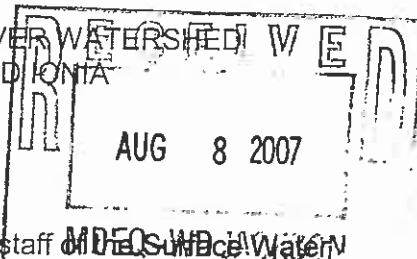


MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 WATER BUREAU
 AUGUST 2007

STAFF REPORT

A BIOLOGICAL SURVEY OF THE UPPER GRAND RIVER WATERSHED
 JACKSON, INGHAM, EATON, CLINTON, AND IONIA
 COUNTIES, MICHIGAN
 JUNE - AUGUST 2006



As part of the watershed surveillance activity of the Water Bureau, staff of the Surface Water Assessment Section conducted a qualitative biological survey of the Grand River Watershed in Jackson, Ingham, Eaton, Clinton, and Ionia Counties. The biological surveys were conducted according to Great Lakes and Environmental Assessment Section Procedure 51 (MDEQ, 1990). Water and sediment samples were collected and preserved following appropriate procedure (MDNR, 1994) and transported to the Michigan Department of Environmental Quality (MDEQ) Environmental Laboratory for chemical analyses. The survey objectives were to document current conditions and to gather information that may be useful in both the review of National Pollutant Discharge Elimination System permits and the progress of total maximum daily loads (TMDLs) where appropriate