)											
54-74	21	4110101	Near Fargo 43-05-32 X 82-37-05	*	1										
66	"	"	"	*	1					4D[a] 3B[b]					
67	"	"	"	*	1			2BC		9	2C	2BC	2BC		
68	"	"	"	*	1					9C 5D					
69	"	"	"	*	1					2A 9B-D					
70	"	"	"	*	1					5A 9B-D					
73	"	"	"		1	5D									
74	"	"	"		1	5AC 2BD									
73	06	4110102	West End of Oxbow, River Mile 6.2			2BC	2C	2BC	2C	2C				2BC	2BC
73	06	4110103	Foot of Woodstock Drive, River Mile 3.0			2BC	2C	2BC	2C	2C				2BC	2BC
67	21	4110104	Vincent Road T6N, R16E, Section 2		2BC	2BC		2BC				2BC	2BC		
73	06	4110105	I-94 Bridge, River Mile 2.2			2C	2C	2C	2C	2C				2C	2C
73	06	4110106	End of Thomas Street, River Mile 1.9			2BC	2BC	2C	2C	2C				2BC	2BC
63	06	4110107	At C&O RR Bridge in Port Huron	*	8B-D	8B-D		8B-D		8B-D		2BD		3B-D	8B-D
64	"	"	"		5A 8B-D	5A 8B-D		5A 8B-D		5A 8B-D		2D		5A 8B-D	5A 8B-D
65	"	"	"		8A-C 5D	8A-C 5D		8A-C 5D		8A 5B-D		5C	5C	8A-C 5D	5ACD 5D
66	"	"	"		8A 5B-D	5ACD 2B		5ACD 2B		5AC 2BD				5ACD 2B	5ACD 2B
67	"	"	"		8	8		2A 8B-D	8CD	8				8	8
68	"	"	"		8AB 5CD	8AB 5CD		8AB 5CD	8AB 5CD	8AB 5CD		5B 2CD	2B-D	8AB 5CD	5ACD 8B
69	"	"	"		5	5	5AD 2BC	5B-D	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5	5	5	5	5	5		5	5A 2BD	5	5
72	"	"	"		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2AD 5BC	5A-C 2D	5A-C 2D

[a] Weekly from October 7 through November 26.

[b] Daily from May through September.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4110101															
"															
"	2BC								2BC						
"															
"															
"															
"															
"															
4110102	2BC		2BC	2BC	2BC	2BC	2BC		2BC						
4110103	2BC		2BC	2BC	2BC	2BC	2BC		2BC				2C		
4110104	2BC								2BC						
4110105	2C		2C	2C	2C	2C	2C		2C						
4110106	2BC		2BC	2BC	2BC	2BC	2BC		2BC						
4110107	8B-D		8B-D	8B-D			8B-D		8B-D		2BD				
"	5A 8B-D		5A 8B-D	5A 8B-D			5A 8B-D		5A 8B-D		2A				
"	8A-C 5D		8A-C 5D	8A-C 5D			8AB 5CD		8AC 5D						
"	5ACD 2B		5ACD 2B	5ACD 2B			5ACD 2B		5ACD 2B						
"	8		8AB 2C	8AB 2C			5A 8B 2C		8		2CD				
"	8AB 5CD		8AB 5CD	8AB 5CD	2B-D	8B 5CD	8B 5CD		8AB 5CD		2B-D				
"	5		5	5	5ABD 2C	5	5		5		2A				
"	5	5CD	5	5	5AB	5	5		5						
"	5	5	5	5	2ABD	5	5		5	2C	2C	2C	2C	5B 2D	5B 2D
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	5C	2C	2C

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	06	4110107	(Continued)		5BC 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
74	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
73	06	4110108	At 10th Avenue Bridge in Port Huron	*		2B 5C		2B 5C	5C	5C				2B 5C	2B 5C
74	"	"	"		5	5		5	5	5		5	5	5	5
75	"	"	"		2A	5A-C		5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
		41102	Unnamed Tributary South of South Park (No Data Found)												
			HYDROLOGIC AREA 4.1.2 St. Clair Complex												
		41201	Pine River												
67	21	4120101	US-25 Bridge		2BC	2BC		2BC				2BC	2BC		
74	"	"	"		2ABD 5C										
67	21	4120102	Newman Road Bridge T5N, R16E, Section 22					2C				2C	2C		
67	21	4120103	Vine Road T5N, R16E, Section 27		2BC	2BC		2BC				2BC	2BC		
63	06	4120104	M-29 Bridge Near Mouth	*		8B-D		8B-D		8B-D		6		8B-D	8B-D
64	"	"	"			5A 8B-D		8B 5ACD		5A 8B-D				8B 5ACD	5A 8B-D
65	"	"	"			8A-C 5D		8A-C 5D		8A-C 5D		5C		8A-C 5D	8B 5ACD
66	"	"	"			5		5		5				5	5
67	"	"	"			8		8	8CD	8D				8	8
68	"	"	"			8A-C 5D		8A-C 5D	8A-C 5D	8A-C 5D		6	6	8A-C 5D	8A-C 5D
69	"	"	"			5	5AD 2BC	5	5	5		5	5	5	5
70	"	"	"			5	5	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4110107	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	2D	2D	2C	2D	2C	2C
"	2A	2A	2A	2A	2A	2A	2A		2A						
4110108	2B 5C		2B 5C	2B 5C	2B 5C	2B 5C	2B 5C		2B 5C						
"	5		5	5	5	5	5		5	2C	2C		2C		
"	5A-C		5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						
4120101	2BC								2BC						
"															
4120102	2C								2C						
4120103	2BC								2BC						
4120104	8B-D		8B-D	8B-D			8B-D		8B-D		6				
"	5A 3B-D		5A 8B-D	5A 8B-D			5A 8B-D		5A 8B-D						
"	8A-C 5D		8AB 5CD	8AB 5CD			8A-C 5D		8A-C 5D						
"	5		5	5			5		5						
"	8		5A 8B 2C	5A 8B 2C			8AB 2C		8		2CD				
"	8A-C 5D		8A-C 5D	8A-C 5D	6	8B-D	8B-D		8A-C 5D		6				
"	5		5	5	5	5	5		5				2C		
"	5	5CD	5	5	5B 2AD	5	5		5						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	06	4120104	(Continued)			5	5	5	5	5		5A 2BD	5A 2BD	5	5
72-73	"	"	"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
74-75	06	4120105	St. Clair City Dock 42-49-07 X 82-29-26	*		5	5	5	5	5		5	5	5	5
76	"	"	"			2A	2A	2A	2A	2A		2A	2A	2A	2A
		41202	Belle River	flow: 2.3 m^3/s (81 cfs)											
62-74	21	4120201	Highway 19 Bridge at Memphis 42-54-03X82-46-09	•	1										
67	21	4120202	St. Clair Highway T4N, R16E, Section 6		2BC	2BC		2BC				2BC	2BC		
67	21	4120203	King Road T4N, R16E, Section 23		2BC	2BC		2BC				2BC	2BC		
74-75	06	4120204	Meisner Road Bridge 42-45-14 X 82-29-33	*	5	5	5	5	5	5		5	5	5	5
76	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
63	06	4120205	Bridge Street in Marine City	*	8B-D	8B-D		8B-D		8B-D				8B-D	8B-D
64	"	"	"		5A 8B-D	5A 8B-D		5A 8B-D		5A 8B-D		2D		5A 8B-D	5A 8B-D
65	"	"	"		8	8A-C 5D		8		8A-C 5D				8	8AB 5CD
66	"	"	"		5	5		5ACD		5ACD				5ACD	8AC 2B
67	"	"	"		8	8		8	8CD	2BC 8D				8	8
68	"	"	"		8AB 5CD	8A-C 5D		8B 5ACD	8B 5ACD	8B 5ACD		6	6	8AB 5CD	8B 5ACD
69	"	"	"		5	5	5AD 2BC	5B-D	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5	5	5	5	5	5		6	5A 2BD	5	5
72	"	"	"		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"		5B-D	5	5	5	5	5		5	5	5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4120104	5	5	5	5	6	5	5		5		2C	2C	2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2CD		
4120105	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
4120201															
4120202	2BC								2BC						
4120203	2BC								2BC						
4120204	5	5	5	5	5	5	5		5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A	2A		2A						
4120205	8B-D		8B-D	8B-D			8B-D		8B-D		6				
"	5A 8B-D		5A 8B-D	5A 8B-D			5A 8B-D		5A 8B-D						
"	8A-C 5D		8AB 5CD	8AB 5CD			8A-C 5D		8A-C 5D						
"	5		2B 5ACD	2B 5ACD			5		2B 5ACD						
"	8		8	8			8AB 2C		8		2CD				
"	8A-C 5D		8AB 5CD	8AB 5CD	6	8BC 5D	8BC 5D		8AB 5CD		6				
"	5		5	5	5	5	5		5				2C		
"	5	5CD	5	5	6	5	5		5						
"	5	5	5	5	6	5	5		5			2C	2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	2C	2C		
"	5	5	5	5	5	5	5		5	2D	2D	2C	2CD		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		41203	Marsh Drain												
71	21	4120301	Near Broad Bridge 42-41-05 X 82-31-52		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
		41204	Beaubien Creek												
71	21	4120401	Near Starville 42-40-24 X 82-35-15		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B		2B				2B	2B		
		41205	Swan Creek												
71	21	4120501	At Arnold Road Near Fair Haven 42-42-30X82-39-05		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
73	"	"	"		2C	2C	2C	2C				2C	2C		
71	21	4120502	Swan Creek Tributary Near Anchorville 42-41-37 X 82-40-06		2C	2C	2C	2C				2C	2C		
		41206	Marsac Creek												
71	21	4120601	At New Baltimore 42-41-37 X 82-42-30		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4120301	2C		2C						2C						
"	2B		2B						2B						
4120401	2C		2C						2C						
"	2B		2B						2B						
4120501	2C		2C						2C						
"	2B		2B						2B						
"	2C	2C	2C						2C						
4120502	2C		2C						2C						
4120601	2C		2C						2C						
"	2B		2B						2B						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		41207	Salt River												
71	21	4120701	24 Mile Road Near New Baltimore 42-41-25 X 82-46-02		2D	2D	2D	2D				2D	2D		
72	"	"	"		2B	2B	2B	2B				2B	2B		
			HYDROLOGIC AREA 4.1.3 Clinton River												
		41301	Clinton River flow: 14.3 m^3/s (505 cfs)												
66	21	4130101	Near Fraser 42-34-40 X 82-57-00	*	2D					2D					
67	"	"	"	*	9AB 11C[a] 2D	2BC		2BC		9AB 11C[a] 5D	2A	2BC	2BC		
68	"	"	"	*	9A 2BC					9A 2BC					
69	"	"	"	*	2BC 9D	2BC		2BC		9D		2BC	2BC		
70	"	"	"	*	9B-D					9B-D					
72	"	"	"		2A 5D	2A 5D									
73	"	"	"		2A 5B-D	2A 5B-D									
34-74	21	4130102	At Mt. Clemens 42-35-45 X 82-54-35	*	1										
69	"	"	"		1	2BC		2BC				2BC	2BC		
72	"	"	"	*	1	2D									
73	"	"	"	*	1	2A 5BC	2D	2D					2D		
67	21	4130103	Moravian Drive in Mt. Clemens T2N, R13E		2BC	2BC		2BC				2BC	2BC		
73	06	4130104	Southernmost Outlet 42-34-35 X 82-52-15			5BD 9C	5B-D	5BD 9C	5B-D	5B-D		5B-D	5B-D	5BD 9C	5B-D
63	06	4130105	Bridgeview Rd. Near Mouth 42-36-20X82-50-00	*	8B-D	8B-D		8B-D		8B-D		2BD	2BD	8B-D	8B-D
64	"	"	"		5AD 8BC	5AD 8BC		5AD 8BC		5AD 8BC		2A	2A	5AD 8BC	5AD 8BC
65	"	"	"		8A-C 5D	8A-C 5D		8A-C 5D		8A-C 5D		2A 5C	2A 5C	8A-C 5D	8AB 5CD
66	"	"	"		5ACD 8B	5ACD 8B		5ACD 8B						5ACD 8B	5ACD 8B

[a]Nine samples collected in June, ten collected in July, 1967.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4120701	2D		2D						2D						
"	2B		2B						2B						
4130101															
"	2BC								2BC						
"															
"	2BC								2BC		2B				
"															
"															
"															
4130102															
"	2BC								2BC		2B				
"															
"	2D		2D						2D						
4130103	2BC								2BC						
4130104	5BD 9C	5B-D	5BD 9C	5BD 9C	5BD 9C	5BD 9C	5BD 9C		5B-D	2D	2D	2C	2D		
4130105	8B-D		8B-D	8B-D			8B-D		8B-D		2BD				
"	5AD 8BC		5AD 8BC	5AD 8BC			8AD 8BC		5AD 8BC		2A				
"	8A-C 5D		8A-C 5D	8A-C 5D			8AB 5CD		8A-C 5D						
"	5ACD 8B		5ACD 8B	5ACD 8B			5		5ACD 8B						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	4130105	(Continued)		8	8		8	8CD	2BC 8D				8	8
68	"	"	"		8AB 5CD	8AB 5CD		8AB 5CD	8AB 5CD	8AB 5CD		2B-D	2B-D	8AB 5CD	8AB 5CD
69	"	"	"		5	5	5AD 2C	5B-D	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5A-C 2D	5	5	5	5	5		5A 2BD	5A 2BD	5	5
72	"	"	"			5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
73	"	"	"		2BD	5AB 9C 8D	5	5AB 9C 2D	5	5		5	5	5ABD 9C	5ABD 9C
			HYDROLOGIC AREA 4.1.4 Rouge Complex												
			41401 Rouge River												
48-74	21	4140101	Near Plymouth Road 42-22-20 X 83-15-20	*	1										
67	"	"	"		1	2BC		2BC				2BC	2BC		
72	"	"	"		1	2A 5BC									
73	"	"	"		1	5ACD 2B									
74	"	"	"		1	5A-C 2D									
30-33	21	4140102	Middle Rouge Near Inkster Rd. 42-20-55 X 83-18-45	*	1										
47-74	"	"	"	*	1										
47-74	21	4140103	Lower Rouge at Daly Rd. 42-18-00 X 83-18-00	*	1										
71	06	4140104	Lower Rouge in Dearborn 42-18-32 X 83-15-11	*	2B 5CD	2CD	2C	2C	2C	2C		2C	2C	2C	2C
72	"	"	"		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"		5BD 9C	2A 5B 9CD	5A-C 9D	5AB 9CD	5	5		5	5	5AB 9CD	5AB 9CD
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		2A	2A	2A	2A	2A	2A		2A	2A	2A	2A
73	06	4140105	Southfield X-way 42-18-28 X 83-12-53		11C[a]	2B 11C[a]	2C	2B 11C[a]	2C	2C				2B 11C[a]	2BC

[a]Sampled three times each day on July 16 and 17.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4130105	8		8AB 2C	8AB 2C			5A 8B 2C		8		2CD				
"	8AB 5CD		8AB 5CD	8AB 5CD	2B-D	8B 5CD	8B 5CD		8AB 5CD		2B-D				
"	5		5	5	5ABD 2C	5	5		5		2A		2C		
"	5	5CD	5	5	5AB 2D	5	5		5						
"	5	5	5	5	2ABD	5	5		5	2C	2C	2C	2C		
"	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C	5A-C		5A-C		2C	2C	2C		
"	5ABD 9C	5	5ABD 9C	5ABD 9C	5ABD 9C	5ABD 9C	5ABD 9C		5ABD 9C	2D	2D	2C	2D		
4140101															
"	2BC								2BC						
"															
"															
"															
4140102															
"															
4140103															
4140104	2CD	2C	2CD	2CD	2CD	2CD			2C		2D	2D	2D		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D		2C	2C	2C		
"	5AB 9CD	5	5AB 9CD	5AB 9CD	5AB 9CD	5AB 9CD		5AB 9CD	5A-C 9D	2D	2D	2D	2D		
"	5	5	5	5	5	5		5	5	2C	2C	2C	2C		
"	2A	2A	2A	2A	2A	2A		2A	2A	2A	2A	2A	2A		
4140105	2B 11C[a]		2BC	2BC	2C	2BC		2BC	2BC						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	06	4140106	Rotunda Drive Bridge 42-18-10 X 83-11-46		11C[a]	11C[a] 2D	2CD	11C[a] 2D	2CD	2CD				11C[a] 2D	2CD
72	06	4140107	DT&I Railroad Bridge 42-17-43 X 83-11-03			2C 5D		2C 5D	2C 5D	2C 5D				2C 5D	
73	"	"	"			2C		2C	2C	2C				2C	
70	06	4140108	Greenfield Road Bridge, River Mile 4.68			2BD 5C				2BD 5C				5C	
71	"	"	"												
72	"	"	"			2BC			2BC	2BC				2BC	
73	"	"	"			5B-D	2C	2BC	2C	2B 5CD				5B-D	2C
74	"	"	"			2B 5C	5C	2B 5C	2B 5C	2B 5C			2B	2B 5C	2C
47	18	4140109	Schaffer Road 42-17-26 X 83-10-00				5CD								
47	18	4140110	Near Greenfield Road 42-17-39 X 83-10-35				5CD						5CD	5CD	5CD
47	18	4140111	Dix Highway 42-17-35 X 85-09-06				5CD						5CD	5CD	5CD
47	18	4140112	Fort Street 42-17-29 X 83-08-34				5CD						5CD	5CD	5CD
70	06	"	"			2A 5B-D				2A 5B-D				2D 5BC	
71	"	"	"			2B 5CD			2A 5B-D	2A 5B-D				2B 5CD	
72	"	"	"			2B 5CD			2B 5CD	2B 5CD				2B 5CD	
73	"	"	"			2B 5CD	2C	2C		2B 5CD				2B 5CD	2C
74	"	"	"			2B 5C	2C	2B 5C	2B 5C	2B 5C			2B	2B 5C	5C
66	06	4140113	W. Jefferson Ave. Bridge River Mile 1.06	*	2BC 5D	2B-D				2B 5C				2B-D	
67	"	"	"		5BD 2C	5BD 2C				5BD 2C				5BD 2C	
68	"	"	"		5AB										
70	"	"	"		2A 5B-D	2A 5B-D				2A 5B-D				2A 5B-D	
71	"	"	"		2A 5BD	2B 5CD			2B 5CD	2B 5CD				2B 5CD	
72	"	"	"		5AD 8BC	5AD 8BC	5	5A-C 2D	5	5		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"		2C 5D	5AC 8BD	5AC 8BD	5AC 8BD	5AC 8BD	5AC 8BD		5	5	5AC 8BD	5AC 8BD
74	"	"	"		5	5AD 8BC	5ABD 8C	5AD 8BC	5AD 8BC	5AD 8BC		5	5	5AD 8BC	5AD 8BC
75	"	"	"		2A	2AC 5B	2AC 5B	2AC 5B	2AC 5B	2AC 5B		2AC 5B	2AC 5B	2AC 5B	2AC 5B
66	06	4140114	Near Mouth 42-16-41 X 83-06-56	*		2B 5D				2B 5D				2B 5D	

[a]Sampled three times each day, July 16 and 17.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4140106	11C[a] 2D		2CD	2CD	2CD	2CD		2CD	2CD			2C			
4140107	2C 5D		2C 5D	2C 5D		2C 5D		2C 5D	2C 5D		2C 5D				
"	2C		2C	2C		2C		2C	2C		2C				
4140108	2BD 5C		5C 2D	5C 2D		5C	5C		5C 2D		2BD 5C				
"														5B 2C	5B 2C
"	2BC		2BC	2BC		2BC	2BC		2BC		2BC				2C
"	5B-D		2B 5CD	2B 5CD	2CD	2B 5CD	2B 5CD		2B 5CD		2CD				
"	2B 5C		2B 5C	2B 5C	2B 5C	2B 5C	2B 5C		2B 5C		2B 5C				
4140109		5CD		5CD											
4140110	9C	5CD		5CD					5CD						
4140111	9C	5CD		5CD					5CD						
4140112	9C	5CD		5CD					5CD						
"	2A 5B-D		2B 5CD	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2A 5B-D				
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2B 5CD				
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2B 5CD				
"	2B 5CD		2B 5CD	2B 5CD	2C	2B 5CD	2B 5CD		2B 5CD		2B 5CD				
"	2B 5C		2B 5C	2B 5C	2B 5C	2B 5C	2B 5C		2B 5C		2B 5C				
4140113				2B-D											
"				5BD 2C											
"															
"	2A 5B-D		2B 5CD	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2A 5B-D		2BC		
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2A 5BD				
"	5ABD 8C	5A-C 2D	5ABD 8C	5ABD 8C	5	5ABD 8C	5ABD 8C		5ABD 8C		2A 5BD	2C	2C		
"	5AC 8BD	5	5AC 8BD	5AC 8BD	5AC 8BD	5AC 8BD	5AC 8BD		5AC 8BD		2B 5CD	2C			
"	5AD 8BC	5AD 8BC	5AD 8BC	5AD 8BC	5AD 8BC	5AD 8BC	5AD 8BC		5AD 8BC	2AC	2B 5C		2C	2C	
"	2AC 5B	2AC 5B	2AC 5B	2AC 5B	2AC 5B	2AC 5B	2AC 5B		2AC 5B						
4140114	2B 5D		2B 5D	2B 5D		2B 5D		2B 5D	2B 5D		2B 5D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	06	4140114	(Continued)			5BD 2C				5BD 2C				5BD 2C	
68	"	"	"			5BC 2D				5BC 2D				5BC 2D	
69	"	"	"			5BC 2D				5BC 2D				5BC 2D	
70	"	"	"			2B 5CD				2B 5CD				2B 5CD	
71	"	"	"			2B 5C 9D			5D	2B 5CD				2B 5CD	
72	"	"	"			5B-D			2B 5CD	2B 5CD				2B 5CD	
73	"	"	"			2B 5CD				2B 5CD				2B 5CD	
74	"	"	"			2B 5C	5C	2B 5C	2B 5C	2B 5C			2B	2B 5C	5C
		41402	Ecorse River												
71	21	4140201	Dix Road in Lincoln Park		2C	2C	2C	2C				2C	2C		2C
71	21	4140202	S. Branch Ecorse River 42-13-27 X 83-11-52		2C	2C	2C	2C				2C	2C		2C
60-64	18	4140203	W. Jefferson Ave. Bridge 42-14-06 X 83-08-55	*		9		9		2B[a]		9	9		
68	06	"	"			5D		5D	5D	5D		2D	5D	5D	5D
69	"	"	"			5A-C	2C	5BC	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
71	"	"	"				2C	2C	2C	2C		2C	2C	2C	2C
72	"	"	"				5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"				5	5	5	5		5	5	5	5
74	"	"	"				5	5	5	5		5	5	5	5
		41403	Frank and Poet Drain												
71	21	4140301	Van Horn Road 42-07-36 X 83-12-11		2C	2C	2C	2C				2C	2C		
73	"	"	"		2C	2C	2C	2C				2C	2C		

[a] May, 1964 only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4140114	5BD 2C		5BD 2C	5BD 2C		5BD 2C		5BD 2C	5BD 2C		5BD 2C				
"	5BC 2D		5BC 2D	5BC 2D		5BC 2D		5AB 2C	5AB 2C		5BC 2D				
"	5BC 2D		5BC 2D	5BC 2D		5BC 2D		5BC 2D	5BC 2D		5BC 2D				
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2B 5CD	2B 5CD		2B 5CD				
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2B 5CD	2B 5CD		2B 5CD				
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2B 5CD	2B 5CD		2B 5CD				
"	2B 5CD		2B 5CD	2B 5CD		2B 5CD		2B 5CD	2B 5CD		2B 5CD				
"	2B 5C	2B 5C	2B 5C	2B 5C	2B 5C	2B 5C		2B 5C	2B 5C		2B 5C				
4140201			2C						2C						
4140202			2C						2C						
4140203	9								9						
"	5D		5D	5D		5D	5D		5D		5D				
"	5A-C		5A-C	5A-C	2B	5A-C	5A-C		5A-C		5AB				
"	2CD	2C	2C	2C	2C	2C	2C		2CD		2D	2D	2D		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C		2C		
"	5	5	5	5	5	5	5		5						
"	5	5	5	5	5	5	5		5	2AC	2AC	2C	2AC		
4140301	2C		2C						2C						
"	2C	2C	2C						2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72-74	06	4140302	In Gibralter 42-05-41 X 83-12-09			7	7	7	7	7	7	7	7	7	7
		41404	Brownstown Creek-Marsh Creek												
71	21	4140401	Allen Road 42-06-14 X 83-13-24		2C	2C	2C	2C				2C	2C		
72	06	4140402	Gibralter Road in Gibralter			2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC
73	"	"	"			5A 2BD	5A 2BD	5A 2BD	5A 2BD	5A 2BD		5A 2BD	5A 2BD	5A 2BD	5A 2BD
74	"	"	"			2C	2C	2C	2C	2C		2C	2C	2C	2C
			HYDROLOGIC AREA 4.1.5 Huron River (Michigan)												
		41501	Huron River flow: 12.6 m^3/s (445 cfs)												
04-74	21	4150101	Wall St. Bridge, Ann Arbor 42-17-10 X 83-44-00	*	1										
66	18	4150102	42-05-40 X 83-17-50			2A 5B		2A 5B	2A 5B	2A 5B	2A 5B	2A 5B		2A 5B	2A 5B
70	06	4150103	Flat Rock Water Works			2D		2D	2D	2D				2D	
71	"	"	"			2B		2B	2B	2B		2B	2B		
72	"	"	"		2B	2B		2B	2B	2B		2B	2B		
73	"	"	"			2B	2B	2B	2B	2B		2B	2B		
74	"	"	"			2C	2C	2C	2C	2C		2C	2C		
71	21	4150104	At Flat Rock T4S, R10E, Section 31		2C		2C	2C				2C	2C		
62	18	4150105	42-03-55 X 83-15-10			4D		2C					2C		
63	"	"	"			9B 5D									
64	"	"	"			2AC									
66	"	"	"			2A 8BC		2A 8BC	2A 8BC	2A 8BC		2A 8BC		2A 8BC	2A 8BC

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4140302	7	7	7	7	7	7	7		7		7		7		
4140401	2C		2C						2C						
4140402	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC		2C		2C		
"	5A 2BD	5A 2BD	5A 2BD	5A 2BD	5A 2BD	5A 2BD	5A 2BD		5A 2BD	2D	2D		2D		
"	2C	2C	2C	2C	2C	2C	2C		2C		2C		2C		
4150101															
4150102	2A 5B		2A 5B	2A 5B	2A 5B	2A 5B		2A 5B	2A 5B		2A 5B				
4150103	2D	2D	2D	2D		2D	2D		2D			2D	2D		
"	2B	2B	2B	2B	2B	2B	2B		2B	2B		2B			
"	2B	2B	2B	2B	2B	2B	2B		2B	2B	2B	2B	2B	2B	2B
"	2B	2B	2B	2B	2B	2B	2B		2B	2B	2B	2B	2B		
"	2C	2C	2C	2C	2C	2C	2C		2C	2C	2C	2C	2C		
4150104	2C		2C						2C						
4150105	4D								4D						
"		2C		2C	2C	2C			5B						
"															
"	2A 8BC	2A 8BC		2A 8BC	2A 8BC	2A 8BC		2A 8BC	2A 8BC		2A 8BC		2B		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
62	18	4150106	42-02-40 X 83-12-50			8D		2D					2D		2D
63	"	"	"			9B 2C 5D		2D							
64	"	"	"			2A 4C 5BD		2D							
65	"	"	"			5BC									
66	"	"	"			2A 8BC		2A 8BC	2A 8BC	2A 8BC		2A 5BC		2A 8BC	2A 8BC
71	21	4150107	Silver Cr. at Rockwood 42-03-34 X 83-13-27		2C		2C	2C				2C	2C		
63	06	4150108	River Road Bridge Near Mouth	•	8B-D	8B-D		8B-D		8B-D		6		8B-D	8B-D
64	"	"	"		5A 8B-D	5A 8B-D		5A 8B-D		5A 8B-D		2D		5A 8B-D	5A 8B-D
65	"	"	"		8A-C 5D	5D 8A-C		8A-C 5D		5AD 8BC		5C		8A-C 5D	8B 5ACD
66	"	"	"		5ABD 2C	5ABD 2C		5ABD 2C		5A-C 2D				5ABD 2C	5AC 2BD
67	"	"	"		5A 8B-D	5A 8B-D		5A 8B-D	8CD	2C 8D				5A 8B-D	5AD 8BC
68	"	"	"		8AB 5CD	8AB 5CD		8AB 5CD	8AB 5CD	8AB 5CD		6	6	8AB 5CD	8AB 5CD
69	"	"	"		5	5	5AD 2BC	5B-D	5	5		5	5	5	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5	5ABD 2C	5ABD 2C	5	5	5		5A 2BD	5A 2B-D	5	5
72	"	"	"			5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"			5	5	5A-C 2D	5	5		5	5	5	5
74	"	"	"			5	5	5	5	5		5	5	5	5
75	"	"	"			5A-C	5A-C	5A-C	5A-C	5A-C		5A-C	5A-C	5A-C	5A-C
		41502	Mouillee Creek		(No Data Found)										

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4150106	5D								5D						
"	2D		2D			2D			5B 2D						
"			2AC	2C	2C	2AC			2A						
"															
"	2A 8BC		2A 8BC	2A 8BC	2A 8BC	2A 8BC		2A 8BC	2A 8BC		2A 5BC		2AB		
4150107	2C		2C						2C						
4150108	8B-D		8B-D	8B-D			8B-D		8B-D		6				
"	5A 8B-D		5A 8B-D	5A 8B-D			5A 8B-D		5A 8B-D		2AD				
"	5AD 8BC		8A-C 5D	8A-C 5D			5AD 8BC		8A-C 5D						
"	5		5ABD 2C	5ABD 2C			5		5ABD 2C						
"	5A 8B-D		5A 8B-D	5A 8B-D			5A 8BC		2A 8B-D		2D				
"	8AB 5CD		8AB 5CD	8AB 5CD	6	8B 5CD	8B 5CD		8AB 5CD		6		2BC 5D		
"	5		5	5	5ABD 2C	5	5		5	5A 2BC	5AD 2BC		5ABD 2C		
"	5		5	5	2ACD 5B	5	5		5	2C	5		5ABD 2C		
"	5		5	5	6	5	5		5	2C	2C	2C	2CD	5B 2D	5B 2C
"	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D		2C	5C	2C	2C	2C
"	5		5	5	5	5	5		5	2D	2D	2C			
"	5		5	5	5	5	5		5	2C	2C		2C	2C	
"	5A-C		5A-C	5A-C	5A-C	5A-C	5A-C		5A-C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA	4.1.6 Swan Creek Complex											
		41601	Swan Creek												
71	21	4160101	At Newport 42-00-12 X 83-18-02		2D	2D	2D	2D				2D	2D		
72	"	"	"		2B	2B	2B	2B				2B	2B		
56-70	06	4160102	Dixie Highway Bridge, River Mile 2.7	*		9									
		41602	Stony Creek												
71	21	4160201	Near Newport 41-57-50 X 83-20-22		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
73	"	"	"		2C	2C	2C	2C				2C	2C		
		41603	Sandy Creek												
71	21	4160301	Near Monroe 41-56-55 X 83-18-34		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
73	"	"	"		2C	2C	2C	2C				2C	2C		
			HYDROLOGIC AREA	4.1.7 Raisin River Complex											
		41701	River Raisin	flow: 19.5 m^3/s (689 cfs)											

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4160101	2D		2D						2D						
"	2B		2B						2B						
4160102															
4160201	2C		2C						2C						
"	2B		2B						2B						
"	2C	2C	2C						2C						
4160301	2C		2C						2C						
"	2B		2B						2B						
"	2C	2C	2C						2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
66	18	4170101	41-57-50 X 83-32-55			2A 5B 8C		2A 5B 8C	2A 5B 8C	2A 5B 8C		2A 5BC		2A 5B 8C	2A 5B 8C
37-74	21	4170102	Ida Road Bridge 41-57-40 X 83-31-55	*	1										
67	21	"	"	*	2BC	3		2BC		3[a]	2AB	2BC	2BC		
68	"	"	"	*		3				3[a]					
69	"	"	"	*		3				3[a]	2AB				
70	"	"	"	*	2BC	3		2BC		3[a]	2B	2BC	2BC		
71	"	"	"	*		3				3[a]	2AB				
72	"	"	"	*		3[b]				3[a,b]	5B 2C				
73	"	"	"	*	5	5									
73	06	"	"	*	2B 5CD	2B 5CD	2B 5CD	2BD 5C	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
74	"	"	"	*	5	5	5	5	5	5		5	5	5	5
74	21	"	"		5A-C 2D	5A-C 2D									
75	06	"	"		5A	5A	5A	5A	5A	5A		5A	5A	5A	5A
73	06	4170103	Roessler Road, River Mile 4.85		5C	5C	5C	5C	5C	5C				5C	5C
62	18	4170104	41-55-20 X 83-25-00			4D		2D					5D		
63	"	"	"			9B 5C 2AD		2AD							
64	"	"	"			2A									
66	"	"	"			2A 8BC		2A 8BC	2A 8BC	2A 8BC		2A 5BC		2A 8BC	2A 8BC
73	06	4170105	Railroad Bridge at River Mile 3.21		5C	5C	5C	5C	2C	2C		2C	2C	5C	5C
73	06	4170106	River Mile 0.25		2C	2C	2C	2C	2C	2C				2C	2C
64	18	4170107	41-54-02 X 83-21-17			9B 2C								2C	
58	06	4170108	Environ. Asc. Dock in Monroe 41-54-02X83-21-16	*	8CD										
59	"	"	"		8										
60	"	"	"		2A										
63	"	"	"		2B 8CD	2B 8CD		2B 8CD		2B 8CD		2BD	2B-D	2B 5C 8D	2B 8CD
64	"	"	"		8A-C 4D	8A-C 4D		8A-C 5D		8		2AD	2A	8	5ABD 8C
65	"	"	"		4A-C 8D	4A-C 8D		8AB 5C 2D		8A 5B-D		5C	2A 5C	4A-C 8D	8ABD 4C

[a] Measured more frequently during peak flows and periods of rapidly fluctuating discharge.

[b] Through September, 1972.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4170101	2A 5B 8C		2A 5B 8C	2A 5B 8C	2A 5B 8C	2A 5B 8C		2A 5B 8C	2A 5B 8C		2A 5BC		2B		
4170102															
"	2BC								2BC						
"															
"															
"	2BC		2BC						2BC						
"															
"															
"															
"	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD				2B 5CD	2C	2C		2C		
"	5	5	5	5	5				5						
"															
"	5A	5A	5A	5A	5A				5A						
4170103	5C		5C	5C	5C	5C	5C		5C			2C			
4170104	4D								4D						
"	2AD 5BC								2D 5BC						
"	2A								2A						
"	2A 8BC		2A 8BC	2A 8BC	2A 8BC	2A 8BC		2A 8BC	2A 8BC		2A 5BC		2AB		
4170105	5C		5C	5C	5C	5C	5C		5C						
4170106	2C		2C	2C	2C	2C	2C		2C			2C			
4170107															
4170108															
"															
"															
"	2B 8CD		2B 8CD	2B 8CD				2B 5C 8D	2B 8CD		2BD				
"	8		8	8				8	8		5A				
"	4A-C 8B		8AB 5C 2D	8AB 5C 2D				8AB 5C 2D	8AB 5C 2D			2C			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
66	06	4170108	(Continued)		8A 2D 5BC	8A 2D 5BC		5AC 2BD		5AC 2BD				8A 2D 5BC	8A 2D 5BC
67	"	"	"		5A 8B-D	5A 8B-D		2A 8D 5BC	8CD	2BC 5D				5A 8B-D	5A 8B-D
68	"	"	"		8AB 5CD	8AB 5CD		8AB 5CD	8AB 5CD	8AB 5CD		2B-D	2B-D	8AB 5CD	8AB 5CD
69	"	"	"		5	5	5AD 2BC	5	5	5		5	5	5.	5
70	"	"	"		5	5	5	5	5	5		5	5	5	5
71	"	"	"		5	5	5	5	5	5		5	5A 2B-D	5	5
72	"	"	"		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	"	"	"		5AB 2C 9D	5AB 2C 9C	5AB 2C 9D	5AB 2CD	5ABD 2C	5ABD 2C		5ABD 2C	5ABD 2C	5ABD 2C	5ABD 2C
74	"	"	"		5	5	5	5	5	5		5	5	5	5
75	"	"	"		5A-C 2D	5	5	5	5	5		5	5	5	5
76	"	"	"			2A	2A	2A	2A	2A		2A	2A	2A	2A
62	18	4170109	At Mouth 41-53-34 X 83-20-15			2C 4D		2D							
63	"	"	"			2A 5B-D		2D					5D	2C	
64	"	"	"			2A 9B 8C 5D		2AD		5BD 8C			5C		
65	"	"	"			5B-D				5BD 2C				5C 2D	
66	"	"	"			5BC								5C	
68	"	"	"			5BC 2D	5BC	5BC 2D						5C 2D	
69	"	"	"			2C 5D	2C 5D	2C 5D	2C 5D	2C 5D				2C 5D	
70	"	"	"			2CD	2CD	2CD	2CD	2CD				2CD	
73	"	"	"			2B 5C	2BC	2BC	2BC	2BC				2BC	
70	21	4170199	Exact Location Unknown, Land Grant 159,T6S,R8E		2BC			2BC				2BC	2BC		
		41702	La Plaisance Creek		(No Data Found)										

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4170108	8A 2D 5BC		5AC 2BD	5AC 2BD				5AC 2BD	5AC 2BD			2B			
"	5A 8B-D		5A 8B 2C	5A 8B 2C				5A 8B 2C	2A 8B-D		2CD				
"	8AB 5CD		2A 8B 5CD	8AB 5CD	2B-D	8B 5CD		8B 5CD	8AB 5CD		2B-D				
"	5		5	5	5ABD 2C	5		5	5		5ABD 2C		5ABD 2C		
"	5	5CD	5	5	5AB 2D	5		5	5	2C	5		5ABD 2C	5B	5B
"	5	5	5	5	6	5		5	5	2C	2C	2CD	2C		
"	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	2AD 5BC	5A-C 2D		5A-C 2D	5A-C 2D		2C	2C	2C	2C	2C
"	5ABD 2C	5ABD 2C	5ABD 2C	5ABD 2C	5ABD 2C	5ABD 2C		5ABD 2C	5ABD 2C	2D	2D	2CD	2D		
"	5		5	5	5	5			5	2C	2C	2C	2C	2C	2C
"	5		5	5	5	5			5	2C	2C	2C	2C		
"	2A		2A	2A	2A	2A			2A						
4170109	9C 4D								9CD						
"	2AD 5C		2B 5CD			2B 5CD			5BC 2D						
"	2B		5BD 8C	5BD 8C	5BD 8C	5BD 8C					2B				
"			5B-D	2BC 5D	2BC 5D	5B-D		5B-D	5B-D						
"			5BC			5BC		5BC	5BC						
"			5BC 2D	5BC 2D	5BC 2D	5BC 2D		5BC 2D	5BC 2D		5BC 2D				
"	2C 5D		2C 5D	2C 5D	2C 5D	2C 5D			2C 5D		2C 5D				
"	2CD		2CD			2CD			2CD		2CD				
"				2BC	2BC	2BC			2BC	2B	2B	2B		2BC	2C
4170199	2BC		2BC						2BC			2D	2D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		41703	Otter Creek												
67	06	4170301	Goutz Road Bridge 41-52-36 X 83-29-23			2C		2C	2C	2C		2C		2C	2C
71	21	4170302	M-25 Bridge 41-52-01 X 83-27-13		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
73	"	"	"		2C	2C	2C	2C				2C	2C		
		41704	Muddy Creek	(No Data Found)											
		41705	Yetter Drain/Bay Creek												
71	21	4170501	Det.&Tol. RR Bridge 41-47-26 X 83-28-32		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
		41706	Little Lake Creek												
71	21	4170601	Suder Road 41-46-23 X 82-29-28		2C	2C	2C	2C				2C	2C		
72	"	"	"		2B	2B	2B	2B				2B	2B		
73	"	"	"		2C	2C	2C	2C				2C	2C		
		41707	Halfway Creek												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4170301	2C		2C	2C		2C	2C		2C		2C				
4170302	2C		2C						2C						
"	2B		2B						2B						
"	2C	2C	2C						2C						
4170501	2C		2C						2C						
"	2B		2B						2B						
4170601	2C		2C						2C						
"	2B		2B						2B						
"	2C	2C	2C						2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	21	4170701	Smith Road Bridge 42-43-40 X 83-34-00		2B	2B	2B	2B				2B	2B		
73	"	"	"		2C	2C	2C	2C				2C	2C		
67	06	4170702	Alternate US-24 Bridge			2C	2C	2C		2C			2C	2C	2C
68	"	"	"			2C	2C	2C		2C		2C	2C	2C	2C
69	"	"	"			2BC		2BC	2BC	2BC		2BC	2BC	2BC	2BC
70	"	"	"			2BD	2BD	2BD		2BD		2BD	2BD	2BD	2BD
71	"	"	"			2BC	2BC	2BC	2BC	2BC		2BC	2BC	2BC	2BC
72	"	"	"			2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC
73	"	"	"			5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B	5A 2B	5A 2B	5A 2B

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4170701	2B		2B						2B						
"	2C	2C	2C						2C						
4170702	2C		2C	2C		2C	2C		2C						
"	2C		2C	2C		2C	2C		2C						
"	2BC		2BC	2BC		2BC	2BC		2BC				2BC		
"	2BD		2BD	2BD		2BD	2BD		2BD						
"	2BC	2BC	2BC	2BC	2BC	2BC	2BC		2BC						
"	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC		2C		2C		
"	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B						

Evaluation and Summary of Data for River Basin Group 4.1

This river basin group is composed of seven hydrologic areas totaling 13,460 km^2 (5,177 mi^2) in Michigan, and 60 km^2 (23 mi^2) in Ohio. Twenty-six tributaries were identified from this river basin group for inclusion on the DAM. Of these, eight were found to have sufficient water quality data to estimate tributary loadings. Six of these rivers have been gauged at a near mouth station for a substantial period of years. Seven of nine rivers identified in Table 4 as major Great Lakes tributaries, were found to have sufficient water quality data to consider tributary loading estimates. Only six of the nine major tributaries had were gauged, however. Considerable biweekly data were collected in the mid-1960's.

A good percentage of the drainage area of this river basin group appears to be adequately monitored in terms of water quality and water quantity parameters. A number of the smaller tributaries in this river basin group which are essentially agricultural drains or creeks, have been sampled although on a relatively infrequent basis. There are few data available on heavy metals, pesticides, and refractory organics, despite the fact that many tributaries drain some highly industrialized areas.

Hydrologic Area 4.1.1 - Black River (Michigan). The Black River flows into the St. Clair River just at the outlet of Lake Huron. A relatively long-term water quality record is available for this tributary. In addition, the Black has been gauged since 1954, although the station (4110101) is upstream of a major tributary. Monthly to biweekly measurements were made of suspended solids, nutrients, and chloride since the mid-1960's. A most useful set of water quality data are available from station 4110107 which is located close to the river mouth. Some biweekly measurements of nutrients were made during the spring period. No regular sampling over an annual cycle was conducted for heavy metals, pesticides or refractory organics.

Hydrologic Area 4.1.2 - St. Clair Complex. Of the seven tributaries identified for this complex only the Pine River and the Belle River were found to have significant river mouth loading data available. The Belle River and the Pine River are the largest rivers in this hydrologic area. Both drain into the St. Clair River.

The Pine River has a relatively good water quality data base, although the river is not gauged at a strategic river mouth loading station. Monthly to biweekly data are available on suspended solids, some nutrients, and chloride beginning in the mid-1960's and continuing to the present time. Very few data are available on heavy metals and no data were identified for pesticides or refractory organics.

The Belle River is gauged, although the station is located approximately 40 river kilometers (25 miles) upstream from the mouth. As was the case for the Pine, a good long-term water quality data base exists for key loading parameters, and some biweekly as well as monthly measurements have been made. A few data are available for heavy metals but not over any full annual cycle. No data are available on pesticides or refractory organics.

Four other tributaries drain into Anchor Bay in Lake St. Clair. None of them are gauged and none have sufficient water quality data for any type of loading calculations.

Hydrologic Area 4.1.3 - Clinton River. The Clinton River, which drains into Lake St. Clair has been gauged since 1934. The gauging station is located approximately eight river kilometers (five miles) upstream from the mouth and it is below the confluence of important tributaries to the Clinton. Considerable water quality data have been collected at several stations further downstream. Beginning in the mid-1960's, monthly to biweekly data have been collected on suspended solids, nitrate, ammonia, dissolved reactive phosphorus and chloride. More recently data have been collected on silica, total kjeldahl nitrogen and total phosphorus. Some scattered data exist on heavy metals and no data were found for either pesticides or refractory organics.

Hydrologic Area 4.1.4 - Rouge Complex. This complex consists of a highly urbanized area and drains many of the industrial plants associated with the U.S. Automobile industry. Four tributaries, all of which drain into the Detroit River, are included in this complex. Some data were found on all four of these tributaries.

The largest tributary in the complex is the Rouge River. This river has been gauged at three stations, one on each of the three main branches of the river. Gauging station data are available since the late 1940's. Water quality data on silica, ammonia, and chloride are available for the Rouge as early as 1947. A number of stations on the lower part of the Rouge have been sampled. During the 1970's there was some monthly to biweekly sampling of key loading parameters. Few data are available from the 1960's which cover a full annual cycle. Despite the fact that heavy metal concentrations would be expected to be high in the Rouge River, data on these species are limited. A few data are available on pesticides and refractory organics.

The Ecorse River was sampled on a monthly basis during 1973 and 1974 for key loading parameters. Also, monthly samples were collected over an annual cycle in 1968 and 1969. Heavy metal data have been collected only sporadically. No flow data other than a few instantaneous measurements were found for the Ecorse River.

Frank and Poet drain and Brownstown-Marsh Creek have some limited data available on them. Howver, neither of these tributaries have monthly data collected for any one full annual cycle. Some scattered heavy metal data are available for them.

Hydrologic Area 4.1.5 - Huron River (Michigan). The Huron River is gauged at a station (4150101) located approximately 90 river kilometers (56 miles) upstream from the mouth. While this station is a long distance upstream, it does monitor a large portion of the drainage basin (as shown on the hydrologic area map). There are a number of impoundments on the river between the gauging station and the outlet to Lake Erie which may complicate interpretation of the flow data. Water quality has been measured at a number of near-mouth stations on the Huron since the 1960's. A relatively good long-term record is available with biweekly to monthly monitoring having been conducted. Most of the biweekly

monitoring was done in the 1960's. Some heavy metal, pesticide and refractory organic data have been collected although monthly monitoring was not conducted over any full annual cycle. No data were found on Mouillee Creek, which is also included in this hydrologic area.

Hydrologic Area 4.1.6 - Swan Creek Complex. Three tributaries - Swan Creek, Stony Creek, and Sandy Creek - are included in this complex. Only limited data are available for these three tributaries. None of the tributaries are gauged and only a few instantaneous flow measurements are available. The Swan Creek complex is the smallest in total area in River Basin Group 4.1.

Hydrologic Area 4.1.7 - Raisin River Complex. This complex consists of seven tributaries, the largest of which is the River Raisin. This river has been gauged since the late 1930's at station 4170107, located approximately eight river kilometers (five miles) upstream from the mouth and below the confluence of the major tributaries. The River Raisin has a relatively good water quality record for downstream stations. Some weekly to biweekly data on key loading parameters are available since the mid-1960's. In most cases, total soluble phosphorus was reported rather than dissolved reactive phosphorus in the routine monthly programs. Only sporadic heavy metal, pesticide and refractory organics data are available.

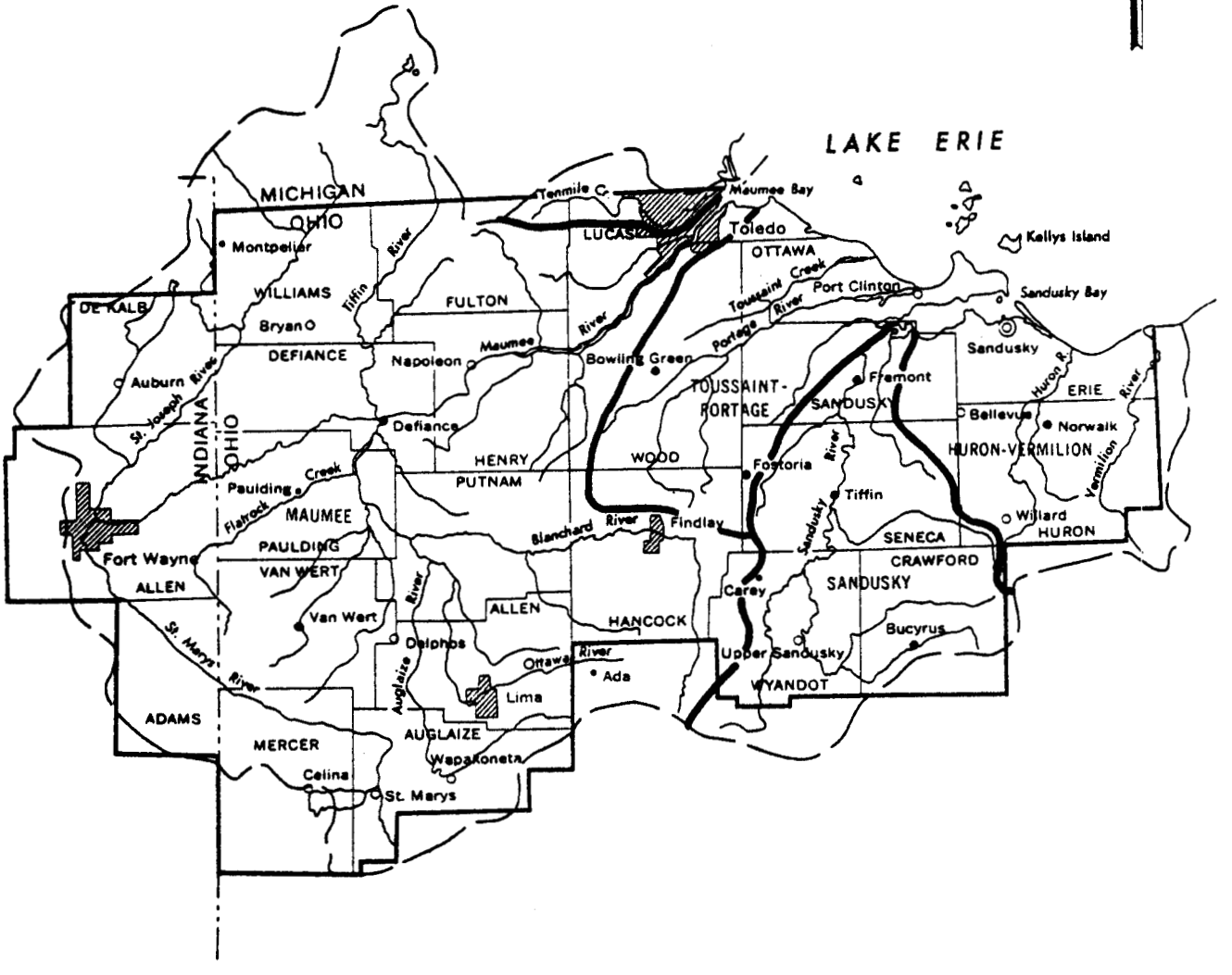
Six other tributaries were identified in this complex, and of these Halfway Creek had the most extensive water quality data available. However, despite the fact that some nutrient, suspended solids, and chloride data were available, they had not been collected at least monthly over any one full annual cycle. None of these tributaries were gauged, although some limited instantaneous flow measurements have been reported.

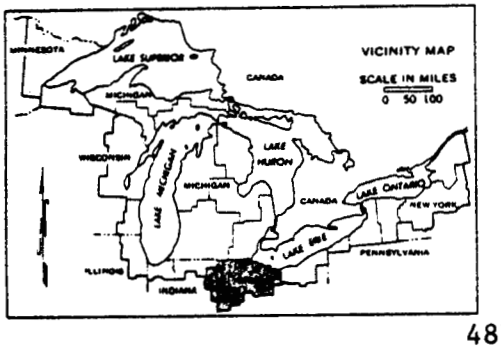
DESCRIPTION AND ANALYSIS OR RIVER BASIN GROUP 4.2

River Basin Group 4.2 drains an area of 26,843 km^2 (10,367 mi^2), shown in Figure 20. This river basin group contains five hydrologic areas. Maps and descriptions of these hydrologic areas follow.

Figure 20

RIVER BASIN GROUP 4.2

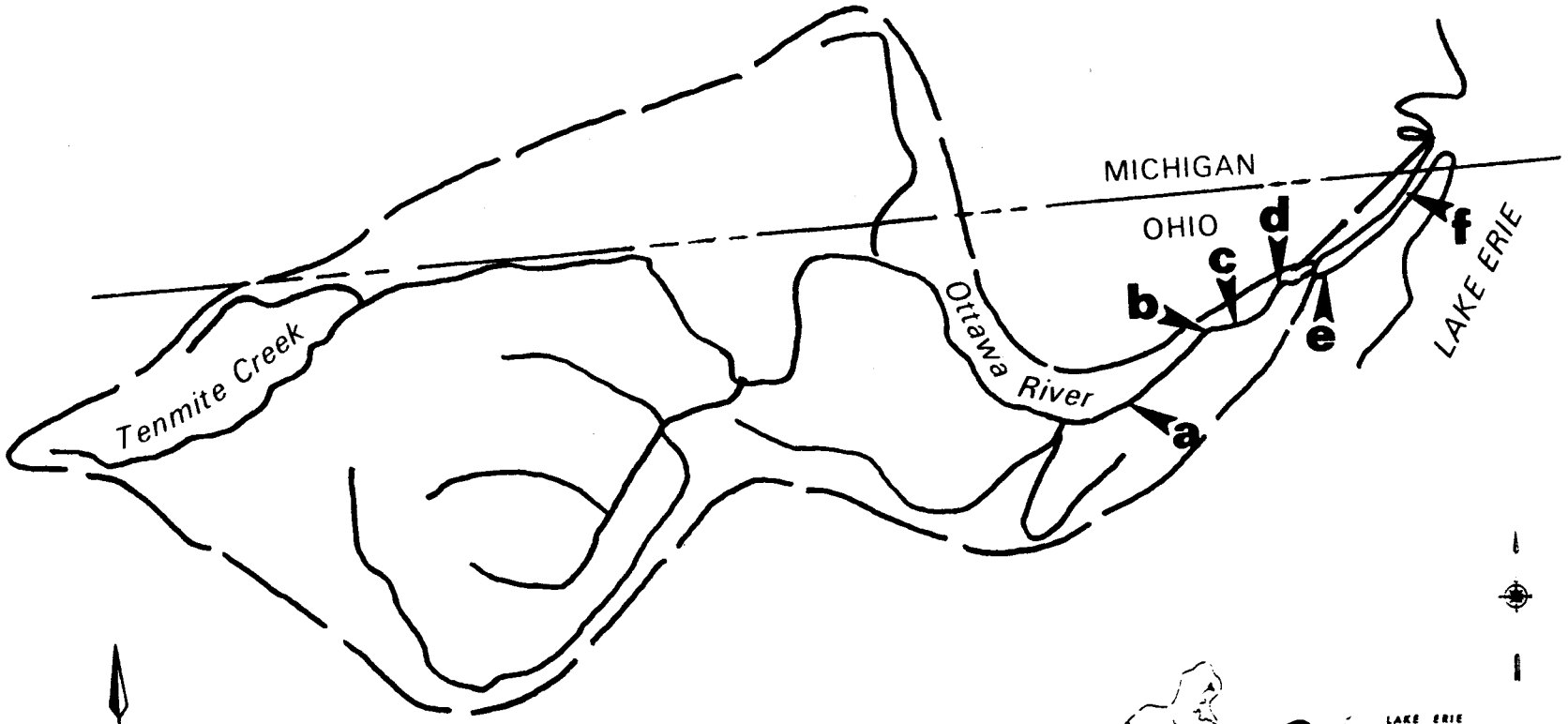


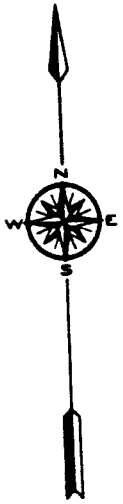


SCALE IN MILES

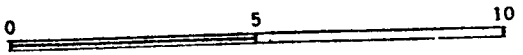
0 5 10 15 20 25

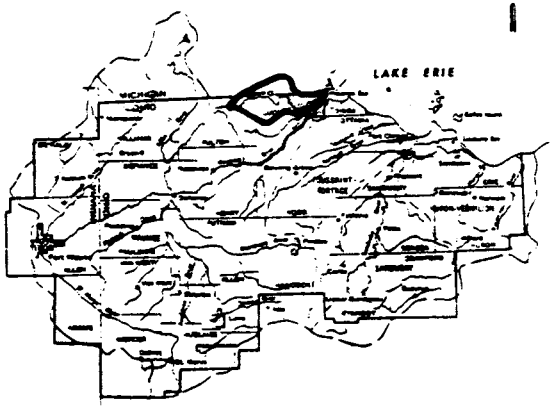
Hydrologic Area 4.2.1
Ottawa River





SCALE IN MILES





Vicinity Map-RBG 4.2

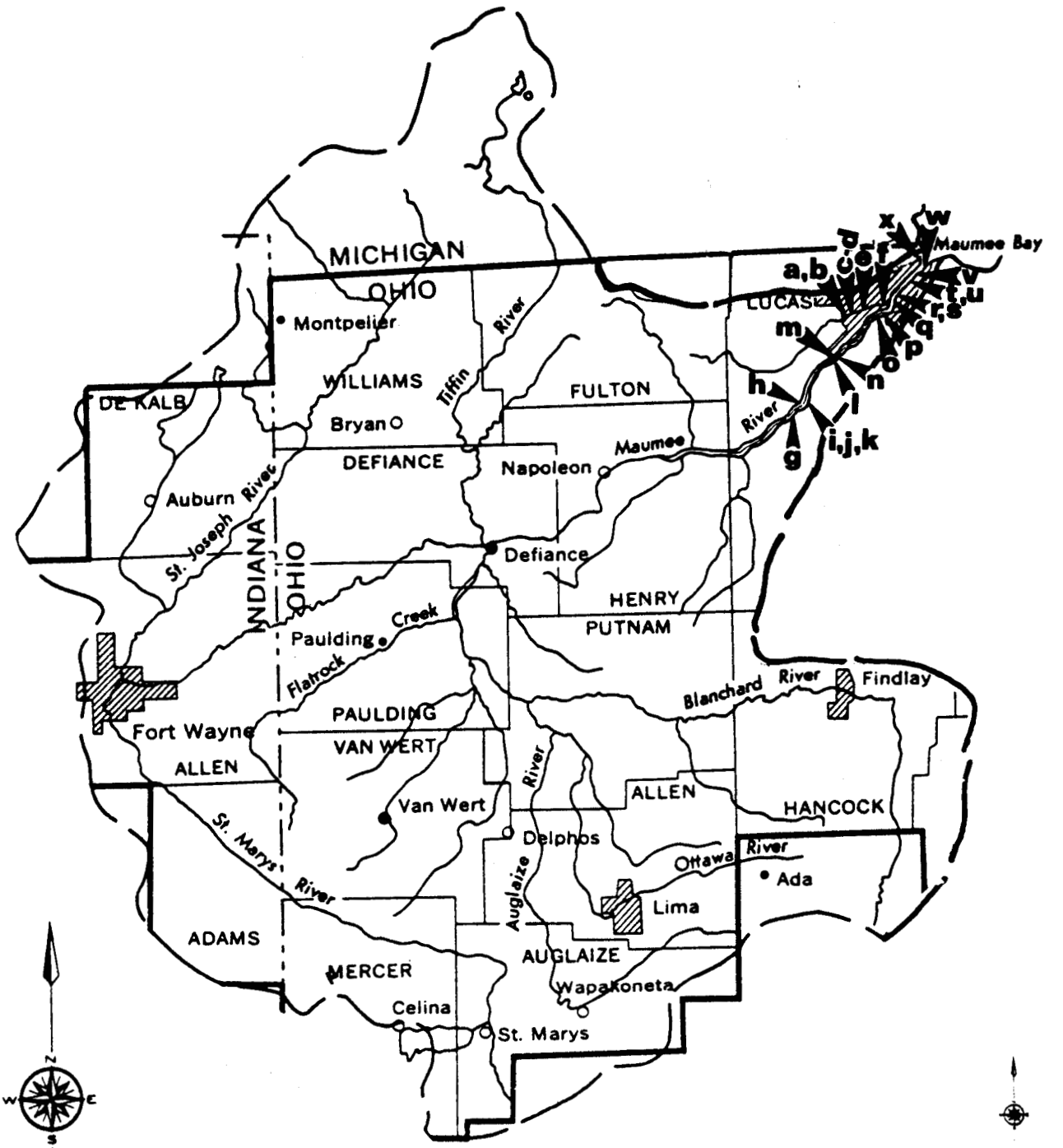
Hydrologic Area 4.2.1
Ottawa River (Ten Mile Creek)

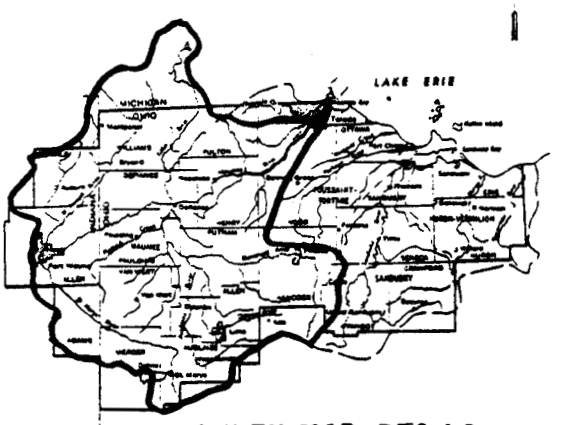
The Ottawa River drains an area of 44,000 hectares (109,000 acres). Seventy percent of the area is located in north central Ohio with the remaining 30 percent in Michigan. The Ottawa River is ungaged. The major tributary to the Ottawa River is Ten Mile Creek. Topography is flat with few wetlands. Approximately 5 percent of the area is forested, 10 percent urbanized, and 70 percent devoted to agriculture. The bedrock is composed mostly of dolomite. The overlying material is predominantly silt and clay. Economy is based on manufacturing and agriculture. The Ottawa River flows through highly developed industrialized sections of Toledo (pop.: 383,818) and Sylvania (pop.: 12,031).

Station Key

Station Location	DAM Rivers and Station Numbers
Ottawa River	42101
a	4210101
b	4210102
c	4210103
d	4210104
e	4210105
f	4210106

Hydrologic Area 4.2.2
Maumee River





VICINITY MAP-REG 4.2

SCALE IN MILES
0 5 10 15 20 25

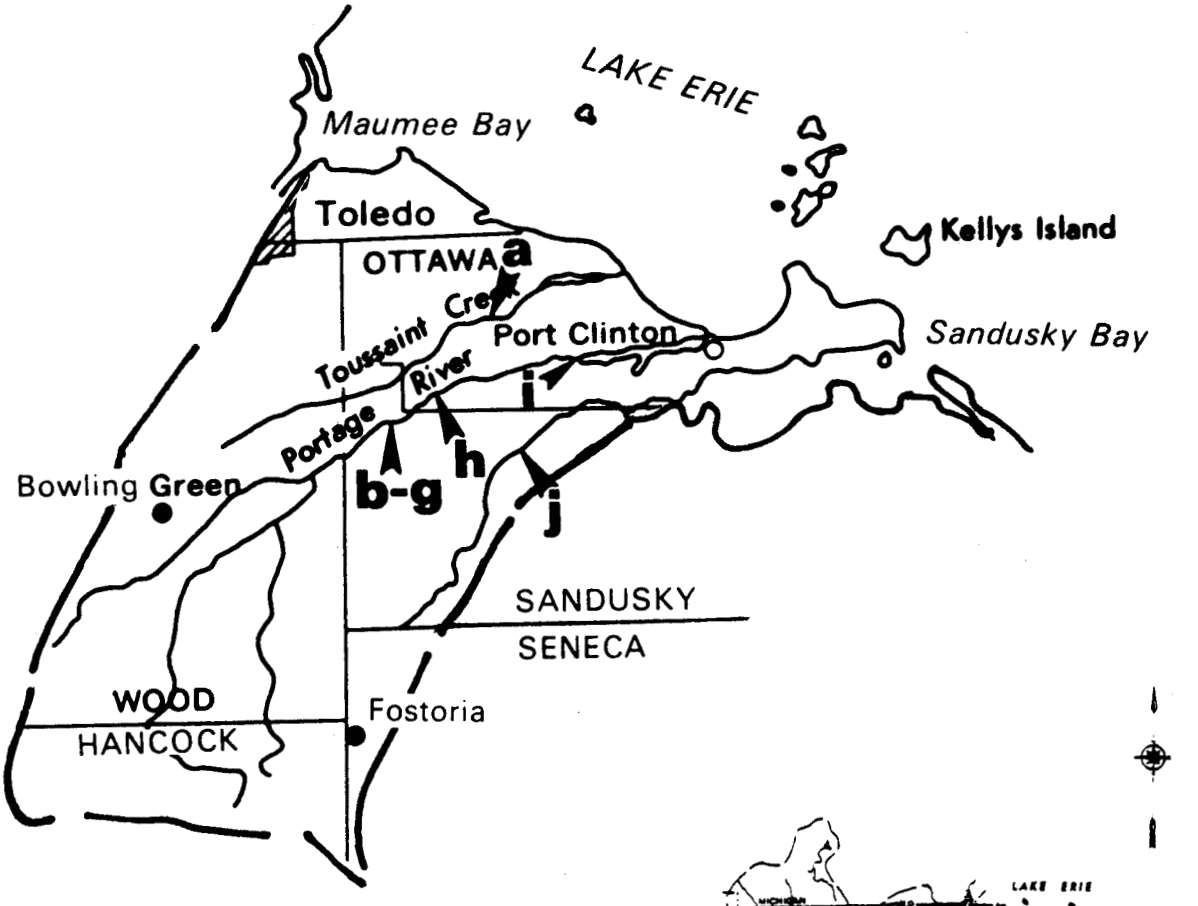
Hydrologic Area 4.2.2
Maumee River

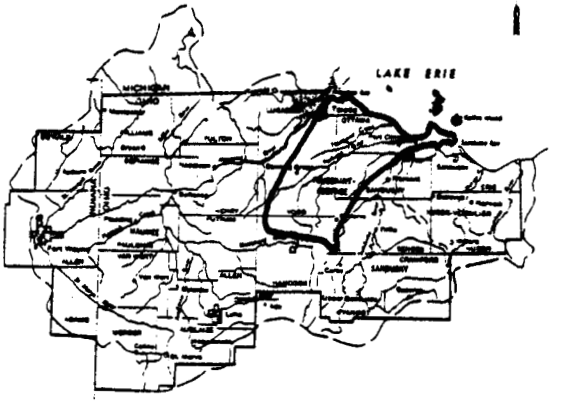
The Maumee River, the largest tributary to the Great Lakes, drains an area of approximately 1,711,000 hectares (4,229,000 acres). Seventy-three and six tenths percent of the area is located in northwest Ohio, with 19.4 percent in adjoining Indiana and the remaining 7 percent in Michigan. The Maumee River has a mean annual discharge of 134.7 m^3/s (4,756 cfs). The lower reaches of the Maumee are subject to esturine effects. The major tributaries to the Maumee are the St. Joseph River, the Auglaize River, the St. Mary's River, and the Tiffin River. Much of the land is nearly level or gently sloping. The fine textured glacial tills and lakelaid clays have poor natural drainage. The soils have slow permeability, and are subject to intensive row cropping. A glacial depression, formerly known as the Great Black Swamp, covers a large portion of the basin. Because the region is poorly drained, drainage ditches and subsurface tile drains have been constructed to remove water from much of the agricultural land. Approximately 85 percent of the area within the hydrologic boundaries is used for agricultural purposes. Eleven percent of the area is found in urbanized areas with nearly 70 percent of the population located in the three major areas of Fort Wayne, Indiana, Lima, Ohio, and Toledo, Ohio. Another 8 percent of the area can be classified as forest and woodland. The bedrock consists mostly of sandstone in the northwest section of the area and dolomite in the southeast. Bands of shale are interspersed throughout the area. The economy is based on manufacturing and agriculture with some extraction of natural resources such as sand, gravel, limestone, dolomite and clay.
The heavy sediment load and its associated contaminants of the Maumee River is a major source of pollution to Maumee Bay and Lake Erie in general. The surface waters of the area receive a heavy point source load of wastewater. More than 150 municipalities, industries, and private wastewater sources use these surface waters for waste assimiliation. Important municipal and industrial centers in the area are the cities of Fort Wayne, Indiana (pop.: 177,671), Toledo, Ohio (pop.: 383,818), Lima, Ohio (pop.: 53,734), Findlay, Ohio (pop.: 35,800), Van Wert, Ohio (pop.: 29,194), Defiance, Ohio (pop.: 16,281), and Maumee, Ohio (pop.: 15,937).

Station Key

Station Location	DAM Rivers and Station Numbers	Station Location	DAM Rivers and Station Numbers
Swan Creek	42201	m	4220207
a	4220101	n	4220208
b	4220102	o	4220209
c	4220103	p	4220210
d	4220104	q	4220211
e	4220105	r	4220212
f	4220106	s	4220213
Maumee River	42202	t	4220214
g	4220201	u	4220215
h	4220202	v	4220216
i	4220203	w	4220217
j	4220204	x	4220218
k	4220205		
l	4220206		

Hydrologic Area 4.2.3
Toussaint-Portage Complex





Vicinity Map-RBG 4.2

SCALE IN MILES

0 5 10 15 20 25

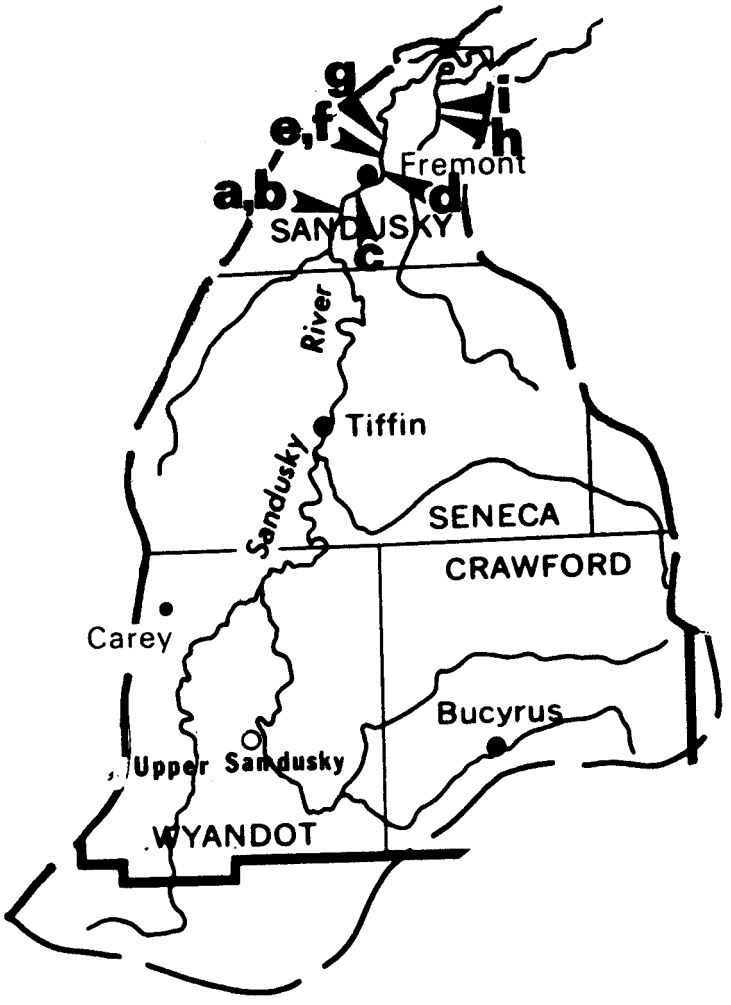
Hydrologic Area 4.2.3
Toussaint-Portage Complex

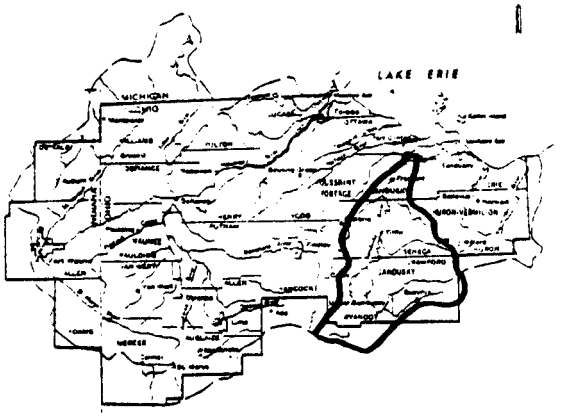
The Toussaint-Portage Complex covers 266,000 hectares (656,000 acres). The area is located in northwestern Ohio. The major rivers in the area are the Portage River, which has a mean annual discharge of 8.6 m^3/s (304 cfs) and Toussaint Creek (ungaged). A number of other small streams drain the remaining area. The Complex is flat with few wetlands although the area is highly underdrained and ditched. Less than 10 percent of the area is forested, approximately 80 percent is devoted to agriculture, and about 10 percent is urbanized. The bedrock is composed primarily of dolomite. The overlying material is predominantly a mixture of silt and clay near the shore and glacial till throughout the remainder of the complex. Streams in this area are usually high in dissolved solids. The cities of Bowling Green (pop.: 21,760), Fostoria (pop.: 16,037), and Port Clinton (pop.: 7,202) are the largest population centers in the area and all contribute waste to the surface waters.

Station Key

Station Location	DAM River and Station Numbers
Toussaint Creek	42305
a	4230501
Portage River	42307
b	4230701
c	4230702
d	4230703
e	4230704
f	4230705
g	4230706
h	4230707
i	4230708
Muddy Creek	42309
j	4230901

Hydrologic Area 4.2 4
Sandusky River





SCALE IN MILES

0 5 10 15 20 25

Vicinity Map-RBG 4.2

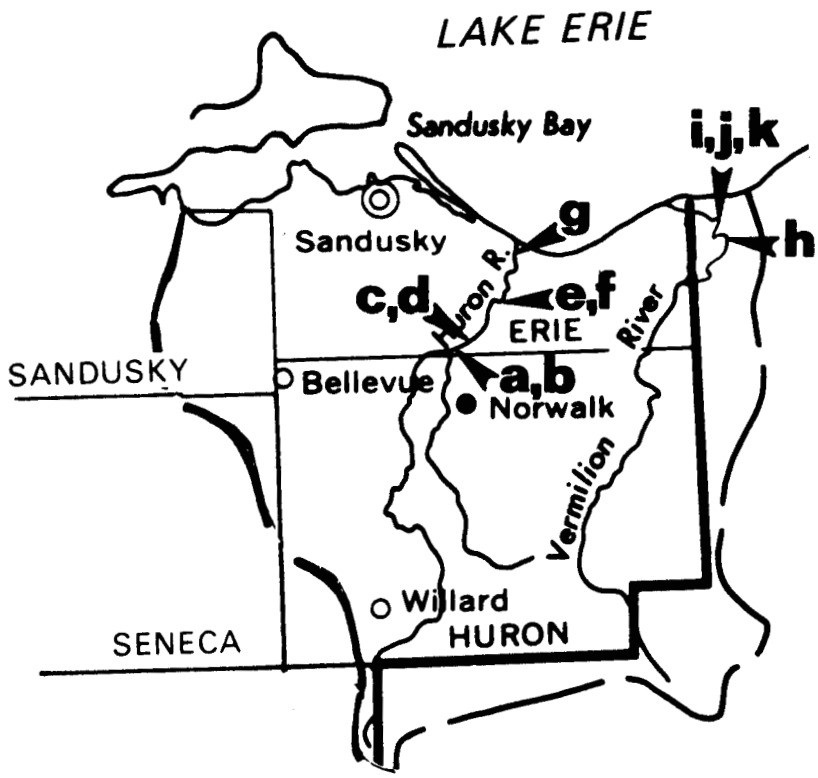
Hydrologic Area 4.2.4
Sandusky River

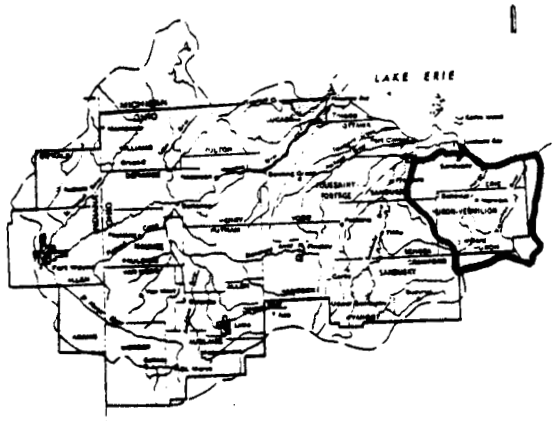
The Sandusky River drains an area of 397,000 hectares (980,000 acres). The area is located in north central Ohio. The Sandusky River has a mean annual discharge of 8.6 m^3/s (304 cfs). Major tributaries to the Sandusy River are Tymochtee Creek and Honey Creek. The area is generally very flat and poorly drained. An extensive network of surface ditches and underdrains exists in the area. Approximately 80 percent of the area is used in agriculture, about 10 percent urbanized, and about 5 percent forested. The bedrock is principly composed of shale, dolomite and some sandstone. The overlying material consists of silt and clay in the northern portion and glacial till in the south. The Sandusky River tends to be high in dissolved solids which leach from the caleureous bedrock. The cities of Tiffin (pop.: 21,596), Freement (pop.: 18,490), and Bucyrus (pop.: 13,111) are the major population and industrial centers in the Basin.

Station Key

Station Location	DAM River and Station Numbers
Sandusky River	42401
a	4240101
b	4240102
c	4240103
d	4240104
e	4240105
f	4240106
g	4240107
Green Creek	42402
h	4240201
i	4240202

Hydrologic Area 4.2.5
Huron- Vermilion Complex





Vicinity Map-RBG 4.2

SCALE IN MILES

0 5 10 15 20 25

Hydrologic Area 4.2.5
Huron-Vermilion Complex

The Huron-Vermilion Complex compasses and area of 267,000 hectares (661,000 acres) in north central Ohio. The major rivers in the complex and their mean annual discharges are the Huron River, 8.2 m^3/s (290 cfs), and the Vermilion River 6.6 m^3/s (233 cfs). A number of other small streams also drain this complex. This area had a rolling topography with relatively few wetlands. Approximately 80 to 90 percent of this area is devoted to agriculture, about 5 percent urbanized, and about 5 percent forested. Bedrock is composed predominantly of sandstone and shale. Overlying material consists of glacial till with silt and clay near the shore. Some sand, gravel, and stone are extracted from the area. Large population centers, such as Sandusky (pop.: 32,674), Norwalk (pop.: 13,386), and Bellevue (pop.: 8,604) utilize the Huron River for wastewater assimilation. The Vermilion River receives much less human pressure since its drainage area is relatively sparsely populated, the largest city being New London (pop.: 2,336).

Station Key

Station Location	DAM River and Station Numbers
Huron River	42508
a	4250801
b	4250802
c	4250803
d	4250804
e	4250805
f	4250806
g	4250807
Vermilion River	42511
h	4251101
i	4251102
j	4251103
k	4251104

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 4.2.1 Ottawa River												
		42101	Ottawa River (Tenmile Creek)												
55	21	4210101	Bancroft Road Bridge, Toledo					2D				2D	2D	2D	
56	"	"	"					2B				2B	2B	2B	
68	02	4210102	Berdan Ave. Bridge			5B-D	5	5						5ABD	5
69	"	"	"			5	5	5		5				5	5
70	"	"	"			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				2A 5B-D	2AD 5BC
71	"	"	"			5	5	5		5				5	2B 5CD
72	"	"	"			5	5	5		5				5	5
73	"	"	"			5	5	5		5				5	5ACD 2B
74	"	"	"			5	5	5		5				5	5
51	21	4210103	Lagrune Ave. Bridge River Mile 6.25			5B-D		5B-D				5B-D	5B-D	5B-D	5B-D
52	"	"	"			5A		5A				5A	5A	5A	5A
68	02	4210104	Stickney Road Bridge			5B-D	5	5						5ABD	5
69	"	"	"			5	5	5		5				5	5
70	"	"	"			2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D				2A 5B-D	2AD 5BC
71	"	"	"			2A 5B-D	5	5		5				5	2B 5CD
72-73	"	"	"			5	5	5		5				5	5
74	"	"	"			5	5	5		5				5	5
73	43	4210105	Chesapeake & O. RR Bridge 41-42-11 X 83-31-45	•		2BC 5D	2B	2BC 5D	2BC 5D			2B	9B 5CD	2B 5D	
74	"	"	"			2AD 5BC		2AD 5BC	2A 5BC	5BC			2A	2AD 5BC	2BD 5C
75	"	"	"			2A	2A	2A	2A	2A				2A	2A
67	06	4210106	Alternate US-24 Bridge (Summit Street)			9C	9C			2C			2C	9C	2C
68	"	"	"			2C	2C			2C		2C	2C	2C	2C
68	02	"	"			5B-D	5	5						5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4210101	2D	2D	2D			2D			2D		2D				
"	2B	2B	2B						2B		2B				
4210102	5		5	5		5									
"	5		5	5		5									
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
4210103	5B-D	5B-D	5B-D						5B-D		5B-D	5B-D			
"	5A	5A	5A						5A		5A	5A			
4210104	5		5	5		5									
"	5		5	5		5									
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
"	5		5ABD 2C	5		5									
4210105	9B 5D		9B 2C 5D	9B 2C 5D	2BC 5D	2BC 5D	2B		2BC 5D						
"	2ABD 5C		2A 5BC	2A 5BC	2A 5BC	2A 5BC	2C		2A 5BC	5BC	5BC	5BC			
"				2A	2A	2A	2A		2A	2A	2A	2A			
4210106	9C		2C	2C		2C		2C	2C						
"	2C		2C	2C		2C		2C	2C						
"	5		5	5		5									

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	02	4210106	(Continued)			5	5	5		5				5	5
69	06	"	"			2BC			2BC	2BC		2BC	2BC	2BC	2BC
70	"	"	"			2BD	2BD	2BD		2BD		2BD	2BD	2BD	2BD
70	02	"	"			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				2A 5B-D	2AD 5BC
71	"	"	"			5	5	5		5				5	2B 5CD
71	06	"	"			2BD	2BD	2BD	2BC	2BC		2BC	2BC	2BC	2BC
72	"	"	"			2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC		2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC
72-74	02	"	"			5	5	5		5				5	5
73	06	"	"			5A 2B	5A 2B	5A 2B		5A 2B		5A 2B	5A 2B	5A 2B	5A 2B
			HYDROLOGIC AREA 4.2.2 Maumee River												
		42201	Swan Creek												
55	21	4220101	At US-25 Bridge					2D				2D	2D		
56	"	"	"					2B				2B	2B		
64	18	4220102	South Avenue Bridge 41-37-50 X 83-35-16		9CD	4CD		4CD	4CD				4CD	4CD	4CD
65	"	"	"		9AB	9AB		9A 4B					9A 4B	9A 4B	9A 4B
68	02	4220103	Salisbury Road			5B-D	5	5						5	5
69	"	"	"			5	5	5		5				5	5
70	"	"	"			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				2A 5B-D	2AD 5BC
71	"	"	"			5	5	5		5				5	2B 5CD
72-73	"	"	"			5	5	5		5				5	5
74	"	"	"			5	5	5		5				5	5B-D
68	02	4220204	Eastgate Road			5B-D	5	5						5	5
69	"	"	"			5	5	5		5				5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4210106	5		5	5		5									
"	2BC		2BC	2BC		2BC	2C	2BC	2BC				2BC		
"	2BD		2BD	2BD		2BD		2BD	2BD				2BD		
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D									
"	5		5	5		5									
"	2BC	2BC	2BC	2BC	2BC	2BC		2BC	2BC			2C			
"	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC	2AD 5BC		2AD 5BC	2AD 5BC		2C	5C	2C		
"	5		5	5		5									
"	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B	5A 2B		5A 2B	5A 2B						
4220101	2D	2D								2D					
"	2B	2B								2B					
4220102	4CD	5CD	4CD	4CD		4CD		4CD	4CD				4CD		
"	9A 4B		9A 2B	9A 4B	9A 4B	9A 4B		9A 4B	9A 4B						
4220103	5		5	5		5									
"	5		5	5		5									
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
4220104	5		5	5		5									
"	5		5	5		5									

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	02	4220104	(Continued)			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				2A 5B-D	2AD 5BC
71	"	"	"			2A 5B-D	5	5		5				5	2B 5CD
72-74	"	"	"			5	5	5		5				5	5
68	02	4220105	Howley Street Bridge			5B-D	5	5						5	5
69	"	"	"			5	5	5		5				5	2A 5B-D
70	"	"	"			5B-D	2A 5B-D	2A 5B-D		5				2A 5B-D	2AD 5BC
71	"	"	"			5	5	5		5				5	2B 5CD
72-74	"	"	"			5	5	5		5				5	5
51	21	4220106	Erie Street Bridge River Mile 1.0			5B-D		5B-D				5B-D	5B-D	5B-D	5B-D
52	"	"	"			5A		5A				5A	5A	5A	5A
68	02	4220199	Exact Location Unknown Near Mouth			2A 5B-D	5	5						5ABD 2C	5
69	"	"	"			5	5	5		5				5B-D	2A 5B-D
70	"	"	"			5B-D	5	5		5				5	2AD 5BC
71	"	"	"			5	5	5		5				5	2B 5CD
72-74	"	"	"			5	5	5		5				5	5
		42202	Maumee River	flow: 134.7 m^3/s (4,756 cfs)											
67-72	21	4220201	Near Waterville 41-28-34 X 83-44-20												
71	43	4220202	At Waterville 41-29-38 X 83-42-58				2AB		2AB			2AB	2AB		
72	"	"	"				2AB		2AB			2AB	2AB		
73	"	"	"				2C	2C	2C			2C	2C		
74	"	"	"				2AC	2AC	2AC			2AC	2AC		
75	"	"	"				2A	2A	2A			2A	2A		
98-01	21	4220203	Highway 64 Bridge in Waterville	*	1										
21-35	"	"	"	*	1										

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4220104	2A 5B-D		2A 5B-D	5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
4220105	5		5	5		5									
"	5		5	5		5									
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
4220106	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	5A	5A	5A						5A		5A		5A		
4220199	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
4220201														5B-D	
4220202	2AB		2AB						2AB	2AB	2AB	2AB	2AB		
"	2AB		2AB						2AB	2AB	2AB	2B	2B		
"	2C		2C			2C			2C	2C	2C	2C		2D	
"	2AC		2AC			2AC			2AC	2AC	2AC	2AC			
"	2A		2A			2A			2A	2A	2A	2A			
4220203															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
39-74	21	4220203	(Continued)	*	1										
50	"	"	"	*	1						2D				
51[a]	"	"	"	*	1	5B-D		3B-D			9B 2C	11B-D	11B-D	5B-D	11B-D
52[a]	"	"	"	*	1	5A		3A			9B	11A	11A	5A	11A
53	"	"	"	*	1						9B				
54	"	"	"	*	1						9BD 2C				
55	"	"	"	*	1			2D			2AD 9B	2D	2D	2D	
56	"	"	"	*	1			2B		1D	2AC 9B	2B	2B	2B	
57	"	"	"	*	1	1D				1A-D[b]	9AB 2C				
58	"	"	"	*	1	1A-D[b]									
63-64[c]	"	"	"	*	1										
65[d]	"	"	"	*	1	1D		1D		3D		11D	11D	1D	
66[d]	"	"	"	*	1	1		1		3	5A	11	11	1	
67[d]	"	"	"	*	1	1		1		3A-C 1D	2B	11A-C 8D	11A-C 8D	1	
68[d]	"	"	"	*	1	1		1		1	9A 5B	11AC 8BD	11AC 8BD	1ABD 9C	
69	"	"	"	*	1	9A 1B-D		9A 1B-D		1	5AB	8A-C 2D	8A-C 5D	9A 1B-D	
70	"	"	"	*	1	9ABD 1C		9ABD 1C		1	2A 5B	8	8	9D	
71[d]	"	"	"	*	1	9AB 1CD		9AB 1CD		1	2AB	5A 8C 11B 2D	5A 11B 8CD	9	
72	"	"	"	*	1	9AD 1BC		1A-C 9D		1A-C 9D	5B 2C	5D	8A-C 5D	9AD 1BC	
73[d]	"	"	"	*	1	1		1		1	5AB	8A-C 2D	8A-C 11D	9A 1B-D	
74	"	"	"	*	1	9A 1B-D		9A 1B-D			1	2AB	5AC 9B	11A 9B 5C	9A-C 1D
75[e]	"	"	"					11B		11B					
64	18	4220204	At Waterville 41-30-01 X 83-42-50		2B 4CD	2B 9C 4D		2C					2D	2B 4CD	2B 4CD
73	43	4220205	At Waterville 41-30-00 X 83-42-46		5B-D	2BC 5D		2BC 5D	5D				8B 2C 5D		
74	"	"	"		2AD 5BC	2A 5B-D		2AD 5BC	2A 5BC						
75	"	"	"		2AC 5B	5AB 2C		5AB	2AC 5B			5AB			
64	18	4220206	Highway 20 Bridge Near Perrysburg		4	4		4	4				4	4	4

[a]Three samples per month (11).

[b]September only.

[c]Parameters and frequencies unknown.

[d]Twice monthly (11).

[e]Major spring runoff events sampled as part of LEWMS. Ten storms monitored. (11B)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	ORGANICS REFRACTORY
												TOTAL	DIS-SOLVED		
4220203															
"															
"	11B-D	11B-D	11B-D						11B-D		11B-D		11B-D		
"	11A	11A	11A						11A		11A		11A		
"															
"															
"	2D	2D	2D			2D			2D		2D				
"	2B	2B	2B						2B		2B				
"															
"															
"															
"	1D		11D						11D						
"	1		11						11						
"	1		11A-C 8D				2D		11A-C 8D						
"	1AD 9BC		11AC 8BD			11C 8D			11AC 8BD						
"	9		8A-C 5D			8A-C 5D			8A-C 5D						
"	9BD 1C		8			8			8			2D			
"	9BD 1C		5A 11B 8CD			5A 8C 11B 2D			5A 11B 8CD			2BD			
"	9ABD 1C		8A-C 5D			5D			8A-C 5D			2CD			
"	9A 1B-D		8A-C 11D			8A-C 11D			8A-C 11D			2CD			
"	9A 1B-D	2A-C	11A 9B-D		5A-C 2D	5A 2D 9BC			11A 9B 5C	2AC	2AC	2A-C	2A-C		
"		11B	11B	11B		11B	11B		11B						
4220204								2C							
4220205	2C 5BD		8B 5CD	8B 5CD	8B 2C 5D	2B 5CD	2B		5D	2BD 5C	2BD 5C	2B 5CD	2B 5CD	2BC 5D	
"	2AD 5BC		2A 5B-D	2A 5B-D	2A 5BC	2A 5B-D	2D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2AD 5BC	
"	2AC 5B		5AB	2AC 5B	5B	5AB	5AB		5AB	5AB	5AB	5AB	5AB	2A 5B	
4220206	4	4AB 9C 5D	4	4				4	4				4AB 9C 5D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
65	18	4220206	(Continued)		9A 4B	4B		4B					9A 4B	9A 4B	9A 4B
67	"	"	"		2A 8B-D	2A 8B-D			2A 8B-D						
67	19	"	"			2A 5B 8CD			2A 5B 8CD						
68	"	"	"			5A			5A						
68	18	"	"		8B-D	2A 8B-D			2A 8B-D	8B-D					
69	"	"	"		8A 2B	8A 2B			8A 2B	8A 2B					
74	"	"	"					2CD		2CD					2CD
74	18	4220207	I-80-90 Bridge River Mile 11.4					2D		2D					2D
68	02	4220208	Fort Miami			2A 5B-D	5	5						2A 5B-D	2A 5B-D
69	"	"	"			2A 5B-D	5	5		5				5	5
70	"	"	"			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				5B-D	5B-D
71	"	"	"			5B-D	5	5		5				5	5CD
72	"	"	"			2A 5B-D	5	5		5				5	5
73-74	"	"	"			5	5	5		5				5	5
68	02	4220209	Rossford Marina			2A 5B-D	5	5						5	2A 5B-D
69	"	"	"			5	5	5		5				5	5
70	"	"	"			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				5B-D	5B-D
71	"	"	"			5	5	5		5				5	2B 5CD
72-74	"	"	"			5	5	5		5				5	5
74	18	4220210	DiSalle Bridge River Mile 6.9					2D		2D					2D
74	18	4220211	Anthony Wayne Bridge River Mile 5.4					2D		2D					2D
63	18	4220212	Cherry Street Bridge River Mile 4.6					9C	9C				9C	9C	9C
64	"	"	"		2B 9CD	5CD		2C	2C				2CD	2B 8C 9D	2B 8C 9D
65	"	"	"		9B									9B	9B
74	"	"	"					2CD		2CD					2CD
68	18	4220213	At Sports Arena			2A 5B-D	5	5		5				5	2A 5B-D
69	"	"	"			5	5	5		5				5	5

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4220206	4B		9A 2B	2A 4B	9A 4B			9A 4B	2A 4B						
"															
"						2A 5B 8CD			2A 5B 8CD						
"						5A			5A						
"					8B-D				2A 8B-D						
"					8A 2B				8A 2B						
"			2CD	2CD	2CD	2CD	2CD								
4220207			2D	2D	2D	2D	2D								
4220208	5		2A 5B-D	2A 5B-D		5									
"	5		5	5		5									
"	2A 5B-D		5B-D	5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
4220209	5		5	5		5									
"	5		5	5		5									
"	2A 5B-D		5B-D	5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
4220210			2D	2D	2D	2D	2D								
4220211			2D	2D	2D	2D	2D								
4220212	9C		9C	9C	9C			9C	9C						
"	2B 8C 9D								2C						
"				2B	2B										
"			2CD	2CD	2CD	2CD	2CD								
4220213	5		5	5		5									
"	5		5	5		5									

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA											
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	18	4220213	(Continued)			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				5B-D	5B-D
71	"	"	"			5	5	5		5				5	2B 5CD
72	"	"	"			5B-D	5	5		5				5	5
73-74	"	"	"			5	5	5		5				5	5
62-64[a]	21	4220214	Ash-Consaul Bridge 41-39-46 X 83-30-28												
64	18	"	"		2B	8C 5D		2C	2C				2CD	2B 8C 9D	2B 8C 9D
65	"	"	"		9B	2B 8C 9D								9B	9B
65	21	"	"			2D	2D	2D		2D		2D	2D	2D	2D
66	"	"	"			4CD[b]	4CD[b]	4CD[b]		4CD[b]		4CD[b]	4CD[b]	4CD[b]	4CD[b]
74	18	"	"					2D		2D					2D
71	18	4220215	I-280 Bridge												
72	"	"	"												
51[c]	21	4220216	Toledo Terminal RR Bridge 41-40-59 X 83-28-56			5B-D		3B-D				11B-D	11B-D	5B-D	11B-D
52[c]	"	"	"			5A		3A				11A	11A	5A	11A
63	18	"	"					9C	9C				9C	9C	9C
64	"	"	"		4	4		4	4				4	4	4
65	"	"	"		9B									9B	9B
68	"	"	"			5	5	5						5	5
69	"	"	"			5	5	5		5				5	5
70	"	"	"			5B-D	2A 5B-D	2A 5B-D		2A 5B-D				5B-D	5B-D
71	"	"	"			5	5	5		5				5	2B 5CD
72	"	"	"			2A 5B-D	5	5		5				5	5
73	"	"	"			5	5	5		5				5	5
74	"	"	"			5	5	5		5				5	5
62-64[a]	21	4220217	Overseas Terminal Dock 41-41-06 X 83-28-35	*											
65	"	"	"	*		4D	4D	4D		4D		4D	4D	4D	4D
66	"	"	"	*		4	4	4		4		4	4	4	4

[a]Data were collected. Parameters and frequencies unknown.

[b]Through September only.

[c]Three samples per month (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4220213	2A 5B-D		5B-D	5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
4220214															
"	2B 8C 9D														
"			2B	9B	9B				2C						
"	2D		2D				2D		2D						
"	4CD[b]		5A-C 2D				5A-C 2D		4CD[b]						
"			2D	2D	2D	2D	2D								
4220215														5D	
"														2C	
4220216	11B-D	11B-D	11B-D						11B-D		11B-D		11B-D		
"	11A	11A	11A						11A		11A		11A		
"	9C	9C	9C	9C	9C			9C	9C						
"	4	9AB 5CD	5	2A 5B-D				5	4				4A 8B 2C		
"															
"	5		5	5		5									
"	5		5	5		5									
"	2A 5B-D		5B-D	5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5		5									
"	5		5	5	2D	5	2D								
4220217															
"	4D		5D				5D		4D						
"	4		5				5		4						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	21	4220217	(Continued)			4A-C 9D	4A-D[a]	4A-C 9D		9AB		4A-C 9D	4A-C 9D	9AB	9AB
68	"	"	"			5A 4B-D		5A 4B-D		2B 4CD		5A 4B-D	5A 4B-D	2B 4CD	
69[b]	"	"	"			4BD 9A 11C	4D	4BD 9A 11C		9A 4BD		4BD 9A 11C	4BD 9A 11C	4BD 9A	4D
70	"	"	"			4	4	4		4		4	4	4	4
71	"	"	"			9A 4B-D	9AD 4BC	9A 4B-D		9AD 4BC		9A 4B-D	9A 4B-D	9A 4B-D	9AD 4BC
72	"	"	"			4	8A 4B-D	4		4AB 9CD		4	4	4A-C 9D	4AB 9CD
73	"	"	"			4AB 9CD	4AB 9C	4AB 9CD		4AB		4AB 9C	4AB 9CD	4AB	4AB
74	"	"	"			9A 4B 2C		9A 4B 2C				9A 4B 2C	9A 4B 2C		
67	21	4220218	Coast Guard Station at Mouth 41-41-35X83-28-20	*		1		1						1A-C 9D	
68[c]	"	"	"	*		1		1				11A-C 8D	11A-C 8D	1ABD 9C	
69[c]	"	"	"	*		9A 1B-D		9A 1B-D				11A 8B-D	11A 8B-D	9ACD 1B	
70[c]	"	"	"	*		9AB 1CD		9AB 1CD				8ABD 11C	8ABD 11C	9AB 1CD	
71	"	"	"	*		1		1				8A-C 5D	8A-C 5D	9A 1B-D	
72	"	"	"	*		1		1		8D		5A 8B-D	5A 8B-D	1	
73[c]	"	"	"	*		1		1		8AC 11B 2D		8AC 11B	8ACD 11B	1AD 9BC	
74[c]	"	"	"	*		9AB 1CD[a]		9AB 1CD[a]				11A 8B 2CD	11A 8B 2CD	9AB 1CD[a]	
74	18	"	"	*				2CD		2CD					2CD
		42203	Grassy Creek												
68	02	4220399	Exact Location Unknown			2A 5B-D	2A 5B-D	2A 5B-D						2A 5B-D	2A 5B-D
69	"	"	"			5	5	5						5	5
70	"	"	"			5B-D	2A 5B-D	2A 5B-D						2A 5B-D	2AD 5BC
71	"	"	"			2A 5B-D	5	5						5	5
72-74	"	"	"			5	5	5						5	5

[a] Through September only.

[b] Three times monthly (11).

[c] Twice monthly (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4220217	4A-C 9D		5			2D	5A-C 2D		4A-C 9D						
"	5A 4B-D		5ACD 9B			5			5A 4B-D						
"	4BD 9A 11C		5			5			4BD 9A 11C						
"	4		5			5			4						
"	9A 4B-D		5			5			9A 4B-D						
"	4		5			5			4						
"	4AB 9CD		5AB 2C 9D			5ABD 2C			4AB 9CD						
"	9AB 2C		9A 4B 2C			9A 4B 2C			9A 4B 2C						
4220218	1A-D[a]														
"	11A-C 9D		11A-C 8D						11A-C 8D						
"	11A 2D 8BC		11A 8B-D						11A 8B-D						
"			8ABD 11C						8ABD 11C			2D	2D		
"	9A 1B-D		8A-C 5D						8A-C 5D			2CD			
"	1		5A 8B-D						5A 8B-D			2CD			
"	1		8ACD 11B						8ACD 11B						
"	9A-C 1D[a]	2D	11A 8B 2CD	2D		2D			11A 8B 2CD	2D	2D	2B			
"			2CD	2CD	2CD	2CD	2CD								
4220399	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D									
"	5		5	5		5									
"	2A 5B-D		5B-D	5B-D		2A 5B-D									
"	5		5	5		5									
"	5		5	5		5									

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		42204	Otter Creek												
73	43	4220401[a]	Near Mouth 41-41-43 X 83-27-28										9BC		
74	"	"	"			2AD 5BC		2AD 5BC	2AD 5BC	2A 5BC				2AD 5BC	2AD 5BC
		42205	Amlosch Ditch (No Data Found)												
			HYDROLOGIC AREA 4.2.3 Toussaint-Portage Complex												
		42301	Williams Ditch (No Data Found)												
		42302	Cedar Creek, East and West Outlets (No Data Found)												
		42303	Crane Creek (No Data Found)												
		42304	Turtle Creek (No Data Found)												

[a]Not located on Hydrologic Area map.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS TOTAL	HEAVY METALS DISSOLVED	PESTICIDES	REFRACTORY ORGANICS
4220401	2B		9B 2C			2BC	2BC			2C	2C	2C			
"	2ABD 5C		2A 5BC		2A 5BC	2A 5BC	2C		2A 5BC	2A 5BC	5BC	2A 5BC			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		42305	Toussaint Creek												
67-68	21	4230501	Near Limestone 41-32-55 X 83-14-30	*	2D			2D				2D	2D		
70	"	"	"	*	2D			2D				2D	2D		
71	"	"	"	*	2C			2C				2C	2C		
72	"	"	"	*	2D	2D		2D				2D	2D		
73	"	"	"	*	2D	2D		2D					2D		
		42306	La Carpe Creek	(No Data Found)											
		42307	Portage River	flow: 8.6 m^3/s (304 cfs)											
28-35	21	4230701	At US-20 Bridge in Woodville	*	1										
38-74	"	"	"	*	1										
51	"	"	"	*	1						5B 2C				
52	"	"	"	*	1						9B				
53	"	"	"	*	1						2A 9B				
54	"	"	"	*	1						2ACD 9B				
55	"	"	"	*	1	3D				1D	2A 9B				
56	"	"	"	*	1	3A-D[a]				1A-D[a]	9A-C				
65	"	"	"	*				2D				2D	2D	2D	
66	"	"	"	*				2C				2C	2C	2C	

[a]Through September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4230501	2D								2D						
"	2D					2D			2D						
"			2C			2C			2C						
"	2D		2D			2D			2D						
"	2D		2D			2D			2D						
4230701															
"															
"															
"															
"															
"															
"															
"															
"	2D		2D				2D		2D						
"	2C		2C				2C		2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	21	4230701	(Continued)	*	2D			2D				2D	2D		
71	18	"	"												
72	"	"	"												
68[a]	21	4230702	Railroad Bridge in Woodville	*		9		9C 1D				5C 11D	5C 11D		
69[a]	"	"	"	*		9		9				11	11	9A	
70	"	"	"	*		9A 1B-D		9AC 1B-D				8	8	9A	
71[a]	"	"	"	*		1A-C 9D		1				11	11	1B-D	
72[a]	"	"	"	*		1		1				11A 8B-D	11A 8B-D	1	
73[a]	"	"	"	*		1ACD 9B		1ACD 9B				8AB 11C	8ABD 11C	1ACD 9B	
74	"	"	"	*		1ACD[b] 9B		1A-D[b]				5AC 8B	8AB 5C	1A-D[b]	
71	43	4230703	At Woodville 41-27-09 X 83-21-45				2AD		2AD			2AD	2AD		
72	"	"	"				2A		2A			2A	2A		
73	"	"	"				5D	5D	5D			5D	5D		
74	"	"	"				2CD	2CD	2CD			2CD	2CD		
75	"	"	"				2C	2C	2C			2C	2C		
68	21	4230704	At Woodville 41-26-58 X 83-21-41		2D			2D				2D	2D		
74	"	"	"												
75[c]	17	4230705	At Woodville 41-26-56 X 83-21-30					11B		11B					
49	21	4230706	At Woodville 41-26-58 X 83-21-29					2D				2D	2D		
73	43	"	"	*	9B 5C 2D	9B 2D	2BC	5D	5D			2BC	4B 5CD	9B 2D	
74	"	"	"	*	5A-C 2D	5	5D	5A-C 2D	5	2A 9C 5D		2D	5A	5	5B-D
75	"	"	"	*	2A			2A	2A	2A					
51[d]	21	4230707	120 Bridge in Elmore	*		3B-D		3B-D				11B-D	11B-D	2BC 5D	11B-D
52[d]	"	"	"	*		3A		3A				11A	11A	5A	11A
67	18	4230708	Route 14 at Oak Harbor	*	2A 5B 8CD	2A 5B 8CD			2A 5B 8CD						
68	"	"	"	*	8	8			8	8B-D					
71	"	"	"												

[a]Twice monthly (11).

[b]Through September only.

[c]Runoff events sampled from 10 storms as part of LEWMS (11).

[d]Three times per month (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4230701	2D								2D						
"														5	
"														2AC 5B	
4230702	9CD		5C 11D						5C 11D						
"	9		11						11						
"	9A 1B-D		8						8			2D			
"	9AB 1CD		11						11			2CD			
"	1BD 9C		11A 8B-D						11A 8B-D			2CD			
"	9AB 1CD		8ABD 11C						8ABD 11C			2BD			
"	9A 1B-D[b]	2C	8AB 5C	2C		2C			8AB 5C	2C	2C	2B			
4230703	2AD		2AD						2AD	2AD	2AD	2D	2D		
"	2A		2A						2A	2A	2A	2A	2A		
"	5D		5D			5D			5D	5D	5D		5D		
"	2CD		2CD			2CD			2CD	2CD	2CD		2CD		
"	2C		2C	2C		2C			2C	2C	2C		2C	2C	
4230704	2D								2D						
"	2B		2B						2B						
4230705		11B	11B	11B		11B	11B		11B						
4230706	2D	2D	2D						2D		2D				
"	9B 2C 5D		4B 5CD	9B 2C 5CD	2B 5D	8B 5CA	9B 5C		2B 5D	2B 5CD		2B 5CD	2B 5CD	5BD	
"	2AB 5CD		5	5	2AD 5BC	5			5	5		5	5	5ACD 2B	
"	2A		5A 2B	5A	2AB	5A 2B		5A 2B	5A	5A		5A	5A	5B	
4230707	11B-D	11B-D	11B-D						11B-D		11B-D		11B-D		
"	11A	11A	11A						11A		11A		11A		
4230708						2A 5B 8CD			2A 5B 8CD						
"					8B-D	8A			8						
"														5D	

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	18	4230708	(Continued)												
		42308	Little Portage River (No Data Found)												
		42309	Muddy Creek												
71	43	4230901	Near Lindsey 41-25-17 X 83-13-32				2C		2C			2C	2C		
72	"	"	"				2BD		2BD			2BD	2BD		
		42310	Little Muddy Creek (No Data Found)												
			HYDROLOGIC AREA 4.2.4 Sandusky River												
		42401	Sandusky River flow: 26.7 m^3/s (943 cfs)												
98-01	21	4240101	Near Fremont 41-18-28 X 83-09-32	*	1										
23-35	"	"	"	*	1										
38-74	"	"	"	*	1										
50	"	"	"	*		10				10					
51[a]	"	"	"	*				3B-D		2B	2B	11B-D	11B-D	2B 9C 5D	11B-D
52[a]	"	"	"	*				3A		9A 2B	9A 2B	11A	11A	5A	11A

[a]Three times per month (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4230708														2AC 5B	
4230901	2C		2C						2C	2C	2C		2C		
"	2BD		2BD						2BD	2BD	2BD	2D	2B		
4240101															
"															
"															
"															
"	11B-D	11B-D	11B-D						11B-D		11B-D		11B-D		
"	11A	11A	11A						11A		11A		11A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
53	21	4240101	(Continued)	*						2AC 9B	2AC 9B				
54	"	"	"	*						9B	9B				
55	"	"	"	*		9D				9ABD	9AB				
56	"	"	"	*		3A-C 2D				1A-C 9D	2A 9BC				
62-64	"	"	"	•		10				10					
65	"	"	"	•	2D	3D	5D	3D				9D	9D	5D	
66	"	"	"	*	2D	3A-D[a]	5A-C 2D	3A-D[a]				9A 2D 8BC	9A 2D 8BC	5AC 2BD	
67	"	"	"	*	2C			2C				2C	2C		
68	"	"	"	*	2D			2D				2D	2D		
69-74	44	"	"							11[b]					
73	43	"	"		9B 5D	9B 5D	2BC	5D	2B 5D			2BC	4B 5CD	9B 5D	
74	"	"	"		5	5	2BD 5C	5	5A-C 2D			2BC	2A-C	5	5B-D
74	21	"	"		2B							5B	2B		
75	43	"	"		5B 2C	5B 2C	2A 5B	2A 5B	2A 5B			5B 2C		5B 2C	2AC 5B
75[c]	17	4240102	Near Fremont 41-18-31 X 83-09-29					11B		11B					
70	43	4240103	Near Fremont 41-19-35 X 83-08-13				2D		2D			2D	2D		
71	"	"	"				2A 5C	2A	2A 5C			2A 5C	2A 5C		
72	"	"	"				2D		2D			2D	2D		
73	"	"	"				2A	2A	2A			2A	2A		
74	"	"	"				2B	2B	2B			2B	2B		
75	"	"	"				2D					2D	2D		
67-71	21	4240104	At Fremont Water Intake 41-20-00 X 83-07-13	*											
63	43	4240105	At Fremont 41-20-02 X 83-06-55					5B-D	5B-D			5B-D	5B-D		
64-67	"	"	"					5	5			5	5		
67	18	"	"		5B 8CD	5B 8CD			5B 8CD						
68	"	"	"		8	8			8	8B-D					
68	43	"	"					5AD	5AD			5AD	5AD		

[a] Through September only.

[b] Up to 200 samples collected at various flow conditions.

[c] Ten runoff events sampled as part of LEWMS.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4240101															
"															
"															
"															
"															
"	9D		9D				5D		9D	5D	5D				
"	9A 2D 8BC		9A 2D 8BC				5AC 2BD		9AD 8BC	5AC 2BD	5AC 2BD				
"	2C								2C						
"	2D								2D						
"						11[b]	11[b]								
"	9B 2C 5D		9B 2C 5D	9B 2C 5D	2B 5D	9B 2C 5D	5BC		2BD			2B 5CD			
"	5B-D		5	5	5A-C 2D	5	5		5	2B 5CD	2B 5C	5		5BD 2C	
"	5B	5B	5B						5B	5	5	2A 5B-D		5AB 2CD	
"	2AC 5BD		2A 5B	2A 5B	2A 5B	2A 5B	2B		2A 5B	2A 5B	2A 5B	2A 5B		2B	
4240102		11B	11B	11B		11B	11B		11B						
4240103	2D		2D						2D				2D		
"	2A 5C		2A 5C						2A 5C				2A 5C		
"	2D		2D			2D			2D			2D			
"	2A		2A			2A			2A	2A	2A	2A			
"	2B		2B			2B			2B			2B			
"	2D		2D			2D			2D			2D			
4240104														5BCD	
4240105	5B-D		5B-D			5B-D			5B-D						
"	5		5			5			5						
"									5B 8CD						
"					8B-D										
"	5AD		5AD			5AD			5AD						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	18	4240105	(Continued)		5A 2B	5A 2B			5A 2B	5A 2B					
70	43	"	"												
71	"	"	"												
72	"	"	"												
74	"	"	"												
75	"	"	"												
67	19	4240106	Route 20 Bridge River Mile 13.5	•		2A 5B 8CD			2A 5B 8CD						
68	"	"	"	•		8A			8A						
71	18	"	"												
72	"	"	"												
74	43	"	"					2CD		2CD				2CD	2CD
66	21	4240107	Downstream from Fremont 41-22-12 X 83-06-10	•	9D	9D		9D				9D	9D	9D	
67	"	"	"	*	8A-C 2D	1D		1D				8	8	9	
68	"	"	"	*	5D	9A 1B-D		9A 1B-D				8	8	9A 1B-D	
69[a]	"	"	"	*	11A-C 2D	9A 1B-D		9A 1B-D				11A-C 5D	11A-C 5D	9ACD 1B	
70[a]	"	"	"	*		1		1				8ACD 11B	8ACD 11B	9A 1B-D	
71[a]	"	"	"	*		1		1				8A 11B-D	8A 11B-D	1	
72	"	"	"	•		1		1				8	8	1	
73	43	"	"	•		9B 5D	2BC	5D	5D 2B			2BC	9B 5CD	9B 5D	
73[a]	21	"	"	*		1		1				11A-C	11A-C 8D	1	
74[a]	"	"	"	•		1ACD[b] 9B		1A-D[b]				11A 8B 5C	11A 8B 5C	1A-D[b]	
74	43	"	"	*		5AC 2D	2BD 5C	5	5	2A 5B-D		2BC	5A 2BC	5	
		42402	Green Creek												
68	21	4240201	Near Fremont 41-23-30 X 83-01-45		2D			2D				2D	2D		

[a]Twice monthly (11).

[b]Through September.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4240105					5A 2B				5A 2B						
"										2D	2D		2D	5BC	
"										2A 5C	2A 5C		2A 5C		
"										2D	2D	2D	2D		
"											2B	2B			
"										2D	2D	2D			
4240106						2A 5B 8CD			2A 5B 8CD						
"						8A			8A						
"														5D	
"														2AC 5B	
"			2CD	2CD	2CD	2CD						2CD			
4240107	1D		9D						9D						
"	1A 9D 8BC		8						8						
"	8A-C 2D		8A-C 5D			8C 5D			8A-C 5D						
"	9B 1CD		11A-C 5D			11A-C 5D			11A-C 5D						
"	9A 1B-D		8ACD 11B			8ACD 11B			8ACD 11B						
"	1		8A 11B-D			8A 11B-D			8A 11B-D			5D			
"	1		8			8			8			2CD			
"	9B 2C 5D		9B 2C 5D	9B 2C 5D	2B 5D	9B 2C 5D	2B 5C		2BD	2B 5C	2BC	2B 5C			
"	1		11A-C 8D			11A-C 8D			11A-C 8D			2BD			
"	1A-D[b]	2C	11A 8B 5C	5C		11A 5C 8B			11A 8B 5C	2C	2C	2B			
"	5		5	5	5A 2B-D	5A-C 2D	2D		5A-C 2D	2AD 5BC	5BC 2D	5A-C 2D			
4240201	2D								2D						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	21	4240202	Near Fremont 41-23-36 X 83-01-35	*	2C			2C				2C	2C		
72-73	"	"	"	*	2D	2D		2D				2D	2D		
74	"	"	"	*	2C	2C		2C				2C	2C	2C	
		42403	South Creek	(No Data Found)											
		42404	Racoon Creek	(No Data Found)											
			HYDROLOGIC AREA 4.2.5 Huron-Vermillion Complex												
		42501	Pickerel Creek	(No Data Found)											
		42502	Unnamed Tributary at White's Landing	(No Data Found)											
		42503	Little Pickerel Creek	(No Data Found)											

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS TOTAL	HEAVY METALS DISSOLVED	PESTICIDES	REFRACTORY ORGANICS
4240202	2C		2C			2C			2C						
"	2D		2D			2D			2D						
"	2C	2C	2C	2C		2C			2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		42504	Mills Creek	(No Data Found)											
		42505	Pipe Creek	(No Data Found)											
		42506	Plum Brook	(No Data Found)											
		42507	Sawmill Creek	(No Data Found)											
		42508	Huron River	flow: 8.2 m^3/s (290 cfs)											
51	21	4250801	At Highway 250-13 Bridge at Milan					5B-D				5B-D	5B-D	2B 5CD	5B-D
52	"	"	"					5A				5A	5A	5A	5A
57	"	"	"					1D							
58	"	"	"					1A-D[a]							
67	19	"	"			2A 5B 8CD			2A 5B 8CD						
68	"	"	"			8A			8A						
71	18	"	"												
72	"	"	"												
50-74	21	4250802	At Milan, 500 Feet Below US-250	*	1										

[a]Through September.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4250801	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	5A	5A	5A						5A		5A		5A		
"															
"															
"						2A 5B 8CD			2A 5B 8CD						
"						8A			8A						
"														5D	
"														5B 2C	
4250802															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
53-66	21	4250802	(Continued)	*		1									
65-66	"	"	"	*	1	1		2D				2D		2D	
67	"	"	"	*	1			2C				2C	2C		
67	18	4250803	At Milan 41-18-04 X 82-36-36	•	2A 5B 8CD	2A 5B 8CD			2A 5B 8CD						
68	"	"	"	*	8	8			8	8B-D					
69	"	"	"	•	8A 2B	8A 2B			8A 2B	8A 2B					
73	43	4250804	At Milan 41-18-06 X 82-36-25	*	5D	5D		5D	5D				5D	5D	
74	"	"	"	*	5A-C 2D	5	5D	5A-C 2D	5A-C	2B 5C		2D	5A 2B	5A 2B	5
75	"	"	"	*		5B 2C	2AC 5B	2AC 5D	2AC 5B	2AC 5B		5B 2C		5B 2C	2AC 5B
75[a]	17	4250805	Below Milan 41-20-05 X 82-34-36	*				11B		11B					
68[a]	21	4250806	Below Milan 41-20-06 X 82-34-38	*		9CD		9CD				11C 8D	11C 8D	9CD	
69[a]	"	"	"	*		9AB		9AB 8D				8	8		
70[a]	"	"	"	•		9AB 1CD		9AB 1CD				8ACD 11B	8ACD 11B	1D	
71[a]	"	"	"	*		1ABD 9C		1ABD 9C				11AD 8BC	11AD 8BC	1ABD 9C	
72[a]	"	"	"	*		1		1				11A 8B-D	11A 8B-D	1	
73	"	"	"	*		1ACD 9B		1				8A-C 2D	8	1	
73	43	"	"	*	9B 5C	9B	2BC		2B			2BC	4B 8C	9B	
74	21	"	"	*		1ABD[b] 9C		1ABD[b] 9C				8AB 5C	8AB 5C	1ABD[b] 9C	
71	18	4250807	Routes 2-6 Bridge in Huron												
72	"	"	"												
		42509	Old Woman Creek	(No Data Found)											

[a]Twice Monthly (11).

[b]Through September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4250802															
"	2D		2D				2D		2D	2D	2D				
"	2C								2C						
4250803									2A 5B 8CD						
"					8B-D				8						
"					8A 2B				8A 2B						
4250804	5D		5D	5D	5D	5D				5D		5D		5D	
"	2ACD 5B		5	5ACD 2B	5AC 2BD	5	5D			5	2A 5B-D	5		5A-C	
"	2AC 5B		2AC 5B	2AC 5B	2AC 5B	2AC 5B	2AC 5B			2AC 5D	2AC 5D	2AC 5B		5B 2C	
4250805		11B	11B	11B		11B	11B		11B						
4250806	9CD		11C 8D			11C 8D			11C 8D						
"	9AB		8			8			8						
"	9A-C 1D		8ACD 11B			8ACD 11B			8ACD 11B			2D			
"	1ABD 9C		11AD 8BC			11AD 8BC			11AD 8BC			2CD			
"	1		11A 8B-D			11A 8B-D			11A 8B-D			2CD			
"	1		8			8			8			2CD			
"	9B 2C		4B 8C	9B 2C		9B 5C	9B 5C		2B	2B 5C	2B 5C	2B 5C		5B	
"	9A 1B-D[b]	2C	8AB 5C	2C		2A 8B 5C			8AB 5C	2C	2C	2B			
4250807														5D	
"														2A 5B	

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		42510	Chappel Creek	(No Data Found)											
		42511	Vermillion River	flow: 6.6 m^3/s (233 cfs)											
67	19	4251101	River Mile 6.2			2A 5B 8CD			2A 5B 8CD						
68	"	"	"			8A			8A						
50-74	21	4251102	Near Vermillion, River Mile 4.5	*	1										
51	"	"	"		1	5B-C		5B-C				5B-C	5B-C	5B-C	5B-C
52	"	"	"		1	5A		5A				5A	5A	5A	5A
65-66	"	"	"	*	1			2D				2D		2D	
67	"	"	"	*	2C			2C				2C	2C	2C	
68	"	"	"	*	2C	2C		2C				2C	2C		
69	"	"	"	*		1B 9D		1B 9D 2AC		2D		2ACD 5B	2ACD 5B		
70	"	"	"	*		1AC 9BD		1ACD 9B		5A-C 2D		2A 5B-D	2A 5B-D		
71[a]	"	"	"	•		1BC 9D		9ABD 1C		5D		8ABD 11C	8ABD 11C		
72[a]	"	"	"	*		1		9AB 1CD		5AB 2CD	2A	11A 8B-D	11A 8B-D		
73[a]	"	"	"	•		9A 1B-D		9A 1B-D		5AB 2D	5B	8AB 11C	8AB 11CD		
74[a]	"	"	"	*		1A-D[b]		1ACD[b] 9B		5A 9B 2CD	2A 5B	8A 5C 11B	8A 5C 11B	2C	
73	43	4251103	41-22-55 X 82-19-00	*	9B 5CD	9B 5D	2BC	5D	2B 5D	2BD 5C			4B 8C 5D	9B 5D	
74	"	"	"		5	5A-C 9D		5A-C 9D	2A 9D 5BC				5A 2B	5A-C 9D	2B 5C 9D
75	"	"	"			5AB 2C	2AC 5B	2AC 5D	5AB 2C					5AB 2C	5AB 2C
75[c]	17	"	"					11B	11B	11B					11B
67	18	4251104	41-22-56 X 82-19-03		2A 8B-D	2A 8B-D			2A 8B-D						
68	"	"	"		8	8			8	8B-D					
69	"	"	"		8A 2BD	8A 2BD			8A 2BD	8A 2BD					

[a]Twice monthly (11).

[b]Through September only.

[c]Two runoff events sampled as part of LEWMS.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4251101						2A 5B 8CD			2A 5B 8CD						
"						8A			8A						
4251102															
"		5B-C	5B-C						5B-C		5B-C		5B-C		
"		5A	5A						5A		5A		5A		
"	2D		2D				2D		2D	2D	2D				
"	2C								2C						
"	2C								2C						
"	2ACD 5B		2ACD 5B						2ACD 5B						
"	2A 5B-D		2A 5B-D						2A 5B-D			2D			
"	8ABD 11C		8ABD 11C						8ABD 11C			5C 2D			
"	11A 8B-D		11A 8B-D						11A 8B-D			2CD		5B-D	
"	8AB 11CD		8AB 11CD						8AB 11CD			2BD			
"	8A 5C 11B	2C	8A 5C 11B	2C		2C			8A 5C 11B	2C	2C	2B			
4251103	9B 2C 5D		4B 8C 5D	9B 2C 5D	2B 5D	9B 8C 5D	9B 2C			2B 5CD	2B 5C	2B 5CD		5B-D	
"	2ACD 9B		5A-C 9D	5A-C 9D	5A-C	5A-C 9D	2CD			5A-C 9D	2B 5C 9D			5A-C 2D	
"	5AB 2C		5AB 2C	5AB 2C	5AB 2C	5AB 2C	5AB 2C			2AC 5B	2AC 5B	2AC 5B		2AC 5B	
"			11B	11B	11B	11B	11B	11B	11B						
4251104									2A 8B-D						
"					8B-D				8						
"					8A 2BD				8A 2BD						

Evaluation and Summary of Data for River Basin Group 4.2

Five hydrologic areas totaling 1,334 km^2 (513 mi^2) in Michigan, 22,287 km^2 (8,572 mi^2) in Ohio, and 3,333 km^2 (1,282 mi^2) in Indiana, comprise River Basin Group 4.2. Of the 31 tributaries identified for this river basin group, eight were found to have sufficient water quality data to consider tributary loading estimates. However, only five of these have been gauged at near-mouth stations. Of the six major tributaries included in this river basin group, all but one have at least monthly water quality data over an annual cycle and adequate flow data. This river basin group is dominated by the Maumee River, which contributes the largest loading from land drainage to Lake Erie. The Maumee has an excellent record of water quality and quantity data in general. Four of the major tributaries in this river basin group were monitored as part of the LEWMS. Frequency of data collection in hydrology area 4.2.1 is dominated by monthly sampling. Sampling of other significant tributaries in this river basin group could best be characterized by a series of relatively intensive studies with sampling frequencies ranging from two to three times per month, to some monthly and biweekly sampling of key loading parameters.

Data on refractory organics were absent throughout this river basin group, while data on pesticides were generally either nonexistent or insufficient for loading calculation purposes. Adequate heavy metal data were frequently encountered on some of the major tributaries.

In general, data on most parameters were found to be reasonably adequate for most of the major tributaries identified for this river basin group. There was a noticeable lack of total soluble phosphorus data in hydrologic areas 4.2.3, 4.2.4, and 4.2.5

Because this river basin group is largely dominated by agriculture, the contribution of agriculturally oriented pollutants by the unmonitored and ungauged smaller tributaries in this river basin group may be significant.

Hydrologic Area 4.2.1 - Ottawa River (Ten Mile Creek). A good deal of water quality data are available on this tributary dating back to the 1950s. However, no discharge data are available for the river mouth area. Frequency of sampling for water quality parameters has been primarily monthly or less. Nutrients measured include nitrate, ammonia, and total phosphorus. Very little data are available on dissolved reactive phosphorus. There are some data available on total soluble phosphorus, although not over any full annual cycle. Few data exist on heavy metals and no data were found for pesticides or refractory organics for the Ottawa River.

Hydrologic Area 4.2.2 - Maumee River. Although the Maumee River is by far the largest tributary in Hydrologic Area 4.2.2, and in fact the largest tributary in the entire Great Lakes Basin, a number of other tributaries were included in this hydrologic area. Swan Creek drains into Lake Erie and has some monthly to weekly data available for periods dating back to the 1960s. In fact, there is a good deal of monthly data at a number of separate near-mouth stations on this tributary. Major nutrients measured were nitrate, ammonia and total phosphorus. No data were found on dissolved reactive phosphorus and only a small amount of

data were found on total soluble phosphorus. Few chloride, total kjeldahl nitrogen and silica data were found, although there are considerable suspended solids data available. There are some monthly heavy metal data over an annual period dating back to 1951 and 1952. No pesticides or refractory organics data were found.

The Maumee River has one of the most extensive water quality records. Also, the Maumee has an extremely long-term gauging record with flow data being collected from the Waterville gauge (station 4220203) as early as 1898. The Waterville station is located approximately 34 river kilometers (21 miles) upstream from the mouth of the Maumee. This station is perhaps the lowermost station that does not experience lake effects. Another gauging station (4220218) located at the mouth of the Maumee has a continuous discharge record beginning in 1967. However, interpretation of the flow data is complicated by the effects of inflow from the lake.

An excellent record exists for suspended solids in the Maumee with continuous monitoring having been conducted from 1968 through 1973 at the Waterville gauging station (4220203). In addition to suspended solids data there is also an excellent data base for particle size. During 1974 particle size was measured on a continuous basis at the Waterville gauging station. The Maumee River is one of the few tributaries to the Great Lakes which has particle size data.

Nutrient data are also extensive on the Maumee. Normal sampling was done on a monthly basis for parameters such as nitrate, ammonia, and total phosphorus. There are few dissolved reactive phosphorus and total soluble phosphorus data, however, Total soluble phosphorus was measured on a weekly basis in 1964 at station 4220206. During 1966 dissolved reactive phosphorus was measured on a monthly basis. The only other study where dissolved reactive phosphorus was measured on a frequent basis was the Lake Erie Wastewater Management Study project which monitored runoff events on the Maumee. The runoff event sampling was conducted at the Waterville station and also included measurements of suspended solids, silica, nitrate, ammonia, total phosphorus, and chloride. Ten storms were monitored during 1975, and continuation of this event sampling program is expected.

Heavy metals were sampled on the Maumee three times per month over an annual cycle in 1951 and 1952. This was done at the Waterville station as well as at a station (4220216) further downstream. Some heavy metal data were collected in 1964 on a weekly basis during the winter and on a biweekly basis during the spring. Otherwise, only sporadic heavy metal measurements are available. No refractory organics data were found for the Maumee River, although some partial-year pesticide data collected at a monthly (or less) frequency are available. There are no monthly pesticide data over a full annual cycle at a frequency of monthly or greater.

Two other tributaries in Hydrologic Area 4.2.2 have data available. Grassy Creek has some monthly data on nitrate, ammonia and total phosphorus covering about a five-year period. Otter Creek has some nutrient, chloride and suspended solids data available but it is of limited value for loading calculation purposes.

Hydrologic Area 4.2.3 - Toussaint-Portage Complex. Of the ten tributaries defined for the DAM in this complex, significant data for loading calculation purposes were found only for the Portage River. The Portage River is gauged, although the station (4230701) is located approximately 24 river kilometers (15 miles) upstream from the mouth. The period of record extends back to 1928, although there are some interuptions. In terms of water quality, there are no suspended solids data of a monthly or greater collection frequency covering at least one annual period. However, there are some biweekly data that cover certain seasons of the year for suspended solids. Some silica, nitrate, chloride and heavy metal data, collected three times per month, are available at station 4230707 for 1951 and 1952. There are some monthly data for nitrate and ammonia during 1974. Some biweekly nitrate data were collected at a number of different stations on the Portage. Total phosphorus data are somewhat limited with monthly data collection occurring only during 1974. In 1967 and 1968 there were some monthly to biweekly total phosphorus samples collected at station 4230708. Some limited dissolved reactive phosphorus and total soluble phosphorus data are also available but not over any complete annual cycle. A good chloride data base exists for the Portage. Heavy metal data include some monthly analysis. Also, pesticides have been collected on a monthly basis over a full annual cycle. No refractory organics data were found for this tributary.

Although Toussaint Creek is listed as a major tributary (Table 4), no discharge data were found, and water quality data identified for this stream were insufficient for tributary loading estimations.

Hydrologic Area 4.2.4 - Sandusky River. The Sandusky River has been gauged since 1898 at a station (4240101) located approximately 30 river kilometers (19 miles) upstream from the mouth. This gauge represents about 90 percent of the Sandusky River drainage area. An extensive suspended solids data base exists for the Sandusky. This parameter was measured continuously over most of 1956 at the gauging station. Between 1969 and 1974 up to 200 samples were collected over various flow conditions. Some measurements of particle size were made on an irregular basis in the early 1950s.

Considerable nutrient data exist for the Sandusky. Nitrate and silica were measured three times per month over an annual cycle in 1951 and 1952. Chloride was also measured at this frequency over the same time period. In the 1960s nitrate was frequently measured monthly to biweekly at a number of different stations. The phosphorus parameter most commonly collected has been total phosphorus, although there have been some dissolved reactive phosphorus data collected as well.

The Sandusky River was sampled as part of the runoff event monitoring program of the Lake Erie Wastewater Management Study. Ten different runoff events were sampled during 1975, during which suspended solids, silica, nitrate, ammonia, total phosphorus, dissolved reactive phosphorus, and chloride were measured. Some heavy metal and pesticide data are available for the Sandusky. During 1951 and 1952 heavy metals were measured three times per month over an annual cycle. Pesticides were measured monthly in spring, summer and fall from 1967 to 1971. No refractory organics data are available for the Sandusky.

Some annual data are available for Green Creek but they are probably insufficient for any loading calculations. The remaining two tributaries in Hydrologic Area 4.2.4 are both unmonitored and ungauged.

Hydrologic Area 4.2.5 - Huron-Vermillion Complex. Eleven tributaries were identified from this complex for inclusion on the DAM. Of these, only the Huron and Vermillion Rivers were found to have any data available on them. Data on both rivers are sufficient (for most parameters) to consider loading estimations.

The Huron River has been gauged at a station (4250802) located approximately 16 river kilometers (10 miles) upstream from the mouth since 1950. A fairly good record of suspended solids does exist. Biweekly samples were collected over a full annual cycle in 1968 and 1969 at station 4250803. In addition, suspended solids data were collected biweekly in 1975 at a near-mouth station.

A good data base exists for some nutrient species on the downstream portion of the Huron. Silica and nitrate were measured monthly over an annual cycle in 1972. A considerable amount of monthly to weekly data is available for nitrate since 1968. Data on ammonia and total kjeldahl nitrogen is less abundant, although total kjeldahl nitrogen was measured biweekly over an annual cycle in 1968 and 1969. Phosphorus measurements have been confined almost exclusively to total phosphorus with some biweekly data available.

Heavy metals and pesticides were sampled on the Huron at a station (4250804) on a monthly basis for a full annual cycle in 1973 and 1974. No refractory organics data were found for this tributary.

The Vermillion River is the other major tributary identified for this hydrologic area. In many respects the data record for the Vermillion is similar to that of the Huron. A discharge gauge has been in operation at a station (4251101) located approximately 7 river kilometers (4 miles) upstream from the mouth since 1950.

Suspended solids data are generally monthly from one to three seasons per year in the early 1970s. Biweekly data for this parameters were collected over a full annual cycle in 1968 and 1969.

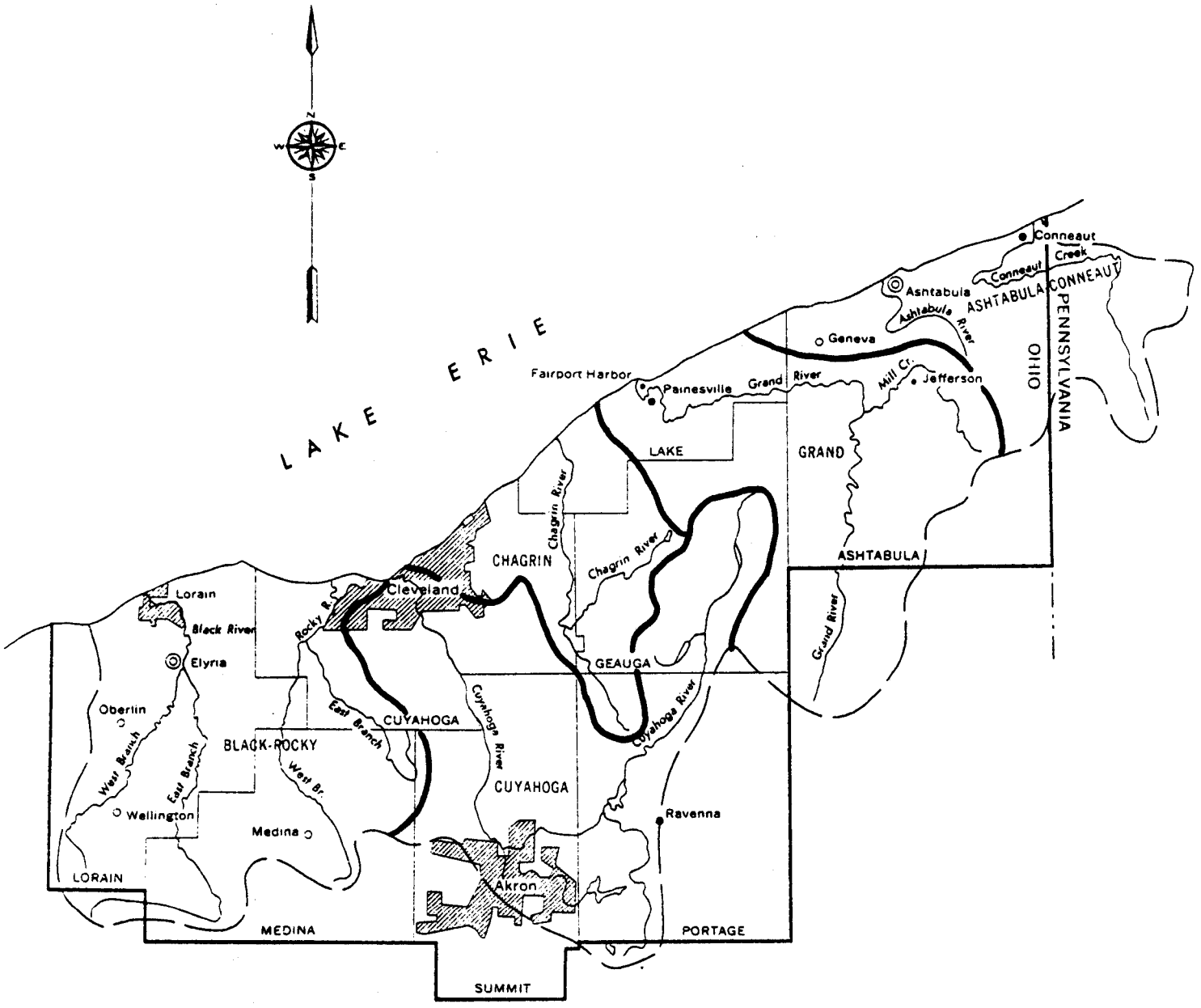
Of the nutrient parameters evaluated, nitrate was found to have been sampled most extensively. Most of the nitrate data have been collected since 1970 on either a monthly or a biweekly basis. Ammonia and total kjeldahl nitrogen data have been collected since 1973 at a near-mouth station (4251103). Data for total phosphorus are available as a result of at least monthly sampling over a full year period in 1968 and 1968, and again in 1973 and 1974. All the nitrogen and phosphorus parameters, as well as suspended solids, chloride, and other parameters were sampled during two runoff events in 1975 as part of LEWMS. Monthly pesticide data over an annual cycle are available for the Vermillion, but heavy metal data were more limited. No refractory organics data were found.

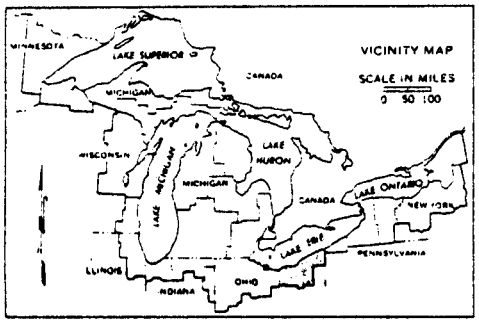
DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 4.3

River Basin Group 4.3 drains an area of 8,425 km^2 (3,253 mi^2), shown in Figure 21. This river basin group contains five hydrologic areas. Maps and descriptions of these hydrologic areas follow.

Figure 21

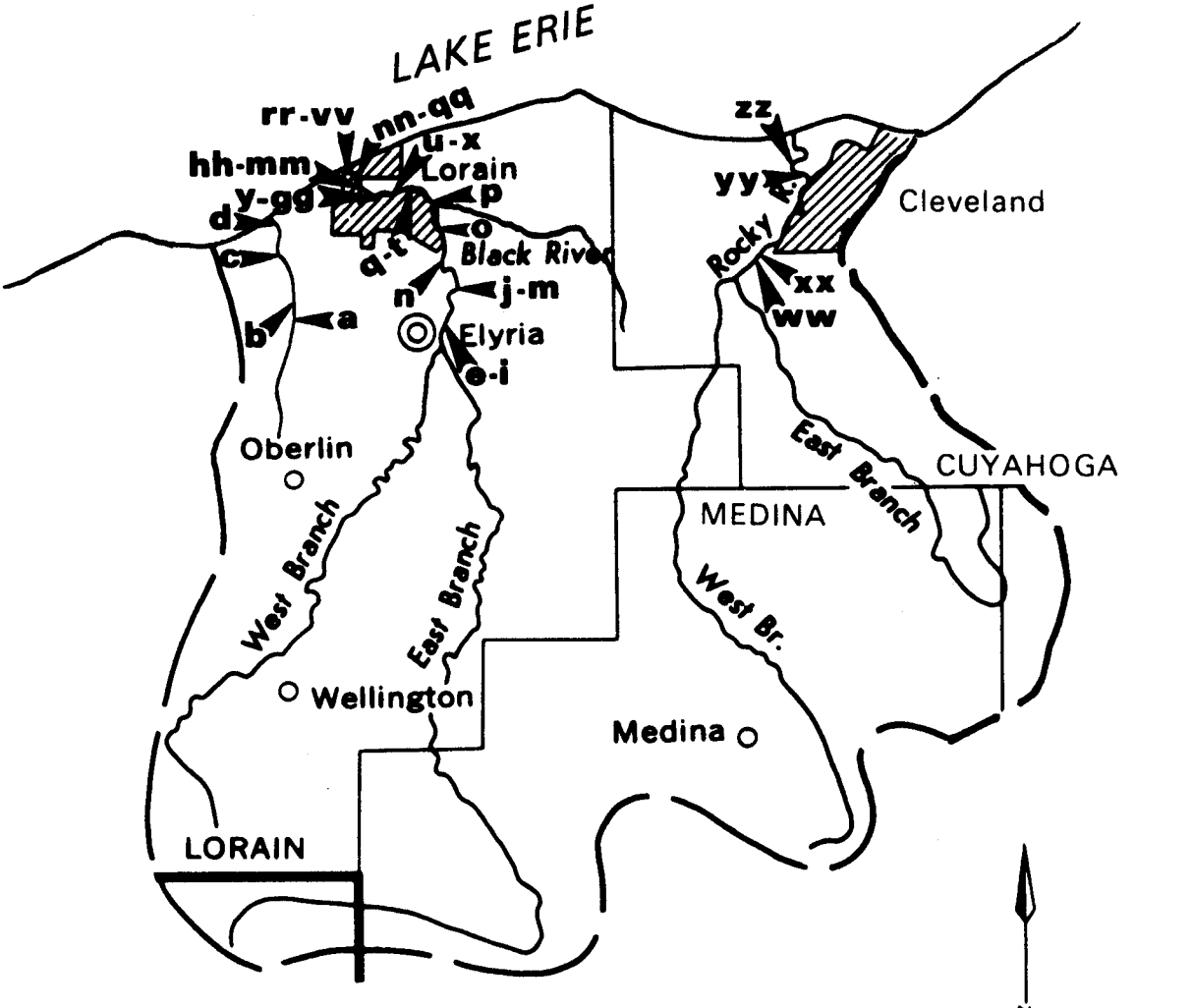
RIVER BASIN GROUP 4.3

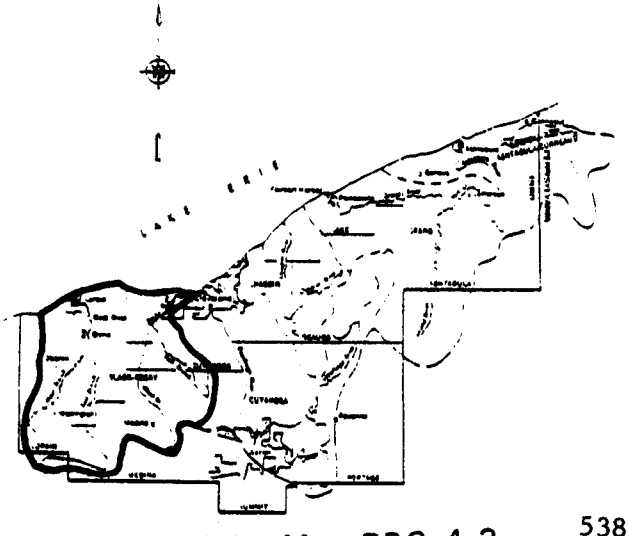




SCALE IN MILES
0 5 10 15

Hydrologic Area 4.3.1
Black-Rocky Complex





SCALE IN MILES
0 5 10 15

Vicinity Map-RBG 4.3

Hydrologic Area 4.3.1
Black-Rocky Complex

The Black-Rocky Complex encompasses an area of 230,000 hectares (568,000 acres). This area is located in north central Ohio. The major tributaries and their mean annual discharges are the Black River 8.8 m^3/s (311 cfs) and the Rocky River 7.3 m^3/s (258 cfs). A number of other small streams drain the remaining portions of this area. The topography is rolling with relatively few wetlands. Approximately 40 percent of the area is devoted to agriculture, about 15 percent urbanized, and 15 percent forested. The bedrock is composed predominantly of shale near the lake shore and sandstone throughout the remaining area. The bedrock is covered mostly by a silt and clay mixture near the shoreline and glacial till throughout the remaining portions. The economy is heavily based on manufacturing with some agriculture and mineral extraction. Industrial waste, treated municipal waste, and combined sewer overflows heavily influence water quality, throughout the area. The cities of Lorain (pop.: 78,185), and Elyria (pop.: 53,427) are the largest population centers on the Black River. The city of Medina (pop.: 10,913) and part of Cleveland (pop.: 750,903) utilize the Rocky River for wastewater assimilation.

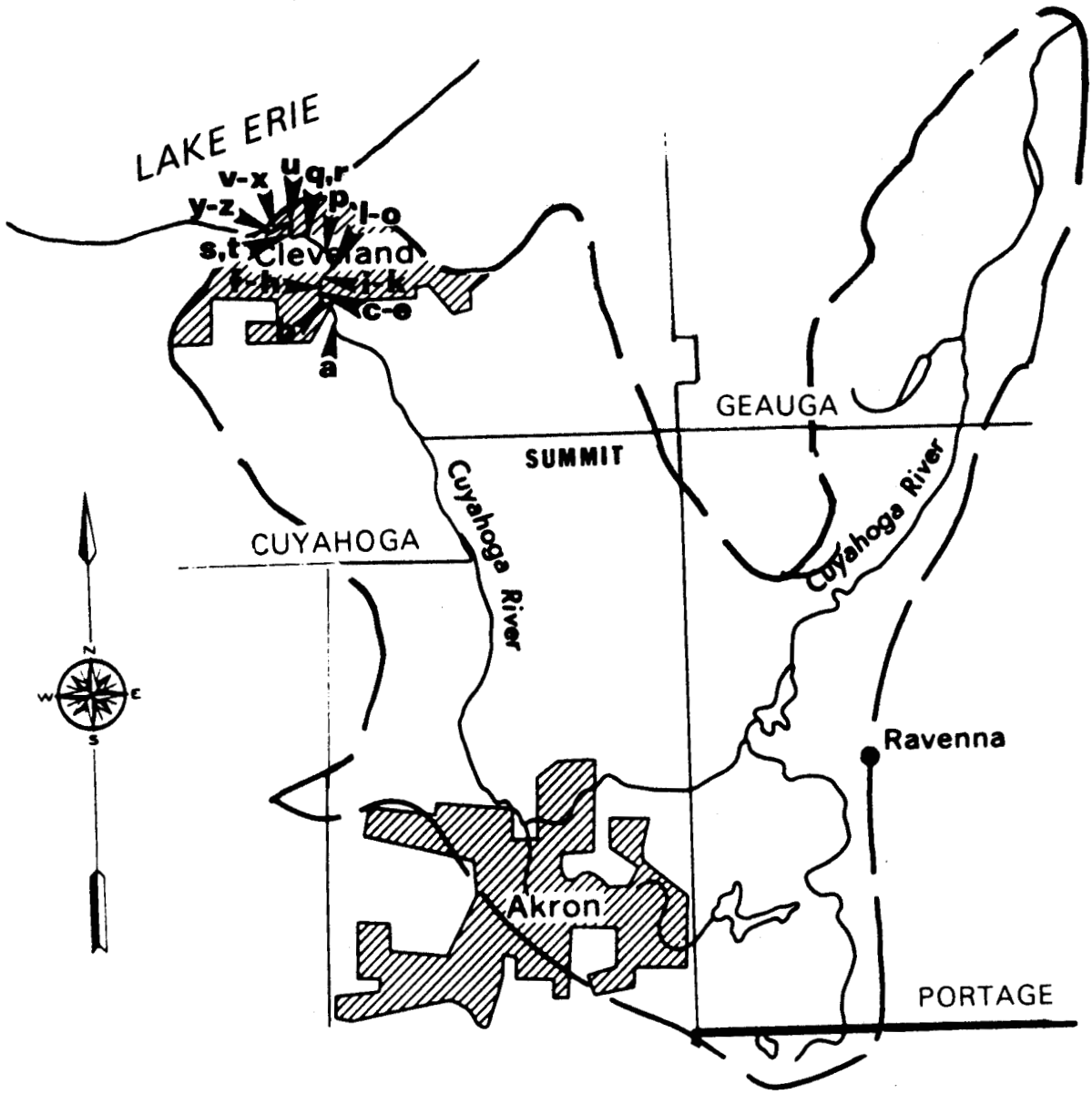
Station Key

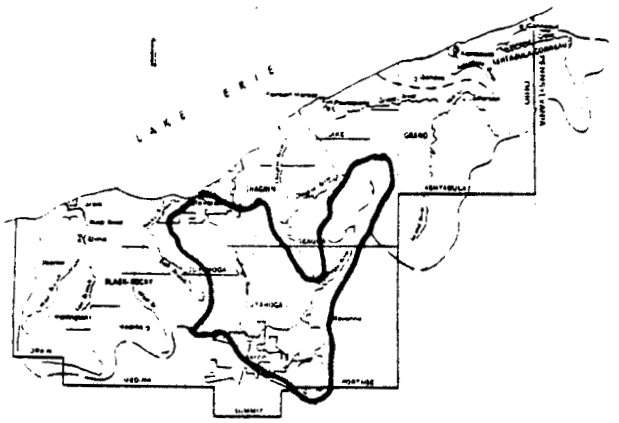
Station Location	DAM River and Station Numbers
Beaver Creek	43102
a	4310201
b	4310202
c	4310203
d	4310204
Black River	43104
e	4310401
f	4310402
g	4310403
h	4310404
i	4310405
j	4310406
k	4310407
l	4310408
m	4310409
n	4310410
o	4310411
p	4310412
q	4310413
r	4310414
s	4310415
t	4310416
u	4310417
v	4310418
w	4310419
x	4310420
y	4310421
z	4310422

Station Key

Station Location	DAM River and Station Numbers
aa	4310423
bb	4310424
cc	4310425
dd	4310426
ee	4310427
ff	4310428
gg	4310429
hh	4310430
ii	4310431
jj	4310432
kk	4310433
ll	4310434
mm	4310435
nn	4310436
oo	4310437
pp	4310438
qq	4310439
rr	4310440
ss	4310441
tt	4310442
uu	4310443
vv	4310444
Rocky River	43108
ww	4310801
xx	4310802
yy	4310803
zz	4310804

Hydrologic Area 4.3.2
Cuyahoga River





SCALE IN MILES
0 5 10 15

Vicinity Map-RBG 4.3

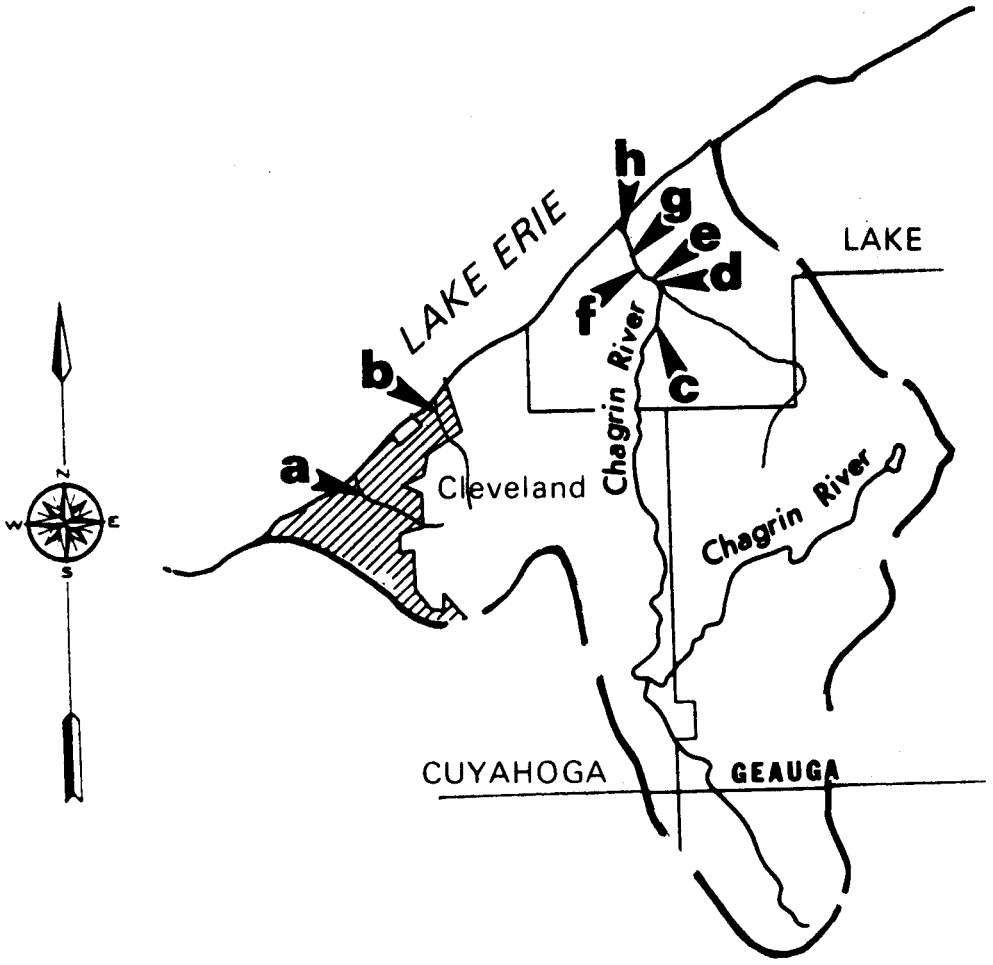
Hydrologic Area 4.3.2
Cuyahoga River

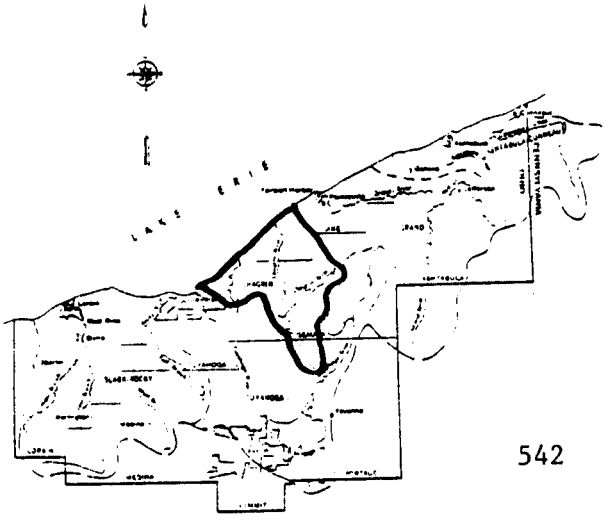
The Cuyahoga River drains an area of 234,000 hectares (578,000 acres) in northeastern Ohio. The Cuyahoga River has a mean annual discharge of 21.6 m^3/s (763 cfs). The topography varies from rolling to steep hills with relatively few wetlands. Approximately 40 percent of the area is devoted to agriculture, 20 percent forested, and 20 percent urbanized. The bedrock is composed predominantly of shale near the shoreline and sandstone throughout the rest of the area. The overlying material is composed of silt and clay near the shore with an area of sand and gravel in the southern portion, and glacial till throughout the remaining regions The economy is based mainly on manufacturing. Large amounts of municipal and industrial wastewater enter the surface waters from metropolitan Cleveland (pop.: 750,903) and Akron (pop.: 275,425), as well as the cities of Cuyahoga Falls (pop.: 49,678), and Kent (pop.: 28,103). Steel and chemical industries are prevalent along the Cuyahoga River.

Station Key

Station Location	DAM River and Station Numbers
Cuyahoga River	43201
a	4320101
b	4320102
c	4320103
d	4320104
e	4320105
f	4320106
g	4320107
h	4320108
i	4320109
j	4320110
k	4320111
l	4320112
m	4320113
n	4320114
o	4320115
p	4320116
q	4320117
r	4320118
s	4320119
t	4320120
u	4320121
v	4320122
w	4320123
x	4320124
y	4320125
z	4320126

Hydrologic Area 4.3.3
Chagrin River





542

SCALE IN MILES
0 5 10 15

Vicinity Map-RBG 4.3

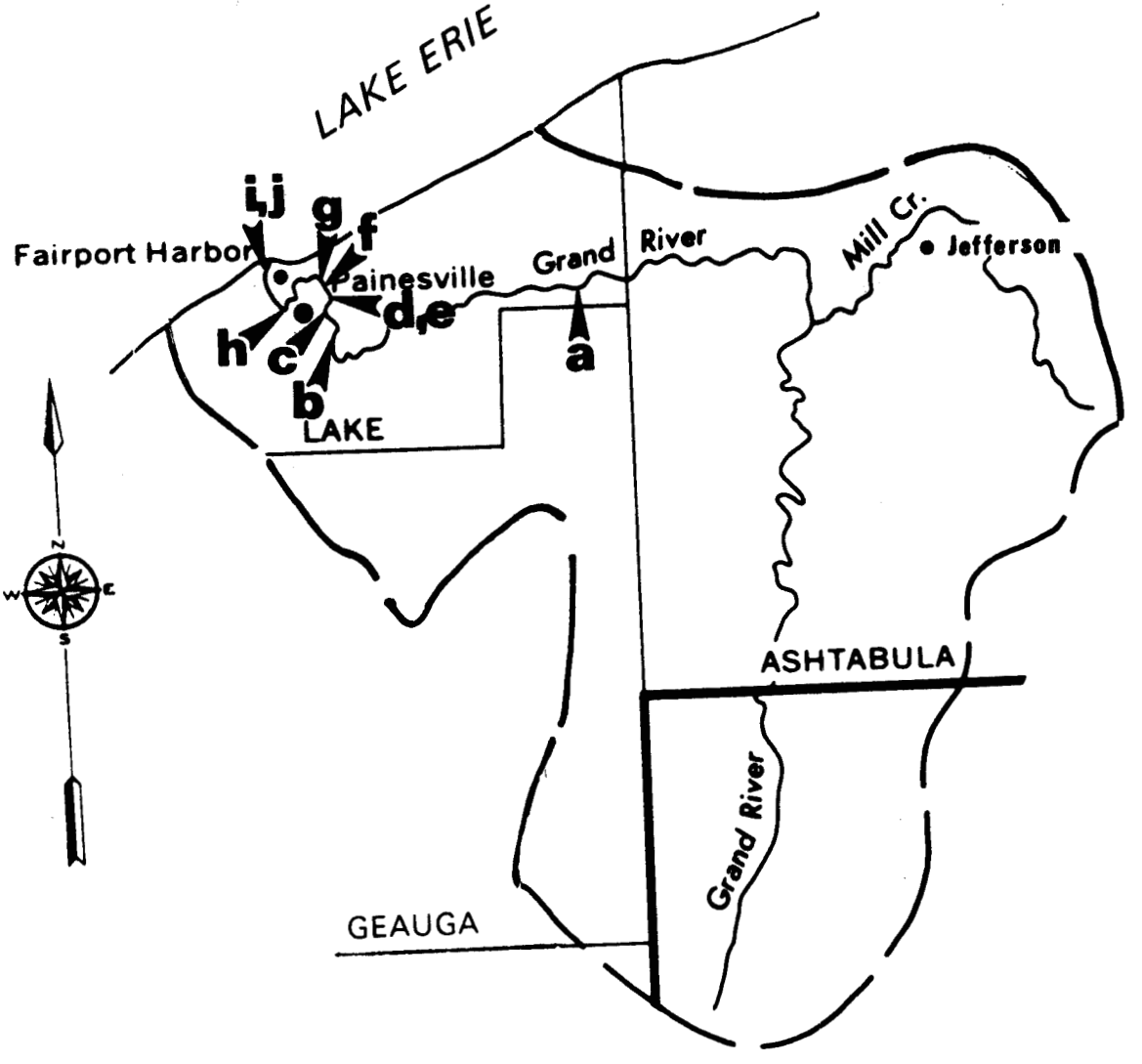
Hydrologic Area 4.3.3
Chagrin Complex

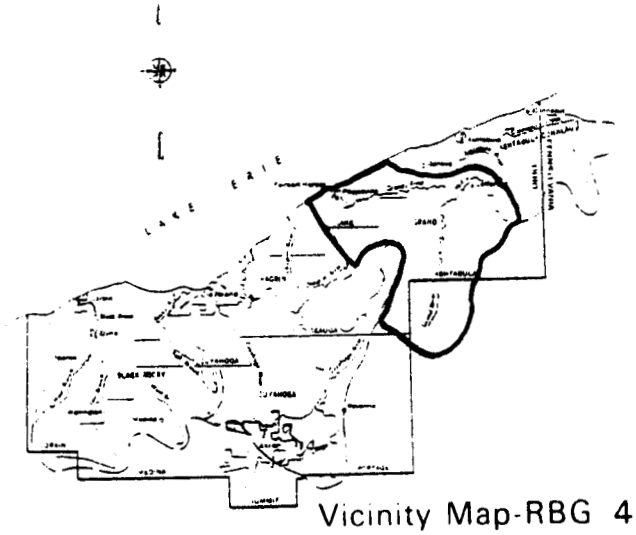
The Chagrin Complex covers 77,000 hectares (189,000 acres) in northwestern Ohio. The major tributary draining the area is the Chagrin River, which has a mean annual discharge of 9.0 m^3/s (318 cfs). Approximately 5 other small streams drain the remaining areas of this complex. The area has a steep rolling topography with relatively few wetlands. Approximately 40 percent of the area is agriculturalized, about 25 percent forested, and about 20 percent urbanized. The bedrock in the northern portion of the area is predominantly composed of shale and to a lesser extent, sandstone. The overlying material consists of mostly silt and clay near the shore with glacial till throughout the rest of the region. The economy is based upon manufacturing with some agriculture and mineral extraction. The area is subject to heavy human pressure from the cities of East Cleveland (pop.: 39,600), Willoughby (pop.: 18,634), Chagrin Falls (pop.: 4,848) and portions of Cleveland (pop.: 750,903). Sheet erosion also causes a serious water quality problem.

Station Key

Station Location	DAM River and Station Numbers
Doan Brook	43302
a	4330201
Euclid Creek	43305
b	4330501
Chagrin River	43306
c	4330601
d	4330602
e	4330603
f	4330604
g	4330605
h	4330606

Hydrologic Area 4.3.4
Grand River





Vicinity Map-RBG 4.3

SCALE IN MILES
0 5 10 15

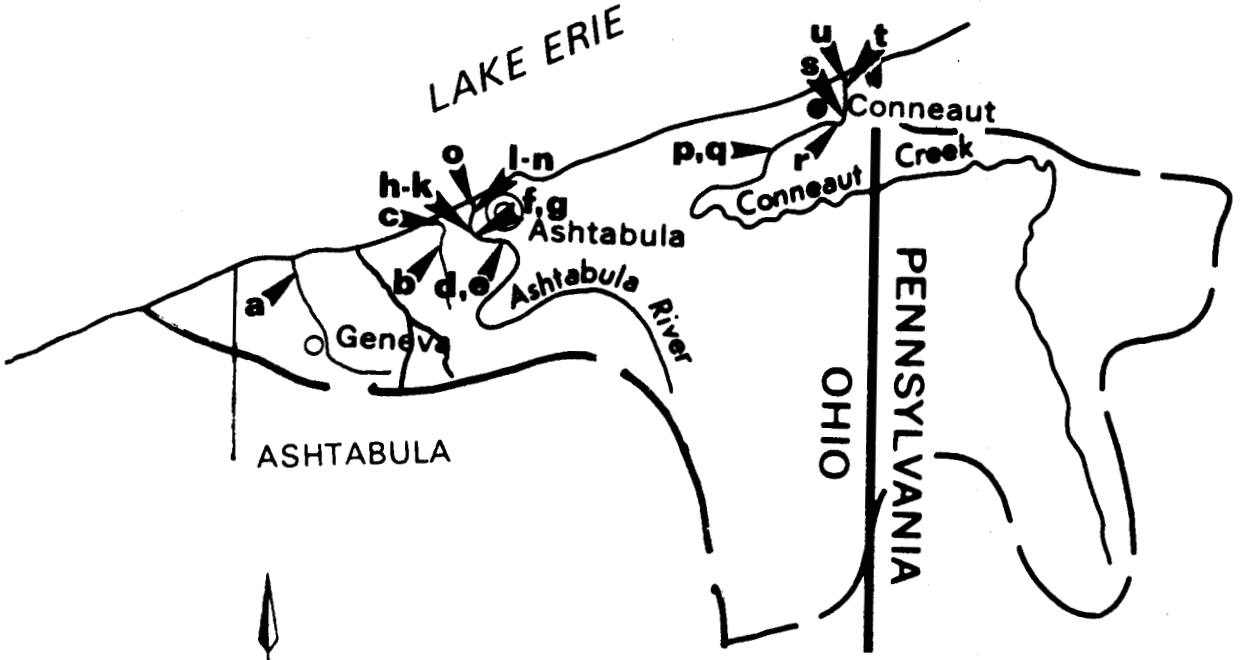
Hydrologic Area 4.3.4
Grand River

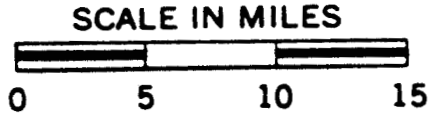
The Grand River drains an area of 212,000 hectares (525,000 acres) in northeastern Ohio. The Grand River has a mean annual discharge of 18.7 m^3/s (660 cfs). The major tributary to the Grand River is Mill Creek. The topography of the area is rolling with relatively few wetlands. Approximately 40 percent of the area is agriculturalized, about 30 percent is forested, and about 20 percent is urbanized. Bedrock is composed mostly of shale with some sandstone in the southern portion. The bedrock is covered by silt and clay near the shore and glacial till over the rest of the area. The economy is based heavily on manufacturing. The city of Painesville (pop.: 16,536) discharges a heavy industrial and minicipal wastewater load to the Grand River.

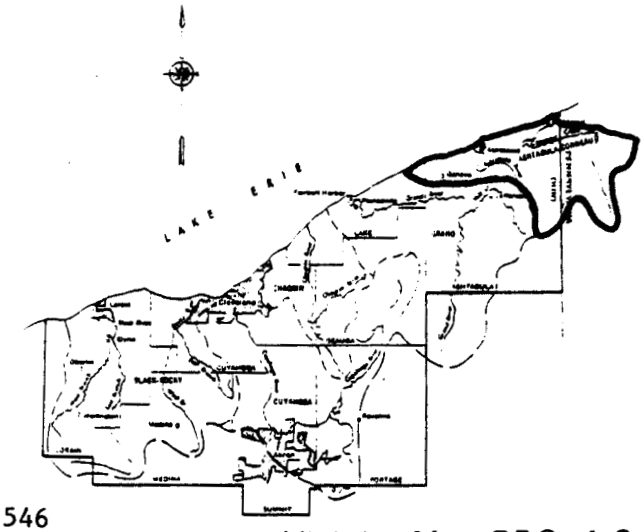
Station Key

Station Location	DAM River and Station Numbers
Grand River	43402
a	4340201
b	4340202
c	4340203
d	4340204
e	4340205
f	4340206
g	4340207
h	4340208
i	4340209
j	4340210

Hydrologic Area 4.3.5
Ashtabula-Conneaut Complex







Vicinity Map-RBG 4.3

Hydrologic Area 4.3.5
Ashtabula-Conneaut Complex

The Ashtabula-Conneaut Complex encompasses an area of 90,000 hectares (220,000 acres). Fifty-four percent of the area is located in northeastern Ohio with the remaining 46 percent in bordering Pennsylvania. The major tributaries in the area and their mean annual discharges are the Ashtabula River 4.1 m^3/s (145 cfs) and the Conneaut Creek 7.2 m^3/s (254 cfs). The topography varies from flat to rolling with few wetlands. The Ashtabula basin is characterized by high runoff. Approximately 30 percent of the area is forested, about 40 percent is devoted to agriculture, and about 15 percent urbanized. The bedrock is composed mostly of dolomite. The bedrock is covered by a combination of silt and clay near the shore areas, and glacial till throughout the remaining area. The economy is based heavily upon manufacturing. The lower reaches of the Ashtabula River are affected by municipal and industrial wastewater discharges from the city of Ashtabula (pop.: 24,313). The Ashtabula has a relatively small drainage basin and a relatively low flow, resulting in a low dillution potential. During periods of low natural flow, efflent from the Ashtabula industrial complex dominates the rivers discharge.

Station Key

Station Location	DAM River and Station Numbers
Cowles Creek	43503
a	4350301
Red Brook	43505
b	4350501
c	4350502
Ashtebula River	43506
d	4350601
e	4350602
f	4350603
g	4350604
h	4350605
i	4350606
j	4350607
k	4350608
l	4350609
m	4350610
n	4350611
o	4350612
Conneaut Creek	43508
p	4350801
q	4350802
r	4350803
s	4350804
t	4350805
u	4350806

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 4.3.1 Black-Rocky Complex												
		43101	Quarry Creek (No Data Found)												
		43102	Beaver Creek												
72	43	4310201	South Amherst 41-21-18 X 82-15-27				2B		2B			2B	2B		
74	"	"	"				2A	2A	2A			2A	2A		
74	18	4310202	Middle Ridge Road 41-22-53 X 82-14-26		2B	2B		2B	2B	2B		2B	2B	2B	2B
74	18	4310203	West of Amherst 41-24-08 X 82-14-00			2B		2B	2B	2B		2B	2B	2B	2B
74	18	4310204	West of Jager Road 41-25-34 X 82-13-58		2B			2B	2B	2B		2B	2B	2B	2B
		43103	Martin Run (No Data Found)												
		43104	Black River flow: 8.8 m^3/s (311 cfs)												
44-74	21	4310401	At Elyna 41-22-49 X 82-06-17	*	1										
62-64	"	"	"		1	3									
65	"	"	"			3D	5D	3D				8D	8D	5D	
66[a]	"	"	"		8D	3A-C 1D	5A-C 2D	3A-C 1D				11AC 8BD	11AC 8BD	5	
67[a]	"	"	"		10A-D[b]	1A-D[b]		1A-D[b]				11AB 8C 2C	11AB 8C 2D	5A-C 2D	
68[c]	"	"	"		4D	3D		1D				11D	11D	5D	

[a] Twice monthly (11).

[b] Through September only.

[c] Three times monthly (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4310201	2B							2B	2A	2A	2B				
"	2A		2A			2A		2A	2B	2B	2A				
4310202	2B		2B	2B	2B	2B			2B		2B		2B		
4310203	2B		2B	2B	2B	2B			2B		2B		2B		
4310204	2B		2B	2B	2B	2B			2B		2B		2B		
4310401															
"															
"	8D		8D			5D			8D	5D	5D				
"	11AC 8BD		11AC 8BD			5			11AC 8BD	5	5				
"	11AB 8C 2D		11AB 8C 2D			5A-C 2D			11AB 8C 2D	5A-C 2D	5A-C 2D				
"	11D		11D			11D			11D	5D	5D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69[a]	21	4310401	(Continued)	*	9A 4B-D[b]	3BC 1D		1		9D		11A-C 4D	11A-C 4D	5	
70[a]	"	"	"	*		1A-D[b]		1A-D[b]		5AB 9C 2D		11A-D[b]	11A-D[b]	5A-C 2D	
74	18	"	"	*		5B		5B	5B	5B			5B	5B	
67[a]	21	4310402	At Elyria 41-22-50 X 87-06-15			3D		3D				11D	11D	5D	
68[a]	"	"	"			3A-D[b]		3A-D[b]				11A-D[b]	11A-D[b]	5A-C 2D	
74	18	4310403	River Mile 10.8 41-23-54 X 82-05-43			9C		9C						9C	9C
74	18	4310404	Spring Valley Golf Club 41-23-55 X 82-05-44			2B		2B	2B	2B		2B	2B	2B	2B
74	18	4310405	River Mile 10.1 41-24-42 X 82-05-22			9C		9C						9C	9C
74	18	4310406	Ford Rd. Near Sheffield 41-24-42 X 82-05-44			2B		2B	2B	2B		2B	2B	2B	2B
51[a]	21	4310407	Below Elyria 41-24-42 X 82-05-45			3B-D		3B-D				11B-D	11B-D	5BD 9C	11B-D
52[a]	"	"	"			3A		3A				11A	11A	2A	11A
66	"	"	"			3		3						3	
67	"	"	"			9AC 1BD		9AB 1D				8D	8D	9AB 1D	
68	"	"	"			9A 1B-D		1				8	8	9ACD	
69[c]	"	"	"			1AB 9CD		1ABD 9C				8AD 11C 5B	8AD 11C 5B	9A-C	
70	"	"	"			1A-C 9D		1A-C 8D				8	8	1BC 9D	
71	"	"	"			9A 1B-D		9A 1B-D				8	8	9BC 1C	
72	"	"	"			9AB 1CD		9A 1B-D				8	8	9A-C 1D	
73[c]	"	"	"			1		1				8AC 11B	8ACD 11B	1A-C 9D	
73	43	"	"	*	5C 2D	2B 8D	2C	8D				2C		5D	5D
74	"	"	"	*	8	8		8	2A 8B-D	2D		2A 9C 8D	8A-C	8	8
74[c]	21	"	"			1A-D[b]		1A-D[b]				11A 8B 5C	11A 8B 5C	1A-D[b]	
75	43	"	"		5A 2B	5AB		5A 2B	5AB	2A 5B		5AB		5AB	5AB
75[d]	17	4310408	41-24-43 X 82-05-43					11B	11B	11B					11B
67	19	4310409	River Mile 8.6 41-25-09 X 82-06-08			2A 5B 8CD			2A 8B-D						
68	"	"	"			8A			8A						
74	18	"	"			9C			9C					9C	9C

[a]Three times monthly (11).

[b]Through September only.

[c]Twice monthly (11).

[d]Two runoff events sampled as part of LEWMS (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4310401	11A-C 4D		11A-C 4D			11A-C 4D			11A-C 5D	5	5				
"	11A-D[b]		11A-D[b]			11A-D[b]			11A-D[b]	5A-C 2D	5A-C 2D				
"	5B		5B	5B	5B		5B			2B	5B	2B		2B	
4310402	11D		11D			9D			11D	5D	5D				
"	11A-D[b]		11A-D[b]			11A-D[b]			11A-D[b]	5A-C 2D	5A-C 2D				
4310403	9C		9C	9C	9C	9C			9C		2C	2C			
4310404	2B		2B	2B	2B	2B			2B	2B	2B	2B			
4310405	9C		9C	9C	9C	9C			9C		9C	9C			9C
4310406	2B		2B	2B	2B	2B			2B	2B	2B	2B			
4310407	11B-D	11B-D	11B-D						11B-D		11B-D		11B-D		
"	11A	11A	11A						11A		11A		11A		
"															
"	8D		8D						8D						
"	8		8			8CD			8						
"	8AD 11C 5B		8AD 11C 5B			8AD 11C 8B			8AD 11C 8B						
"	8		8			8			8			2D	2D		
"	8		8			8			8			2CD	2D		
"	8		8			8			8			2C			
"	8ACD 11B		8ACD 11B			8ACD 11B			8ACD 11B			2BD			
"	5BD 2C		5BC 8D	5BC 8D	2B 5D	2B 5C 8D	5B 2C		2C 5D	5BC 8D	5B 2C	2B 5CD		5B-D	
"	8		8	8	8AC 5BD	8			8A-C 2D	8A-C 2D	5A 8C 2D	5AB 8CD		8ACD 5B	
"	11A 8B 5C	2C	11A 8B 5C	2C		11A 8B 5C			11A 8B 5C	2C	2C	2B			
"	2B		5AB	5AB	5AB	5AB			5A 2B	2AB		5AB		2AB	
4310408			11B	11B	11B	11B	11B	11B	11B						
4310409						2A 8B-D			2A 8B-D						
"						8A			8A						
"	9C		2C	9C	9C	9C			9C		9C	9C			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	18	4310410	41-25-16 X 82-05-51	•	8CD	8CD			8CD						
68	"	"	"		8	8			8	8B-D					
69	"	"	"		8A 2B	8A 2B			8A 2B	8A 2B					
72	18	4310411	River Mile 6.6 41-26-35 X 82-06-25		9A	9A		9A	9AD	9AD		9D		9A	9AD
74	18	4310412	River Mile 6.5			9C		9C						9C	9C
71	18	4310413	River Mile 5.3 41-27-24 X 82-06-49						2BC	2BC				2B	
72	"	"	"			9C		9C						9C	
72	18	4310414	River Mile 5.0 41-27-31 X 82-07-11		9B	9BD		9BD	9B	9B				9BD	
74	"	"	"			2B		2B	2B					2B	
74	18	4310415	River Mile 4.85 41-27-30 X 82-07-03			9C		9C						9C	9C
74	18	4310416	41-27-37 X 82-07-22			2B		2B	2B					2B	
72	18	4310417	River Mile 4.5 41-27-39 X 82-07-37					9D	9D	9D		9D			9D
69	18	4310418	U.S. Steel Intake #3 41-27-17 X 82-08-00			9D		9D	9D	9D					9D
70	"	"	"			9A		9A	9A	9A					9A
71	"	"	"			2D		2B-D	2B-D	2B-D					
74	"	"	"			9C		9C						9C	2C
74	18	4310419	River Mile 4.0 41-27-17 X 82-08-03			2B		2B	2B					2B	
71	18	4310420	River Mile 3.7 41-27-17 X 82-08-19						2B	2B				2B	
72	18	4310421	River Mile 3.5 41-27-22 X 82-08-32			9D		9D						9D	
74	"	"	"			9C		9C						9C	2C
74	18	4310422	Near Cornwell Park 41-27-23 X 82-08-33			2B		2B	2B					2B	
71	18	4310423	River Mile 3.4 41-27-26 X 82-08-39						2BC	2B				2B	
72	"	"	"		9A	9A		9AD	9AD	9AD		9D		9A	9AD
72	18	4310424	River Mile 3.2 41-27-23 X 82-08-50			9D		9D						9D	
69	18	4310425	U.S. Steel Intake #2 41-27-13 X 82-08-48			9D		9D	9D	9D					9D
70	"	"	"			9A		9A	9A	9A					9A
71	"	"	"			2D		2BC	2B-D	2BC					2CD

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4310410									8CD						
"					8B-D				8						
"					8A 2B				8A 2B						
4310411	9D		9AD	9AD					9D	9D	9D	9D			
4310412	9C		9C	9C	9C	9C			9C		9C	9C			2C
4310413	2C			2BC							2BC	2BC			
"															
4310414	9B		9B	9B								9D			
"															
4310415	9C		9C	9C	9C	9C			9C		9C	9C			9C
4310416	9D		9D	9D					9D	9D	9D	9D			
4310417															
4310418	9D			9D							9D	9D			
"	9A			9A							9A	9A			
"	2CD			2B-D							2B-D	2B-D			
"	9C		9C	9C	9C	9C			9C		9C	2C			
4310419	2B														
4310420				2B							2B	2B			
4310421															
"	9C		2C	2C	2C	2C			9C		2C	2C			2C
4310422	2B														
4310423	2C			2BC							2BC	2BC			
"	9D		9AD	9AD					9D	9D	9D	9AD			
4310424															
4310425	9D			9D							9D	9D			
"	9A			9A							9A	9A			
"	2CD			2BC							2B-D	2BC			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA											
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	18	4310425	(Continued)			9A		9A	9A	9A					
74	"	"	"			9C		9C						9C	9C
74	18	4310426	River Mile 2.85 41-27-17 X 82-08-48			9C		9C						9C	2C
74	18	4310427	Above Turning Basin 41-27-18 X 82-08-49			2B		2B	2B					2B	
74	18	4310428	Middle of Turning Basin 41-27-11 X 82-09-00			2B		2B	2B					2B	
74	18	4310429	Below Turning Basin 41-27-09 X 82-09-11			2B		2B	2B					2B	
72	18	4310430	River Mile 2.2 41-27-26 X 82-09-25		9A	9A		9A	9A	9A				9A	9A
74	18	4310431	E. 21st Street 41-27-27 X 82-09-33			2B		2B	2B					2B	
74	18	4310432	E. 21st Street 41-27-27 X 82-09-37			9C		9C						9C	2C
72	18	4310433	River Mile 2.0 41-27-25 X 82-09-41					9D	9D	9D		9D			9D
74	18	4310434	41-27-37 X 82-09-51			2B		2B	2B					2B	
69	18	4310435	River Mile 1.8 41-27-26 X 82-09-52			9D		9D	9D	9D				9D	9D
70	"	"	"			2A		9A	9A	9A				9A	9A
71	"	"	"						2BC	2BC				2B	
72	18	4310436	River Mile 1.4 41-27-46 X 82-09-53		9A	9A		9A	9A	9A				9A	9A
74	18	4310437	Railroad Bridge 41-27-52 X 82-10-09			2B		2B	2B					2B	
71	18	4310438	River Mile 1.0 41-28-00 X 82-10-18						2A	2A				2A	
72	"	"	"					2D	2D	2D		2D			2D
74	18	4310439	Erie Avenue Bridge 41-28-12 X 82-10-33			2B		2B	2B					2B	
72	18	4310440	River Mile 0.5 41-28-12 X 82-10-41			9D		9D						9D	
69	18	4310441	River Mile 0.2 41-28-20 X 82-11-00			9D		9D	9D	9D				9D	9D
70	"	"	"			9A		9A	9A	9A				9A	9A
71	"	"	"						2B	2B				2B	
74	18	4310442	River Mile 0.0 41-28-20 X 87-11-00			9C		9C						9C	2C
74	18	4310443	At Mouth 41-28-26 X 82-11-05			2B		2B	2B					2B	
72	18	4310444	River Mile 0.0 41-28-26 X 87-11-07					9D	9D	9D		9D			9D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4310425			9A	9A											
"			9C	9C	9C				9C		9C	9C			
4310426	9C		2C	2C	2C	2C			9C		2C	2C			2C
4310427									2B						
4310428									2B						
4310429									2B						
4310430			9A	9A								9A	9A		
4310431												2B			
4310432	9C		2C	2C	2C	2C			9C		2C	2C			2C
4310433	9D		9D	9D					9D	9D	9D	9D			
4310434									2B						
4310435	9D			9D							9D	9D			
"	9A			9A							9A	9A			
"	2C			2BC							2BC	2BC			
4310436			9A	9A								9A	9A		
4310437									2B						
4310438				2A											
"									2D		2D	2D			
4310439	2B								2B						
4310440															
4310441	9D			9D							9D	9D			
"	9A			9A							9A	9A			
"				2B							2B	2B			
4310442	9C		2C	2C	2C	2C			9C		2C	2C			2C
4310443	2B								2B						
4310444	9D			9D					9D	9D	9D	9D			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		43105	Unnamed Tributary at Avon Lake (No Data Found)												
		43106	Porter Creek (No Data Found)												
		43107	Cahoon Creek (No Data Found)												
		43108	Rocky River flow: 7.3 m^3/s (258 cfs)												
23-35	21	4310801	Near Bereu 41-24-24 X 81-53-14	*	1										
43-74	"	"	"	*	1										
65-66	"	"	"	*	1			2D				2D		2D	
67-68	"	"	"	*	1			2C				2C	2C		
69	"	"	"	*	1			5A-D 2D		9C 1D		2D	2D		
70	"	"	"	*	1			2CD		9A-C 1D		2C	2C		
71	"	"	"	*	1	2D		5		9AD 1BC	2B-D	6	2D		
72	"	"	"	*	1	2AD 5BC		2AD 5BC		1A-C 9D	5B 2CD	2AB 5C	2C		
73	"	"	"	*	1	5AC 2BD		5AC 2BD		9A-C 1D	2AD 5B	5A 2C	2D		
73	43	"	"	*	8BD 5C	8BD 5C		8BD 5C	2B			8B 2C	2B 5C 8D	8B 5CD	5BD 2C
74	"	"	"	*	8AB	8AB		8AB	5A 8B				8AB	8AB	8AB
74	21	"	"	*	1	5A 2BC		2AC		9A-D	2A	2A-C	2BC	2C	

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4310801															
"															
"	2D		2D				2D		2D	2D	2D				
"	2C								2C						
"									5						
"						2C			2ABD 5C						
"	6		6			2D			6						
"	2AB 5C		2AB 5C			2C			2AB 5C						
"	5A 2CD		5A 2CD						5A 2CD						
"	8B 5CD		8BD 5C	2C 8D	8D	8BD 5C			5BC 8D	8B 2C	8BD 5C	8B 2C		8B 5CD	
"	8AB		8AB	8AB	8A 2B	8AB			8AB	2A	8AB	5AB		8A 5B	
"	5A 2BC	2C	5A 2BC	2C		2C			5A 2BC	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
51	21	4310802	River Mile 8.0				5BD 8C	5B-D				5B-D	5B-D	5BD 8C	5B-D
52	"	"	"				5A	5A				5A	5A	5A	5A
67	19	4310803	River Mile 2.9			2A 8B-D			2A 8B-D						
68	"	"	"			8A			8A						
67	18	4310804	Near Lakewood 41-28-10 X 81-49-55	*	2A 8B-D	2A 8B-D			2A 8B-D						
68	"	"	"		8	8			8	8B-D					
69	"	"	"		8A	8A 2B			8A 2B	8A 2B					
			HYDROLOGIC AREA 4.3.2 Cuyahoga River												
		43201	Cuyahoga River flow: 21.6 m^3/s (763 cfs)												
81-22	21	4320101	At Independence 41-23-43 X 81-37-48	*	3										
27-35	"	"	"	*	3										
40-74	"	"	"	*	1										
48[b]	"	"	"	*	1			3D				11D	11D		
49[b]	"	"	"	*	1			3A-D[c]				11A-C 9D	11A-C 9D		
51	"	"	"	*	1					2AB	2AB				
52	"	"	"	*	1					2B	2B				
53	"	"	"	*	1					9B	9B				
54	"	"	"	*	1					2A 9BD	2A 9BD				
55	"	"	"	*	1			2D		9B	9B	2D	2D	2D	
56	"	"	"	*	1			2B		9A-C 1D	9A-C	2B	2B	2B	
57	"	"	"	*	1	1D				1A-D[c]	5A 2D 9BC				
58	"	"	"	*	1	1A-D[c]									
65	"	"	"	*		9D		9D		1D				9D	

[a] From 1952.

[b] Three times monthly (11).

[c] Through September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4310802	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	5A	5A	5A						5A		5A		5A		
4310803						2A 8B-D			2A 8B-D						
"						8A			8A						
4310804									2A 8B-D						
"					8B-D				8						
"					8A 2B				8A 2B						
4320101															
"															
"															
"	11D	11D	11D						11D		11D				
"	11A-C 9D	11A-C 9D	11A-C 9D						11A-C 9D		11A-C 9D				
"															
"															
"															
"															
"	2D	2D	2D						2D		2D				
"	2B	2B	2B						2B		2B				
"															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
66	21	4320101	(Continued)		1	9A 1B-D		9A 1B-D		1				9A 1B-D	
67	"	"	"		1	1A-C 9D		1		1				1	
68	"	"	"		1	1AD 9BC		9A-C 1D		1	2D	2B 8CD	2B 8CD	9A-C 1D	
69	"	"	"		1	1ABD 9C		1ABD 9C		1	2AD 5B	8	8	1AD 9BC	
70	"	"	"		1	1		1		1	2BD	8	8	9A 1CD	
71	"	"	"		1	1		1		1	5C	8	8	1	
72	"	"	"		1	1		1		1	5AB 2CD	8	8	1	
73	"	"	"		1	1		1		1	2ACD 5B	8	8	1	
74	"	"	"		1	1A-D[a]		1A-D[a]		1A-D[a]	5AB	9AC 8B	9AC 8B 2D	1A-D[a]	
75[b]	"	"	"					11B	11B	11B					11B
72	18	4320102	River Mile 10.7 41-25-17 X 81-38-35			2D		2D							
69	18	4320103	U.S. Steel Intake #9 41-26-09 X 81-39-50			9D		9D	9D	9D					2D
70	"	"	"			9D		9D	9D	9D					
69	18	4320104	Republic Steel Intake #8 41-27-03 X 81-40-55			9D		9D	9D	9D					2D
70	"	"	"			2A 9D		2A 9D	2A 9D	2A 9D					
71	"	"	"			2ACD		2ACD	2ACD	2ACD					2D
72	"	"	"			2A		2A	2A	2A					
69	18	4320105	J&L Steel Intake #7 41-27-52 X 81-40-43			9D		2D	2D	2D					2D
70	"	"	"			9A 5D		9A 5D	9A 5D	9A 5D					
71	"	"	"			5A 2B		8A 9B 2C	8A 9B 2C	8A 9B 2C					
72	"	"	"			2C		2C	2C	2C					
69	18	4320106	Republic Steel Intake #6 41-27-52 X 81-40-36			9D		9D	9D	9D					2D
70	"	"	"			9D		9D	9D	9D					
71	"	"	"			2CD		2B-D	2B-D	2B-D					2D
72	"	"	"			2A		2A	2A	2A					2A
69	18	4320107	Republic Steel Intake #5			9D		9D	9D	9D					2D
70	"	"	"			2A 9D		2A 9D	2A	2A 9D					

[a]Through September only.

[b]Two runoff events ampled as part of LEWMS (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4320101															
"															
"	2B 8CD		2B 8CD						2B 8CD						
"	8		8A-C 2D						8						
"	8A-C 2D		8						8			2D			
"	8D		8						8			2CD			
"	8A-C 2D		8						8			2CD			
"	1B-D		8						8			2CD			
"	1A-D[a]		9AC 8B 2D		2D 5A-C				9AC 8B 2D			2AC	2A-C		
"			11B	11B	11B	11B	11B	11B	11B						
4320102											2D	2D	2D		
4320103	2D										2D	2D			
"	9D										9D	9D			
4320104	2D										2D	2D			
"	9D										2D	2D			
"	2ACD										2CD	2C			
"	2A										2A				
4320105											2D	2D			
"											5D	5D			
"	8A 2BC										2C	2C			
"	2C											2C			
4320106	2D			9D							2D	2D			
"	9D										2D	2D			
"	2CD			2D							2CD	2C			
"	2A			2A							2A				
4320107	2D			9D											
"	9D										2D	2D			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	18	4320107	(Continued)			9D		2BC 9D	2BC 9D	2BC 9D					2D
72	"	"	"			2A		2A	2A	2A					2A
71	18	4320108	41-27-46 X 81-40-58			2CD	2CD	2CD	2CD	2CD					2C
72	"	"	"			9B								9B	
69	18	4320109	J&L Steel Intake #4 41-28-10 X 81-40-11			9D		9D	9D	9D					2D
70	"	"	"			9A 5D		9A 5D	9A 5D	9A 5D					
71	"	"	"			5A 2B		8A 2BC	8A 2BC	8A 2BC					
72	"	"	"			2C		2C	2C	2C					
69	18	4320110	Republic Steel Intake #3 41-28-15 X 81-40-07			9D		9D	9D	9D					2D
70	"	"	"			2A 9D		2A 9D	2A 9D	2A 9D					
71	"	"	"			2D		2CD	2CD	2CD					2D
72	"	"	"			2A		2A	2A	2A					
67	18	4320111	41-27-55 X 81-40-23			9B-D		9BC					9BC	9B-D	
62-72	18	4320112	41-28-13 X 81-40-09			10								10	
67	"	"	"					9BC	9BC				9BC		
72	"	"	"												
69	18	4320113	Republic Steel Intake #2 41-28-16 X 81-40-10			9D		9D	9D	9D					2D
70	"	"	"			2A 5D		2A 5D	2A 5D	2A 5D					
71	"	"	"			2D		2CD	2CD	2CD					2D
72	"	"	"			2A		2A	2A	2A					
67	18	4320114	41-28-37 X 81-40-15			10B-D		2B	2B				2B	10B-D	
71	"	"	"												
64	21	4320115	At DuPont Intake 41-28-39 X 81-40-13	*				1D							
65-66	"	"	"	•				1							
67	"	"	"	•				1				2B 8CD	2B 8CD		
68-69	"	"	"	*				1				8	8		
70	"	"	"	•				1				8A-C 2D	8A-C 2D		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4320107	2C 9D			2D							2BC 9D	2BC			
"	2A			2A							2A				
4320108	2D										2D	2D			
"															
4320109				9D							2D	2D			
"											2D	2D			
"	8A 2BC										2C	2C			
"	2C										2C	2C			
4320110	2D			5D							2D	2D			
"	9D										2D	2D			
"	2CD			2D							2CD	2CD			
"	2A														
4320111	9BC		9BC	9BC	9BC	9BC	9BC		9BC						
4320112															
"	9BC		9BC	9BC	9BC	9BC	9BC								
"									2A		2A	2A			
4320113	2D			5D							2D	2D			
"	5D										5D	5D			
"	2CD			2D							2CD	2C			
"	2A										2A				
4320114	2B		2B	2B	2B	2B	2B		2B						
"											2B	2B			
4320115															
"															
"	2B 8CD		2B 8CD			2D			2B 8CD						
"	8		8						8						
"	8A-C 2D		8A-C 2D						8A-C 2D						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71-74	21	4320115	(Continued)	*				1							
73	43	"	"	*		3CD[a]		3CD[a]						3CD[a]	
69	18	4320116	U.S. Steel Intake #1 41-29-08 X 81-40-43			9D		9D	9D	9D					2D
70	"	"	"			2D		9D	9D	9D					
71	"	"	"			2ABD		2ABD	2ABD	2ABD					
66	21	4320117	W. 3rd Street Bridge 41-29-17 X 81-41-07	*		9D		9D						9D	
67[b]	"	"	"	*		9AB 1CD		9ABC 1D				11	11	9AB 1CD	
68[b]	"	"	"	*		1		1				8AD 11BC	8AD 11BC	1	
69	"	"	"	*		1		1				8	8	9AC 1BD	
70	"	"	"	*		1		1				8	8	9A 1B-D	
71[b]	"	"	"	*		1		1				8ABD 11C	8ABD 11C	1	
72	"	"	"	*		1		1				8	8	1	
73b	"	"	"	*		1		1				8AB 11C 2D	8AB 11CD	1	
74[b]	"	"	"	*		1A-D[a]		1A-D[a]				5A 8C 11B	5A 8C 11B	1A-D[a]	
75[c]	17	"	"					11B	11B	11B					11B
67	19	4320118	Railroad Bridge River Mile 6.6			2A 8B-D			2A 8B-D						
68	"	"	"			8A			8A						
67	18	4320119	41-29-10 X 81-41-25			2BD 5C		2BD 5C	2B 5C				2B 5C	2BD 5C	
67	18	4320120	41-29-19 X 81-41-58			2BD 5C		2B 5C	2B 5C				2B 5C	2BD 5C	
67	18	4320121	41-29-21 X 81-40-54			10B-D		2B	2B				2B	10B-D	
67	18	4320122	41-29-22 X 81-42-14			10B-D		2B	2B				2B	10B-D	
50-52	21	4320123	Center Street Bridge 41-29-39 X 81-42-11	*		10									
64	"	"	"	*		10									
65	"	"	"	*		1D		1D				5D	5D	9D	
66	"	"	"	*		1B-D		1B-D				8	8	9A-C 1D	
51[d]	21	4320124	In Cleveland River Mile 0.75			3B-D		3B-D				11B-D	11B-D	11B-D	11B-D
52[d]	"	"	"			3A		3A				11A	11A	8A	11A

[a] Through September only.

[b] Twice monthly (11).

[c] Two runoff events sampled as part of LEWMS (11B).

[d] Three times monthly (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4310115															
"	3CD[a]														
4320116	2D			2D							2D	2D			
"	9D			2D							9D	9D			
"	2BD										2BD	2BD			
4320117	9D														
"	1		11			2D			11						
"	9A 1B-D		8AD 11BC			11C 8D			8AD 11BC						
"	1		8			8			8D						
"	1		8			8			8			2D	2D		
"	1		8ABD 11C			8ABD 11C			8ABD 11C			2D	2D		
"	1		8			8			8			5C 2D	2D		
"	1		8AB 11CD			8AB 11CD			8AB 11CD			2CD			
"	1A-D[a]	2C	8A 5C 11B	2C		8A 5C 11B			8A 5C 11B			2B			
"			11B	11B	11B	11B	11B	11B	11B						
4320118						2A 8B-D			2A 8B-D						
"						8A			8A						
4320119	2B 5C		2B 5C	2B 5C	2B 5C				2B 5C						
4320120	2B 5C		2B 5C	2B 5C	2B 5C				2B 5C						
4320121	2B		2B	2B	2B	2B	2B		2B						
4320122	2B		2B	2B	2B	2B	2B		2B						
4320123															
"															
"	1D								5D						
"	1B-D		2A 8D						8						
4320124	11B-D	11B-D	11B-D						11B-D		11B-D		11B-D		
"	11A	11A	11A						11A		11A		11A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	18	4320125	At Mouth 41-30-22 X 81-42-50			9B		9B	9B	9B			9B	9B	
67	18	4320126	At Mouth 41-30-34 X 81-43-00			9B		9B	9B	9B			9B	9B	
73	43	4320199	At Bridge, Exact Location Unknown			4BC		4BC	4BC	4BC				4BC	4BC
			HYDROLOGIC AREA 4.3.3 Chagrin Complex												
		43301	Giddings Branch (No Data Found)												
		43302	Doan Brook												
51	21	4330201	River Mile 1.5			5BD 8C		5B-D				5B-D	5B-D	5BD 8C	5B-D
52	"	"	"			5A		5A				5A	5A	5A	5A
		43303	Unnamed Tributary at West Edge of Brutenahl (No Data Found)												
		43304	Ninemile Creek (No Data Found)												
		43305	Euclid Creek												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4320125	9B		9B	9B	9B	9B	9B		9B						
4320126	9B		9B	9B	9B	9B	9B		9B						
4320199	4BC		4BC	4BC	4BC	4BC			4BC						
4330201	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	5A	5A	5A						5A		5A		5A		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
51	21	4330501	Highway 283 Bridge River Mile 0.25			2B 8C 5D		5B-D				5B-D	5B-D	2B 8C 5D	5B-D
52	"	"	"			5A		5A				5A	5A	5A	5A
		43306	Chagrin River	flow: 9.0 m^3/s (318 cfs)											
75[a]	17	4330601	41-35-52 X 81-24-08					11B	11B	11B					11B
55	21	4330602	Highway 84 at Willoughby					2D				2D	2D	2D	
56	"	"	"					2B				2B	2B	2B	
25-35	21	4330603	At Willoughby 41-37-51 X 81-24-13	*	5										
39-74	"	"	"	*	1										
65	"	"	"	*	1			2D				2D		2D	
66	"	"	"	*	1			2D				2D	2D	2D	
67	"	"	"	*	1			2C				2C	2C		
68	"	"	"	*	1			2C				2C	2C		
69	"	"	"	*	1			2AD 5C		9C 1D		2D	2D		
70	"	"	"	*	1			5AD 2BC		1A 9B-D	2AD 5B	2D	2D		
71	"	"	"	*	1	2D		9		9D	5A 2BD	2AB 5C	2C		
72	"	"	"	*	1	2A 9D 5BC		2A 9D 5BC		9	5B 2CD	6	2D		
73	"	"	"	*	1	2AD 5BC		2AD 5BC		9AB 1CD	2AD 5B	2A-C	2D		
73	43	"	"	*	8B 2C 5D	8B 5CD		8B 5CD		2D		8B 2C	2B 5CD	8B 5CD	5BD 2C
74	"	"	"	*	8A-C 9D	8		8A-C 5D	5A 8B-D	5D		2A 5C 8D	8A-C	5A 8B-D	8A-C 5D
74	21	"	"	*	1	5B 2C		2C		9A-C	2A 5B	5B 2C	5B 2C	2C	
75	43	"	"	*	5AB	5AB	2B	5AB	5A 2B	2AB		5AB		5A 2B	5A 2B
67	19	4330604	River Mile 3.7	*		2A 5B 8CD			2A 8B-D						
68	"	"	"	*		8A			8A						
64	21	4330605	41-38-52 X 81-24-20		4	4		4	4					4	4

[a]Two runoff events sampled as part of LEWMS (11B).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4330501	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	5A	5A	5A						5A		5A		5A		
4330601			11B	11B	11B	11B	11B	11B	11B						
4330602	2D	2D	2D						2D		2D				
"	2B	2B	2B						2B		2B				
4330603															
"															
"	2D		2D				2D		2D	2D	2D				
"	2D		2D			2D			2D	2D	2D				
"	2C					2C			2C						
"	2C								2C						
"	2D								2AD 5C						
"	2D					2D			5A 2B-D						
"	2AB 5C		2AB 5C			2C			2AB 5C						
"	6		6			2D			6						
"	6		6			2D			6						
"	8B 5CD		8B 5CD	2C 5D	5D	8B 5CD			8B 5CD	5B 2C	5BD 2C	5B 2CD	8B 2C	9B 5C 8D	
"	5AD 8BC		8	8	8AC 5BD	8			8A-C 5D	5A 2B 8C	5A 2B 8BC	8BC 2D	5BC	8AC 5BD	
"	5B 2C	2C	5B 2C	2C		2C			5B 2C	2C	2C				
"	5A 2B		5AB	5A	2B	5A 2B			5A 2B		2B	2B	2B	5AB	
4330604						2A 8B-D			2A 8B-D						
"						8A			8A						
4330605	4	5AD 9BC	4	4AC 9B				4A 9BC	4				4AB 5CD		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	21	4330605	(Continued)		2A 8B-D	2A 5B 8CD			2A 8B-D						
68	"	"	"		8	8			8	8B-D					
69	"	"	"		8A 2B	8A 2B			8A 2B	8A 2B					
51	21	4330606	Highway 283 Bridge			2B 8C 5D		5B-D				5B-D	5B-D	2C 8C 5D	5B-D
52	"	"	"			5A		5A				5A	5A	5A	5A
			HYDROLOGIC AREA 4.3.4 Grand River												
		43401	Marsh Creek (No Data Found)												
		43402	Grand River flow: 18.7 m^3/s (660 cfs)												
22-35	21	4340201	Near Madison 41-44-26 X 81-02-48		10										
35-74	"	"	"	*	1										
64	18	4340202	41-43-07 X 81-13-41		2B 4C 9D	2B 4CD		2B 4CD	2B 4CD				2B 4CD	2B 4CD	2B 4CD
73	18	4340203	E. Main St., Painesville 41-43-33 X 81-14-17			2B 5CD		2B 5CD	2BD 5C	2BD 5C		2BD 5C	2B-D	2B 5CD	2B 5C
67	19	4340204	Route 20 Bridge River Mile 5.8			2A 8B-D			2A 8B-D						
68	"	"	"			8A			8A						
64	18	4340205	41-44-15 X 81-13-48		9D 4A-C	4		4	4				4	4	4
67	"	"	"		2A 8B-D	2A 8B-D			2A 8B-D						
68	"	"	"		8	8			8	8B-D					
69	"	"	"		8A 2B	8A 2B			8A 2B	8A 2B					
73	18	4340206	Highway 2, Painesville			2B 5CD		2B 5CD	2BD 5C	2BD 5C		2BD 5C	2B-D	2B 5CD	2BD 5C
51[a]	21	4340207	Highway 535 Bridge, Painesville	*		3B-D		3B-D				11B-D	11B-D	5B 9C 8D	11B-D

[a]Three times monthly (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4330605									5A 8B-D						
"					8B-D				8						
"					8A 2B				8A 2B						
4330606	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	5A	5A	5A						5A		5A		5A		
4340201															
"															
4340202	2B 4CD	2B 5CD	2B 4CD					2B 4CD	2B 4CD				2B 5CD		
4340203	2BD 5C		2B-D	2B-D	2B-D	2BD 5C			2B 5CD	2BD 5C	2BD 5C	2BD 5C			
4340204						2A 8B-D			2A 8B-D						
"						8A			8A						
4340205	4	4AB 5CD	4	2C				4	4				4AB 5CD		
"									2A 8B-D						
"				8B-D					8						
"				8A 2B					8A 2B						
4340206	2BD 5C		2B-D	2B-D	2B-D	2BD 5C			2B 5CD	2BD 5C	2BD 5C	2BD 5C			
4340207	11B-D	11B-D	11B-D								11B-D		11B-D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
52[a]	21	4340207	(Continued)	*		3A		3A				11A	11A	5A	11B-D
73	18	"	"	*		2B 5CD		2B 5CD	2CD	2CD		2CD	2C	2B 5CD	2B 5CD
50-52	21	4340208	At Painesville 41-44-09 X 81-15-59	*		10									
62-64	"	"	"	*		10									
64	18	"	"		4A-C 9D	4		4	4				4	4	4
65	21	"	"	*		3D	5D	3D				8D	8D	5D	
66	"	"	"	*		3A-C 1D	5A-C 2D	3A-C 1D				8	8	5	
67	"	"	"	*		1		1ABD 9C				8	8	1ABD 9C	
68	"	"	"	*		1		1				8	8	1	
69	"	"	"	*		1		9A-C 1D				8	8	1A 9B-D	
70	"	"	"	*		1		9AC 1D				8	8	9A 1B-D	
71	"	"	"	*		1		1				8	8	1AD 9BC	
72	"	"	"	*		1		1				8	8	1	
73	"	"	"	*		1		1				8A-C 2D	8	1	
74	"	"	"	*		1A-C 9D		1A-C 9D				8A 5BC	8A 5BC	1A-C 9D	
64	18	4340209	41-45-37 X 81-16-51		2B 4C 9D	2B 4CD		2B 4CD	2B 4CD				2B 4CD	2B 4CD	2B 4CD
73	18	4340210	Near Mouth 41-45-31 X 81-16-50			2B 5CD		2B 5CD	2CD	2CD		2CD	2CD	2B 5CD	2BD 5C
		43403	Unnamed Tributary Near North Perry (No Data Found)												
			HYDROLOGIC AREA 4.3.5 Ashtabula-Conneaut Complex												
		43501	Arcola Creek (No Data Found)												

[a] Three times monthly (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4340207	11B-D	11A	11B-D								11A		11A		
"	2CD								2B-D			2CD			
4340208															
"															
"	4	4AB 5C	5	2D				4AB	4				4AB 5CD		
"	8D		2D				5D		8D	5D	5D				
"	8		5			5D	5A-C 2D		8	5	5				
"	1ABD 9C		5ABD 2C			5A 2B			8	5A 2B	5A 2B				
"	1A-C 9D		5ABD						8						
"	1CD		5AB 8CD						8						
"	9A 1B-D		8						8			2D	2D		
"	9AC 1BD		8						8			2D	2D	5D	
"	1		8						8			2AD		2AC 5B	
"	1A-C 9D		8						8			2BD			
"	1A 9BD	2C	8A 5BC	2C		2C			8A 5BC	2C	2C	2B			
4340209	2B 4CD	2B 5CD	2B 5CD						2B 4CD				2B 5CD		
4340210	2CD		2BD	2BD	2BD	2BD	2D		2BC 5D	2D	2D	2D			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		43502	Wheeler Creek (No Data Found)												
		43503	Cowles Creek												
73	18	4350301	Highway 534 41-51-01 X 80-52-43			2BC		2BC	2BC	2BC		2BC	2BC	2BC	2BC
		43504	Indian Creek (No Data Found)												
		43505	Red Brook												
73	18	4350501	Wade Avenue 41-52-26 X 80-50-25			5C		5C	5C	5C		5C	5C	5C	5C
73	18	4350502	Lake Road 41-53-03 X 80-51-04			5C		5C	5C	5C		5C	5C	5C	5C
		43506	Ashtabula River flow: 4.1 m^3/s (145 cfs)												
24-35	21	4350601	Near Ashtabula 41-51-20 X 80-45-44	*	1										
39-47	"	"	"	*	1										
50-74	"	"	"	*	1										

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4350301	2BC		2BC	2BC	2BC	2BC			2BC	2BC	2BC	2BC			
4350501	5C		5C	2C	2C	5C			2C	5C	5C	5C			
4350502	5C		5C	2C	2C	5C			2C	5C	5C	5C			
4350601															
"															
"															

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
66-67	21	4350601	(Continued)	*	1			2C				2C	2C		
68	"	"	"	*	1	2C		2CD				2C	2C		
69	"	"	"	*	1			2AC 5D				2D	2D		
70	"	"	"	*	1			2AB 5C				2C	2C		
71	"	"	"	*	1	2D		5A 2BD				6	2D		
72	"	"	"	*	1	5		2AB 5CD				6	2D		
73	"	"	"	*	1	2ACD 5B		2AC 5BD				2A-C	2C		
73	43	"	"		2B 5C	2B 5C		2B 5C	2B 5C	2B 5C		2B 5C	2B 5C	2B 5C	2B 5C
74	21	"	"	*	1	5B						5B	5B		
64	18	4350602	41-52-23 X 80-46-55	*	4	4		4	4				4	4	4
67	"	"	"	*	2A 8B-D	2A 8B-D			2A 8B-D						
68	"	"	"	*	8	8			8	8B-D					
69	"	"	"	*	8A 2B	8A 2B			8A 2B	8A 2B					
67	19	4350603	River Mile 3.3			2A 8B-D			2A 8B-D						
68	"	"	"			8A			8A						
51	21	4350604	River Mile 3.0					5B-D				5B-D	5B-D		5B-D
52	"	"	"					2AB				2AB	2AB		2AB
73	18	4350605	Above 24th St. Bridge			2C 9D		2C 9D	2C 9D	2C 9D		2C 9D	2C 9D	2C 9D	2C 9D
64	18	4350606	41-52-30 X 80-47-42			10B-D		2A	2A	2A			2A	10	2A
73	18	4350607	East 24th Street 41-52-57 X 80-47-42			5BC		5BC	10BC	5BC		5BC	5BC	5BC	5BC
68	21	4350608	At Ashtebula 41-54-00 X 80-47-44	*		1CD		1CD				8CD	8CD	9CD	
69	"	"	"	*		1A-C 9D		1A-C 9D				8	8	9ACD 1B	
70[a]	"	"	"	*		9A 1B-D		9A 1B-D				11AD 8BC	11AD 8BC	9C 1D	
71[a]	"	"	"	*		9A 1B-D		1				11AC 8B 5D	11AC 8B 5D	1	
72	"	"	"	*		1		1				8ACD 5B	8ACD 5B	1ABD 9C	
73	"	"	"	*		1		1				8A-C 2D	8	1	
73	43	"	"	*	5B-D	5B-D		5D					2C 5D	5B-D	5BD 2C

[a]Twice monthly (11).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4350601	2C								2C						
"	2C								2CD						
"	2D								2AC 5D						
"	2C					2C			2AB 5C						
"	6		6						6						
"			6			2D			6						
"	6		6			2C			6						
"	2B 5C		2B 5C	2B 5C	2B 5C	2B 5C			2B 5C	5C	5C	5C			
"	5B		2B						5B						
4350602	4	2D 4A-C	4	4	9AB			4	4			4A 2D 9B 5C			
"									2A 8B-D						
"				8B-D					8						
"				8A 2B					8A 2B						
4350603						2A 8B-D			2A 8B-D						
"						8A			8A						
4350604	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	2AB	2AB	2AB						2AB		2AB		2AB		
4350605	2C 9D		2C 9D	2C 9D	2C 9D	2C 9D	2C 9D		2C 9D		9D	9D			
4350606	10	2A	2A	2A	2A				2A				2A		
4350607	5BC		5BC	5BC	5BC	5BC			5BC	5BC	5BC	5BC			
4350608	1CD		8CD						8CD						
"	9AD 1BC		8						8						
"	9B 1CD		11AD 8BC						11AD 8BC			2D	2D		
"	9A 1CD		11AC 8B 5D						11AC 8B 5D						
"	1AC 9BD		8ACD 5B						8ACD 5B			2C	2D		
"	9A 1B-D		8						8			2D			
"	5B-D		2C 5D	5C 2D	5D	5BD 2C			2BC 5D	5B 2C	5B-D	5B 2C		8B 5CD	

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
74	21	4350608	(Continued)	*		1A-D[a]		1A-D[a]				8AB 2CD	8AB 2CD	1A-D[a]	
74	43	"	"	*	8	8		8ACD 5B	5A 8C-D	2C 5D		8CD	8A-C	8ACD 5B	8A-C 5D
75	"	"	"	*	2AB	2A 5B		2A 5B	2A 5B	2A 5B		2A 5B		2A 5B	2A 5B
73	18	4350609	6th Street Bridge			10BC		5BC	5BC	10BC		10BC	10BC	10BC	2BC
73	18	4350610	At 5th Street Bridge			2C 9D		2C 9D	2C 9D	2C 9D		2C 9D	2C 9D	2C 9D	2C 9D
63	18	4350611	41-54-07 X 80-47-55			9D		9D	9D				9D	9D	9D
64	"	"	"		4	4		4	4				4	4	4
63	18	4350612	41-54-38 X 80-47-55			9D		9D	9D				9D	9D	9D
64	"	"	"			2A 9C 5B 8D		8A 5B 9C 8D	5B 9CD				5B 9CD	2A 5B 9CD	5B 9CD
		43507	Unnamed Tributary Northwest of Airport (No Data Found)												
		43508	Conneaut Creek flow: 7.2 m^3/s (254 cfs)												
68	21	4350801	At Conneaut 41-55-34 X 80-36-18		2C	2C		2C				2C	2C		
22-35	21	4350802	At Conneaut 41-55-37 X 80-36-15	*	1										
50-74	"	"	"	*	1										
66	"	"	"	*	1			2C				2C	2C		
68	"	"	"	*	1			2D							
69	"	"	"	*	1			2ABD 5C				2D	2D		
70	"	"	"	*	1			2AD 5BC				2D	2D		
71	"	"	"	*	1	9D		5ACD 2B				6	2D		
72	"	"	"	*	1	5		2AB 5CD				2AC 5D	2D		
73	"	"	"	*	1	2AC 5BD		2AC 5BD				2B-D	5D		

[a]Through September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4350608	1A-D[a]	2D	8AB 2CD	2D		2D			8AB 2CD	2D	2D	2B			
"	8A 5BC		8	8	8AC 5BD	8			8A-C 2D	2AD 5B 8C	2AD 5B 8C	2D		8AC 5BD	
"	5B		2A 5B	2A 5B	2B	2A 5B			2AB	2A	2AB	2AB		2A 5B	
4350609	5BC		2BC	2BC	2BC	2BC			2BC	2BC	2BC	2BC			
4350610	2C 9D		2C 9D	2C 9D	2C 9D	2C 9D	2C 9D		2C 9D		9D	9D			
4350611	9D			2D	2D			2D	9D						
"	4	9AB 5CD	4A-C 5D	4AB 9C 5D	4A 9B			4AB 8C 5D	4				4AB 9C 5D		
4350612	9D								9D						
"	5B 9CD		5B-D	2D	2D				5B 9CD				5B-D		
4350801	2C								2C						
4350802															
"															
"	2C								2C						
"									2D						
"	2D		2D						2ABD 5C						
"	2D		2D			2D			2AD 5BC						
"	6		6			2D			6						
"	2ACD		2AC 5D			2D			2AC 5D						
"	6		2BC 5D			2D			2BC 5D						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA											
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	18	4350802	(Continued)		2BC	2BC		2B	5BC	2BC		2BC	2BC	2BC	2BC
73	43	"	"		5B-D	5B-D		5BD 2C				5B 2C	2B 5CD	5BD 2C	8B 5D 2C
74	21	"	"		1	5B 2D		2BD				5B 2D	5B 2D	2D	
74	43	"	"	*	8A-C 5D	8A-C 5D		8A 5B-D	5AD 8AC	2C 5D		2A 8CD	8A-C	8AC 5BD	8A-C 5D
75	"	"	"	*	2A 5B	2A 5B		2A 5B	2A 5B	2A 5B		2A		2A 5B	2AB
67	18	4350803	41-56-16 X 80-33-30	*	2A 8B-D	2A 8B-D			2A 8B-D						
68	"	"	"		8	8			8	8B-D					
69	"	"	"		8A 2B	8A 2B			8A 2B	8A 2B					
51	21	4350804	River Mile 3.4 Highway 7 Bridge					5B-D				5B-D	5B-D		5B-D
52	"	"	"					2AB				2AB	2AB		2AB
67	19	"	"			2A 8B-D			2A 8B-D						
68	"	"	"			8A			8A						
73	18	4350805	41-57-55 X 80-32-49			2B		2B						2B	
73	18	4350806	Near Mouth 41-58-12 X 80-32-57			2BC		2BC	2B	2B		2B	2B	2BC	2BC

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4350802	2B		2BC	2BC	2BC	2BC			2BC	2BC	2BC	2BC			
"	5BC 8D		8BD 5C	2C 8D	5D	8BD 5C			8B 5CD	8B 2C	8B 5D 2C	8B 2C		8B 5CD	
"	5B 2D	2D	5B 2D	2D		2D			5B 2D	2D	2D				
"	8A-C		8	8	8AC 5BD	8			8A-C	5BC	2A 5B 8C	2A 5B 8C		8AC 5BD	
"	5B		2AB	2AB	2B	2AB			2AB		2B	2AB		2A 5B	
4350803									2A 8B-D						
"					8B-D				8						
"					8A 2B				8A 2B						
4350804	5B-D	5B-D	5B-D						5B-D		5B-D		5B-D		
"	2AB	2AB	2AB						2AB		2AB		2AB		
"						2A 8B-D			2A 8B-D						
"						8A			8A						
4350805										2B	2B	2B			
4350806	2B		2B	2B	2B	2B			2B	2B	2B	2BC			

Evaluation and Summary of Data for River Basin Group 4.3

This river basin group is comprised of five hydrologic areas with 8,039 km^2 (3,092 mi^2) in Ohio, and 419 km^2 (161 mi^2) in Pennsylvania. Of the 26 tributaries identified for inclusion on the DAM in this river basin group, seven were found to have been adequately sampled for both water quality and quantity parameters to consider loading estimations. These seven tributaries were all identified as major Great Lakes tributaries in Table 4. Five additional tributaries were found to have some water quality data available, but the data were judged inadequate for loading purposes. The remaining 14 tributaries had no tributary loading data available. Most of the gauging stations on the major tributaries in this river basin group are located sufficiently near their respective mouths to be representative of the tributary discharge.

Water quality data for some of these tributaries range back to the late 1940s and early 1950s when a number of key parameters were sampled at frequencies ranging from three times per month to once per month. In the tributaries that were determined to be adequately sampled, a number of parameters were sampled at a relatively high frequency, including some continuous, weekly, and biweekly frequencies for such parameters as suspended solids, some of the nitrogen species, and chloride. As was found to be the case with the two previously evaluated river basin groups in the Lake Erie basin, the data record for some species of central concern to the study is somewhat weaker than that for others. However, some tributaries were found to have few data on silica and dissolved reactive phosphorus, and heavy metals. Three tributaries in this river basin group were included in the runoff event sampling conducted for the LEWMS. None of the tributaries in this river basin group have been adequately sampled for refractory organics, while a few have been sampled monthly over an annual cycle for pesticides.

Each of the hydrologic areas in this river basin group have significant proportions of both agricultural and urbanized land use. The lack of adequate tributary loading data for a substantial number of smaller streams in this river basin group represents one of the more significant data gaps in the Lake Erie basin.

Hydrologic Area 4.3.1 - Black-Rocky Complex. Eight tributaries were identified in this complex for inclusion on the DAM. Of these, only two, the Black River and the Rocky River, were found to have adequate data to consider loading estimations. Of the remaining six tributaries, only Beaver Creek was found to have been sampled for parameters of concern. The Black River has been one of the most intensively studied tributaries in the Great Lakes Basin, and more sampling stations were identified for the Black than for any other Great Lakes tributary.

Because of the large number of downstream stations, many of which have been sampled concurrently, it might be possible to gain insight into the transport of certain parameters from the data. Discharge of the Black River has been gauged since 1944 at a station (4310401) located approximately 19 river kilometers (12 miles) upstream from the mouth. The most useful water quality data of interest have been collected since 1965. A major gap in the chemical data base is the lack of dissolved reactive phosphorus data. The only significant dissolved reactive phosphorus data were obtained during the runoff event sampling conducted as part of the Lake Erie Wastewater Management Study (LEWMS). During the early 1950s some

frequent heavy metal measurements were made over a full annual cycle. Pesticides were measured at a monthly or greater frequency over nearly two years in 1973 and 1974.

The Rocky River, the other major tributary identified in this complex, has been gauged at a station (4310801) located approximately 13 river kilometers (8 miles) upstream from the mouth since 1923. Although not as extensive as that of the Black River, the water quality data record of the Rocky River shows at least monthly sampling over one or more annual cycles for most key parameters. Notably, suspended solids have been sampled intensively since 1969, with some continuous sampling included in some seasons in most of these years. Corresponding with these data are some measurements of particle size at a somewhat reduced frequency.

Significant nutrient data were found for silica, nitrate, total kjeldahl nitrogen, and total phosphorus. Dissolved reactive phosphorus and total soluble phosphorus are essentially unmeasured in this tributary except during the runoff event studies conducted as part of LEWMS. Chloride data are very abundant for a number of stations identified for this tributary. During the early 1950s some heavy metals were measured over a full annual cycle. Pesticides were measured at a monthly or greater period during 1973 and 1974. No data were found for refractory organics.

Hydrologic Area 4.3.2 - Cuyahoga River. The Cuyahoga River is the only tributary included in this hydrologic area. Because the Cuyahoga drains into Lake Erie at the City of Cleveland, the river has considerable urban drainage. The Cuyahoga has been gauged at a station (4320101) located approximately 16 river kilometers (10 miles) from the mouth at various intervals since 1881. Continuous discharge data have been available at this location since 1940.

A long term water quality data record exists for this tributary for several key parameters. Suspended solids have been measured on a continuous basis since 1966. In 1951 and 1952 a number of parameters, including silica, nitrate, chloride, iron and heavy metals were measured three times per month over an annual cycle. A fair amount of particle size data is also available. A major gap in the nutrient data is the sparsity of dissolved reactive phosphorus data. The only significant dissolved reactive phorphorus data were obtained during runoff event analysis as part of the LEWMS in 1975. No data were found for pesticides and refractory organics.

Hydrologic Area 4.3.3 - Chagrin Complex. Of the six tributaries identified in this complex for inclusion on the DAM, Doan Brook, Euclid Creek, and the Chagrin River were found to have adequate water quality data for tributary loading estimate purposes. Although the data available for Doan Brook and Euclid Creek were collected on a monthly basis over a full annual cycle, the data found were collected in 1951 and 1952 and do not cover all parameters of concern (e.g., phosphorus). Also, there are no discharge data for these tributaries.

The Chagrin River has been gauged since 1925 at a station (4330603) located only 8 river kilometers (5 miles) from the mouth. Suspended solids have been sampled on an irregular basis with some continuous sampling included since 1969 at

the discharge gauge. There are some particle size data collected during this same period which correlate with the suspended solids data.

Data on nutrients identified for the Chagrin were generally deemed adequate to consider loadings for nitrate, ammonia, total kjeldahl nitrogen, and total phosphorus. As has been the case with other Lake Erie tributaries in this region, data on dissolved reactive and total soluble phosphorus are relatively meager. Some weekly sampling for total soluble phosphorus in the winter of 1964, some irregular samples during the remainder of that year, and some runoff event sampling in 1975 as part of LEWMS (at station 4330601) may provide some insight into loading of this parameter. The LEWMS has provided the only useful data of dissolved reactive phosphorus for the Chagrin River.

Data on chloride are relatively abundant and are of adequate frequency and period of record to consider tributary loading calculations. Heavy metals were monitored on a weekly or monthly basis over a full annual cycle in 1964, and on a biweekly to monthly basis in the spring seasons of 1973 and 1974. Some pesticide data were collected in 1974 on a biweekly to monthly basis covering a full annual cycle. No refractory organics data were found.

Hydrologic Area 4.3.4 - Grand River. This hydrologic area is composed of Marsh Creek and the Grand River. No water quality or quantity data were located for Marsh Creek. The Grand River, which is one of the more significant tributaries to Lake Erie, has been gauged at a station located approximately 40 river kilometers (25 miles) upstream from the mouth since 1935. This station is located upstream from the confluence of a number of small tributaries with the Grand River. Most of the parameters were found to have sufficient frequency and period of record data for loading calculation purposes. Suspended solids were measured biweekly over an annual cycle in 1968 and 1969. A number of parameters including total solids, nitrate, total soluble phosphorus and chloride were measured weekly in 1964 at station 4340205.

All of the key parameters except total kjeldahl nitrogen have been sampled at a monthly or greater frequency over at least one full year. Data on a number of parameters were collected as far back as 1951 and 1952. Weekly to monthly heavy metal data were collected as part of the two sampling programs conducted in 1951, 1952 and 1964. Some monthly samples were collected in 1971 and 1972 for pesticides, but not over a full annual cycle. No refractory organics data were identified for the Grand River.

Hydrologic Area 4.3.5 - Ashtabula-Conneaut Complex. This complex includes eight Lake Erie tributaries, two of which were found to have sufficient data to consider loading estimations. Of the remaining six tributaries, four were found to have no data available.

The main tributary in this complex is the Ashtabula River, which has been gauged at a near-mouth station (4350601) located approximately 9 river kilometers (5 miles) upstream from the mouth. The period of record of continuous discharge data includes some unmonitored intervals over 42 years. The Ashtabula has been included in many of the Lake Erie tributary surveys conducted over the years. The record for suspended solids is generally good, with biweekly data collected over

an annual cycle in 1968 and 1969. Some other monthly and grab sample data are available for this parameter. Weekly nutrient data for the Ashtabula were obtained in 1964 at station 4350602. Considerable monthly, biweekly and other periodic data exist for nitrate and to a lesser extent for ammonia. Of the phosphorus species measured, total phosphorus has been most frequently sampled, with biweekly sampling conducted in 1967 and 1968, monthly sampling in the spring and summer of 1973, and biweekly sampling again in 1974. Data on dissolved reactive phosphorus are sparse, however, Chloride has been monitored extensively. Heavy metal data have been collected for the Ashtabula over the years at a variety of sampling frequencies, although not over any full annual cycle. Some monthly pesticide data over a full annual cycle are available. No refractory organics data were identified.

Conneaut Creek is gauged at a station (4350802) located approximately 10 river kilometers (6 miles) upstream from the mouth. The most extensive sampling on Conneaut Creek was conducted in 1968, 1969, and 1974 when generally biweekly measurements were made of several parameters of concern. Other sampling is limited to scattered monthly or less frequent data. In the nutrient species, no data were found for dissolved reactive or total soluble phosphorus. Silica data are also sparse. Nitrate, ammonia, total kjeldahl nitrogen and total phosphorus were all sampled from biweekly to monthly in 1973 and 1974. An extensive record of chloride measurements exists.

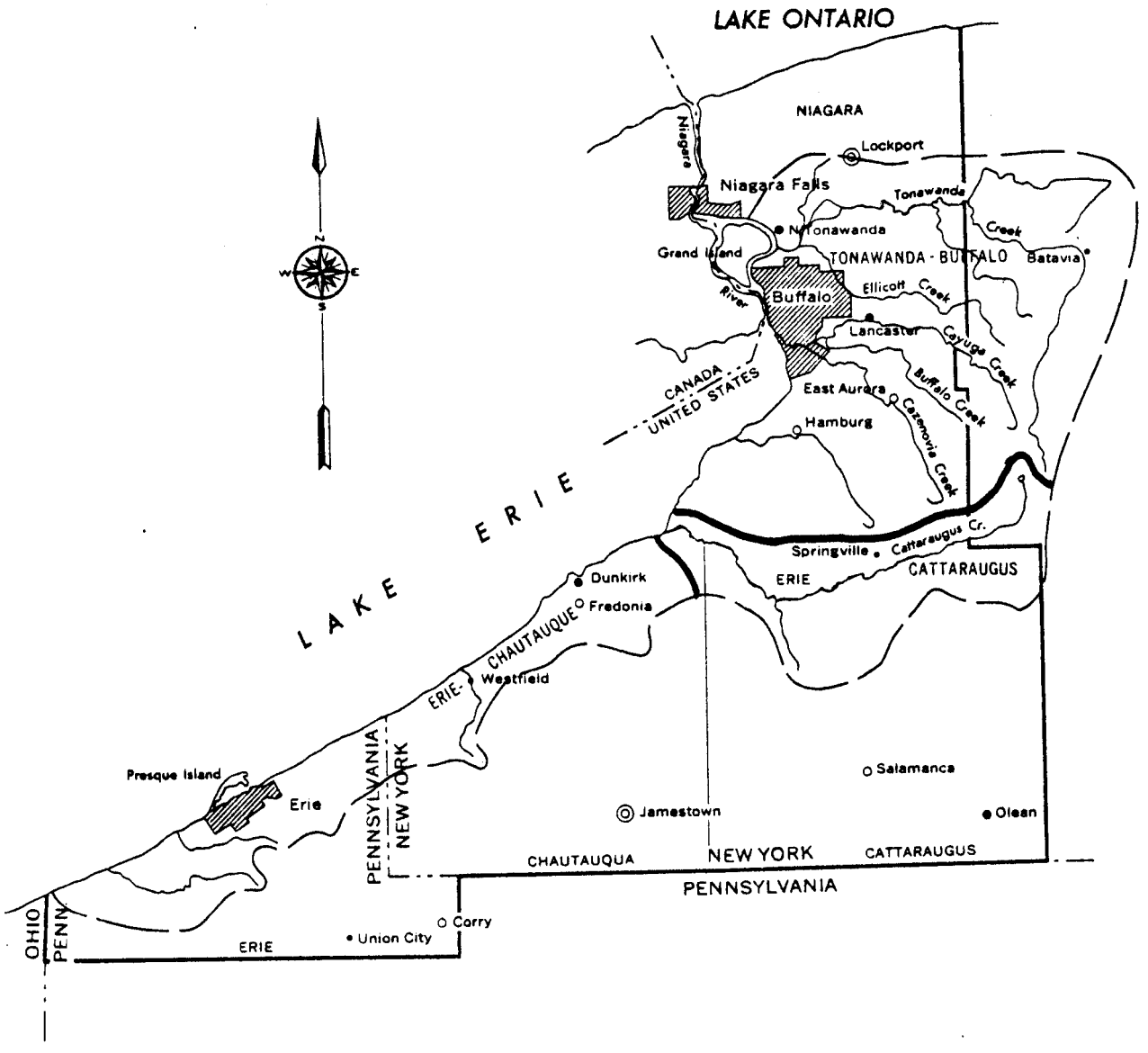
Pesticides were measured on a monthly or greater basis over a full annual cycle on Conneaut Creek. The record of heavy metal data is characterized by at least monthly sampling during the spring period over three separate years. Although these data are not sufficient for loading estimations, they may permit some insight into the springtime loadings of heavy metals.

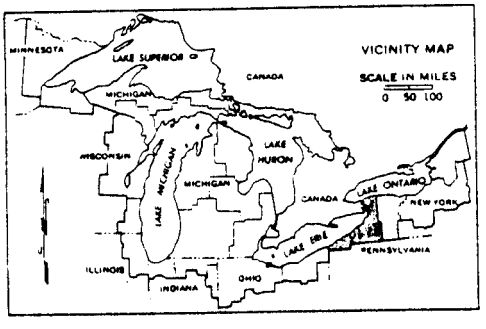
DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 4.4

River Basin Group 4.4 encompasses an area of 6,838 km^2 (2,640 mi^2), shown in Figure 22. This river basin group contains three hydrologic areas. Descriptions and maps of these hydrologic areas follow.

Figure 22

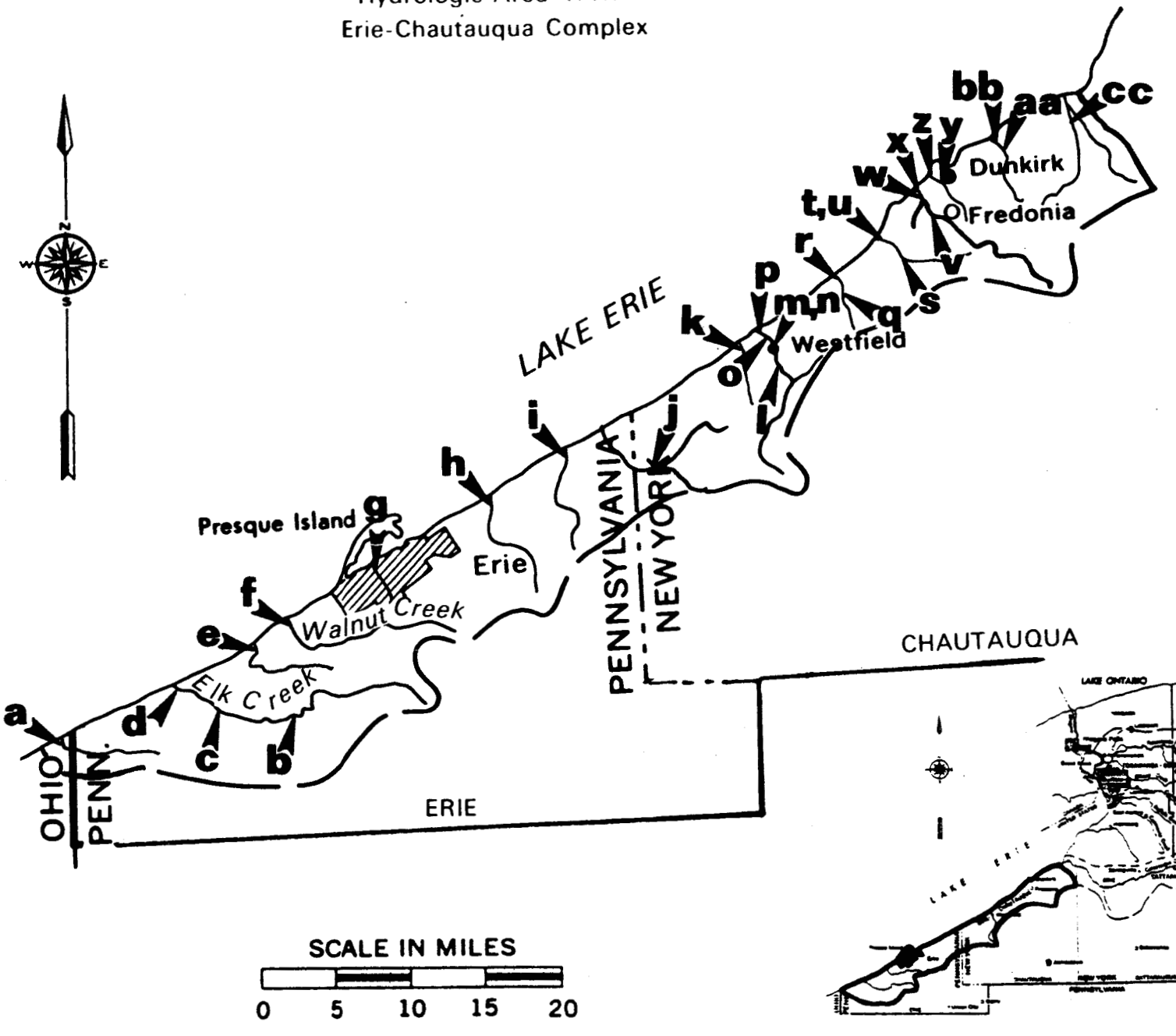
RIVER BASIN GROUP 4.4





SCALE IN MILES
0 5 10 15 20

Hydrologic Area 4.4.1
Erie-Chautauqua Complex



Vicinity Map-RBG 4.4

Hydrologic Area 4.4.1
Erie-Chautauqua Complex

The Erie-Chautauqua Complex covers 169,000 hectares (418,000 acres). Fifty-three percent of the area is located in northern Pennsylvania, with the remaining 47 percent in New York. There are a number of small streams draining the area but no major rivers. The area has a rolling relief with relatively few wetlands. Approximately 45 percent of the complex is forested, about 35 percent is agriculturalized and about 10 percent is urbanized. The bedrock is composed mostly of shale. Overlying material consists of glacial till with some areas of silt and clay. The economy is based heavily upon manufacturing. Despite the small size of the tributaries in this area, they contribute a significant amount of wastewater to Lake Erie. The cities of Erie, Pennsylvania (pop.: 129,231), Fredonia, New York (pop.: 10,326), and Dunkirk, New York (pop.: 16,855), are the major population centers in this area.

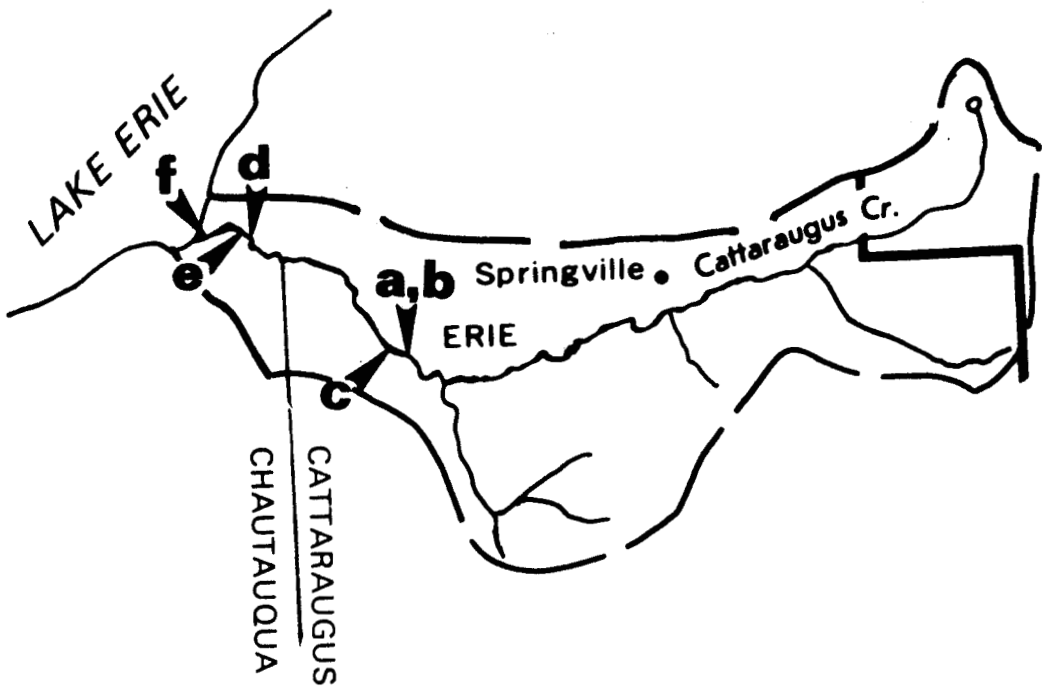
Station Key

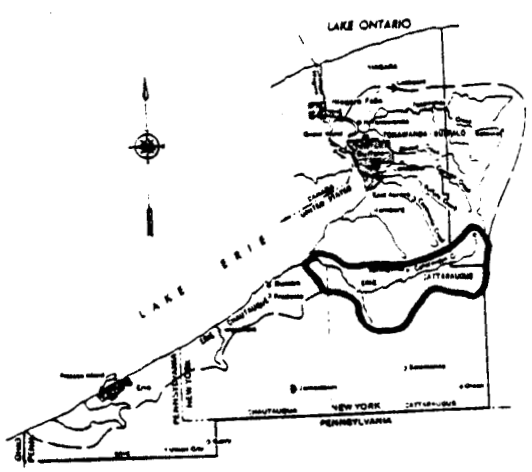
Station Location	DAM River and Station Numbers
Turkey Creek	44101
a	4410101
Elk Creek	44104
b	4410401
c	4410402
d	4410403
Trout Run	44105
e	4410509
Walnut Creek	44106
f	4410608
Cascade Creek	44107
g	4410706
Sixmile Creek	44111
h	4411101
Sixteen Mile Creek	44115
i	4411506
Twentymile Creek	44116
j	4411601
Freelings Creek	44119
k	4411901

Station Key

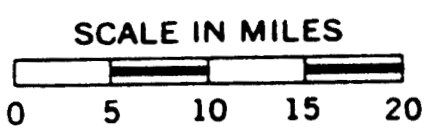
Station Location	DAM River and Station Numbers
Chautauqua Creek	44120
l	4412001
m	4412002
n	4412003
o	4412004
p	4412005
Corell Creek	44126
q	4412601
r	4412602
Little Canadaway Creek	44128
s	4412801
t	4412802
u	4412803
Canadaway Creek	44130
v	4413001
w	4413002
x	4413003
Crooked Brook	44131
y	4413101
z	4413102
Beaver Creek	44134
aa	4413401
bb	4413402
Walnut-Silver Creek	44136
cc	4413601

Hydrologic Area 4.4.2
Cattaraugus River





Vicinity Map-RBG 4.4



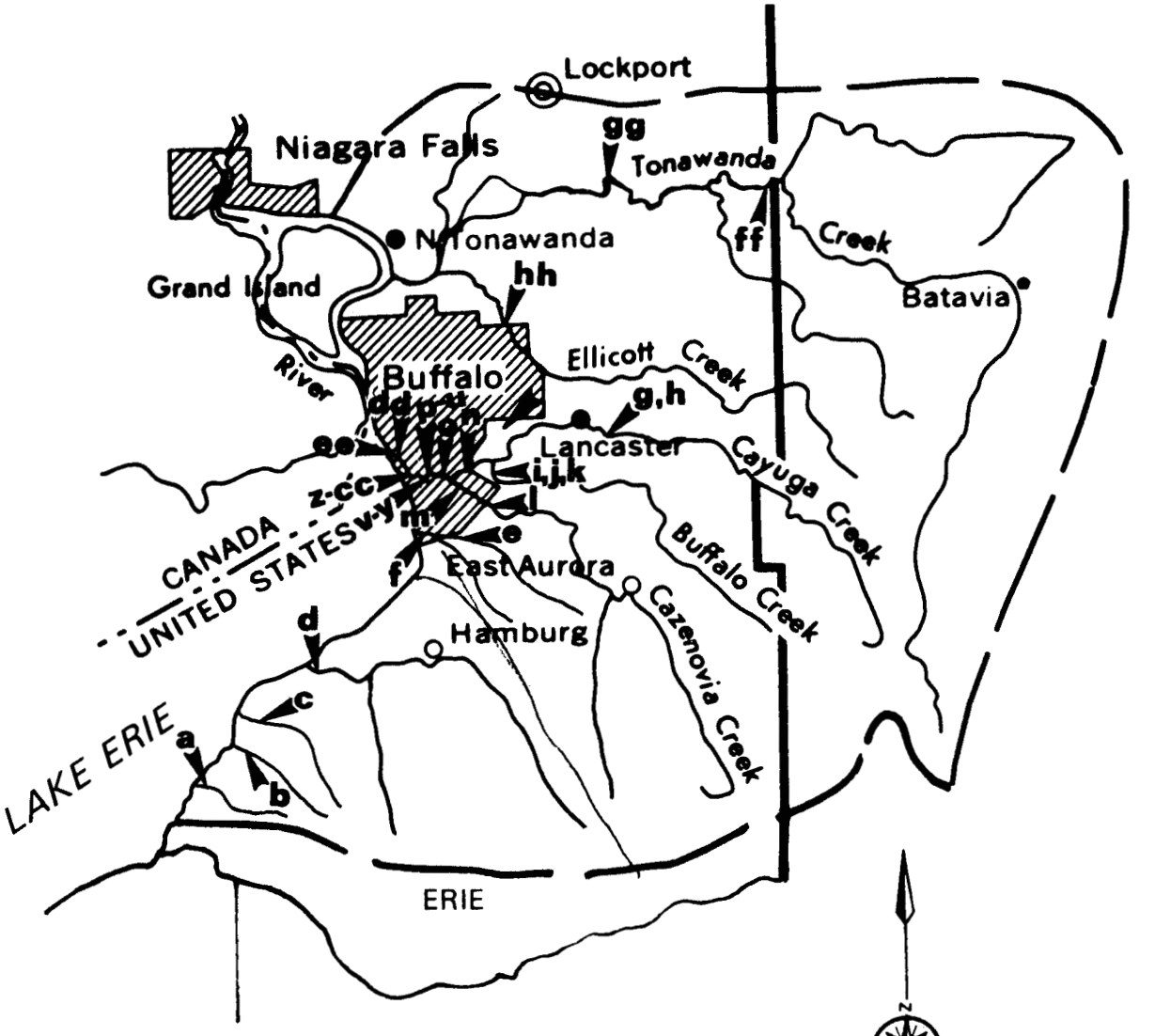
Hydrologic Area 4.4.2
Cattaraugus Creek

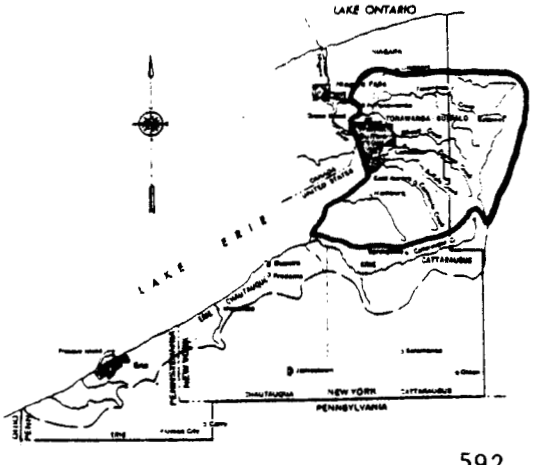
The Cattaraugus Creek drains an area of 144,000 hectares (355,000 acres) in the southwest portion of New York. Cattaraugus Creek has a mean annual discharge of 20.2 m^3/s (713 cfs). The topography of the area is quite hilly with relatively few wetlands. Approximately 50 percent of the area is forested, about 35 percent if devoted to agriculture, and about 10 percent is urbanized. Bedrock consists mostly of shale. The overlying material is predominantly silt and clay near the shore, glacial till in the more southern portions, and sand and gravel in the east. The only important wastewater point sources are discharged near the village of Gowanda (pop.: 3,110), and the village of Arcade (pop.: 3,048). Along with the city of Springville (pop.: 4,350), these villages are the most highly populated zones within this area.

Station Key

Station Location	DAM River and Station Numbers
Cattaraugus Creek	44201
a	4420101
b	4420102
c	4420103
d	4420104
e	4420105
f	4420106

Hydrologic Area 4.4.3
Tonawanda Complex





SCALE IN MILES

0 5 10 15 20

Vicinity Map-RBG 4.4

Hydrologic Area 4.4.3
Tonawanda Complex

The Tonawanda Complex covers 371,000 hectares (917,000 acres) in the western region of New York State. The major tributaries and their mean annual discharges are Eighteen Mile Creek (ungaged), the Buffalo River 11.6 m^3/s (408 cfs), and Tonawanda Creek 7.5 m^3/s (265 cfs). Major tributaries to the Buffalo River are the Cazenovia Creek and the Buffalo Creek. The topography of the area is rolling with relatively few wetlands. Approximately 30 percent of the area is forested, about 30 percent is devoted to agriculture, and roughly 20 percent is urbanized, including the metropolitan Buffalo area. The bedrock is composed mostly of shale. The overlying material consists principly of glacial till in the eastern portions and silt and clay in the west. The economy is based almost entirely upon manufacturing. Eighteen Mile Creek receives wastewater discharges from the Hamburg (pop.: 10,215) area. The Buffalo River is subject to heavy industrial and municipal wastewater loadings from the cities of Buffalo (pop.: 462,768), Lockport (pop.: 25,399), Depew (pop.: 22,158), and Lancaster (pop.: 13,365). Tonawanda Creek receives industrial and municipal wastewater streams from the cities of North Tonawanda (pop.: 36,012) and Tonawanda (pop.: 21,898).

Station Key

Station Location	DAM River and Station Numbers
Muddy Creek	44301
a	4430101
Delaware Creek	44302
b	4430201
Big Sister Creek	44303
c	4430301
Eighteen Mile Creek	44305
d	4430501
Smoke Creek	44306
e	4430601
f	4430602
Buffalo River	44307
g	4430701
h	4430702
i	4430703
j	4430704
k	4430705
l	4430706
m	4430707
n	4430708

Station Key

Station Location	DAM River and Station Numbers
o	4430709
p	4430710
q	4430711
r	4430712
s	4430713
t	4430714
u	4430715
v	4430716
w	4430717
x	4430718
y	4430719
z	4430720
aa	4430721
bb	4430722
cc	4430723
dd	4430724
ee	4430725
Tonawanda Creek	44308
ff	4430801
gg	4430802
hh	4430803

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 4.4.1 Erie-Chautauqua Complex												
		44101	Turkey Creek												
73	18	4410101	Near Conneaut 41-58-23 X 80-31-51			2BC		2B	2BC	2BC		2BC	2BC	2BC	2BC
		44102	Raccoon Creek (No Data Found)												
		44103	Crooked Creek (No Data Found)												
		44104	Elk Creek												
73	15	4410401	41-59-08 X 80-14-13		2D	2D	2D		2D				2D	2D	2D
72	15	4410402	41-59-49 X 84-19-30		2C	2C	2C		2C	2C			2C		2C
73	15	4410403	Route 5 Bridge 42-01-14 X 80-21-41	*	2BC 5D	5B-D	5B-D	5B-D	2B-D			5B-D	5B-D	5B-D	2D
74	"	"	"	*	2ABD	5AD 2BC	5AD 2BC	5AD 2BC				5AD 2BC	5AD 2BC	5AD 2BC	2B
75	"	"	"	*	2A	2A 5CD	5ACD	5ACD				5ACD	5ACD	2A 5CD	
		44105	Trout Run												
72	15	4410501[a]	42-01-41 X 80-14-02				2B		2B	2B			2B		2B

[a]Station not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	ORGANICS REFRACTORY
												TOTAL	DIS-SOLVED		
4410101	2B		2BC	2BC	2BC	2BC			2BC	2BC	2BC	2BC			
4410401	2D		2D	2D		2D			2D		2D				
4410402	2C		2C	2C		2C	2C			2C	2C				
4410403	5B-D		5B-D	5B-D		5B-D			5B-D	2C	5B-D	2C			
"	5AD 2BC		5AD 2BC	5AD 2BC		5AD 2BC			5AD 2BC	2D	5AD 2BC	2D			
"	2AD 5D		5ACD 2B	5ACD 2B		5AD 2BC			2A 5CD	2C	5ACD	2C			
4410501	2B		2B	2B		2B					2B				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	15	4410502[a]	42-01-42 X 80-15-15		2D	2D	2D		2D	2D			2D	2D	2D
72	15	4410503[a]	42-01-41 X 80-15-28				2AB		2AB	2AB			2B		2B
72	15	4410504[a]	42-01-42 X 80-16-00		2D	2D	2D		2D	2D			2D	2D	2D
72	15	4410505[a]	42-01-44 X 80-15-28		2AB		2AB		2AB	2AB		2AB	2AB		2AB
72	15	4410506[a]	42-01-51 X 80-16-36		2D	2D	2D		2D	2D			2D	2D	2D
75	15	4410507[a]	42-02-30 X 80-16-19		2A	2A	2A		2A	2A		2A	2A	2A	2A
72	15	4410508[a]	42-02-41 X 80-16-17				2A		2A	2A					
75	15	4410509	42-02-54 X 80-16-26		2A	2A	2A			2A		2A	2A	2A	2A
		44106	Walnut Creek												
73	15	4410601[a]	42-03-40 X 80-07-00		2A	2A	2A			2A			2A	2A	2A
73	15	4410602[a]	42-03-22 X 80-08-33		2A	2A	2A			2A			2A	2A	2A
73	15	4410603[a]	42-02-57 X 80-09-58		2A	2A	2A			2A			2A	2A	2A
72	15	4410604[a]	42-03-08 X 80-11-28				2C	2C	2C				2C		2C
73	"	"	"		2A	2A	2A			2A			2A	2A	2A
71	15	4410605[a]	42-03-00 X 80-12-30		2B										
73	15	4410606[a]	42-03-01 X 80-13-24		2A		2A			2A			2A		
70	15	4410607[a]	42-04-00 X 80-13-45				2A		5A			2A	2A		5A
72	15	4410608	42-04-23 X 80-14-05	*			2C		2C	2C			2C		2C
73	"	"	"	*	2A-C 5D	2A 5B-D	2A 5B-D	5B-D	2C	2A		5B-D	2A 5B-D	2A 5B-D	2A
74	"	"	"	*	2ABD	5AD 2BC	5AD 2BC	5AD 2BC				5AD 2BC	5AD 2BC	5AD 2BC	2B
75	"	"	"	*	2A	5ACD	5ACD	5ACD				5ACD	5ACD	5AD 2C	5AD 2C

[a]Station not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4410502	2D		2D	2D		2D					2D				
4410503	2B		2B	2B		2B					2B				
4410504	2D		2D	2D		2D					2D				
4410505	2AB		2AB	2AB		2AB			2AB		2AB				
4410506	2D		2D	2D		2D					2D				
4410507	2A		2A	2A		2A			2A		2A				
4410508															
4410509	2A		2A	2A		2A			2A		2A				
4410601	2A		2A	2A		2A			2A		2A				
4410602	2A		2A	2A		2A					2A				
4410603	2A		2A	2A		2A					2A				
4410604	2C		2C	2C		2C					2C				
"	2A		2A	2A		2A					2A				
4410605															
4410606	2A										2A				
4410607	5A		5A	2A		2A			2A		2A				
4410608	2C		2C	2C		2C					2C				
"	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D			5B-D	2C	5B-D	2C			
"	5AD 2BC		5AD 2BC	5AD 2BC		5AD 2BC			5AD 2BC	2D	5AD 2BC	2D			
"	5ACD 2C		5ACD	5ACD		5ACD			5ACD	2C	5ACD	2G			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		44107	Cascade Creek												
74	15	4410701[a]	42-06-04 X 80-06-28		2C	2C	2C		2C				2C	2C	2C
74	15	4410702[a]	42-06-24 X 80-06-33		2C	2C	2C		2C				2C	2C	2C
74	15	4410703[a]	42-06-39 X 80-07-01			2C	2C			2C			2C	2C	2C
74	15	4410704[a]	42-06-59 X 80-07-02		2C	2C	2C		2C				2C	2C	2C
74	15	4410705[a]	42-07-30 X 80-06-39		2C	2C	2C		2C				2C	2C	2C
73	18	4410706	Near Mouth					5D	5D	5D			5D		5D
74	18	"	"					2AB	2AB	2AB			2AB		2AB
		44108[b]	Mill Creek												
73	18	4410801	Near Confluence with Garrison Run					2D	5D	5D			5D		5D
74	"	"	"					2A-C	2AB	2AB			2AB		2AB
		44109[b]	Fourmile Creek												
72	15	4410901	42-08-38 X 80-00-48				2A			2A			2A		2A
72	15	4410902	42-09-30 X 80-01-22				2A	2A	2A	2A		2A	2A		2A
		44110[b]	Unnamed Tributary Between Fourmile and Sixmile Creeks												
74	15	4411001	42-08-20 X 79-59-40				2B			2B			2B		2B
73	15	4411002	42-09-27 X 80-00-34		2B										

[a]Station not shown on Hydrologic Area map (4.4.1).

[b]Tributary and stations not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4410701	2C		2C	2C		2C			2C		2C	2C			
4410702	2C		2C	2C		2C			2C		2C	2C			
4410703	2C		2C	2C		2C			2C	2C	2C	2C			
4410704	2C		2C	2C		2C			2C		2C				
4410705	2C		2C	2C		2C			2C		2C				
4410706	5D		5D	5D	5D	5D	5D	2D			5D	5D			
"	2AB		2AB	2AB	2AB	2AB	2AB	2AB			2AB	2AB			
4410801	5D		5D	5D	5D	5D	5D	2D			5D	5D			
"	2AB		2A-C	2A-C	2A-C	2A-C	2A-C	2A-C			2A-C	2A-C			
4410901	2A		2A	2A											
4410902	2A		2A	2A					2A		2A				
4411001	2B		2B	2B		2B			2B						
4411002	2B										2B				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		44111	Sixmile Creek												
70	15	4411101	42-10-30 X 79-59-18				2A		2A	2A		2A	2A		
		44112[a]	Sevenmile Creek												
70	15	4411201	42-10-49 X 79-57-54				2A		2A	2A		2A	2A		
		44113	Eightmile Creek (No Data Found)												
		44114[a]	Twelvemile Creek												
70	15	4411401	42-12-30 X 79-54-57				2A		2A	2A		2A	2A		
		44115	Sixteenmile Creek												
72	15	4411501[b]	42-12-29 X 79-50-13			2D	2D		2D	2D		2D	2D	2D	2D
72	15	4411502[b]	42-12-29 X 79-50-37			2D	2D		2D	2D		2D	2D	2D	2D
72	15	4411503[b]	42-12-54 X 79-50-06				2B		2B	2B			2B		
72	15	4411504[b]	42-12-54 X 79-50-18				2B		2B	2B			2B		

[a] Tributary and stations not shown on Hydrologic Area map (4.4.1).

[b] Station not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4411101			2A	2A			2A		2A	2A	2A				
4411201	2A		2A	2A			2A		2A	2A	2A				
4411401	2A						2A		2A	2A	2A				
4411501	2D		2D	2D		2D			2D	2D	2D				
4411502	2D		2D	2D		2D			2D	2D	2D				
4411503	2B		2B	2B							2B				
4411504	2B		2B	2B							2B				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	15	4411505[a]	42-14-09 X 79-50-03			2B	2B		2B	2B			2B	2B	2B
73	15	4411506	42-14-11 X 79-50-00	*	2B 5D	2B 5CD	5B-D	2B 5CD	5B	2B		2B 5CD	5B-D	2B 5CD	
74	"	"	"	*	2ABD	5AD 2C	5AD 2BC	5AD 2BC				5AD 2BC	5AD 2BC	5AD 2BC	
		44116	Twentymile Creek												
62	10	4411601	River Mile 9.62			5C	5C			5C		5C	5C	5C	5C
		44117[b]	Unnamed Tributary East of Ripley												
62	10	4411701	River Mile 0.16			5C	5C			5C		5C	5C	5C	5C
		44118[b]	Unnamed Tributary West of Shore Haven												
62	10	4411801	River Mile 0.29			2C	2C			2C		2C	2C	2C	2C
		44119	Freelings Creek												
62	10	4411901	River Mile 0.22			2C	2C			2C		2C	2C	2C	2C
		44120	Chautauqua Creek												

[a] Station not shown on Hydrologic Area map (4.4.1).

[b] Tributary and stations not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4411505	2B		2B	2B		2B			2B	2B	2B				
4411506	5B-D		5B-D	5B-D		2B 5CD			2B 5CD	2C	5B-D	2C			
"	5AD 2BC		5AD 2BC	5AD 2BC		5AD 2BC			5AD 2BC		5AD 2BC				
4411601	5C								5C						
4411701	5C								5C						
4411801	2C								2C						
4411901	2C								2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
62	10	4412001	River Mile 3.55			5C	5C			5C		5C	5C	5C	5C
67	21	4412002	At Westfield 42-18-31 X 79-34-39		2D			2D				2D	2D		
71	21	4412003	At Westfield 42-19-00 X 79-34-45		2C	2C		2C				2C	2C		
62	10	4412004	River Mile 1.32			5C	5C			5C		5C	5C	5C	5C
62	10	4412005	River Mile 0.34			5C	5C			5C		5C	5C	5C	5C
		44121[a]	Doty Creek												
62	10	4412101	River Mile 0.23			2C	2C			2C		2C	2C	2C	2C
		44122[a]	Bournes Creek												
67	21	4412201	At Westfield 42-20-28 X 79-32-29		2C			2C					2C		
67	21	4412202	Near Westfield 42-21-25 X 79-33-05		2C			2C					2C		
62	10	4412203	River Mile 0.42			2C	2C			2C		2C	2C	2C	2C
		44123[a]	Unnamed Tributary at Bournes Beach												
62	10	4412301	River Mile 0.28			2C	2C			2C		2C	2C	2C	2C
		44124[a]	Unnamed Tributary West of Walker Creek												
62	10	4412401	River Mile 0.28			2C	2C			2C		2C	2C	2C	2C

[a]Tributary and stations not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4412001	5C								5C						
4412002	2D	2D	2D						2D	2D	2D				
4412003	2C	2C	2C	2C					2C						
4412004	5C								5C						
4412005	5C								5C						
4412101	2C								2C						
4412201	2C	2C	2C						2C	2C	2C				
4412202	2C	2C	2C						2C	2C	2C				
4412203	2C								2C						
4412301	2C								2C						
4412401	2C								2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		44125[a]	Walker Creek												
62	10	4412501	River Mile 0.11			5C	5C			5C		5C	5C	5C	5C
		44126	Corell Creek												
62	10	4412601	River Mile 2.25			5C	5C			5C		5C	5C	5C	5C
62	10	4412602	River Mile 0.25			5C	5C			5C		5C	5C	5C	5C
		44127[a]	Slippery Rock Creek												
67	21	4412701	US-20 Bridge in Brockton		2C			2C				2C	2C		
62	10	4412702	River Mile 1.46			2C	2C			2C		2C	2C	2C	2C
62	10	4412703	River Mile 0.05			2C	2C			2C		2C	2C	2C	2C
		44128	Little Canadaway Creek												
62	10	4412801	River Mile 3.5			5C	5C			5C		5C	5C	5C	5C
67	21	4412802	42-26-04 X 79-25-15		2BC			2BC				2BC	2BC		
62	10	4412803	River Mile 0.22			5C	5C			5C		5C	5C	5C	5C

[a]Tributary and stations not shown on Hydrologic Area map (4.4.1).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4412501	5C								5C						
4412601	5C								5C						
4412602	5C								5C						
4412701	2C	2C	2C						2C	2C	2C				
4412702	2C								2C						
4412703	2C								2C						
4412801	5C								5C						
4412802	2BC	2BC	2BC						2BC	2BC	2BC				
4412803	5C								5C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		44129[a]	Unnamed Tributary at Van Buren Bay												
62	10	4412901	River Mile 0.16			5C	5C			5C		5C	5C	5C	5C
		44130	Canadaway Creek												
62	10	4413001	River Mile 2.62			5C	5C			5C		5C	5C	5C	5C
75[b]	17	"	"					11B		11B					11B
62	10	4413002	River Mile 1.40			5C	5C			5C		5C	5C	5C	5C
62	10	4413003	River Mile 0.22			5C	5C			5C		5C	5C	5C	5C
72	09	"	"	*		5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
73	"	"	"	*		5	5	5	5	5		5	5	5	5
74	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
		44131	Crooked Brook												
62	10	4413101	River Mile 0.6			5C	5C			5C		5C	5C	5C	5C
62	10	4413102	River Mile 0.26			5C	5C			5C		5C	5C	5C	5C
		44132[a]	Hyde Creek												
62	10	4413201	River Mile 1.64			2C	2C			2C		2C	2C	2C	2C

[a] Tributary and stations not shown on Hydrologic Area map (4.4.1).

[b] Sampled over three storm events by LEWMS (11B).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4412901	5C								5C						
4413001	5C								5C						
"		11B	11B	11B	11B	11B	11B		11B						
4413002	5C								5C						
4413003	5C								5C						
"	5B-D		5B-D	5B-D	5B-D	5B-D			5B-D	5B-D	5B-D		2CD		
"	5		5	5	5	5			5	5	5		2C		
"	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D		2ACD		
4413101	5C								5C						
4413102	5C								5C						
4413201	2C								2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		44133[a]	Scott Creek												
62	10	4413301	River Mile 3.6			2C	2C			2C		2C	2C	2C	2C
62	10	4413302	River Mile 0.28			2C	2C			2C		2C	2C	2C	2C
		44134	Beaver Creek												
62	10	4413401	River Mile 1.03			2C	2C			2C		2C	2C	2C	2C
62	10	4413402	River Mile 0.1			2C	2C			2C		2C	2C	2C	2C
		44135[a]	Unnamed Tributary West of Fletcher Point												
62	10	4413501	River Mile 0.8			2C	2C			2C		2C	2C	2C	2C
		44136	Walnut-Silver Creek												
67	21	4413601	Walnut Creek at U.S. 20 Bridge		2D			2D				2D	2D		
			HYDROLOGIC AREA 4.4.2 Cattaraugus Creek												
		44201	Cattaraugus Creek flow: 20.2 m^3/s (713 cfs)												
75	17	4420101[b]	At Gowanda 42-27-47 X 78-56-07					11B		11B					11B

[a] Tributary and stations not shown on Hydrologic Area map (4.4.1).

[b] Sampled over five storm events by LEWMS (11B).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4413301	2C								2C						
4413302	2C								2C						
4413401	2C								2C						
4413402	2C								2C						
4413501	2C								2C						
4413601	2D	2D	2D						2D	2D	2D				
4420101		11B	11B	11B	11B	11B	11B		11B						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
39-74	21	4420102	At Gowanda 42-27-50 X 78-56-10	*	1										
56	11	"	"		2C			2C				2C	2C		
58	"	"	"		3D			3D				3D	3D		
59	"	"	"		3			3				3	3		
63	"	"	"		5B 2C		5B 2C	5B 2C				5B 2C	5B 2C		
64	09	4420103	River Mile 16.7 42-28-05 X 78-56-30	*		5C		2C	2C			2C	2C	5C	2C
65	"	"	"	*		2AB 5D	2D	2AB 5D	2AB 5D	5D		2AB 5D	2A	2AB 5D	2AB 5D
66	"	"	"	*		5	2C	5	5	5		5	2BD 5C	5	5
67	"	"	"	*		5	5D	5	5	5		5	2C 5D	5	5
68	"	"	"	*	2AB 5CD	5	5	5	5	5		5	5	5ABD 2C	5
69	"	"	"	*	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
70	"	"	"	*	5	5	5	5	5	5		5	5	5	5
71	"	"	"	*	5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD	5BC 2AD			5BC 2AD	5BC 2AD	5BC 2AD
63	11	4420104	At Irving Route 20 Bridge					2C				2C			
64[a]	18	4420105	River Mile 1.5 42-34-12 X 79-06-45	*		4		4	4				4	4	4
67	"	"	"	*	2A 8B-D	2A 8B-D			2A 8B-D						
68	"	"	"	*	8	8			8	8B-D					
69	"	"	"	*	8A 2B	8A 2B			8A 2B	8A 2B					
72	09	"	"	*		5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
73	"	"	"	*		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D
74	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
57	11	4420106	At Mouth					2D				2D			
62	10	"	"			5C	5C			5C		5C	5C	5C	5C

[a]Sampled weekly from January 9 through April 21, 1964 (11AB).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
4420102															
"	2C	2C	2C						2C	2C	2C				
"	3D	3D	3D						3D		2D				
"	3	3	3						3		3				
"	5B 2C	5B 2C	5B 2C						5B 2C	5B 2C	5B 2C				
4420103	9C		2C				2C		2C	2C	2C				
"	2AB 5D		2AB 5D	2AB 5D	5D		2AB 5D		2AB 5D	2B 5D	2B 5D				
"	5		5	5	5		5		5	5	5				
"	5		5	5	5		5		5	5	5				
"	5		5	5	5		5		5	5	5				
"	5B-D		5B-D	5B-D	5B-D		5B-D		5B-D	5B-D	5B-D				
"	5		5	5	5		5		5	5	5				
"	5BC 2AD		5BC 2AD	5BC 2AD	5BC 2AD		5BC 2AD		5BC 2AD	5BC 2AD	5BC 2AD				
4420104	2C								2C						
4420105	4	11AB 5CD	4AB 5CD	11AB	11AB			4AB 5CD	4			11AB 5CD	11AB 5CD		
"						2A 8B-D			2A 8B-D						
"					8B-D	8A			8						
"					8A 2B										
"	5B-D		5B-D	5B-D	5B-D	5B-D			5B-D	5B-D	5B-D		2CD		
"	2A 5B-D		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D			2A 5B-D	2A 5B-D	2A 5B-D		2C		
"	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D		2ACD		
4420106	2D								2D						
"	5C								5C				2C 5D		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 4.4.3 Tonawanda Complex												
		44301	Muddy Creek												
64	11	4430101	1.5 Miles NW of Farnham 42-36-54 X 79-04-54					2B							
70	21	"	"		2C	2C		2C				2C	2C		
71	"	"	"		2C	2C		2C				2C	2C		
72	"	"	"		2C	2C		2C				2C	2C		
		44302	Deleware Creek												
63	11	4430201	Highway 5 Bridge 42-37-46 X 79-03-15					2C				2C			
64	"	"	"					2B							
70	21	"	"		2C			2C				2C	2C		
71	"	"	"		2C	2C		2C				2C	2C		
72	"	"	"		2C	2C		2C				2C	2C		
		44303	Big Sister Creek												
63	11	4430301	Highway Bridge at Evans 42-39-24 X 79-02-29		2C			2C	2C			2C	2C		
64	"	"	"					2B							
70	21	"	"		2C	2C		2C				2C	2C		
71	"	"	"		2C	2C		2C				2C	2C		
72	"	"	"		2C	2C		2C				2C	2C		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4430101															
"	2C	2C	2C	2C	2C				2C						
"	2C	2C	2C	2C					2C						
"	2C	2C	2C						2C	2C	2C				
4430201	2C								2C						
"															
"	2C	2C	2C	2C	2C				2C						
"	2C	2C	2C	2C					2C						
"	2C	2C	2C						2C	2C	2C				
4430301	2C	2C	2C						2C	2C	2C				
"															
"	2C	2C	2C	2C	2C				2C						
"	2C	2C	2C	2C					2C						
"	2C	2C	2C						2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		44304	Little Sister Creek	(No Data Found)											
		44305	Eighteenmile Creek												
63	11	4430501	River Mile 0.6 42-42-44 X 78-58-00		2BC		2BC	2BC				2BC	2BC		
72	09	"	"	*		5B-C	5B-C	5B-C	5B-C	5B-C		5B-C	5B-C	5B-C	5B-C
73	"	"	"	*		5	5	5	5	5		5	5	5	5
74	"	"	"	*		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
		44306	Smoke Creek												
63	11	4430601	River Mile 3.5					2C				2C			
64	"	"	"					2B							
63	18	4430602	At Mouth 42-48-33 X 78-51-55					2C		2C					
		44307	Buffalo River												
51	11	4430701	Cayuga Creek 42-53-24 X 78-38-31		2C		2C	2C				2C	2C		
56	"	"	"		2C		2C	2C				2C	2C		
63	"	"	"		2BC		2BC	2BC				2BC	2BC		
38-68	21	4430702	Cayuga Creek 42-53-24 X 78-38-45	*	1										
74	"	"	"	*	1										

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4430501	2BC	2BC	2BC						2BC	2BC	2BC				
"	5B-C		5B-C	5B-C	5B-C	5B-C			5B-C	5B-C	5B-C	2CD	2CD		
"	5		5	5	5	5			5	5	5	2C	2C		
"	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D		2ABD		
4430601	2C								2C						
"															
4430602															
4430701	2C	2C	2C						2C		2C				
"	2C	2C	2C						2C	2C	2C				
"	2BC	2BC	2BC						2BC	2BC	2BC				
4430702															
"															

RIVER BASIN GROUP 4.4

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
51	11	4430703	Buffalo Creek, 700 ft.up from Gauge Station		2C			2C				2C	2C		
38-74	21	4430704	Buffalo Creek 42-51-16 X 78-45-22		1										
61	"	"	"		3D			3D				3D	3D	3D	
62	"	"	"		3			3[a]				3	3	3B-D	
56	11	4430705	Union Road Bridge 42-51-17 X 78-45-26		2C			2C				2C	2C		
61	"	"	"		2BC			2BC				2BC	2BC		
63	"	"	"		2BC		2BC	2BC				2BC	2BC		
64	"	"	"		2B		2B	2B				2B	2B		
40-74	21	4430706	Cazenovia Creek 42-49-47 X 78-46-33		1										
51	11	"	"		2C			2C				2C	2C		
56	"	"	"		2C			2C				2C	2C		
63	"	"	"		2BC		2BC	2BC				2BC	2BC		
64	"	"	"		2B		2B	2B				2B	2B		
61	18	4430707	Cazenovia Cr.at Baile Ave. 42-51-38X78-49-33					2B							
62	"	"	"									2D	2D		
63	"	"	"												
61	18	4430708	Baile Ave. Bridge 42-51-36 X 78-49-31					2B							
63	"	"	"												
62	18	4430709	At DLW RR Bridge 42-51-38 X 78-50-00					2D				2D	2D		
65	"	"	"			2B		2B		2B		2B	2B		2B
67	"	"	"					2C		2C		2C	2C		2C
73	"	"	"			9D				9D				9D	
73	18	4430710	Upstream from Spark St. Bridge 42-51-49X78-50-30					2D		2D					
62	18	4430711	S. Park St. Bridge 42-51-47 X 78-50-35					2D				2D	2D		
65	"	"	"					2C		2C					
67	"	"	"												2D
73	"	"	"			9CD		2CD		9CD				9CD	

[a]Major data gaps in winter.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4430703	2C	2C	2C						2C		2C				
4430704															
"	3D	3D	3D						3D		3D				
"	3	3[a]	3						3		3				
4430705	2C	2C	2C						2C	2C	2C				
"	2BC	2BC	2BC						2BC	2BC	2BC				
"	2BC	2BC	2BC						2BC	2BC	2BC				
"	2B								2B	2B	2B				
4430706															
"	2C	2C	2C						2C		2C				
"	2C	2C	2C						2C	2C	2C				
"	2BC	2BC	2BC						2BC	2BC	2BC				
"	2B	2B	2B						2B	2B	2B				
4430707	2B														
"	2D								2D						
"			2C												
4430708	2B														
"			2C												
4430709	2D								2D						
"	2B			2B			2B		2B						
"	2C								2C						
"			9D	9D			9D		9D			9D			
4430710			2D	2D			2D		2D		2D	2D			
4430711	2D								2D						
"															
"															
"			2CD	9D			9D		9D		9CD	9CD			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	18	4430712	500 ft. down from S.Park St. 42-51-44 X 78-50-39					2D		2D					
73	18	4430713	1200 ft. down from S.Park St. 42-51-38 X 78-50-46							2D					
73	18	4430714	2000 ft.down from S. Park St. 42-51-29 X 78-50-42					2D		2D					
62	18	4430715	Buffalo Creek Railroad 42-51-38 X 78-50-55					2D				2D	2D		
73	18	4430716	1000 ft. from E&L RR 42-51-43 X 78-50-12					2D		2D					
65	09	4430717	River Mile 3.5 42-51-46 X 78-51-13			2B 5C		2B 5C	2B 5C	2B 5C		2B 5C		2B	2BC
67	"	"	"			9A	2A	9A	9A	9A		2A		9A	2A
62	18	4430718	Penn. Cent. RR Bridge 42-51-47 X 78-51-14									5D	5D		
63	"	"	"									2BC 5D	2BC 5D		
64	"	"	"					2D				2AD 9B 5C	2AD 9B 5C		
65	"	"	"			2BC		2B 5C				2B 5C	2B 5C		2B
67	"	"	"				2A	9A 2C				9A 2CD	9A 2CD		9A 2CD
73	"	"	"			9CD		2CD		9CD				9CD	
73	18	4430719	2000 ft. up from Ohio St. 42-51-47 X 78-51-40					2D		2D					
73	18	4430720	1000 ft.down from Kathine St. 42-51-28 X 78-51-44					2D		2D					
73	18	4430721	River Mile 1.81 42-51-48 X 78-51-49					2D		2D					
64	18	4430722	Ohio Street Bridge 42-51-42 X 78-52-03					2D				2CD	2CD		2C
65	"	"	"					2B 5C				2B 5C	2B 5C		2B
67	"	"	"				2A	9A 2C				9A 2CD	9A 2CD		9A 2CD
68	09	"	"	*		8BD 5C	5BCD	8B-D	8B-D	8B-D		8B-D	8B-D	8B-D	8B-D
69	"	"	"	*		8	8	8	8	8		8	8	8	8
70	"	"	"	*		5	5	5	5	5		5	5	5	5
71	"	"	"	*		5	2A 5B-D	5	5	5		2A 5B-D	2A 5B-D	5	2A 5B-D
72	"	"	"	*		5	5	5	5	5		5	5	5	5
73	"	"	"	*		5	5	5	5	5		5	5	5	5
73	18	"	"	*		9CD		9CD		9D				9CD	
74	09	"	"	*		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4430712			2D	2D			2D		2D		2D	2D			
4430713			2D	2D			2D		2D		2D	2D			
4430714			2D	2D			2D		2D		2D	2D			
4430715	2D								2D						
4430716			2D	2D			2D		2D		2D	2D			
4430717	2B 5C			2B			2B		2B 5C						
"	9A						2A		9A						
4430718	5D								5D						
"	2B 5CD														
"	2AD 9B 5C														
"	2B 5C							2B	2AD 5C 9B						
"									2CD						
"			2D	9D			9D		9D		9D	9CD			
4430719			2D	2D			2D		2D		2D	2D			
4430720			2D	2D			2D		2D		2D	2D			
4430721			2D	2D			2D		2D		2D	2D			
4430722	2CD								2CD						
"	2B 5C							2BC	2B 5C						
"	9A 2CD								9A 2CD						
"	8B-D		8B-D	8B-D	8B-D	8B-D			8B-D	8B-D	8B-D				
"	8		8	8	8		8		8	8A-C 5D	8A-C 5D				
"	5		5	5	5	5			5	5	5				
"	5		2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D			2A 5B-D	2A 5B-D	2A 5B-D				
"	5		5	5	5	5			5	5	5	6	6		
"	5		5	5	5	5			5	5	5		2CD		
"			9D	9CD			9D				9CD	9CD			
"	5AC 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5AC 2BD			5AC 2BD	5AC 2BD	5AC 2BD	2C	2CD		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
64	09	4430723	River Mile 0.9 42-52-17 X 78-52-23			2ACD 9B				2D		2AC 9B			
65	"	"	"			2B 5C	5A	2B 5C	2B 5C	2B 5C		2B 5C			2BC
67	"	"	"			2A		9A	9A	9A		5A		9A	9A
62	18	4430724	Michigan Street Bridge 42-52-17 X 78-52-44									2C 5D	2C 5D		
63	"	"	"									5D 2BC	2B-D		
64	"	"	"					2D				2D	2D		
65	"	"	"			2BC		5C				2BC	2BC		2B
67	"	"	"				2A	9A 2C				9A 2CD	9A 2CD		9A 2CD
71	21	"	"			2D		2D				2D	2D		
73	18	4430725	River Mile 0.36 42-52-34 X 78-52-50					2D		2D					
		44308	Tonawanda Creek flow: 7.5 m^3/s (265 cfs)												
53-74	21	4430801	Near Alabama 43-05-28 X 78-27-15	*	1										
63	11	"	"					2BC				2BC			2BC
64	"	"	"					2B							
63	11	4430802	Tonawanda Creek at Rapids City		2BC		2BC	2BC				2BC	2BC		
64	"	"	"		2B		2B	2B				2B	2B		
63	11	4430803	Ellicott Creek below Williamsville 42-58-40 X 78-45-50		2BC		2BC	2BC				2BC	2BC		
64	"	"	"		2B		2B	2B				2B	2B		
72-74	21	"	"		1										
73	"	"	"		1	2B		2B				2B	2B		

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
4430723	2ACD 9B								2ACD 9B						
"	2B 5C								2B 5C						
"	9A						2A		9A						
4430724	2C 5D								2CD						
"	2BD 5C														
"	2D								2D						
"	2BC								2BC						
"	9A 2CD								9A 2CD						
"	2D	2D	2D	2D					2D	2D	2D	2D	2D		
4430725			2D	2D			2D		2D		2D	2D			
4430801															
"									2BC						
"															
4430802	2BC	2BC	2BC						2BC	2BC	2BC				
"	2B		2B						2B	2B	2B				
4430803	2BC	2BC	2BC						2BC	2BC	2BC				
"	2B		2B						2B	2B	2B				
"															
"	2B	2B	2B						2B	2B	2B				

Evaluation and Summary of Data for River Basin Group 4.4

River Basin Group 4.4 includes three hydrologic areas in two states, with 905 km^2 (348 mi^2) in Pennsylvania, and 5,959 km^2 (2,292 mi^2) in New York. Of the 45 tributaries included in this river basin group, only seven were found to have adequate water quality data for loading purposes, and of these, only two have been gauged at a near-mouth station. Some of these ungauged rivers were sampled instantaneously at the time of water quality measurements. Surprisingly, 34 tributaries in this river basin group have at least some water quality data available and a few have been sampled for discharge at the time of water quality measurements. However, these data were generally not sufficient to consider tributary loading calculations. Of the four major tributaries in River Basin Group 4.4 (Table 4), only two were found to have sufficient water quality and quantity data available to consider loading estimates. Most of the data available for the numerous smaller tributaries were generated as a result of two separate studies conducted in 1962 and 1970. Sampling during these studies was primarily on a grab basis. A number of other minor tributaries were found to have been sampled at least monthly over a full annual cycle. Two tributaries in this river basin group, Canadaway Creek and Cattaraugus Creek were included in the runoff event sampling program conducted as part of LEWMS in 1975. In terms of parameters measured, major data gaps were found for nitrate, total kjeldahl nitrogen and dissolved reactive phosphorus for many of the tributaries. None of the tributaries in this river basin group have been sampled on a monthly or more frequent basis for a full annual cycle for heavy metals, pesticides, or refractory organics.

In general, a significant portion of the drainage area of this river basin group is presently unmonitored and/or ungauged. A great deal of grab samples taken once or twice per year was identified for the bulk of the smaller tributaries in this river basin group but these data cannot be considered adequate for tributary loading estimation purposes. One noticeable characteristics of the data record for this river basin group is that discharge data were generally either not available or were measured by gauging stations above the confluence of major tributaries.

Hydrologic Area 4.4.1 - Erie - Chautauqua Complex. Of the 36 tributaries identified in this complex, 32 were found to have some water quality data available. However, only four were judged to have sufficient water quality data to consider estimating loadings. Most of the data that have been collected were the result of grab samples taken either in the early 1960s or since 1970. None of the tributaries in this complex have been gauged, and the only available discharge data are those taken at the time of water quality samples. All four tributaries found to have adequate water quality loading data were sampled monthly for most key parameters in 1973 and 1974.

Elk Creek, Walnut Creek and Sixteenmile Creek were found to have some useful water quality data, but were not gauged. Suspended solids, silica, total kjeldahl nitrogen and dissolved reactive phosphorus were not measured in these tributaries. Only a few grab samples were analyzed for heavy metals, and no data are available for pesticides or refractory organics.

Canadaway Creek is the most extensively sampled tributary in this hydrologic area. Monthly data are available for several parameters of interest from the spring of 1972 through 1974 at a station (4413003) very close to the mouth. However, no data were found for silica and dissolved reactive phosphorus, except for the data generated as a result of storm event monitoring conducted in the spring of 1975 by LEWMS. No discharge data were found for this tributary.

Individually these tributaries represent insignificant loadings to Lake Erie. Collectively, however, they may contribute significant amounts of pollutants, particularly since they drain areas of significant agricultural activity and some urban areas.

Hydrologic Area 4.4.2 - Cattaraugus Creek. This hydrologic area is comprised entirely of Cattaraugus Creek and its basin. The Cattaraugus has been gauged since 1939 at a station (4420102) located approximately 16 river kilometers (10 miles) upstream from the mouth. In addition, instantaneous discharge measurements were made in conjunction with the many water quality samples taken. As early as 1959 daily monitoring of silica, nitrate, chloride, iron, and other parameters was conducted. Since 1966, a great deal of monthly sampling of many parameters of interest, including dissolved reactive phosphorus, has been conducted on this tributary at station 4420103. In 1964 weekly sampling was conducted in the winter and spring seasons on all the key nutrient parameters except total phosphorus and dissolved reactive phosphorus. Some biweekly data for suspended solids, total kjeldahl nitrogen, and total phosphorus are available for at least a full annual cycle from 1967 to 1969. Monthly sampling has been the rule since 1972 on many parameters of concern.

Cattaraugus Creek was also included as part of the LEWMS, which monitored five major storm runoff events in the spring of 1975, and covered such parameters as suspended solids, all the nutrients except total soluble phosphorus, and chloride. In 1964 heavy metals were included in the sampling program conducted on a weekly basis in the winter and spring seasons and on a monthly basis in the summer and fall seasons. No pesticide or refractory organics data are available.

Hydrologic Area 4.4.3 - Tonawanda Complex. Eight tributaries were identified in this complex for inclusion on the DAM. Of these, Eighteenmile Creek and the Buffalo River were found to have sufficient data to consider estimating loadings. Most of the data found for the smaller tributaries in this complex are characterized by grab samples taken during the summer season in the mid-1960s and again in the mid-1970s.

Eighteenmile Creek was sampled over a full annual cycle in 1973 for suspended solids, some nutrients and chloride. No data were collected on silica and dissolved reactive phosphorus. Also, no discharge data are available to correlate with these water quality data. In 1971-1974 some heavy metals were measured based on grab samples, but none were of sufficient frequency for use in loading calculations. No data are available for pesticides or refractory organics for this tributary.

Although the main steam of the Buffalo River is not gauged, the discharge may be estimated from gauging station data on the three major tributaries to the

Buffalo River. Stations 4430702, 03, and 04 are all located on tributaries to the Buffalo near their confluence with the main stem.

The period of record of water quality data for the Buffalo River extends back to the early 1950s when grab samples were taken for a number of parameters. A noteworthy sampling program was conducted in 1962 at the Buffalo Creek gauging station when silica, nitrate, chloride, and iron and other parameters were sampled on a daily basis. Also, biweekly sampling was conducted from the spring of 1968 through 1969 for such parameters as suspended solids, nitrate, ammonia, total kjeldahl nitrogen, total phosphorus, chloride and other parameters. Biweekly data are also available in 1969 for dissolved reactive phosphorus. A great deal of monthly data exist from 1970 through 1973 for key parameters at station 4430722. Heavy metals have been measured infrequently on the Buffalo River, and no data were found for pesticides and refractory organics.

Few water quality data are available for Tonawanda Creek. The tributary is gauged, although the gauge is located far upstream above the confluence of major tributaries to Tonawanda Creek.

IDENTIFICATION AND EVALUATION OF LAKE ONTARIO DATA

BASIN DESCRIPTION

All of the U.S. portion of the Lake Ontario Basin lies within the State of New York, except for a 247 square kilometer area at the extreme headwaters of the Genessee River which is in Pennsylvania. The 45,765 km^2 (17,670 mi^2) Lake Ontario Basin is divided into River Basin Groups 5.1, 5.2, and 5.3, which drain areas of 9,104 km^2 (3,515 mi^2) 17,656 km^2 (6,817 mi^2), and 5,957 km^2 (2,300 mi^2) respectively. River Basin Groups 5.1 and 5.2 include most of the tributaries to the lake itself and three-fourths of the shoreline. River Basin Group 5.3 is located at the extreme eastern end of the lake near the mouth of the St. Lawrence River. The area is shown on the map in Figure 23.

Four major physiographic provinces are represented in the Lake Ontario Basin. The Appalachian Plateau includes the hilly uplands covering the southern half of the Genessee and Oswego drainage areas and the Finger Lakes Region. All of the lowlands bordering Lake Ontario and extending along the St. Lawrence River through the Thousand Islands area are part of the eastern lake section of the Central Lowlands Province. The broad lowland extending to the outlet of the Great Lakes Basin is part of the St. Lawrence Valley Province. The Adirondack province includes the mountainous headwaters of the Black River. The Adirondack mountains include the highest point in the Great Lakes Basin which, along with the outlet of the Basin, gives the Lake Ontario Basin the greatest extremes in altitude from over 1,370 meters (4,500 feet) to 46 meters (150 feet) above sea level. Much of the Basin has rugged topography, with the deeply incised valleys of the Appalachian Plateau and the severely eroded Adirondack Mountains.

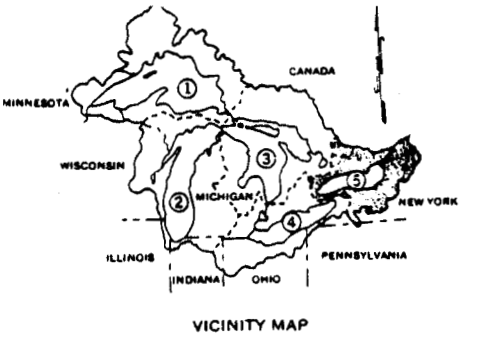
With the exception of the narrow lake plains area in the basin, soils are typically coarse mixtures of sand, gravel, and stones and are high in acidity. Swamps are common in the headwaters. Bedrock outcrops and glacial till deposits over the basin make poor soil constitutents. Land cover in the region is highly variable in nature. Northern hardwoods dominate although many varieties of conifers are intermixed. Red spruce and balsam fir characterize the Adirondack region, with white pine, hemlock, and northern white cedar also present in the Tug Hill Plateau. Over 80 percent of the land is included in agricultural or forested areas. Dairy farming is the predominant economic activity in the basin with fruit and vegetable production important in the western half of the basin and in the Finger Lakes Region.

The 1970 overall basin population density of 55 people per square kilometer (143 people per square mile) is one of the lowest in the entire Great Lakes Region. Over 70 percent of the population lives in nine counties making up the Rochester, Syracuse, and Utica-Rome area.

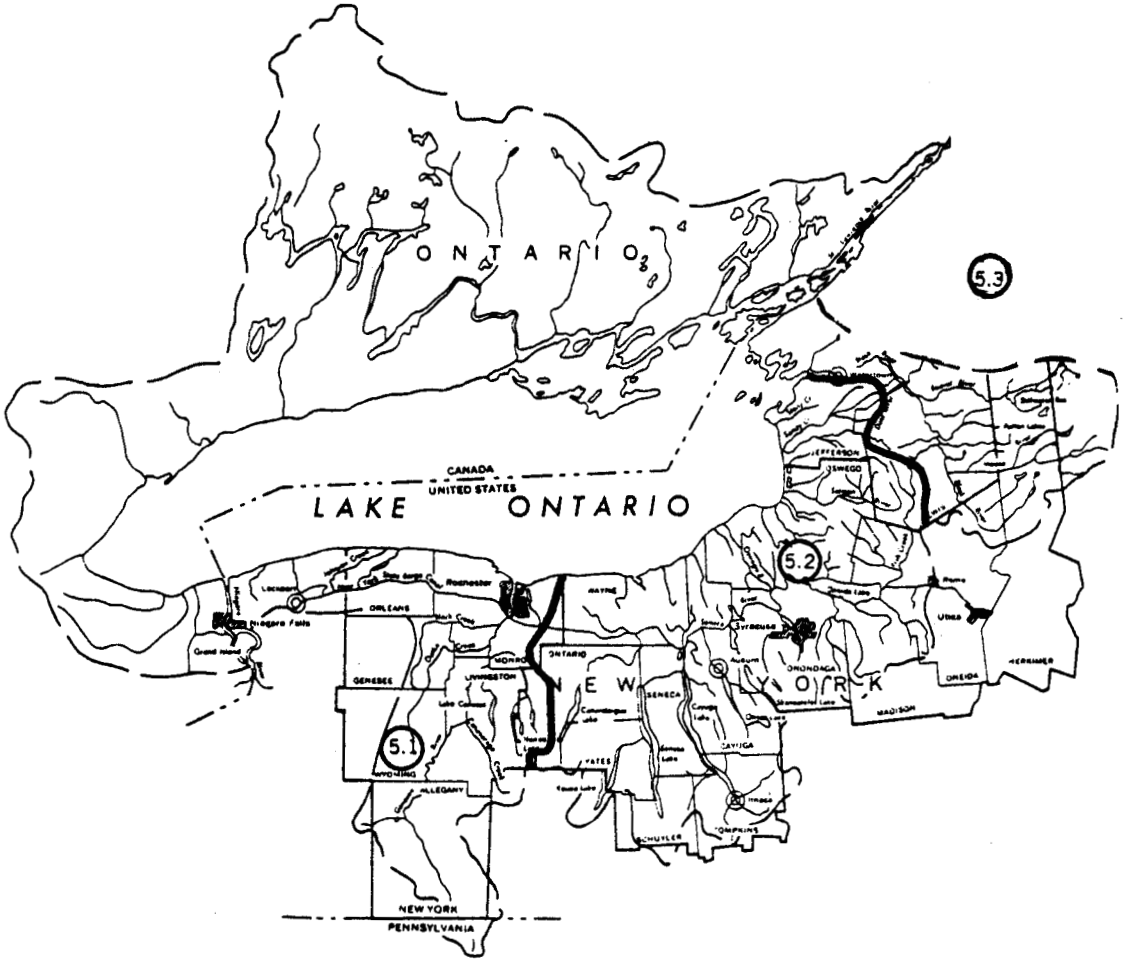
Figure 23

LAKE ONTARIO BASIN, 5

River Basin Groups 5.1 through 5.3



VICINITY MAP



SCALE IN MILES

0 10 20 30 40 50

Mineral resources in the area are composed of significant quantities of iron ore, lead, talc, marble, limestone, and dolomite. Unconsolidated glacial and lake plain deposits provide the basis for the extraction of sand and gravel, peat, marl, and salt.

The average annual inflow to Lake Ontario through the Niagara River and the Welland Canal is 5,721 cubic meters per second (202,000 cubic feet per second). Average annual outflow into the St. Lawrence River is 6,769 m^3/s (239,000 cfs). The net increase in flow of 1,048 m^3/s (37,000 cfs) is generated by the natural inflow from the drainage basin and effected by the man-made conditions within the Lake Ontario Basin. Many basin streams have their origins in the highland region of the Adirondacks, the Tug Hill Plateau, and the Appalachians. They exhibit flashy characteristics with steep gradients and numerous waterfalls. As the streams reach the flatter lakeplain areas, they become sluggish and meander before draining into Lake Ontario. Major rivers in the basin include the Genessee, Oswego, and Black Rivers.

The Genessee River and some of its tributaries are major sediment transporters. The barge canal system, which transverses almost the entire Lake Ontario Basin, include, portions of the Oswego River and its two major tributaries, the Seneca, and Oneida Rivers.

EVALUATION AND SUMMARY OF LAKE ONTARIO DATA

The U.S. Lake Ontario drainage basin has been divided into seven hydrologic areas with 247 km^2 (95 mi^2) and 32,492 km^2 (12,497 mi^2) in Pennsylvania and New York respectively. Only six of the 74 tributaries included on the DAM for this basin had water quality data sufficient for annual loading estimates. Four of the eight major tributaries in the basin (as identified on Table 4) did not have sufficient water quality data for loading estimations. Six tributaries in the basin had gauging stations, although two of the tributaries with gauging stations did not have accompanying water quality data that were deemed adequate for estimates of tributary loading.

Most of the data available for the U.S. Ontario Basin are from the three largest U.S. tributaries to Lake Ontario: the Genessee River, the Oswego River, and the Black River. These tributaries have long-term water quality and discharge records and were all monitored in detail during the IFYGL study. Relative to these major rivers other tributaries in the Ontario basin are small, but since many drain agricultural and/or urban lands they may collectively represent a substantial loading to Lake Ontario.

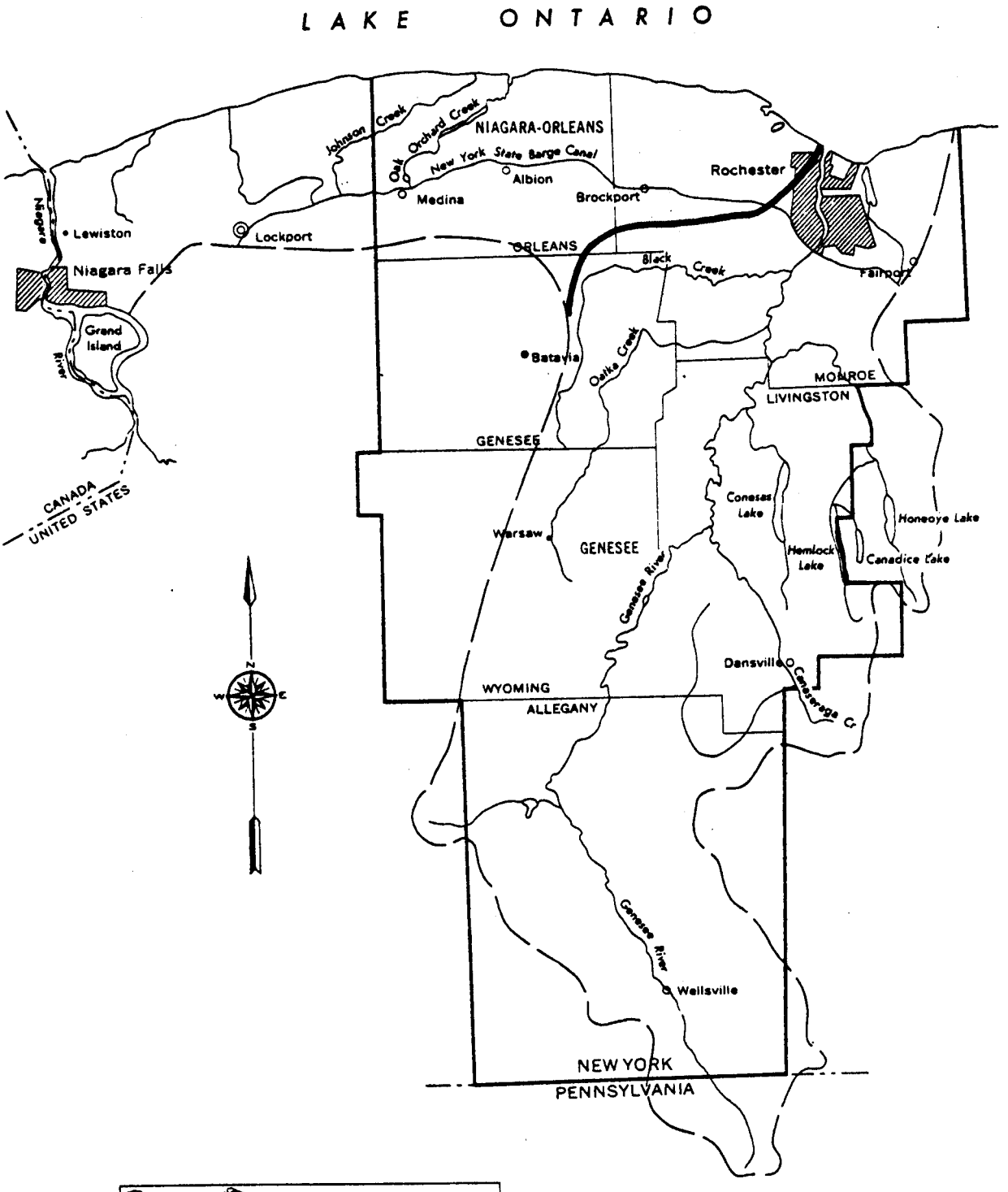
The nutrient data available on the Genessee, Oswego, and Black Rivers include some total soluble phosphorus measurements. Heavy metals were measured during the IFYGL program, but few data were found on pesticides and refractory organics. Although not specifically oriented to runoff events, IFYGL data collected every two to three days in 1972 and 1973 may be useful in interpreting the relative importance of high flow loadings. Specific runoff event monitoring, however, is being conducted as part of PLUARG's Task C Pilot Watershed Study on the Genessee River.

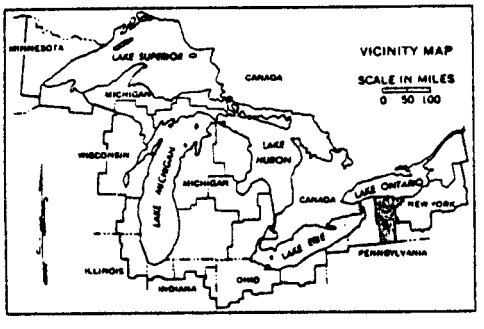
DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 5.1

River Basin Group 5.1 encompasses an area of 9,104 km^2 (3,515 mi^2), shown in Figure 24. This river basin group contains two hydrologic areas. Maps and descriptions of these hydrologic areas follow.

Figure 24

RIVER BASIN GROUP 5.1

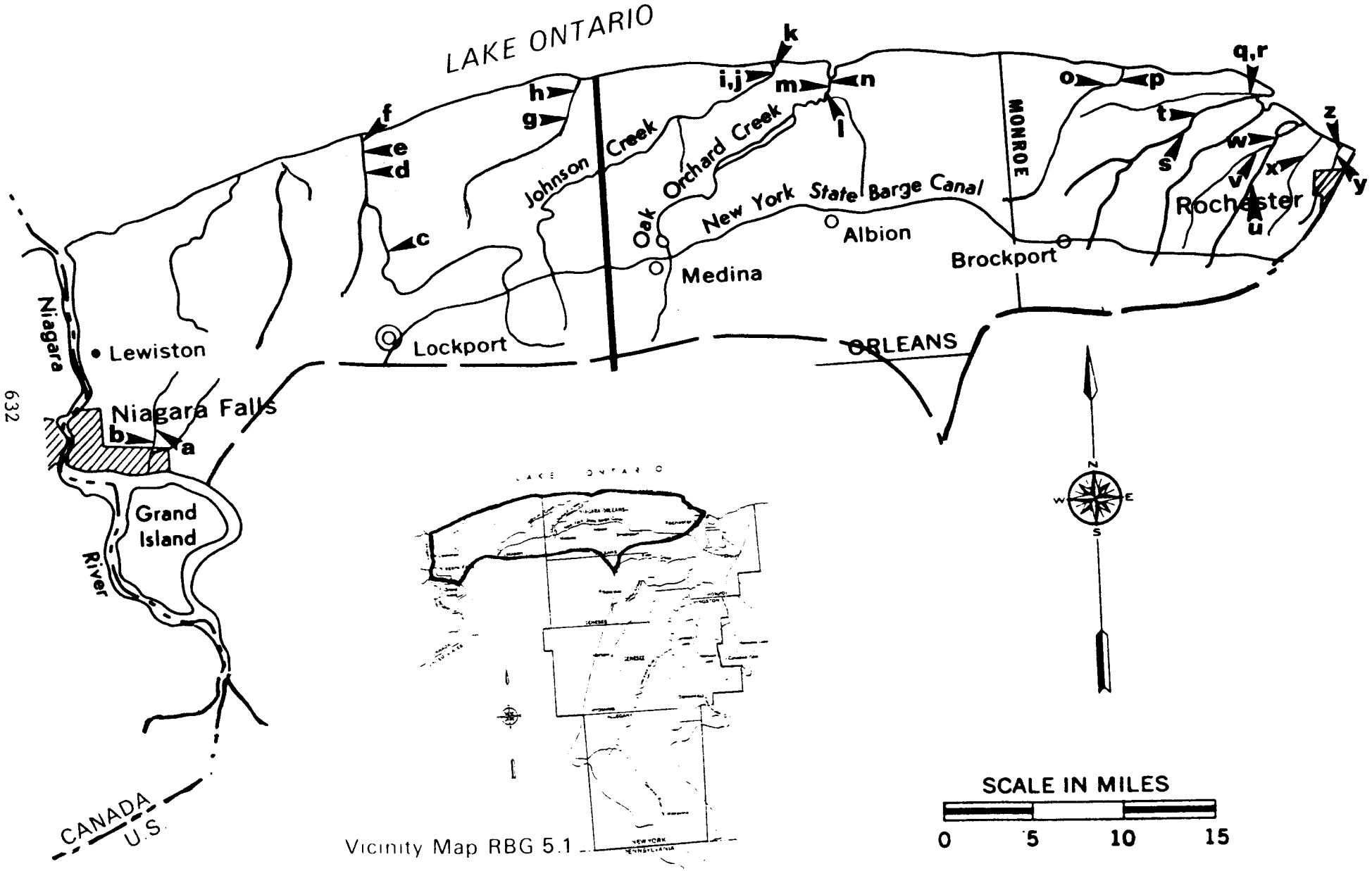




SCALE IN MILES

0 5 10 15

Hydrologic Area 5.1.1
Niagara-Orleans Complex



Vicinity Map RBG 5.1

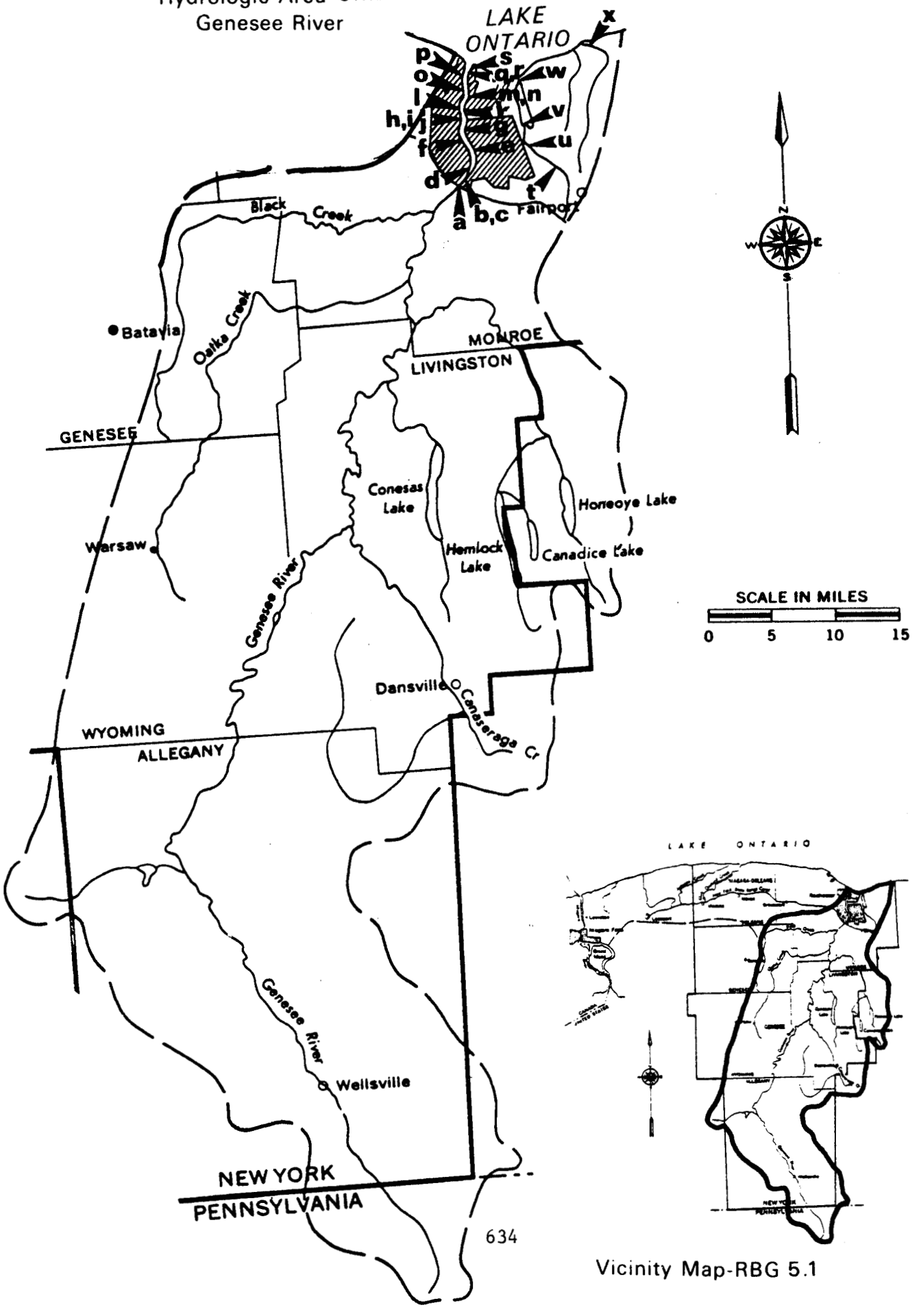
Hydrologic Area 5.1.1
Niagara-Orleans Complex

The Niagara-Orleans Complex covers 269,000 hectares (664,000 acres) in northwestern New York. Major tributaries drainaing this area are Johnson Creek and Oak Orchard Creek, both of which are ungauged. Many additional small streams drain the remaining portions of this area. The New York State barge canal also flows through this complex. The topography is relatively flat. Approximately 50 percent of this area is used for agricultural purposes, about 35 percent is forested, and roughly 10 percent urbanized. The bedrock is composed mostly of shale and dolomite. The overlying material is mainly a mixture of silt and clay with some glacial till. The economy is based heavily upon manufacturing, with some agriculture. The cities of Medena (pop.: 6,415), Albion (pop.: 5,112), Brockport (pop.: 7,878), Niagara Falls (pop.: 85,615), and Rochester (only a portion of the city falls in the watershed pop.: 296,233) exert the greatest human pressure on the area. The cities of Niagara Falls and Rochester are heavily industrialized and utilize the surface waters for large amounts of waste assimilation.

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Cuyuga Creek	51101	Sandy Creek	51116
a	5110101	o	5111601
b	5110102	p	5111602
Eighteen Mile Creek	51107	West Creek	51119
c	5110701	q	5111901
d	5110702	r	5111902
e	5110703	Salmon Creek	51120
f	5110704	s	5112001
Golden Hill Creek	51110	t	5112002
g	5111001	Black Creek	51122
h	5111002	u	5112201
Johnson Creek	51113	v	5112202
i	5111301	w	5112203
j	5111302	Round Pond Creek	51124
k	5111303	x	5112401
Oak Orchard Creek	51114	Slater Creek	51125
l	5111401	y	5112501
m	5111402	z	5112502
n	5111403		

Hydrologic Area 5.1.2
Genesee River



Vicinity Map-RBG 5.1

Hydrologic Area 5.1.2
Genesee River Complex

The Genesee River drains an area of 642,000 hectares (1,586,000 acres). Ninety-six percent of the area is located in western New York with the remaining four percent in Pennsylvania. The Genesee River has a mean annual discharge of 76.8 m^3/s (2,712 cfs). Major tributaries to the Genesee River are the Canaseraga Creek, the Otatka Creek, the Black Creek, and the Honeoye Creek. A barge canal crosses the Genesee River south of Rochester. Guard Locks, located on either side of the river crossing, permit regulation of canal water diverted from Lake Erie. The River has a low slope and many meanders in the lower reaches which results in generally sluggish flow and estuarine effects during low flow conditions. The southern region is characterized by steep rugged terrain, changing to a gently rolling look in the north. There are few wetlands. Approximately 30 to 40 percent of the area is forested, roughly 50 percent is devoted to agriculture, and about 10 percent is urbanized. Bedrock is composed mostly of dolomite and shale. The overlying material is mostly glacial till with some silt and clay. Severe soil erosion occurs in the upper reaches of the watershed. The economy is based upon manufacturing and agriculture in the northern areas with agriculture and forestry being the dominate influence in the south. Approximately four municipalities and three industries induce the greatest pressure upon the river. Discharge from the barge canal also seriously degrades water quality in the river. The city of Rochester (pop.: 296,233) at the mouth of the Genesee River is the most highly industrialized region within this hydrologic area.

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Genesee River	51201	Genesee River	
a	5120101	o	5120115
b	5120102	p	5120116
c	5120103	q	5120117
d	5120104	r	5120118
e	5120105	s	5120119
f	5120106	Irondequoit Creek	51202
g	5120107	t	5120201
h	5120108	u	5120202
i	5120109	v	5120203
j	5120110	w	5120204
k	5120111	Mill Creek	51203
l	5120112	x	5120301
m	5120113		
n	5120114		

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 5.1.1 Niagara-Orleans Complex												
		51101	Cayuga Creek												
58	18	5110101	At Tuscarora Road									2AB	2AB		
58	18	5110102	At Porter Road									2AB	2AB		
		51102	Four Mile Creek (No Data Found)												
		51103	Six Mile Creek (No Data Found)												
		51104	Twelve Mile Creek (No Data Found)												
		51105	East Branch of Twelve Mile Creek (No Data Found)												
		51106	Hopkins Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS TOTAL	HEAVY METALS DISSOLVED	PESTICIDES	REFRACTORY ORGANICS
5110101	2AB														
5110102	2AB														

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		51107	Eighteen Mile Creek												
71	21	5110701	2.5 Miles South of Newfane	*		2CD		2CD		2CD			2CD	2CD	2CD
72	"	"	"	*		6	2D	6		6			6	6	2A-C
73	"	"	"	*		2A 5BC	2A 5BC	2A 5C		2C			2BC	2A 5BC	
65	18	5110702	Near Burt 43-18-31 X 78-42-56			2B	2B	2B		2B			2B	2B	2B
66	"	"	"			5B	5BC 2D	5B-D		5BC			5B-D	5B	5B-D
67	"	"	"	*		5CD	5C 2D	5CD	5CD	5CD			5CD	2C 5D	5CD
68	"	"	"	*		5	5	5	5	5			5	5	5
69	"	"	"	*		5	5	5	5	5			5	5	5
70	"	"	"	*		2BCD	5BC 2D	5BC 2D	5BC 2D	5BC 2D			5BC 2D	5BC 2D	5BC 2D
71	"	"	"	*		2A	2AD	2AD	2AD	2AD		2C	2AD	2AD	2AD
56	10	5110703	N. Y. C. RR Bridge River Mile 1.8			2C	2C					2C	2C	2C	2C
56	10	5110704	NY-18 Bridge River Mile 0.2			2CD	2CD					2C	2CD	2CD	2CD
57	"	"	"			2B	2B					2B	2B	2B	2B
		51108	Keg Creek	(No Data Found)											
		51109	Fish Creek	(No Data Found)											
		51110	Golden Hill Creek												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5110701	2CD		2CD	2CD	2CD	2CD			2CD		2C		2C	2C	
"	6	2D	6	2A-C	2A-C	6			2A-C		2D	2D	2D	2D	2D
"	2A 5BC	2C	2A 5BC			2A 5BC				2C	2C	2A 5BC		2BC	2BC
5110702	2B	2B	2B	2B	2B	2B		2B	2B						
"	5B-D	5B-D	5BC 2D	5BC 2D	5BC 2D	5B-D		5B-D	5BC 2D						
"	5CD		5CD	5CD	5CD	5CD		5CD	5CD		5CD				
"	5	5B-D 2A	5	5	5	5		5	5		5				
"	5	5	5	5	5	5		5	5		5				
"	5BC 2D	5BC 2D	5BC	5BC 2D	5BC 2D	5BC 2D		5BC 2D	5BC 2D		5BC 2D				
"	2AD	2AD	2AD	2AD	2AD	2AD	2D	2ACD	2AD		2ACD				
5110703	2C														
5110704	2CD														
"	2B								2B						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
57	10	5111001	NY-18 Bridge			2C							2C	2C	2C
57	10	5111002	Bridge 1.5 Miles West of County Line			2B	2B					2B	2B	2B	2B
		51111	Marsh Creek (No Data Found)												
		51112	Unnamed Tributary West of Sunset Beach (No Data Found)												
		51113	Johnson Creek												
71	21	5111301	At Kuckville River Mile 1.5	*		5C 2D	5C 2D	5C 2D	5C 2D	5C 2D			5C 2D	2CD	5C 2D
72	"	"	"	*		5C 2D	5C 2D	5C 2D	5C	5C			5C 2D	5C 2D	5C
73	"	"	"	*		5C	5C	5C						5C	
57	10	5111302	Route 18 Bridge			2B	2B					2B	2B	2B	2B
57	10	5111303	0.5 Miles North of Kuckville			2C							2C	2C	2C
		51114	Oak Orchard Creek												
57	10	5111401	Route 18 Bridge			2B	2B					2B	2B	2B	2B
57	10	5111402	At Bridge Downstream from Route 18			2C							2C	2C	2C
65	18	5111403	At The Bridges 43-21-12 X 78-11-15			5A 8B-D	2D	5A 8B-D		5AC 8BD			2B 5C 8D	5B 8CD	5
66	18	"	"			2A	2A	5A		5A			5A	5A	5A

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
5111001	2C														
5111002	2B								2B						
5111301	5C 2D	2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		5C 2D					5C 2D	5C
"	5C 2D	2D	5C 2D	5C 2D	5C 2D	5C 2D	5C 2D		5C	2D	2D	2D		5C 2D	5C 2D
"	5C	2C	5C			5C				2C	2C	5C		5C	5C
5111302	2B								2B						
5111303	2C														
5111401	2B								2B						
5111402	2C														
5111403	2B 5C 8D		5A 8B-D	5A 8B-D	8CD	2C 8D		5A 8B-D	2B 5C 8D						
"	5A		2A	2A	2A	5A		5A	5A						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
67	18	5111403	(Continued)			5D	2CD	2C 5D	2C 5D	2C 5D			2C 5D	2C 5D	2C 5D
68	"	"	"			5	5	2A 5B-D	5	2A 5B-D			5	5	5
69	"	"	"			5ACD 2B	5	5	5	5			5	2AB 5CD	5
70	"	"	"			5B 2D	5BC 2D	5BC 2D	5BC 2D	5BC 2D			5BC 2D	5BC 2D	5BC 2D
71	"	"	"				2D	2D	2D	2D		2C	2D	2D	2D
		51115	Bald Eagle Creek		(No Data Found)										
		51116	Sandy Creek												
65	09	5111601	Near North Hamlin RM 1.6 43-20-21 X 77-54-56			5B 8C 2D	5B 8C 2D							8BC 2D	8BC 2D
65	18	"	"			5A 8B-D	2D	2B 5C 8D		5A-C			2B 5C 8D	5B 8CD	5
66	"	"	"			5A 2B	5A 2B	5A 2B		5A 2B			5A 2B	5A 2B	5A 2B
66	09	"	"			9C	9C							9C	8C
67	"	"	"			8C	8C 2D							8C 2D	8C 2D
67	18	"	"			2C 5D	2C 5D	2C 5D	2C 5D	2A 5D			2C 5D	2C 5D	2C 5D
68	"	"	"			2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D			2A 5B-D	2A 5B-D	2A 5B-D
68	09	"	"			9C 2D	9C 2D							9C 2D	9C 2D
69	"	"	"			8C	8C							9C	9C
69	18	"	"			2B 5CD	2B 5CD	5B-D	5B-D	5B-D			5B-D	5C 2BD	5B-D
70	"	"	"			6	5BC 2D	2AD 5BC	2AD 5BC	2AD 5BC			2AD 5BC	2AD 5BC	2AD 5BC
70	09	"	"			8C	8C							8C	8C
71	18	"	"				2D	2D	2D	2D		2C	2D	2D	2D
72	09	"	"			9C 2D	9C 2D	9C 2D					9C 2D	9C 2D	9C 2D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5111403	2C 5D		2C 5D	2C 5D	2C 5D	2C 5D		2C 5D	2C 5D		2C 5D				
"	5	2A 5B-D	5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D				
"	5	2B 5ACD	5	5	5	5		5	5		5				
"	5BC 2D	5BC 2D	5BC	5BC 2D	5BC 2D	5BC 2D		5BC 2D	5BC 2D		5BC 2D				
"	2D	2D	2D	2D	2D	2D		2D	2D		2CD				
5111601	5B 8C 2D								5B 8C 2D						
"	2B 5C 8D		8B-D	8B-D	8CD	2C 8D		2A 8B-D	2B 5C 8D						
"	5A 2B			2A		5A 2B		5A 2B	5A 2B						
"	9C								9C						
"	8C 2D								8C 2D						
"	2C 5D		2C 5D	2C 5D	2C 5D	5D		5D	2C 5D		2C 5D				
"	2A 5B-D	5B-D	2A 5B-D	5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D				
"	9C 2D								9C 2D						
"	9C								9C						
"	5B-D	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D		5B-D				
"	2AD 5BC	2AD 5BC	2A 5BC	2AD 5BC	2AD 5BC	2ABD 5C		2ABD 5C	2AD 5BC		5BC 2D				
"	8C								8C						
"	2D	2D	2D	2D	2D	2CD	2D	2CD	2D		2CD				
"	9C 2D					2CD					9C 2D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	09	5111601	(Continued)			4C	4C	4C					4C	4C	4C
57	10	5111602	Route 19 Bridge			2B	2B					2B	2B	2B	2B
		51117	Cowsucker Creek	(No Data Found)											
		51118	East Creek	(No Data Found)											
		51119	West Creek												
65	18	5111901	Bennett Rd. Bridge Near Hilton 43-18-30X77-46-30			2A 8B-D	2D	2B 5C 8D		2A 5B 8CD			2B 5C 8D	5B 8CD	2B 5CD
66	"	"	"			5A	5A	5A		5A			5A	5A	5A
67	"	"	"	*		2C 5D	2C 5D	2C 5D	2C 5D	2C 5D			2C 5D	2C 5D	2C 5D
68	"	"	"	*		2A 5B-D	5B-D	2A 5B-D	2A 5B-D	2A 5B-D			2A 5B-D	2AB 5CD	2A 5B-D
69	"	"	"	*		2AC 5BD	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D			2A 5B-D	2B 5CD	2A 5B-D
70	"	"	"	*		5B	5B	5B 2C	5B 2C	5B 2C			5B 2C	5B 2C	5B 2C
70	21	"	"	*	2CD	2CD		2CD	2CD	2CD			2CD	2CD	2CD
71	"	"	"	*	2AB	2AB		2AB	2AB	2AB			2AB	2AB	2AB
65	09	5111902	River Mile 1.5 43-18-31 X 77-46-29			8BC	8BC							8BC	8BC
66	"	"	"			8C	8C							8C	5C
67	"	"	"			8C	8C 2D							8C 2D	8C 2D
68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			8C	8C							8C	8C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5111601	4C					4C					4C				
5111602	2B								2B						
5111901	2B 5C 8D		2A 5D 8BC	2A 5D 8BC	8C 5D	2C 8D		2A 8B-D	2BC 8D						
"	5A		2A	2A	2A	2A		5A	5A						
"	2C 5D		2C 5D	2C 5D	2C 5D	2C 5D		2C 5D	2C 5D		2C 5D				
"	2A 5B-D	5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D				
"	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D		2A 5B-D	2A 5B-D		2A 5B-D				
"	5B 2C	5B 2C	5B 2C	5B 2C	5B 2C	5B 2C		5B 2C	5B 2C		5B 2C				
"	2CD		2CD	2CD	2CD	2CD	2CD						2C	2C	
"	2AB		2AB	2AB	2AB	2AB	2AB								
5111902	5B 8C								8BC 2D						
"	8C								9C						
"	8C 2D								8C 2D						
"	8C 2D								8C 2D						
"	8C								8C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
70	07	5111902	(Continued)			8C	8C							8C	8C
71	"	"	"			5C	5C							5C	5C
		51120	Salmon Creek												
66	09	5112001	River Mile 4.2 43-17-10 X 77-47-30			8C	8C							8C	8C
67	"	"	"			2C	2CD							2CD	2CD
68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69-70	"	"	"			8C	8C							8C	8C
71	"	"	"			5C	5C							5C	5C
72	"	"	"				4C 9D	9C 2D					9C 2D	4C 2D	4C 2D
73	"	"	"				4C	4C					4C	4C	4C
65	09	5112002	River Mile 3.0 43-17-34 X 77-46-37			8BC 2D	5B 8C 2D							8BC 2D	8BC 2D
66	"	"	"			8C	8C							8C	8C
67-69	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
70	"	"	"			8C	8C							8C	8C
71	"	"	"			5C	5C							5C	5C
72	"	"	"			4C 2D	4C 2D	9C 2D					9C 2D	4C 2D	4C 2D
73	"	"	"			4C	4C	4C					4C	4C	4C
		51121	Buttonwood Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5111902	8C								8C						
"	5C						5C		5C						
5112001	8C								8C						
"	2CD								2CD						
"	8C 2D								8C 2D						
"	8C								8C						
"	5C								5C						
"	4C 2D					2CD			4C 2D						
"	4C					4C			4C						
5112002	5B 8C 2D								5B 8C 2D						
"	8C								8C						
"	8C 2D								8C 2D						
"	8C								8C						
"	5C					5C			5C						
"	4C 2D					2CD			4C 2D						
"	4C					4C			4C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		51122	Black Creek												
66	09	5112201	River Mile 4.0 43-12-32 X 77-46-47			8C	8C							8C	8C
67-68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			5C	5C							5C	5C
70	"	"	"			8C	8C							8C	8C
66	09	5112202	43-16-26 X 77-45-02			8C	8C							8C	8C
67-68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			5C	5C							5C	5C
70	"	"	"			8C	8C							8C	8C
65	09	5112203	River Mile 0.4 43-16-53 X 77-42-54			8BC 2D	8BC 2D							8BC 2D	8BC 2D
66	"	"	"			8C	8C							8C	8C
67-68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			5C	5C							5C	5C
70	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
		51123	Larkin Creek (No Data Found)												
		51124	Round Pond Creek												
66	09	5112401	River Mile 1.6 43-15-45 X 77-39-56			8C	8C							8C	8C
67-68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			5C	5C							5C	5C
70	"	"	"			8C	8C							8C	8C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5112201	8C								8C						
"	8C 2D								8C 2D						
"	5C								5C						
"	8C								8C						
5112202	8C								8C						
"	8C 2D								8C 2D						
"	5C								5C						
"	8C								8C						
5112203	8BC 2D								8BC 2D						
"	8C								8C						
"	8C 2D								8C 2D						
"	5C								5C						
"	8C 2D								8C 2D						
5112401	8C								8C						
"	8C 2D								8C 2D						
"	5C								5C						
"	8C								8C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	09	5112401	(Continued)			5C	5C							5C	5C
72	"	"	"				4C 2D	9CD					9CD	4C 2D	4C 2D
73	"	"	"				4C	4C					4C	4C	4C
		51125	Slater Creek												
66	09	5112501	River Mile 1.0 43-15-49 X 77-38-14			8C	8C							8C	8C
67- 68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			5C	5C							5C	5C
70	"	"	"			8C	8C							8C	8C
67	09	5112502	At Mouth 43-16-09 X 77-37-34			2D	2D							2D	2D
68	"	"	"			2C	2C							2C	2C
69	"	"	"			5C	5C							5C	5C
70	"	"	"			8C	8C							8C	8C
71	"	"	"			5C	5C							5C	5C
72	"	"	"			4C 9D	4C 9D	9C 2D					9C 2D	4C 9D	4C 9D
73	"	"	"			4C	4C	4C					4C	4C	4C
			HYDROLOGIC AREA 5.1.2 Genesee River												
		51201	Genesee River flow: 76.8 m^3/s (2,712 cfs)												
72	21	5120101	NY-47 43-07-28 X 77-37-56												
73	"	"	"												
73	18	5120102	River Mile 9.1			5C 9D								5C 9D	5C 9D

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5112401	5C						2C		5C						
"	4C 2D					2CD			4C 2D						
"	4C					4C			4C						
5112501	8C								9C						
"	8C 2D								8C 2D						
"	5C								5C						
"	8C								8C						
5112502	2D								2D						
"	2C								2C						
"	5C								5C						
"	8C								8C						
"	5C								5C						
"	4C 9D					9CD			4C 2D						
"	4C					4C			4C						
5120101													2D		
"													2D		
5120102	5C 9D		9D	2C 9D	2C 9D		9D		9D						

RIVER BASIN GROUP 5.1

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
65	09	5120103	River Mile 9.0 43-08-32 X 77-36-55			2D	2D							2D	2D
66-68	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
69	"	"	"			8C	8C							8C	8C
70	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
71	"	"	"			5C	5C							5C	5C
72	"	"	"			9C 2D	9C 2D	9C 2D					9C 2D	9C 2D	9C 2D
73	"	"	"			4C	4C	4C					4C	4C	4C
70	21	5120104	I-490 in Rochester 43-09-05 X 77-36-34		2D	2D		2D				2D			
75	09	5120105	River Mile 7.2 43-09-24 X 77-37-25			8B-D		8B-D		8B-D		8B-D	8B-D	8B-D	
76[b]	"	"	"			8A		8A		8A		8A	8A	8A	
54-74	21	5120106	River Mile 6.1 43-10-50 X 77-37-40	*	1	1									
68	09	"	"	*	2BD 5C	5BC 2D	2CD	5B-D	5B-D	5B-D		5B-D	5B-D	5BC 2D	5BC 2D
69	"	"	"	*		2AC 5BD	2AC 5BD	2AC 5BD	2AC 5BD	2AC 5BD		2AC 5BD	2AC 5BD	2AC 5BD	2AC 5BD
70	"	"	"	*	2D	5	5	5	5	5		5	5	5	5
70	21	"	"		1	1		2BD				2BD	2BD		
71	"	"	"		1	1		2B				2B	2B		
71	09	"	"	*	2B	8B 5CD	8B 5CD	8B 5CD	8B 5CD	8B 5CD		8B 5CD	5B-D	5B-D	5B-D
72	"	"	"	*	2B 9D	5	5	5	5	5		5	5	5	5
72	21	"	"		1	1		2AB		2A		2AB	2AB		2A
73	09	"	"	*	5ABD 8C	5	5	5	5	5		5	5	5ABD	5
74	"	"	"	*	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
65	09	5120107	River Mile 5.0 43-11-34 X 77-37-15			8C 2D	4C 5D							8C 2D	8C 2D
66	"	"	"		8C 2D	5BD 8C	5BD 8C							5BD 8C	5BD 8C
67	"	"	"			5B 8C 2D	5B 8C 2D							5B 8C 2D	5B 8C 2D
68	"	"	"			2BD 8C	2BD 8C							2BD 8C	2BD 8C
69	"	"	"			4C	4C							4C	4C
70	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D

[a]Sampled six times per year.

[b]To be sampled biweekly with emphasis on run-off events until October, 1977.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5120103	2D								2D						
"	8C 2D								8C 2D						
"	8C								8C						
"	8C 2D								8C 2D						
"	5C						5C		5C						
"	9C 2D					2CD			9C 2D						
"	4C					4C			4C						
5120104	2D	2D	2D	2D					2D						
5120105	8B-D	8B-D	8B-D	8B-D	8B-D	8B-D	8B-D	8B-D	8B-D		8B-D		11[a]		
"	8A	8A	8A	8A	8A	8A	8A	8A	8A		8A		2A		
5120106															
"	5B-D	5B-D					5B-D		5B-D	5B-D	5B-D				
"	2AC 5BD		2AC 5BD	2AC 5BD			2AC 5BD		2AC 5BD	2AC 5BD	2AC 5BD				
"	5		5	5			5		5	5	5		2D		
"	2D	2BD	2BD	2BD	2B				2BD						
"	2B	2B	2B	2B	2B				2B						
"	5ACD		8B 5CD	8B 5CD			8B 5CD		8B 5CD	5A-C 2D	5A-C 2D				
"	5		5	5	5	5			5	5	5		2A		
"	2AB	2AB	2AB	2A	2A	2A			2AB	2A	2A	2A			
"	5ABD		5	5	5	5			5	5	5		2D		
"	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D		2ACD		
5120107	8C 2D								8C 2D						
"	5BD 8C								5BD 8C						
"	5B 8C 2D								5B 8C 2D						
"	2BD 8C								2BD 8C						
"	4C								4C						
"	8C 2D								8C 2D						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	09	5120107	(Continued)			5C	5C							5C	5C
72	"	"	"			5C	4C 2D	2CD					2CD	4C 2D	8C 2D
73	"	"	"		4C		4C	4C					4C	4C	4C
73	18	5120108	River Mile 4.7			5C 9D		5C 9D	5C 9D	5C 9D				5C 9D	5C 9D
64	09	5120109	River Mile 4.6 43-11-46 X 77-37-12	*			2CD	2CD	2CD			2CD			
65	"	"	"	*		2D	2D	5D	5D	5D		5D	2D	2D	2D
66	"	"	"	*	11C[a]	5BD 8C	5BD 8C	5B-D	5B-D	5B-D		5B-D	2D	5BD 8C	5BD 8C
67	"	"	"	*		2C 5D	2CD	5B-D	5B-D	5B-D		5B-D	5BD 2C	2C 5D	5B-D
68	"	"	"	*					2A	2A		2A	2A		2A
64	09	5120110	River Mile 4.3 43-11-53 X 77-37-23	*			2CD	2CD	2CD			2CD	2C		
65	"	"	"	*		2D	2D	5D	5D	5D		5D		2D	5D
66	"	"	"	*		5B-D	5B-D	5B-D	5B-D	5B-D		5B-D		5B-D	5B-D
67	"	"	"	*		5CD	2CD	5B-D	5B-D	5B-D		5B-D	5B-D	5CD	5B-D
68	"	"	"	*				2A	2A	2A		2A	2A		2A
65	09	5120111	River Mile 3.9 43-12-26 X 77-37-39			8C 2D	4C 9D							4CD[b]	4C 9D
66	"	"	"			5BD 8C	5BD 8C							5BD 8C	5BD 8C
67	"	"	"			5B 2D 8C	5B 2D 8C							5B 2D 8C	5B 2D 8C
68	"	"	"			8C 2D	5C 2D							8C 2D	8C 2D
69	"	"	"			4C	4C							4C	4C
70	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
71	"	"	"			5C	5C							5C	5C
72	"	"	"			5C	4C 2D	2CD					2CD	4C 2D	8C 2D
73	"	"	"		4C	4C	4C	4C					4C	4C	4C
73	18	5120112	River Mile 3.4			5C 9D								5C 9D	5C 9D
68	09	5120113	River Mile 2.6 43-13-26 X 77-36-59			5B-D	2C	5B-D	5B-D	5B-D		5B-D	5B-D	5BC 2D	5B-D
69	"	"	"			2A 5B-D	2A 5B-D	2A 5B-D	2A 5B-D	2AC 5BD		2AC 5BD	2A 5B-D	2A 5B-D	2A 5B-D
70	"	"	"			5	5	5	5	5		5	5	5	5

[a] Twice a week.

[b] September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5120107	5C						5C		5C						
"	4C 2D						2CD		4C 2D						
"	4C						4C		4C						
5120108	5C 9D		5C 9D	5C 9D	5C 9D		5C 9D		5C 9D		5C 9D	5C 9D			
5120109	2CD		2CD	2CD			2CD		2CD	2CD	2CD				
"			2D	2D	2D		5D		5D	5D	5D				
"	5BD 8C		5B-D	5B-D	5B-D		5B-D		5BD 8C	5B-D	5B-D				
"	2BC 5D		5B-D	5B-D	5B-D		5B-D		5B-D	5B-D	5B-D				
"			2A	2A	2A		2A		2A	2A	2A				
5120110	2CD		2CD	2CD			2CD		2CD	2CD	2CD				
"	5D		5D	5D	5D		5D		5D	5D	5D				
"	5BD 8C		5B-D	5B-D	5B-D		5B-D		5BD 8C	5B-D	5B-D				
"	5CD		5B-D	5B-D	5B-D		5B-D		5B-D	5B-D	5B-D				
"			2A	2A	2A		2A		2A	2A	2A				
5120111	4C 9D								4C 9D						
"	5BD 8C								5BD 8C						
"	5B 2D 8C								5B 2D 8C						
"	8C 2D								8C 2D						
"	4C								4C						
"	8C								8C 2D						
"	5C						5C		5C						
"	4C 2D					2CD			4C 2D						
"	4C					4C			4C						
5120112	5C 9D		9D	2C 9D	2C 9D		9D		9D						
5120113	5B-D		5B-D	5B-D	5B-D		5B-D		5B-D	5B-D	5B-D				
"	2A 5B-D		2AC 5BD	2AC 5BD	2AC 5BD		2AC 5BD		2AC 5BD	2AC 5BD	2AC 5BD				
"	5		5	5	5		5		5	5	5				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
71	09	5120113	(Continued)			5	5	5	5	5		5	5	5	5
72	"	"	"			5ABD 4C	5ABD 4C	5ABD 4C	5ABD 4C	5ABD 8C		5ABD 8C	5ABD 8C	5ABD 4C	5ABD 4C
73	"	"	"			5ABD 4C	5ABD 4C	5ABD 4C	5	5		5	5	5ABD 4C	5ABD 4C
74	"	"	"			5AC 2BD	5A 4C 2BD	5A 4C 2BD	5AC 2BD	5AC 2BD		5AC 2BD	5AC 2BD	4C	5A 4C 2BD
73	18	5120114	River Mile 2.2			5C 9D								5C 9D	5C 9D
65	09	5120115	River Mile 2.0			8C	4CD[a]							8C 9D	4CD[a]
66-67	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
68	"	"	"			2BD 8C	2BD 5C							2BD 8C	2BD 8C
69	"	"	"			4C	4C							4C	4C
70	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
71	"	"	"			5C	5C							5C	5C
70	21	5120116	At Charlotte Docks 43-13-26 X 77-36-59		2D	2D		2D				2D			
72	"	"	"					2D				2D	2D		
73	"	"	"												
65	09	5120117	River Mile 0.75 43-14-57 X 77-36-41			8C 2D	4C 9D							9CD	4C 9D
66	18	"	"	*		2A 5B	2AB 5C	2A 5BC		2AD 5BC			2A 5CD	2A 5C	2A 5CD
66-67	09	"	"			8C 2D	8C 2D							8C 2D	8C 2D
67	18	"	"	*		2C 5D	5CD	5CD	5CD	5CD			5CD	2C 5D	5CD
68	"	"	"			5	5	5	5	5			5	5	5
68	09	"	"			8C 2D	5C 2D							5C 2D	8C 2D
69	"	"	"			4C	4C							4C	4C
69	18	"	"	*		5ACD 2B	5	5	5	5			5	5	5
70	"	"	"			5ACD	5AC 2D	5ACD 2B	5ACD 2B	5ACD 2B			5ACD 2B	5ACD 2B	5ACD 2B
70	09	"	"			8C 2D	8C 2D							8C 2D	8C 2D
71	"	"	"			5C	5C							5C	5C
71	18	"	"	*		2AC	2CD	2ACD	2ACD	2AD 5C		2CD	2ACD	2ACD	2ACD
72	"	"	"					2A					2A	2A	2A

[a]September only.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5120113	5		5	5	5		5		5	5A-C 2D	5A-C 2D				
"	5ABD 4C		5ABD 8C	5ABD 8C	5ABD 8C	5ABD 8C			5ABD 4C	5	5				
"	5ABD 4C		5	5	5	5ABD 4C			5ABD 4C	5	5				
"	5A 4C 2BD		5AC 2BD	5AC 2BD	5AC 2BD	5ABD 4C			5A 4C 2BD	5AC 2BD	5AC 2BD				
5120114	5C 9D		9D	2C 9D	2C 9D		9D		9D						
5120115	4CD[a]								4CD[a]						
"	8C 2D								8C 2D						
"	2BD 8C								2BD 8C						
"	4C								4C						
"	8C 2D								8C 2D						
"	5C						5C		5C						
5120116	2D	2D	2D	2D					2D				2D		
"	2D	2D	2D						2D	2D		2D			
"												2C			
5120117	4C 9D								4C 9D						
"	2A 5CD	2A 5CD	2AD 5BC	2A 5B-D	2AD 5BC	2A 5B-D		2A 5B-D	2A 5B-D						
"	8C 2D								8C 2D						
"	5CD		5CD	5CD	5CD	5CD		5CD	5C 2D	5CD					
"	5	5	5	5	5	5		5	5	5					
"	8C 2D								8C 2D						
"	4C								4C						
"	5	5	5	5	5	5		5	5	5					
"	5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B	5ACD 2B		5ACD 2B	5ACD 2B	5					
"	8C								8C 2D						
"	5C						5C		5C						
"	2ACD	2AD	2D	2ACD	2ACD	2ACD	2CD	2ACD	2ACD	2ACD					
"	2A		2A						2A						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
72	09	5120117	(Continued)			5C	4C 2D	2CD					2CD	4C 2D	8C 2D
73	"	"	"		4C	4C	4C	4C					4C	4C	4C
73	18	5120118	River Mile 0.7			5C 9D		5C 9D	5C 9D	5C 9D				5C 9D	5C 9D
72	18	5120119[a]	Navel Malita at Mouth 43-15-30 X 77-36-15		3B-D	11B-D							11B-D	11B-D	
73	"	" [a]	"		3AB	11AB							11AB	11AB	
		51202	Irondequoit Creek												
73-74	21	5120201	At E. Rochester 43-07-15 X 77-28-38		1										
65	09	5120202	River Mile 3.6 43-08-56 X 77-30-59			8BC 5D	8BC 5D							8BC 5D	8BC 5D
66-67	"	"	"			8C 2D	8C 2D							8C 2D	8C 2D
68	"	"	"			4C 2D	4C 2D							4C 2D	4C 2D
69	"	"	"			4C	4C							4C	4C
70	"	"	"			5C	5C							5C	5C
66	18	5120203	US-104 Bridge 43-10-33 X 77-31-38			5B	5B 2C			5BC			5B-D	5B	2B 5CD
67	"	"	"			5D		2C 5D	2C 5D	2C 5D			2C 5D	2C 5D	2C 5D
68	"	"	"			2A		5	5	5			2A	2A	2A
68	09	"	"			4C 2D	4C 2D							4C 2D	4C 2D
69	"	"	"			4C	4C							4C	4C
69	18	"	"			2C 5D		5	5	5			2C 5D	2C 5D	2C 5D
70	"	"	"			5A 2CD			5A-C 2D	5A-C 2D			5A 2CD	5A 2CD	5A 2D
70	09	"	"			5C	5C							5C	5C
71	"	"	"			8C	8C							8C	8C
71	18	"	"			2CD	2CD	2CD	2CD	2CD			2CD	2CD	2CD
67	18	5120204	Bay Outlet 43-14-05 X 77-32-04			2C 5D	2C 5D	2C 5D					2C 5D	2C 5D	2C 5D
68	"	"	"			5	5	5					5	5	5

[a] Samples taken every three days (IFYGL Data).

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
5120117	4C 2D					2CD			4C 2D						
"	4C					4CD			4C						
5120118	5C 9D		5C 9D	5C 9D	5C 9D		5C 9D		5C 9D		5C 9D	5C 9D			
5120119	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D		
"	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB		
5120201															
5120202	8BC 5D								8BC 5D						
"	8C 2D								8C 2D						
"	4C 2D								4C 2D						
"	4C								4C						
"	5C								5C						
5120203	5B-D	5B-D	5BC 2D	5BC 2D	5BC	5B-D		5B-D	5B-D						
"	2C 5D			2C 5D	2C 5D	2C 5D		2C 5D	2C 5D		2C 5D				
"	2A	5		2C 5D	5	5		5	5		5				
"	4C 2D								4C 2D						
"	4C								4C						
"	2C 5D	5		2C 5D	5	5		5	5		5				
"	5A 2CD	5A-C 2D		5AB 2C	5AC 2D				5A-C 2D		5A-C 2D				
"	5C								5C						
"	8C								8C						
"	2CD	2D		2CD	2CD				2CD		2CD				
5120204	2C 5D			2C 5D											
"	5			5											

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	18	5120204	(Continued)			5	5	5					5	2A 5B-D	5
70	"	"	"			5A-C 2D	5A-C 2D	5A-C 2D	2CD	5BC 2D			5A-C 2D	5A-C 2D	5A-C 2D
71	"	"	"			2CD	2CD	2CD	2CD	2CD			2CD	2CD	2CD
		51203	Mill Creek												
57	10	5120301				2C							2C	2C	2C
		51204	Four Mile Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA: pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS: TOTAL	HEAVY METALS: DIS-SOLVED	PESTICIDES	REFRACTORY ORGANICS
5120204	5			5											
"	5A-C 2D	5B 2C	5C 2D	5A-C 2D	5B 2C	5BC 2D		5BC 2D			5BC 2D				
"	2CD	2D	2D	2CD	2CD	2CD		2CD			2CD				
5120301	2C														

Evaluation and Summary of Data for River Basin Group 5.1

This river basin group includes two hydrologic areas in two states, 8,892 km^2 (3,420 mi^2) in New York and 247 km^2 (95 mi^2) in Pennsylvania. Of the 29 tributaries included on the DAM for this river basin group, only four were judged to have sufficient data to consider annual loading calculations, and two others have data that may be potentially useful for this purpose. Of the three major tributaries in this river basin group, only the Genessee River had both water quality and discharge records sufficient for loading calculations. Two tributaries in this river basin group have been gauged. Of the four streams with significant water quality data, only the Genessee had sufficient dissolved reactive phosphorus data to consider total tributary loading. Also, only the Genessee has a long-term water quality record available and is the only tributary with significant heavy metal data. None of the tributaries had adequate pesticide or refactory organic data. Some total soluble phsophorus data are available for a number of the tributaries. No specific runoff data were collected, although data were collected on the Genessee River once every three days as part of the IFGYL study.

Hydrologic Area 5.1.1 - Niagara/Orleans Complex. Of the 25 tributaries in this hydrologic area identified on the DAM only two had data which were judged to be adequate for loading calculations. A number of tributaries had a considerable amount of data collected over a number of years, but none had at least monthly data available over any full annual cycle.

Eighteen Mile Creek was one of the few tributaries which had sufficient data available for loading estimations. Suspended solids, some nutrients, and chloride were measured on a monthly basis during 1968 and 1969. In addition, data were collected monthly for a number of parameters in the spring and summer of 1966, 1970 and 1973. Data are available for a number of other years, but most were collected once or twice per year or, in some cases, quarterly. Some limited heavy metal, pesticide, and refractory organics data are also available.

Another tributary in this complex with significant data available is Oak Orchard Creek. During 1965, a number of parameters, including nitrogen species, total phosphorus, and total soluble phosphorus were measured on a biweekly basis during the spring and fall period. Monthly measurements were made during the winter months in 1965 and 1966. Monthly measurements of some parameters in 1969 including total soluble phosphorus. No dissolved reactive phosphorus data are available, however. Also, there are no data available for heavy metals, pesticides, or refractory organics for this tributary.

Both Sandy Creek and West Creek have a considerable amount of data available, particularly for the period 1965 through 1970. Many parameters including key nutrients such as nitrate, ammonia, total phosphorus and total soluble phosphorus were sampled at least monthly during spring, summer and fall for three years during this period, and loading estimations based on these data may be possible. However, except for a few instantaneous flow measurements of West Creek in 1970 and 1971 no discharge data are available for either stream.

The New York State Barge Canal passes through this complex and may effect the flow of some of the tributaries. Although a large portion of this complex is

farmed, there are a number of urban areas which drain into the watershed, including the City of Niagara Falls and portions of Rochester.

Hydrologic Area 5.1.2 - Genessee River. This hydrologic area includes the Genessee River, Irondequoit Creek, Mill Creek, and Four Mile Creek. Adequate loading data are available only on the Genessee River and Irondequoit Creek.

The Genessee River has been extensively sampled over the years and has one of the best data accumulations of any tributary in the Great Lakes Basin. Nineteen different stations have been identified with data which are potentially useful for loading calculations. The river is gauged at station 5120106 and a continuous record is available since 1954. This station is located about 10 river kilometers (six miles) upstream from the mouth. In terms of water quality measurements, there is a good record of most nutrients, suspended solids, and chloride. Biweekly measurements have been made in 1975 and 1976. Weekly, biweekly, and monthly sampling programs have been in effect for certain parameters at many different stations, with the earliest useful data dating back to the mid-1960's. Some total soluble phosphorus data are available, as well as data on total phosphorus and dissolved reactive phosphorus. However, no data were found for either pesticides or refractory organics in the river mouth area of this tributary.

The Genessee River has been or is now being studied as part of two major studies. During the IFYGL Program in 1972 and 1973 the Genessee River was sampled at station 5120119 approximately every three days. Parameters sampled included suspended solids, nutrients, and all three forms of phosphorus, as well as chloride and heavy metals. Daily instantaneous flow measurements were also made during IFYGL. As part of Task C of PLUARG the Genessee is being sampled for most parameters of concern on a biweekly basis at station 5120105. In addition, specific runoff events occuring between March, 1976 and October, 1977 will be monitored in detail.

A considerable amount of data also exists for Irondequoit Creek. This creek drains Irondequoit Bay, for which there is a considerable amount of data. A number of stations have been sampled, both above the bay and at the outlet of the bay before the creek discharges into Lake Ontario. Monthly data are available for a number of years at different stations for silica, total kjeldahl nitrogen, total phosphorus, total soluble phosphorus, chloride, and suspended solids. These data are all from the late 1960's, however. There are no dissolved reactive phosphorus, heavy metal, pesticide, or refractory organics data available. Although Irondequoit Creek has a gauging station, it is located above the embayment and the period of record extends back to only 1973. Irondequoit Bay is considered to be a highly polluted body of water.

DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 5.2

River Basin Group 5.2 drains an area of 17,656 km^2 (6,817 mi^2), shown in Figure 25. This river basin group contains three hydrologic areas. Maps and descriptions of these hydrologic areas follow.

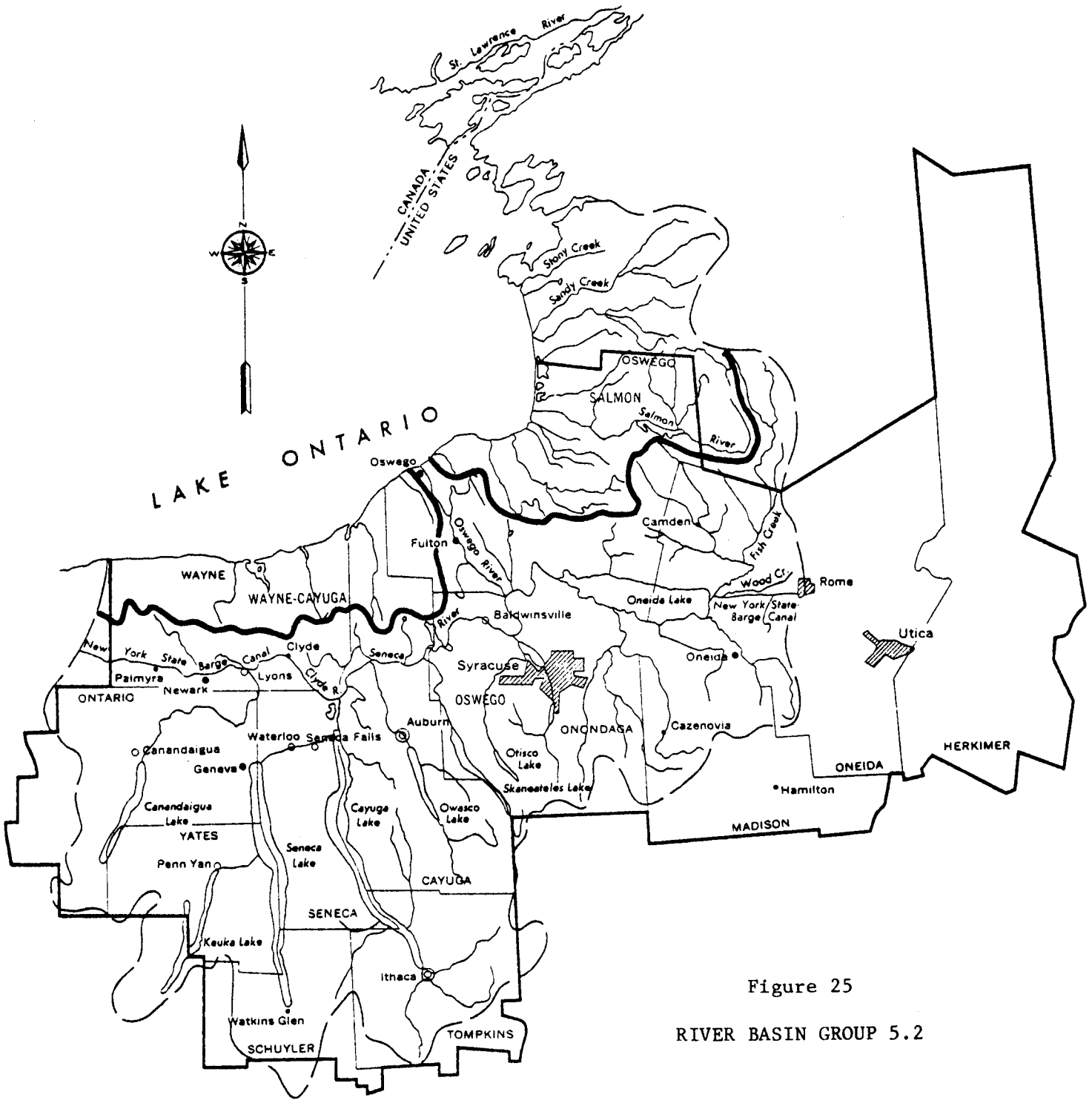
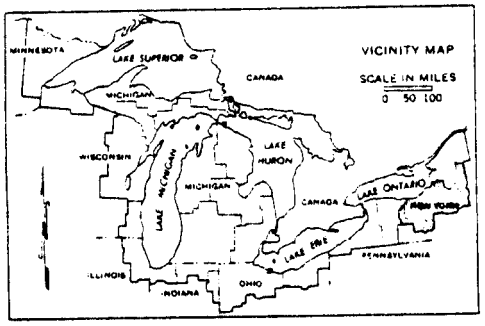


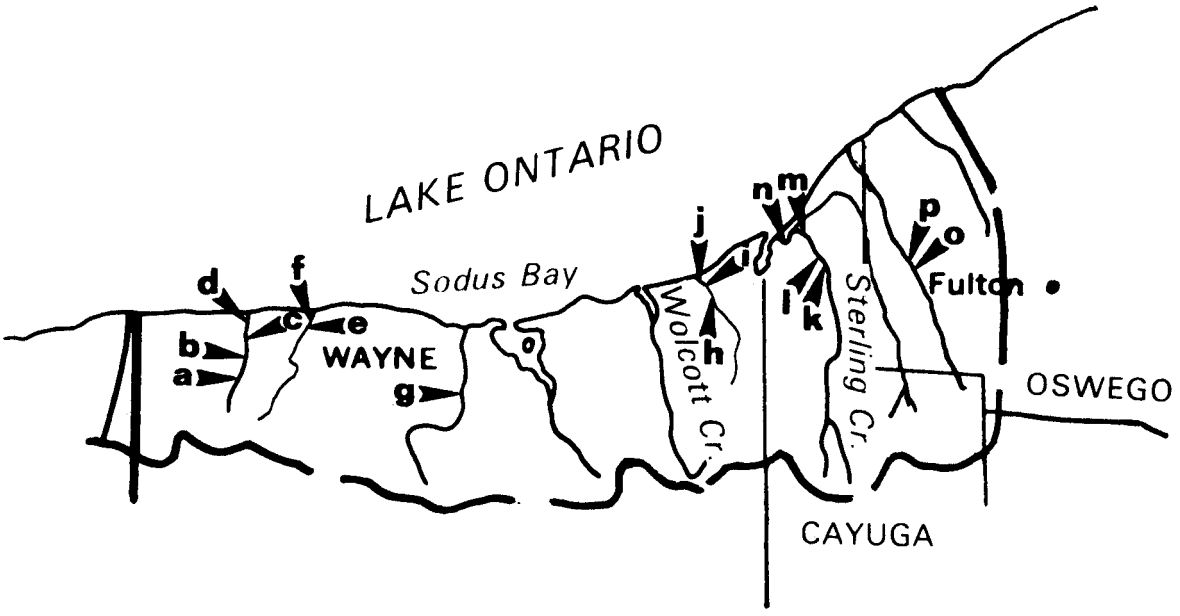
Figure 25

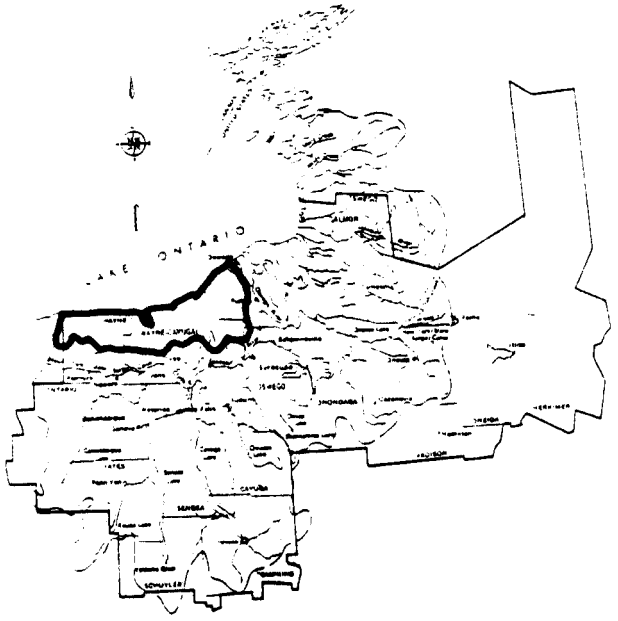
RIVER BASIN GROUP 5.2

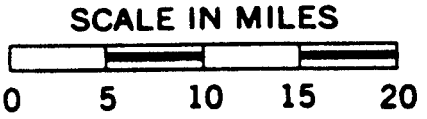


SCALE IN MILES
0 5 10 15 20

Hydrologic Area 5.2.1
Wayne-Cayuga Complex







Vicinity Map-RBG 5.2

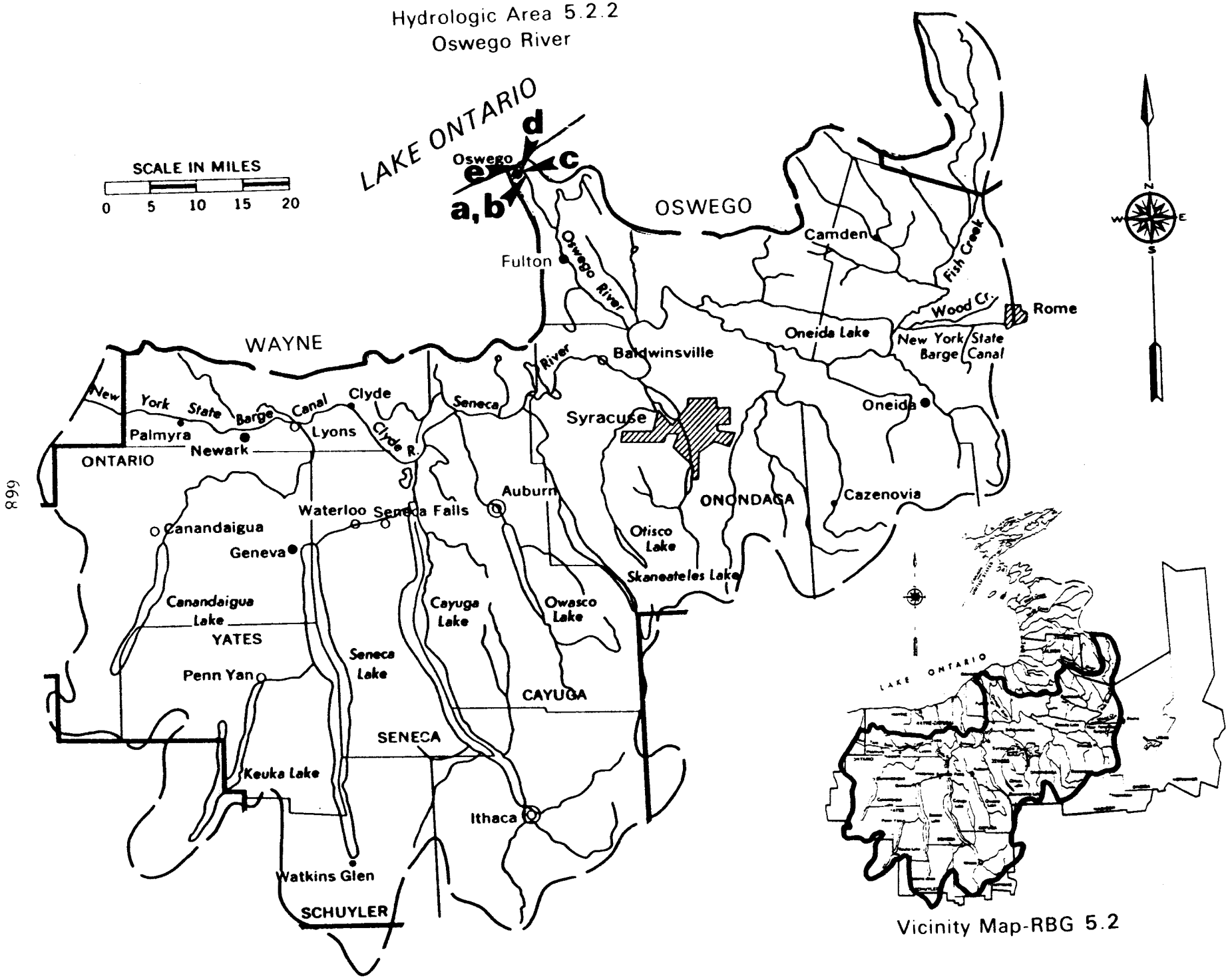
Hydrologic Area 5.2.1
Wayne-Cayuga Complex

The Wayne-Cayuga Complex encompasses an area of 177,000 hectares (437,000 acres) in north central New York. The major tributary in the area is Sterling Creek, which has a mean annual discharge of 1.7 m^3/s (60 cfs). There are a number of smaller streams that drain the remainder of the complex. The area has a rolling topography with relatively few wetlands. Approximately 45 percent of the complex is forested, another 45 percent approximately is agriculturized and about 5 percent is urbanized. The bedrock is composed predominately of dolomite. The overlying material is largely silt and clay. The cities of Sterling (pop.: 2,589) and Sodus (pop.: 1,813) are the largest population centers in the area.

Station Key

Station Location	DAM River and Station Numbers
Bear Creek	52103
a	5210301
b	5210302
c	5210303
d	5210304
Salmon Creek I	52104
e	5210401
f	5210402
Salmon Creek II	52107
g	5210701
Red Creek	52113
h	5211301
i	5211302
j	5211303
Sterling	52115
k	5211501
l	5211502
m	5211503
n	5211504
Nine Mile Creek	52116
o	5211601
p	5211602

Hydrologic Area 5.2.2
Oswego River



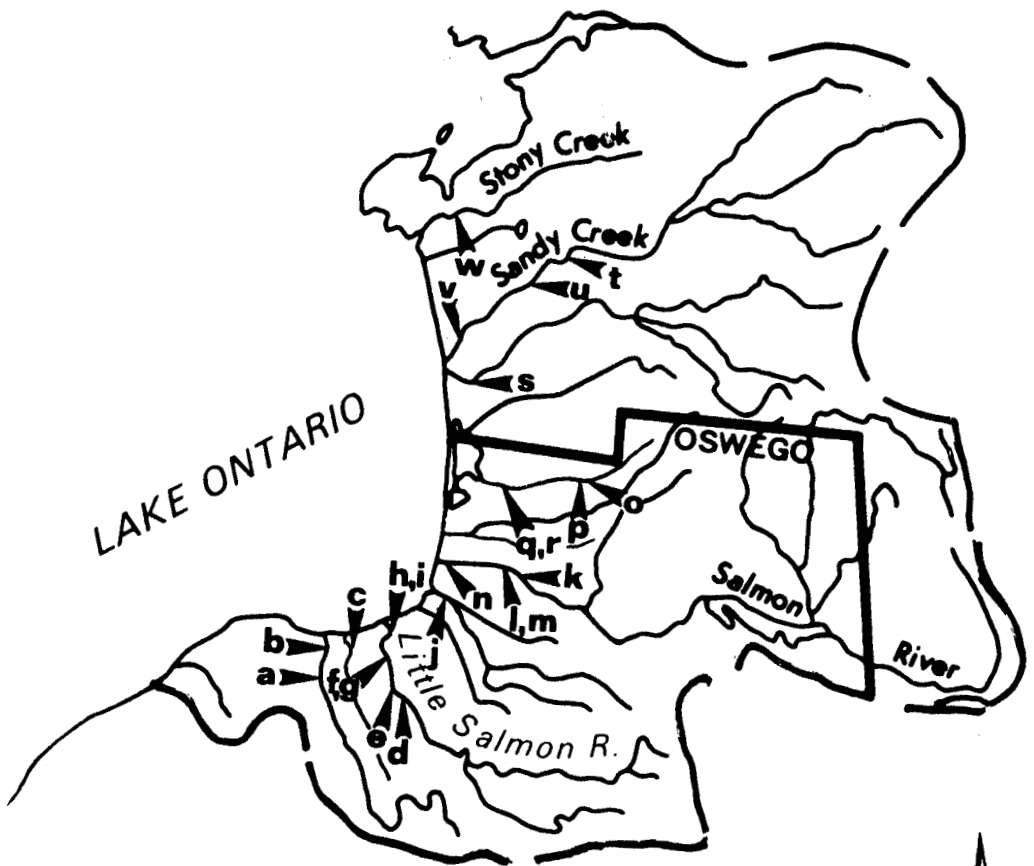
Vicinity Map-RBG 5.2

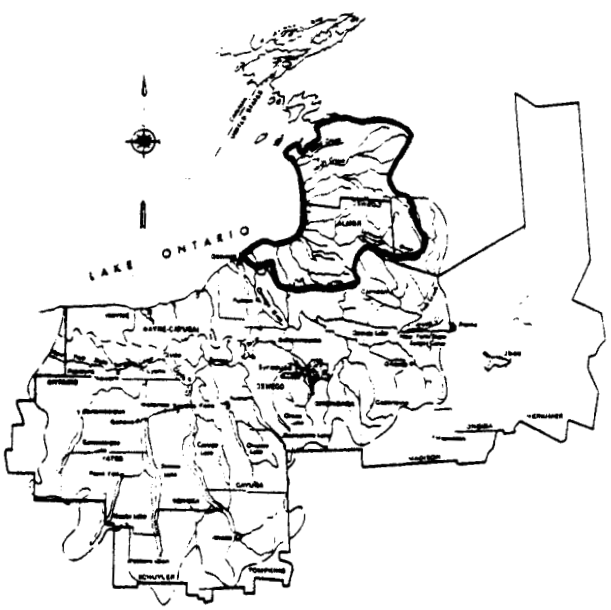
Hydrologic Area 5.2.2
Oswego River

The Oswego River drains an area of 1,316,000 hectares (3,252,000 acres) in north central New York. The Oswego River has a mean annual discharge of 183 m^3/s (6,462 cfs). This area drains the bulk of New York's Finger Lakes Region. A significant feature of this complex is the New York State Barge Canal which completely transects this complex in an east-west direction. The topography varies from rolling in the northern portions to mountainous in the south. There are some wetlands in the eastern region of this area. Approximately 30 percent of the area is forested, about 40 percent is agriculturized, about 5 percent is urbanized, and nearly 5 percent of the complex's area is covered by lakes. The large number of lakes has a modifying effect on runoff. The bedrock is composed largely of dolomite in the northern sections and sahle in the south. The cover material is composed mostly of glacial till with some areas of sand and gravel. The economy is based heavily upon manufacturing with some agriculture and mineral extraction (limestone and dolomite, salt, clay, and sahle). The Oswego River receives heavy organic loadings from three municipalities and six major industries scattered throughout the area. Additional treated wastewater loads are introduced by the New York State Barge Canal, and over 60 industries scattered throughout the metropolitan Syracuse area. The cities of Syracuse (pop.: 197,208), Oswego (pop.: 23,844), Auburn (pop.: 34,599), Ithaca (pop.: 26,226), and Fulton (pop.: 23,844), are the most populated and industrilized centers in this area.

Station Location	DAM River and Station Numbers
Oswego River	52201
a	5220101
b	5220102
c	5220103
d	5220104
e	5220105

Hydrologic Area 5.2.3
Salmon Complex





SCALE IN MILES

0 5 10 15 20

Vicinity Map-RBG 5.2

Hydrologic Area 5.2.3
Salmon Complex

The Salmon Complex encompasses an area of 273,000 hectares (674,000 acres) in north central New York on the eastern shore of Lake Onatrio. The major tributaries in the area are Sandy Creek, which has a mean annual discharge of 6.9 m^3/s (244 cfs), the Salmon River (ungaged), and the Little Salmon River (ungaged). Many additional small streams drain portions of this area. The topography varies from rolling to flat. Wetlands are significant. Approximately 50 percent of the area is forested, about 40 percent is agriculturized, and roughly 5 percent is urbanized. Bedrock is composed mostly of shale. The overlying material consists of silt and clay near the lake shore and glacial till throughout the remaining area. The major population center in the area is the city of Pulaski (pop.: 2,480). There are no important wastewater discharges in the area.

Station Key

Station Location	DAM River and Station Numbers	Station Location	DAM River and Station Numbers
Catfish Creek	52304	Salmon River	52310
a	5230401	k	5231001
b	5230402	l	5231002
Butterfly Creek	52305	m	5231003
c	5230501	n	5231004
Little Salmon River	52306	Little Sandy Creek	52312
d	5230601	o	5231201
e	5230602	p	5231202
f	5230603	q	5231203
g	5230604	r	5231204
h	5230605	South Sandy Creek	52314
i	5230606	s	5231401
Grindstone Creek	52309	Sandy Creek	52316
j	5230901	t	5231601
		u	5231602
		v	5231603
		Stony Creek	52319
		w	5231901

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 5.2.1 Wayne-Cayuga Complex												
		52101	Deer Creek (No Data Found)												
		52102	Dennison Creek (No Data Found)												
		52103	Bear Creek												
57	10	5210301	Highway 104 Bridge			2C	2C					2C	2C	2C	2C
57	10	5210302	Bridge at River Mile 4.1			2C	2C					2C	2C	2C	2C
57	10	5210303	Furnace Road Two Miles North of Ontario			2C	2C					2C	2C	2C	2C
57	10	5210304	Bridge Near Bear Creek Harbor			2C	2C					2C	2C	2C	2C
		52104	Salmon Creek I												
57	10	5210401	NY-21 Bridge			2C							2C	2C	2C
71	21	5210402	At Puttnayville		2C	2C		2C				2C			
72	"	"	"		2C	2C		2C				2C	2C		
		52105	Mink Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5210301	2C								2C						
5210302	2C								2C						
5210303	2C								2C						
5210304	2C								2C						
5210401	2C														
5210402	2C	2C	2C	2C					2C						
"	2C	2C	2C						2C	2C	2C				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		52106	Unnamed Tributary at Boller Point (No Data Found)												
		52107	Salmon Creek II												
57	10	5210701	Highway 104 Bridge			2C	2C					2C	2C	2C	2C
		52108	First Creek (No Data Found)												
		52109	Unnamed Tributary to Sodus Bay (No Data Found)												
		52110	Sodus Creek (No Data Found)												
		52111	Mudge Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5210701	2C								2C						

RIVER BASIN GROUP 5.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		52112	Wolcott Creek (No Data Found)												
		52113	Red Creek												
57	10	5211301	Bridge Above Mouth River Mile 0.75			2D								2D	2D
57	10	5211302	Broadway Road Bridge River Mile 1.4			2D								2D	2D
57	10	5211303	Highway 104A Bridge			5C	5C					5C	5C	5C	5C
57	10	5211398	Exact Location Unknown, Chapman's Corners Road			5C	5C					5C	5C	5C	5C
57	10	5211399	Exact Location Unknown, Holly Road			5C	5C					5C	5C	5C	5C
		52114	Blind Sodus Creek (No Data Found)												
		52115	Sterling Creek flow: 1.7 m^3/s (60 cfs)												
57	10	5211501	Bridge 0.8 Miles South of Sterling			2C							2C	2C	2C
57-74	21	5211502	At Sterling		1										
72	"	"	"		2C	2C		2C				2C	2C		
57	10	5211503	Between Fair Haven and North Sterling			5C	5C					5C	5C	5C	5C
57	10	5211504	At Fair Haven River Mile 0.1			2C	2C					2C	2C	2C	2C

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5211301	2D														
5211302	2D														
5211303	5C								5C						
5211398	5C								5C						
5211399	5C								5C						
5211501	2C														
5211502															
"	2C	2C	2C						2C	2C	2C				
5211503	5C								5C						
5211504	2C								2C						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		52116	Nine Mile Creek												
57	10	5211601	NY-3 Bridge			2C							2C	2C	2C
57	10	5211602	N.Y.C. RR Bridge			2C							2C	2C	2C
		52117	Rice Creek		(No Data Found)										
			HYDROLOGIC AREA		5.2.2	Oswego River									
		52201	Oswego River		flow 183.0 m^3/s (6,462 cfs)										
33-74	21	5220101	At Lock #7 43-27-00 X 76-30-25		1										
64	"	"	"		2D		2D	2D				2D			
65	"	"	"		5AB 2C		5AB 2C	5AB 2C				5AB 2C			
66	"	"	"					2D	2D			2D			
72	"	"	"		2C			2C				2C	2C		
73	"	"	"												
72	18	5220102[a]	At Main Street Bridge 43-27-26 X 76-30-35		3B-D	11B-D							11B-D	11B-D	
73	"	" [a]	"		3B-D	11AB							11AB	11AB	
64	09	5220103	Bridge Street in Oswego 43-27-26 X 76-31-06			2BD 5C	2CD	2D	2D			2D		2BD 5C	2BD 5C
65	"	"	"			5BD 2C	5BD 2C	2B 5D	2B 5D	2B 5D		2B 5D	2B 5D	5BD 2C	5D
66	"	"	"			5AB 8CD	5AB 8CD	5	5	5		5	5	5AB 8CD	5AB 8CD
67	"	"	"		5D	5A 8B-D	5A 8B-D	5	5	5		5	5	5A 8B-D	5A 8B-D
68	"	"	"		5ACD 8B	5AD 8BC	5AD 8BC	5	5	5		5	5	5AD 8BC	5AD 8BC

[a]Samples taken every two days--11. (IFYGL data.)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5211601	2C														
5211602	2C														
5220101															
"	2D	2D	2D						2D	2D	2D				
"	5AB 2C	5AB 2C	5AB 2C						5AB 2C	5AB 2C	5AB 2C				
"	2D	2D	2D						2D						
"	2C	2C	2C						2C			2CD			
"												2C			
5220102	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	9B-D	11B-D	11B-D	11B-D	11B-D	11B-D		
"	11AB	11AB	11AB	11AB	11AB	11AB	11AB	9AB	11AB	11AB	11AB	11AB	11AB		
5220103	2BD 5C		2D	2D		2D			2D	2D	2D				
"	5BD 2C		2B 5D	2B 5D	5D	2B 5D			2B 5D	2B 5D	2B 5D				
"	5AB 8CD		5	5	5	5			5	5	5				
"	5A 8B-D		5	5	5	5			5	5	5				
"	5AD 8BC		5	5	5	5			5	5	5				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
69	09	5220103	(Continued)		2AD 5C	2AD 5C	2AD 5C	2AD 5C	2AD 5C	2AD 5C		2AD 5C	2AD 5C	2AD 5C	2AD 5C
70	"	"	"		5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
70	21	"	"		2D	2D		2D				2D	2D		
71	09	"	"		2B	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
72	"	"	"		5BD 2C	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D	5B-D	5B-D	5B-D
73	"	"	"		2BD 5C	2B 5CD	2B 5CD	2B 5CD	2B 5CD	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD
74	"	"	"			2BD 5C	2BD 5C	2BD 5C	2BD 5C	2BD 5C		2BD 5C	2BD 5C	2BD 5C	2BD 5C
64	03	5220104	400 Meters from Mouth		4A	4A									
65-74	18	5220105[a]	At Mouth	*		10	10	10		10		10		10	10
			HYDROLOGIC AREA 5.2.3 Salmon Complex												
		52301	Wine Creek (No Data Found)												
		52302	Unnamed Tributary East of Wine Creek (No Data Found)												
		52303	Unnamed Tributary at Nine Mile Point (No Data Found)												
		52304	Catfish Creek												
73	21	5230401	At New Haven 43-29-00 X 76-19-39		2D	2D		2D				2D	2D		

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
5220103	2AD 5C		2AD 5C	2AD 5C	2AD 5C	2AD 5C			2AD 5C	2AD 5C	2AD 5C				
"	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD			2B 5CD	2B 5CD	2B 5CD				
"	2D	2D	2D	2D					2D				2D		
"	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD			2B 5CD	2B 5CD	2B 5CD				
"	5B-D		5B-D	5B-D	5B-D	5B-D			5B-D	5B-D	5B-D				
"	2B 5CD		2B 5CD	2B 5CD	2B 5CD	2B 5CD			2B 5CD	2B 5CD	2B 5CD				
"	2BD 5C		2BD 5C	2BD 5C	2BD 5C	2BD 5C			2BD 5C	2BD 5C	2BD 5C				
5220104	4A				4A		4A								
5220105	10		10	10		10			10						
5230401	2D	2D	2D						2D	2D	2D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
57	10	5230402	At Oswego Co. Rd. 1 River Mile 0.7			2CD	2CD					2CD	2CD	2CD	2CD
		52305	Butterfly Creek												
57	10	5230501	Oswego Co. Rd. 1 River Mile 1.3			2CD	2CD					2CD	2CD	2CD	2CD
		52306	Little Salmon River												
57	10	5230601	U.S.-104 in Mexico			2C							2C	2C	2C
57	10	5230602	NY-3 Bridge			2C							2C	2C	2C
57	10	5230603	Texas-Mexico Rd. Bridge			2C							2C	2C	2C
57	10	5230604	County Road River Mile 3.2			2CD	2CD					2CD	2CD	2CD	2CD
57	10	5230605	NY-104B Bridge at Texas			2CD	2CD					2CD	2CD	2CD	2CD
67-74	18[a]	"	"	*		5	5	5		5		5		5	
70	21	5230606	Downstream from Texas			2CD		2CD	2CD	2CD			2CD	2CD	2CD
71	"	"	"			2AB		2AB	2AB	2AB			2AB	2AB	2AB
73	"	"	"		2D	2D		2D				2D	2D		
		52307	Sage Creek (No Data Found)												
		52308	Snake Creek (No Data Found)												

[a]Taken directly from OWDC Catalog of Information on Water Data, 1974.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5230402	2CD								2CD						
5230501	2CD								2CD						
5230601	2C														
5230602	2C														
5230603	2C														
5230604	2CD								2CD						
5230605	2CD								2CD						
"	10		5	5		5			5						
5230606	2CD		2CD	2CD	2CD	2CD	2CD						2C	2C	
"	2AB		2AB	2AB	2AB	2AB	2AB								
"	2D	2D	2D						2D	2D	2D				

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		52309	Grindstone Creek												
57	10	5230901	Route 3 Bridge			2CD	2CD					2CD	2CD	2CD	2CD
		52310	Salmon River												
57	10	5231001	At N.Y.C. RR Tracks			2CD	2CD					2CD	2CD	2CD	2CD
57	10	5231002	Jefferson St. Bridge in Pulaski			2C							2C	2C	2C
57	10	5231003	US-11 Bridge			2CD	2CD					2CD	2CD	2CD	2CD
57	10	5231004	Route 3 Bridge Below Pulaski			2CD	2CD					2CD	2CD	2CD	2CD
71	21	"	"			5C 2D		5C 2D	5C 2D	5C 2D			5C 2D	5C 2D	5C 2D
72	"	"	"			5C 2D	5C 2D	5C 2D	5C	5C 2D			5C 2D	5C 2D	5C
73	"	"	"			5C	5C	5C		2C			2C	5C	
		52311	Deer Creek	(No Data Found)											
		52312	Little Sandy Creek												
57	10	5231201	Railroad Bridge in Lacona			2C							2C	2C	2C
57	10	5231202	US-11 Bridge			2CD	2CD					2CD	2CD	2CD	2CD
57	10	5231203	North Ridge Road River Mile 1.1			2C							2C	2C	2C
57	10	5231204	At Route 3 Bridge			2CD	2CD					2CD	2CD	2CD	2CD

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5230901	2CD								2CD						
5231001	2CD								2CD						
5231002	2C														
5231003	2CD								2CD						
5231004	2CD								2CD						
"	5C 2D		5C 2D	5C 2D	5C 2D	5C 2D	5C 2D							5C 2D	
"	5C 2D	2D	5C 2D	5C	5C 2D	5C 2D	5C		5C			2D		5C 2D	5C 2D
"	5C	2C	5C			5C				2C	2C	5C		5C	5C
5231201	2C														
5231202	2CD								2CD						
5231203	2C														
5231204	2CD								2CD						

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		52313	Skinner Creek (No Data Found)												
		52314	South Sandy Creek												
57	10	5231401	Route 3 Bridge			2CD	2CD					2CD	2CD	2CD	2CD
		52315	Mud Brook (No Data Found)												
		52316	Sandy Creek												
57-74	21	5230601	River Mile 10.0 43-48-48 X 76-04-30		1										
57	10	5231602	Route 284 Bridge			2CD	2CD					2CD	2CD	2CD	
57	10	5231603	Route 3 Bridge			2CD	2CD					2CD	2CD	2CD	
		52317	North Branch Sandy Creek (No Data Found)												
		52318	Little Stony Creek (No Data Found)												

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5231401	2CD								2CD						
5231601															
5231602	2CD								2CD						
5231603	2CD								2CD						

RIVER BASIN GROUP 5.2

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		52319	Stony Creek												
57	10	5231901	Route 3 Bridge			2D	2D					2D	2D	2D	2D
		52320	Bedford Creek	(No Data Found)											
		52321	Mill Creek	(No Data Found)											

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DISSOLVED		
5231901	2D								2D						

Evaluation and Summary of Data for River Basin Group 5.2

This river basin group includes three hydrologic areas, comprised of 17,724 km^2 (6,817 mi^2) in New York. Of the 39 tributaries included on the DAM for this river basin group only one tributary, the Oswego River, was found to have sufficient water quality and water quantity data for loading calculations. Very little water quality data were found for other tributaries in this river basin group. Two tributaries were found that are being gauged, but lack adequate water quality monitoring data. Three tributaries designated as major streams in Table 4 did not have sufficient data for loading calculations. Heavy metal data were found to be available only for the Oswego River. No pesticide or refractory organics data were found for any of the tributaries in this river basin group. Approximately one-third of the drainage area in this river basin group is both ungauged and unmonitored. Since agriculture is fairly prevalent, a significant contribution of pollutants to Lake Ontario could exist.

Hydrologic Area 5.2.1 - Wayne/Cayuga Complex. None of the 17 tributaries identified in this complex for inclusion on the DAM were found to have sufficient data for loading estimations. Most existing data consist of grab samples collected once or twice per year. Some parameters, including suspended solids, total kjeldahl nitrogen, total phosphorus, dissolved reactive phosphorus and total soluble phosphorus, have not been sampled. Continuous discharge data collected near the mouth since 1957 are available for Sterling Creek.

Although a significant amount of this complex is devoted to agriculture, total non-point source loadings might be relatively minor due to the fact that it is the smallest complex in the Lake Ontario Basin.

Hydrologic Area 5.2.2 - Oswego River. The Oswego River is one of the largest tributaries in the Great Lakes Basin in terms of discharge and drainage area, and is the only tributary included in this hydrologic area. A long-term discharge record is available at a station located only about one river kilometer (0.6 miles) upstream from the mouth at Lake Ontario. A considerable amount of monthly water quality data are available for suspended solids, nutrients, chloride, and other parameters from 1966 through 1968. Few data useful for loading calculations were collected from 1969 to 1971. During the IFYGL study samples were collected every two days and analyzed for silica, nitrogen species, chloride, heavy metals, and all three forms of phosphorus. There were no data found on pesticides or refractory organics for the Oswego.

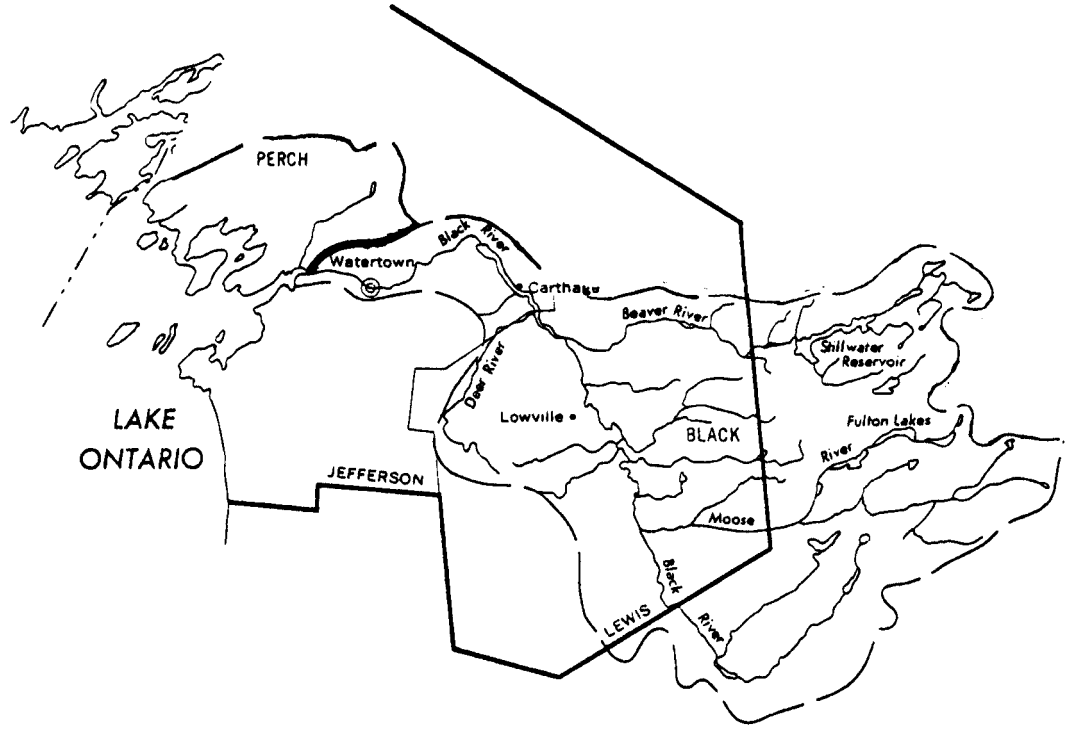
Hydrologic Area 5.2.3 - Salmon Complex. Of the 21 tributaries identified for the DAM from this complex, only the Little Salmon River was judged to have sufficient water quality data available to calculate loadings. Only one of the tributaries, Sandy Creek, has a gauging station near the river mouth area. Sandy Creek has been gauged since 1957, but no accompanying water quality data of significance to loading calculations were found. Although there are no major urban areas in this complex, a relatively large percentage of the complex is used for agricultural purposes. Since the complex does represent a relatively large portion of River Basin Group 5.2, the fact that few data are available is significant.

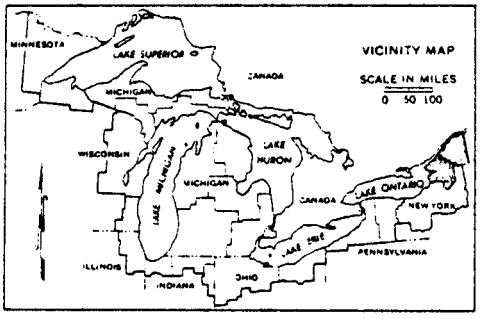
DESCRIPTION AND ANALYSIS OF RIVER BASIN GROUP 5.3

River Basin Group 5.3 covers an area of 5,957 km^2 (2,300 mi^2), shown in Figure 26. This river basin group contains three hydrologic areas. Maps and descriptions of these hydrologic areas follow.

Figure 26

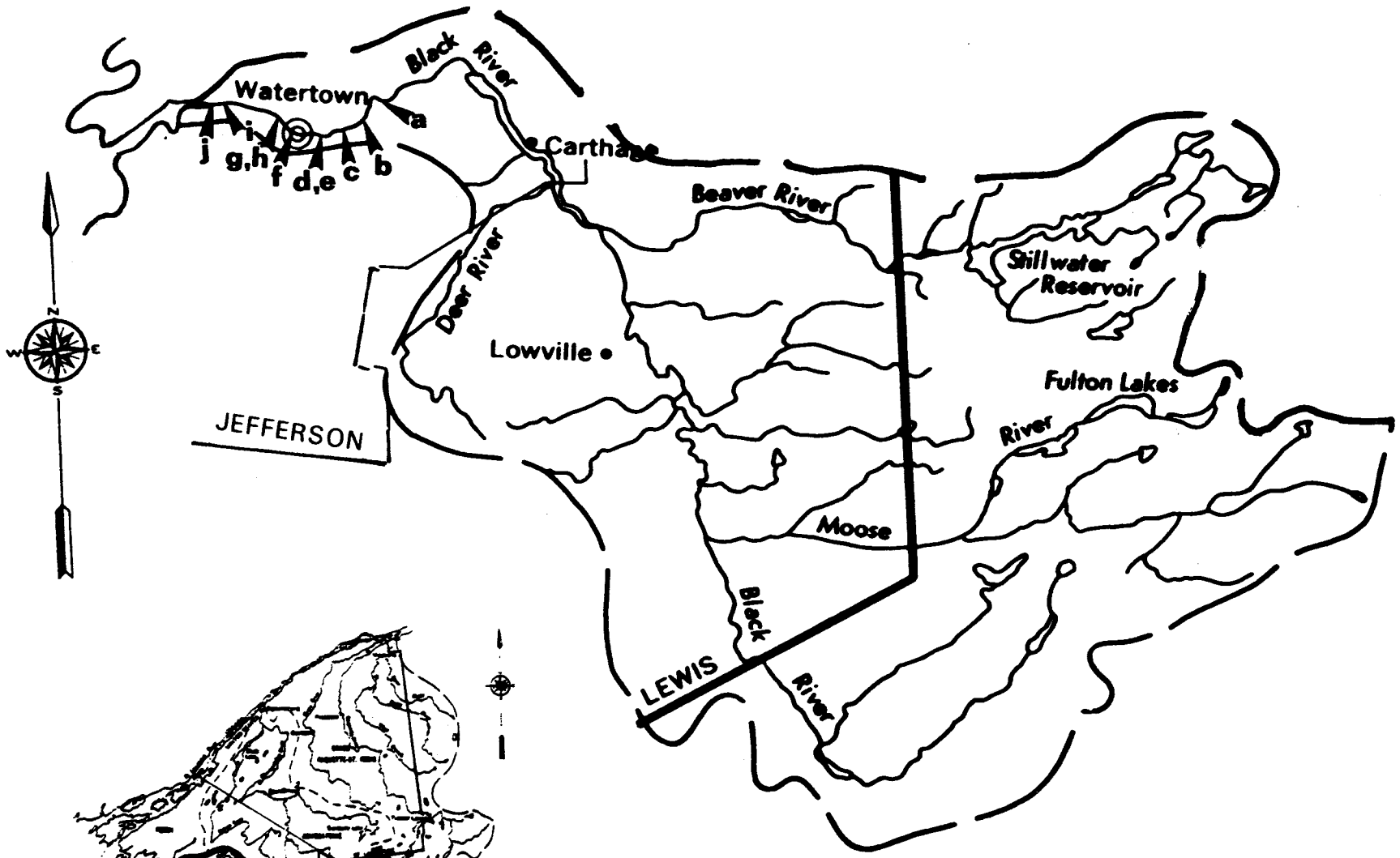
RIVER BASIN GROUP 5.3

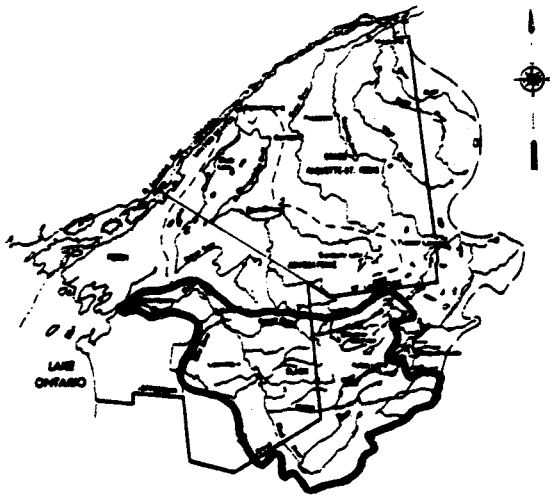




SCALE IN MILES
0 5 10 15 20

Hydrologic Area 5.3.1
Black River





Vicinity Map-RBG 5.3

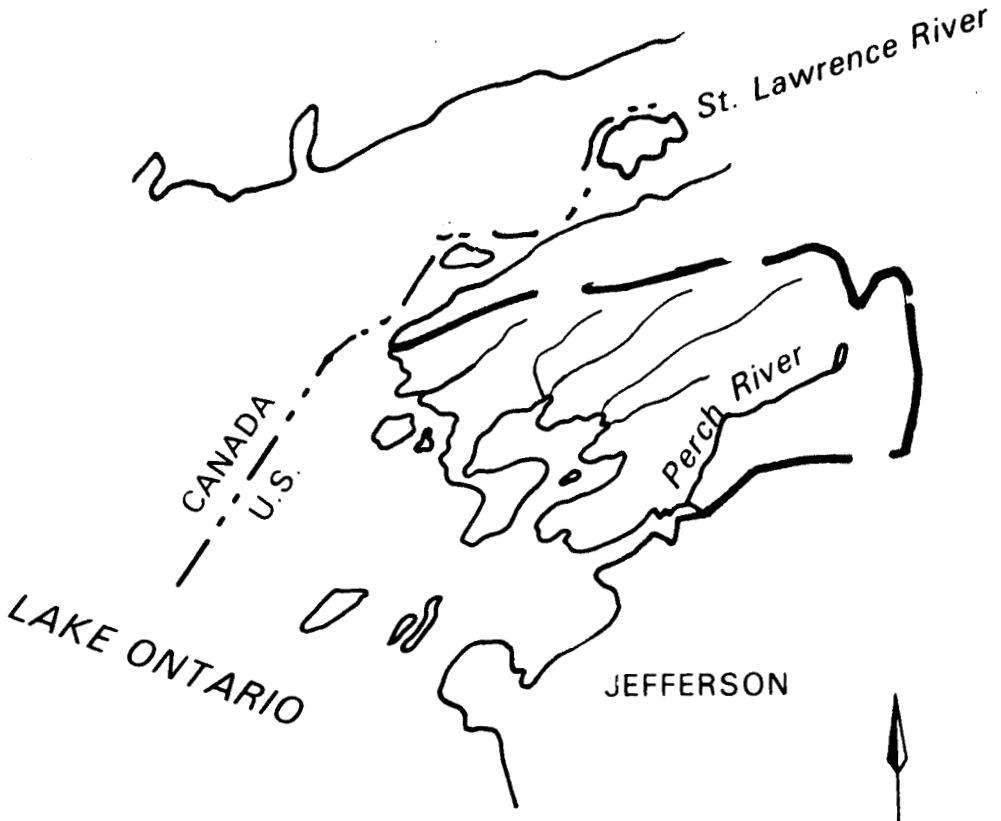
Hydrologic Area 5.3.1
Black River

The Black River drains an area of 521,000 hectares (1,289,000 acres) in northcentral New York. The Black River has a mean annual discharge of 110.0 m^3/s (3,884 cfs). Major tributaries to the Black River are the Moose River, the Beaver River, and the Deer River. The Black River and its tributaries have many natural falls, which are used extensively for power generation. The topography varies from rolling near the lake shore to mountainous in the eastern states. Annual runoff in the Basin is high. Some of the 30 hydroelectric developments in the Basin cause alteration in the flow of the river system. Approximately 60 to 70 percent of the area is forested, 20 to 30 percent is agriculturized, and about 5 percent is urbanized. The bedrock consists predominately of igneous and metamorphic rock, although significant shale is found in the western portions. The overlying material predominantly consists of a silt and clay mixture near the lakeshore areas and glacial till throughout the remainder of the region. Numerous paper and pulp mills use the Black River for waste assimilation. The cities of Watertown (pop.: 30,787), and Carthage (pop.: 3,889) are the most populated and industrialized centers within the area.

Station Key

Station Location	DAM River and Station Numbers
Black River	53101
a	5310101
b	5310102
c	5310103
d	5310104
e	5310105
f	5110106
g	5310107
h	5310108
i	5310109
j	5310110

Hydrologic Area 5.3.2
Perch Complex



Vicinity Map-RBG 5.3

SCALE IN MILES
0 5 10 15 20

Hydrologic Area 5.3.2
Perch Complex

The Perch Complex covers 65,000 hectares (161,000 acres) in northcentral New York. Major tributaries draining this area are the Perch River and Chaumont River, both of which are ungauged. The area is generally flat. About 60 percent of the area is forested, 20 to 30 percent agriculturized, and only a few percent is urbanized. The bedrock is composed mostly of shale. The overlying material is largely silt and clay. The economy is based upon forestry, agriculture, and some manufacturing. This sparsely populated area has no cities with a population greater than 2,500 people.

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURB/DITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
			HYDROLOGIC AREA 5.3.1 Black River												
		53101	Black River flow: 110.0 m^3/s (3,884 cfs)												
65-68	18[a]	5310101	NY-3 Upstream from Watertown	*		5	5	5		5		5			5
69	21	"	"			2C 5D	5D	2C 5D	5D	5D		2D	5D	5D	2C 5D
70	"	"	"			5A-C	5A-C	5A-C 2D	5A-C 2D	5A-C 2D			5A-C 2D	5A-C 2D	5A-C 2D
71	"	"	"			2AB		2AB	2AB	2AB			2AB	2AB	2AB
73	18	5310102	EPA Station #4[b]			2CD	2C		2C	2C				2CD	2CD
69-73	21	5310103	At Huntingtonville 43-59-01 X 75-51-43			3									
69	21	5310104	NY-3 in Watertown					5B-D				5B-D	5B-D		
70	"	"	"					5				5	5		5
71	"	"	"		5D			5		5D		5	5		5
72	"	"	"		5A-C			5		5A-C		5	5		5A-C
73	18	5310105	EPA Station #3[b]			2CD	2C		2C	2C				2CD	2CD
20-74	21	5310106	At Watertown 43-59-08 X 75-55-30	*	1										
55-59	"	"	"	*	1	3									
62-64	"	"	"	*	1	3									
64-74	09[a]	"	"	*				5				5			
65	21	"	"	*	2C 5D	3	2C	2C 5D				2C 5D			
66	"	"	"	*	5	3		5				5			
67	"	"	"	*	5	3		5				5	5D		
68	"	"	"	*	5	3		5				5	5		
69	"	"	"	*	5	3A 9B 5CD		5				5	5	5D	5BCD
70	"	"	"	*	5	5		5				5	5	5	5
71	"	"	"	*	5	5A-C 2D		5		2D		5	5	5A-C 2D	5A-C 2D
72	"	"	"	*	5	5		5	5D	5AD 2C		5	5	5	2AC 5D

[a] Data taken directly from OWDC Catalog of Information on Water Data, 1974.

[b] Station description from Water Pollution Investigation: Black River of New York, December, 1974, p. 24.

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5310101	10		5	5		5	5		5						
"	2C 5D		2C 5D	2C 5D	2C 5D	2C 5D	2C 5D		2C 5D	2D	2D	2D	2D		
"	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D		5A-C				2BC	2C	
"	2AB		2AB	2AB	2AB	2AB	2AB								
5310102	2C		2C	2C	2C	2C	2C								
5310103															
5310104	5B-D	5B-D	5B-D	5B-D	5B-D		5B-D		5B-D	5B-D	5B-D				
"	5	5	5	5	5		5		5	5	5				
"	5	5	5	5	5		5		5	5	5				
"	5	5	5	5A-C	5A-C		5A-C		5	5	5				
5130105	2C		2C	2C	2C	2C	2C								
5130106															
"															
"															
"	5		5	5		5	5		5						
"	2C 5D	2C	2C							2C	2C				
"	5	2BC	2BC						2A 5B-D		2B				
"	5	2AC 5B	2AC 5B						5						
"	5	2A 5BC	2A 5B-D	5CD	5CD	5CD			5						
"	5	5BCD	5	5	5	5			5	5D	5D				
"	5	5	5	5	5		5		5	5	5		2BD		
"	5	5	5	5A-C 2D	5A-C 2D	2D	5A-C		5	5A-C 2D	5A-C 2D		2B		
"	5A-C 2D	5	5	5A 2C	5AD 2C	2AC 5D	5D		5	2A-C 5D	5AD 2BC	2D			

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA: DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
73	21	5310106	(Continued)	•	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	5A-C 2D
73	18	5310107	EPA Station #2[a]			2CD	2C		2C	2C				2CD	2CD
71	21	5310108	I-81 Bridge		2CD	2CD		2CD		2CD			2CD	2CD	2CD
72	"	"	"		5AD 2BC	5AD 2BC	2D	5AD 2BC		5A 2BC			5A 2B-D	5AD 2BC	5A 2BC
73	"	"	"		2A 5BC	5BC	2A 5BC	2A 5BC		2C			2C	2A 5BC	
73	18	5310109	EPA Station #1[a]			2C	2C		2C	2C				2C	2C
65-69[b]	18	5310110	At the Mouth	*		6	6	6		6		6		6	6
72[c]	"	"	"		3B-D	11B-D							11B-D	11B-D	
73[c]	"	"	"		3AB	11AB							11AB	11AB	
			HYDROLOGIC AREA 5.3.2 Perch Complex												
		53201	Perch River		(No Data Found)										
		53202	Chaumont River		(No Data Found)										
		53203	Three Mile Creek		(No Data Found)										
		53204	Kents Creek		(No Data Found)										

[a] Station description from Water Pollution Investigation: Black River of New York, December, 1974, p. 24.

[b] Data taken directly from OWDC Catalog of Information on Water Data, 1974.

[c] Samples taken every two days. (IFYGL data.)

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS		PESTICIDES	REFRACTORY ORGANICS
												TOTAL	DIS-SOLVED		
5310106		5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D		5A-C 2D	5A-C 2D	5A-C 2D	2D			
5310107	2C														
5310108	2CD		2D	2D	2CD	2CD			2CD	2C	2C		2C	2C	
"	5AD 2C	2D	5AD 2BC	5A 2BC	5A 2BC	5AD 2BC			5A 2BC	2D	2D	5D		2D	2D
"	2A 5BC	2C	2A 5BC			2A 5BC				2C	2C	2A 5BC		2BC	2BC
5310109	2C		2C	2C	2C	2C	2C								
5310110	6		6	6		6	6		6						
"	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D	11B-D		
"	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB	11AB		

RIVER BASIN GROUP 5.3

YEAR(S)	AGENCY	STATION NUMBER	STATION DESCRIPTION	OWDC STA	TYPE OF DATA										
					DISCHARGE RATE	TEMP	TURBIDITY	TDS/COND	TOTAL SOLIDS	SUSPENDED SOLIDS	PARTICLE SIZE	HARDNESS	ALKALINITY	DISSOLVED OXYGEN	BOD/COD
		53205	Eight Mile Creek	(No Data Found)											

STATION NUMBER	TYPE OF DATA														
	pH	SILICA	NITRATE	AMMONIA	TOTAL KJELDAHL NITROGEN	TOTAL P	DISSOLVED REACTIVE P	TOTAL SOLUBLE P	CHLORIDE	MANGANESE	IRON	HEAVY METALS TOTAL	HEAVY METALS DIS-SOLVED	PESTICIDES	REFRACTORY ORGANICS

Evaluation and Summary of Data for River Basin Group 5.3

This river basin group includes two hydrologic areas comprising 5,876 km^2 (2,260 mi^2) in New York. Of the six tributaries included on the DAM for this river basin group only the Black River was found to have sufficient data available for loading calculations. No data were found for the five tributaries in Hydrologic Area 5.3.2. The Black River has a long-term chemical and flow record and was monitored in detail during IFYGL.

Hydrologic Area 5.3.1 - Black River. The Black River has been studied rather extensively over the years. Approximately monthly data for a number of parameters including nitrate, ammonia, total phosphorus, dissolved reactive phosphorus, and chloride were collected between 1964 and 1974. During this ten-year period several independent sampling programs overlapped, permitting some data comparison. Data have also been obtained at a near-mouth station (5310104) on a monthly basis from 1970 through 1972. During the IFYGL study water quality data were collected at station 5310110 every two days from the spring of 1972 through the spring of 1973. Among the parameters measured were nutrients (including total soluble phosphorus), chloride, and heavy metals.

In addition to the extensive water quality data record, a discharge record is available from a gauging station (5310106) that has been operating since 1920. The station is located about 13 river kilometers (eight miles) upstream from the mouth and below the confluence of the major tributaries to the Black River. Thus, except for a few parameters including pesticides and refractory organics the Black River has an excellent set of data from which to calculate loadings.

Hydrologic Area 5.3.2 - Perch Complex. Of the five tributaries identified for the DAM in this complex none were found to have any data available on them. This includes discharge as well as water quality data. There is some agriculture in this sparsely populated basin which may provide some non-point source input.

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TO TRIBUTARIES IN
LAKE SUPERIOR BASIN

	Map	DAM	Data Evaluation
Amnicon River	54	80	106
Ankodosh River	126	170	-
Au Train River	122	164	-
Bad River	56	94	108
Baptism River	50	66	102,103
Barden Creek	-	82	-
Bear Creek	-	138	-
Beaver River	50	68	102,104
Betsy River	122	168	177
Big Garlic River	120	158	47,174,177
Black River	112	128	174
Blind Sucker River	122	166	-
Bois Brule River	54	84	106
Boston Creek	116	144	-
Boyd Creek	54	92	107
Brule River	50	60	102
Caribou River	50	66	-
Carp River (12107)	-	130	174
Carp River (12518)	120	160	177
Cascade River	50	62	102,103
Chocolay River	122	162	177
Cole Creek	-	142	-
Cranberry River (11313)	54	88	107
Cranberry River (12117)	112	134	-
Cross River	50	64	102,103
Dead River	120	158	177
Deer Creek	116	140	-
Denomie Creek	-	96	-
Devil Track River	50	62	103
Dover Creek	-	144	-
Duck Creek	-	134	-
Eagle River	-	146	-
East Sleeping River	-	140	-
Elm River	116	140	-
Encampment River	-	70	-
Falls River	120	152	176
Fish Creek I (11309)	54	86	107
Fish Creek II (11322)	54	92	107
Firesteel River	116	138	-
Flag River	54	88	107
Flintsteel River	116	138	-
Flute Reed River	-	60	-
French River	50	72	102,104
Furnace Creek	122	164	-
Gooseberry River	50	70	102,104

	Map	DAM	Data Evaluation
Gratiot River	116	146	-
Graveyard Creek	-	96	-
Halfway River	-	134	-
Harlow Creek	120	158	-
Haukkala Creek	-	84	-
Hills Creek	116	146	-
Huron River	120	154	-
Hurricane River	122	166	-
Iron River (11311)	54	88	107
Iron River (12110)	112	132	174
Kadunce Creek	50	62	103
Kakagon River	-	94	-
Kelsey Creek	-	152	-
Kimball Creek	50	62	103
Knife River	50	72	102,104
Lahti Creek	-	150	-
Laughing Whitefish River	122	162	-
Lester River	50	74	102,104
Little Carp River (12106)	112	130	174
Little Carp River (12502)	-	152	-
Little Garlic River	120	158	47,174,177
Little Gratiot River	116	148	-
Little Huron River	120	156	-
Little Iron River	112	130	174
Little Two Hearted River	122	168	-
Manitou River	50	66	102,103
Maple Creek	-	128	-
McCallum Creek	116	142	-
Menge Creek	-	152	-
Middle River	54	82	-
Mineral River	112	132	174
Miners River	122	164	-
Misery River	116	140	-
Montreal River (11503)	58	96	47,108
Montreal River (12325)	-	148	-
Mosquito River	122	164	-
Naomikong Creek	126	170	-
Nemadji River	54	80	106
Onion River	54	90	107
Ontonagon River	114	136	175
Oronto Creek	-	96	-
Patent Creek	-	132	-
Pearson Creek	-	84	-
Pendills Creek	126	172	-
Pigeon River	50	60	102

INDEX
TO TRIBUTARIES IN
LAKE SUPERIOR BASIN (Continued)

	Map	DAM	Data Evaluation
Pike River	-	142	-
Pikes Creek	54	90	107
Pilgrim River	116	142	175
Pine River (12114)	-	134	-
Pine River (12511)	120	156	-
Pinkerton Creek	-	130	-
Poplar River (11108)	50	64	102,103
Poplar River (11304)	54	82	106
Potato River	112	134	-
Presque Isle River	112	128	174
Rasberry River	54	90	107
Ravine River	120	154	-
Reefer Creek	54	86	107
Rock River	122	162	-
Roxbury Creek	126	170	-
Saint Louis River	52	74	47,105
Salmon Trout River (12310)	116	140	-
Salmon Trout River (12512)	120	156	-
Sand River (11315)	54	90	107
Sand River (12602)	122	162	-
Sawmill Creek	-	142	-
Seven Mile Creek	-	164	-
Silver Creek (11119)	-	70	-
Silver Creek (12314)	-	142	-
Silver Creek (12322)	-	146	-
Silver River (12506)	120	154	176
Sioux River	54	92	107
Siskiwitt River	54	88	107
Sixmile Creek	120	152	-
Slate River	120	154	-
Split Rock River	50	70	102,104
Stewart River	50	70	104
Stony Creek	-	134	-
Sturgeon River	118	150	176
Sucker River (11122)	50	72	102,104
Sucker River (12611)	122	166	-
Tahquamenon River	124	168	47,174,177
Temperance River	50	64	102,103
Tenmile Creek	-	138	-
Tiebel Creek	-	128	-
Tobacco River	116	148	-
Trap Rock River	116	144	175
Traverse River	116	148	-
Two Hearted River	122	166	177
Two Island River	-	66	-
Union River	112	130	174
Unnamed into Superior Bay	-	78	-
Waiska River	126	172	178
Washington Creek	116	146	175
West Sleeping River	-	138	-
Whittlessey Creek	54	92	107
Yellow Dog River	-	156	-

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TO TRIBUTARIES IN
LAKE MICHIGAN BASIN

	Map	DAM	Data Evaluation
Annapee River	196	218	230
Bark River	184	200	-
Bear Creek (21706)	196	216	-
Bear Creek (24104)	286	304	-
Bear River	292	330	-
Beattie Creek	184	202	-
Belangers Creek	-	322	-
Betsie River	292	320	352
Big River	-	342	-
Big Sable River	288	314	351
Black Creek	286	302	350
Black River (23203)	260	270	282
Black River (23401)	264	274	283
Black River (24507)	294	334	353
Boardman River	292	322	352
Brandywine Creek	260	270	-
Brevoort River	294	332	-
Bulldog Creek	294	336	-
Burns Ditch	234	248	256
Bursaw Creek	298	338	-
Carp Lake Creek	-	332	-
Cedar Creek	-	304	-
Cedar River	184	200	228
Crystal River	292	322	-
Davenport Creek	294	334	-
Days River	298	346	354
Deer Creek	-	200	-
Duck Creek	-	306	229
East Branch Black River	294	334	-
East Twin River	196	220	231
Elk River	292	326	352
Escanaba River	300	346	182,354
Fischer Creek	-	224	-
Fishdam River	298	340	-
Flower Creek	-	308	-
Ford River	184	198	228
Fox River	194	212	228,230
Galien River	234	252	256
Garden Creek	-	340	-
Grand River	266	278	181,282,283
Green Creek	-	306	-
Gurney Creek	-	314	-
Hibbards Creek	196	216	-
Indiana Harbor Canal	234	248	255
Inwood Creek	-	328	-
Kalamazoo River	262	272	283
Kewaunee River	196	218	230
Keyes Creek	-	214	-
Kinnickinnic River	234	240	-
Lily Bay Creek	196	216	-
Lincoln River	288	314	351
Little River (21301)	-	206	-
Little River (24708)	-	342	-
Little Manistee River	290	316	351
Little Suamico River	192	212	230
Manistee River	290	318	351
Manistique River	296	336	353
Manitowoc River	196	222	231
Marblehead Creek	294	336	-
Martin Creek	-	342	-
Menominee River	186	202	228
Menomonee River	234	236	181,254
Milakokia River	294	334	-
Millecoquins River	294	334	-
Milwaukee River	234	236	181,254
Mitchell Creek	292	326	-
Moran River	-	332	-
Muskegon River	286	302	350
Norris Creek	-	280	-
Oak Creek	234	240	255
Oconto River	190	208	229
Ogontz River	298	342	-
Paquin Creek	294	332	-
Parent Creek	298	338	-
Pensaukee River	192	210	229
Pentwater River	288	308	351
Pere Marquett River	288	310	351
Peshtigo River	188	206	229
Pettibone Creek	234	246	255
Pigeon River (21717)	-	224	-
Pigeon River (23403)	264	276	283
Pike Creek	234	244	-
Pike River	234	244	255
Pine Creek	264	276	283
Pine River	292	328	353
Platte River	292	320	352
Point Creek	-	224	-
Portage Creek	184	198	228
Pte Aux Chenes River	-	332	-
Rapid River	298	344	354
Red River	196	214	230

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TO TRIBUTARIES IN
LAKE MICHIGAN BASIN (Continued)

	Map	DAM	Data Evaluation
Richely Creek	-	320	-
Rogers Creek	260	270	-
Root River	234	242	255
Saint Joseph River	258	268	282
Sauk Creek	234	236	254
Sheboygan River	196	224	231
Silver Creek (21707)	-	218	-
Silver Creek (21714)	-	224	-
Squaw Creek	298	342	-
Stony Creek	-	308	-
Sturgeon River	298	340	350,353
Suamico River	192	212	230
Sucker Creek (22101)	234	236	-
Sucker Creek (24415)	-	332	-
Susan Creek	292	330	-
Tacoosh River	298	346	-
Tebeco Creek	-	326	-
Thompson Creek	296	338	-
Three Mile Creek	196	218	-
Trail Creek	234	250	256
Valentine Creek	298	340	-
Walton River	-	202	-
Waukegun River	234	244	255
West Twin River	196	222	231
White River	288	306	350
Whitefish River	298	344	353
Whitefish Bay Creek	196	216	-
Yuba Creek	-	326	-

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TO TRIBUTARIES IN
LAKE HURON BASIN

	Map	DAM	Data Evaluation
Au Gres River	370	392	401
Au Sable River	368	388	398,400
Baranski Drain	-	422	-
Benke Creek	-	426	-
Big Creek (31604)	-	392	-
Big Creek (32331)	-	428	-
Birch Creek	-	430	-
Bird Creek	-	422	-
Black River	-	386	398
Burtch Creek	-	430	-
Carp Creek	364	382	399
Carp River	360	376	398
Charlotte River	-	372	-
Cheyboygan River	362	378	398
Cherry Creek	-	428	-
Devil's River	-	386	-
Diamond Creek	-	424	-
Drain north of Bay Park	-	418	-
Drain between Bay Park and Thomas	-	418	-
Drain at Oakhurst	-	418	-
Drain at Thomas	-	418	-
Elliots Creek	-	380	-
Elk Creek	-	426	-
Elm Creek	-	424	-
Forester Creek	-	428	-
Gogomain River	-	372	-
Graup Creek	-	422	-
Greene Creek	364	380	399
Hoban Creek	-	376	-
Indian Creek	-	428	-
Johnson Drain	-	410	-
Kawakwlin River	404	412	432
Lieus Creek	-	428	-
Little Black River	-	376	-
Little Munuscong River	-	372	-
Little Trout River	-	384	-
Long Lake Creek	-	384	-
Martineau Creek	-	376	-
McKay Creek	-	374	-
McKenzie Creek	-	428	-
Mill Creek (31201)	-	376	-
Mill Creek (32326)	-	426	-
Mill Creek (32337)	-	430	-
Miller Creek	-	428	-
Milwaukee Creek	-	430	-
Mud Creek	-	420	-
Mulligan Creek	364	380	399
Munuscong River	-	372	-
New River	-	422	-
Ocka Creek	-	424	-
Ocqueoc River	364	382	399
Pigeon River	408	420	433
Pinconning River	404	410	432
Pine River (31110)	360	374	398
Pine River (31606)	370	394	401
Pinnebog River	408	420	434
Quanicassee River	408	416	433
Railroad Drain	-	410	-
Rifle River	370	392	401
Rock Falls Creek	-	424	-
Saginaw River	406	412	357,432
Sagining River	-	396	401
Schmidt's Creek	364	382	399
Sebewaing River	408	418	433
Shebon Creek	-	420	-
Spring Creek	-	424	-
Swan River	-	384	-
Taft Drain	408	422	434
Tawas River	370	390	400
Tebo Drain	-	410	-
Thunder Bay River	366	384	399
Trout River	364	384	399
Unnamed east of Albany Point	-	374	-
Unnamed between Benke & Elk Creeks	-	426	-
Unnamed from Carlton Lake	-	372	-
Unnamed from Devil's Lake	-	386	-
Unnamed at Forty Mile Point	-	382	-
Unnamed from Grand Lake	-	384	-
Unnamed from Hay Lake	-	376	-
Unnamed at Ponchartrain Shores	-	374	-
Unnamed at point north of Purdy Bay	-	424	-
Unnamed at Sanilac-Huron County Line	-		-
Unnamed south of Six Mile Point	-	372	-
White River	408	424	-
White Feather Creek	-	410	-
White Rock Creek	-	426	-
Whitney Drain	370	392	401
Willow River	408	422	434
Wiscoggin Drain	-	418	-

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TO TRIBUTARIES IN
LAKE ERIE BASIN

	Map	DAM	Data Evaluation
Amlosch Ditch	-	512	-
Arcola Creek	-	572	-
Ashtabula River	546	574	584
Bay Creek	452	480	-
Beaubien Creek	442	460	-
Beaver Creek (43102)	538	548	582
Beaver Creek (44134)	588	610	-
Belle River	442	458	484
Big Sister Creek	592	614	-
Black River (41101)	440	454	484
Black River (43104)	538	548	582
Bournes Creek	-	604	-
Brownstown Creek	446	470	485
Buffalo River	592	616	625
Canadaway Creek	588	608	624,625
Cahoon Creek	-	556	-
Cascade Creek	588	598	-
Cattaruugus Creek	590	610	624,625
Cedar Creek	-	512	-
Chagrin River	542	568	583
Chappel Creek	-	530	-
Chatauqua Creek	588	602	-
Clinton River	444	462	485
Conneaut Creek	546	578	585
Corell Creek	588	606	-
Cowles Creek	546	574	-
Crane Creek	-	512	-
Crooked Brook	588	608	-
Crooked Creek	-	594	-
Cuyahoga River	540	558	583
Deleware Creek	592	614	-
Doan Brook	542	566	583
Doty Creek	-	604	-
Ecorse River	446	468	485
Eighteenmile Creek	592	616	625
Eightmile Creek	-	600	-
Elk Creek	588	594	624
Euclid Creek	542	566	583
Fourmile Creek	-	598	-
Frank and Poet Drain	446	468	485
Freelings Creek	588	602	-
Giddings Branch	-	566	-
Grand River	544	570	533
Grassy Creek	-	510	533
Green Creek	494	522	535
Halfway Creek	452	480	486
Huron River (41501)	448	470	485
Huron River (42508)	496	526	535
Hyde Creek	-	608	-
Indian Creek	-	574	-
La Carpe Creek	-	514	-
La Plaisaunce Creek	-	478	-
Little Canadaway Creek	588	606	-
Little Lake Creek	452	480	-
Little Muddy Creek	-	518	-
Little Pickerel Creek	-	524	-
Little Portage River	-	518	-
Little Sister Creek	-	616	-
Marsac Creek	442	460	-
Marsh Creek (41404)	446	470	485
Marsh Creek (43401)	-	570	584
Marsh Drain	442	460	-
Martin Run	-	548	-
Maumee River	490	502	437,532
Mill Creek	-	598	-
Mills Creek	-	526	-
Mouilee Creek	-	472	486
Muddy Creek (41704)	-	480	-
Muddy Creek (42309)	492	518	-
Muddy Creek (44301)	592	614	-
Ninemile Creek	-	566	-
Old Woman Creek	-	528	-
Ottawa Rier	488	498	532
Otter Creek (41703)	452	480	-
Otter Creek (42204)	-	512	533
Pickerel Creek	-	524	-
Pine River (41201)	442	456	484
Pipe Creek	-	526	-
Plum Brook	-	526	-
Portage River	492	514	534
Porter Creek	-	556	-
Quarry Creek	-	548	-
Racoon Creek (42404)	-	524	-
Racoon Creek (44102)	-	594	-
Raisin River	452	474	486
Red Brook	546	574	-
Rocky River	538	556	582
Rouge River	446	464	485
Salt River	442	462	-
Sandusky River	494	518	534

INDEX
TO TRIBUTARIES IN
LAKE ERIE BASIN (Continued)

	Map	DAM	Data Evaluation		Map	DAM	Data Evaluation
Sandy Creek	450	474	486	Unnamed at Airport near Ashtabula	-	578	-
Sawmill Creek	-	526	-	Unnamed at Avon Lake	-	556	-
Scott Creek	-	610	-	Unnamed at Bournes Beach	-	604	-
Sevenmile Creek	-	600	-	Unnamed at west edge of Brutenahl	-	566	-
Sixmile Creek	588	600	-	Unnamed west of Fletcher Point	-	610	-
Sixteenmile Creek	588	600	624	Unnamed between Four and Six Mile Creeks	-	598	-
Slippery Rock Creek	-	606	-	Unnamed near North Perry	-	572	-
Smoke Creek	592	616	-	Unnamed east of Ripley	-	602	-
South Creek	-	524	-	Unnamed west of Shore Haven	-	602	-
Stony Creek	450	474	486	Unnamed south of South Park	-	456	-
Swan Creek (41205)	442	460	-	Unnamed at Van Buren Bay	-	608	-
Swan Creek (41601)	450	474	486	Unnamed west of Walker Creek	-	604	-
Swan Creek (42201)	490	500	532	Unnamed at White's Landing	-	524	-
Tonawanda Creek	592	622	-	Vermillion River	496	530	535
Toussaint Creek	492	514	534	Walker Creek	-	606	-
Trout Run	588	594	-	Walnut Creek	588	596	624
Turkey Creek	588	594	-	Walnut-Silver Creek	588	610	-
Turtle Creek	-	512	-	Wheeler Creek	-	574	-
Twelvemile Creek	-	600	-	Williams Ditch	-	512	-
Twentymile Creek	588	600	-	Yetter Drain	452	480	-

INDEX
TO TRIBUTARIES IN
LAKE ONTARIO BASIN

	Map	DAM	Data Evaluation
Bald Eagle Creek	-	642	-
Bear Creek	666	672	-
Bedford Creek	-	688	-
Black Creek	632	648	-
Black River	694	698	629,704
Blind Sodus Creek	-	676	-
Butterfly Creek	670	682	-
Buttonwood Creek	-	646	-
Catfish Creek	670	680	-
Cayuga Creek	632	636	-
Chaumont River	-	700	-
Cowsucker Creek	-	644	-
Deer Creek (52101)	-	672	-
Deer Creek (52311)	-	684	-
Dennison Creek	-	672	-
East Branch Twelve Mile Creek	-	636	-
East Creek	-	644	-
Eight Mile Creek	-	702	-
Eighteen Mile Creek	632	638	662
First Creek	-	674	-
Fish Creek	-	638	-
Four Mile Creek (51102)	-	636	-
Four Mile Creek (51204)	-	660	663
Genesee River	634	650	629,662,663
Golden Hill Creek	632	638	-
Grindstone Creek	670	684	-
Hopkins Creek	-	636	-
Irondequoit Creek	634	658	663
Johnson Creek	632	640	-
Keg Creek	-	638	-
Kents Creek	-	700	-
Larkin Creek	-	648	-
Little Salmon River	670	682	690
Little Sandy Creek	670	684	-
Little Stony Creek	-	686	-
Marsh Creek	-	640	-
Mill Creek (51203)	634	660	663
Mill Creek (52321)	-	688	-
Mink Creek	-	672	-
Mud Brook	-	686	-
Mudge Creek	-	674	-
Nine Mile Creek	666	678	-
North Branch Sandy Creek	-	686	-
Oak Orchard Creek	632	640	662
Oswego River	668	678	629,690
Pearch River	-	700	-
Red Creek	666	676	-
Rice Creek	-	678	-
Round Pond Creek	632	648	-
Sage Creek	-	682	-
Salmon Creek (51120)	632	646	-
Salmon Creek I (52104)	666	672	-
Salmon Creek II (52107)	666	674	-
Salmon River	670	684	-
Sandy Creek (51116)	632	642	662
Sandy Creek (52316)	670	686	690
Six Mile Creek	-	636	-
Skinner Creek	-	686	-
Slater Creek	632	650	-
Snake Creek	-	682	-
Sodus Creek	-	674	-
South Sandy Creek	670	686	-
Sterling Creek	666	676	690
Stony Creek	670	688	-
Three Mile Creek	-	700	-
Twelve Mile Creek	-	636	-
Unnamed at Boller Point	-	674	-
Unnamed at Nine Mile Point	-	680	-
Unnamed at Sodus Bay	-	674	-
Unnamed west of Sunset Beach	-	640	-
Unnamed east of Wine Creek	-	680	-
West Creek	632	644	662
Wine Creek	-	680	-
Wolcott Creek	-	676	-

REMOVE FOR USE WITH DAM

DATA AVAILABILITY MATRIX (DAM) CODE LIST

Code	Reporting Agency
01:	Indiana (State) Board of Health, Stream Pollution Control Board
02:	(Ohio) Toledo Pollution Control Agency
03:	The University of Michigan
04:	International Joint Commission
05:	Illinois (State) Environmental Protection Agency
06:	Michigan Department of Natural Resources
07:	(Minnesota) Arrowhead Regional Development Commission
08:	National Commission on Water Quality
09:	New York (State) Department of Environmental Conservation
10:	New York (State) Department of Health
11:	New York (State) Erie-Niagara Basin Regional Water Resources Planning Board
12:	New York Water Resources Commission
13:	Ohio (State) Division of Water
14:	Ohio State University
15:	Pennsylvania Department of Environmental Resources
16:	(Pennsylvania) Erie-County Health Department
17:	U.S. Army Corps of Engineers, Buffalo Division
18:	U.S. Environmental Protection Agency
19:	U.S. Federal Water Pollution Control Administration (now U.S. EPA)
20:	U.S. Fish and Wildlife Service
21:	U.S. Geological Survey
22:	U.S. Lake Survey Center
23:	U.S. Water Quality Office
24:	Northwestern Wisconsin Regional Planning and Development Commission
25:	Wisconsin University Center for Lake Superior Environmental Studies
26:	Wisconsin University Sea Grant Program
27:	Wisconsin Department of Natural Resources
28:	Minnesota Department of Natural Resources
29:	Minnesota Pollution Control Agency (MPCA)
30:	Southeastern Wisconsin Regional Planning Commission
31:	Wisconsin State Committee on Water Pollution
32:	Michigan State University, Institute of Water Research
33:	(Minnesota) Department of Water and Gas, City of Duluth
34:	Minnesota Department of Conservation
35:	U.S. Forest Service
36:	Argonne National Laboratory
37:	(Minnesota) Reserve Mining Company
38:	Northern Michigan University
39:	Michigan Technological University
40:	Minnesota Department of Health
41:	(Michigan) Grand River Watershed Council
42:	(Michigan) Andrews University
43:	Ohio (State) Environmental Protection Agency
44:	(Ohio) Heidelburg College

Frequency Codes

Code	Definition
1	Continuous
2	Grab
3	Daily
4	Weekly
5	Monthly
6	Quarterly

Frequency Codes

Code	Definition
7	Annually
8	Biweekly
9	Irregular
10	Unknown
11	Other Seasonal (defined for each case)

Seasonal Modifiers

Code	Season
A	Winter (Dec-Feb)
B	Spring (Mar-May)
C	Summer (June-Aug)
D	Fall (Sept-Nov)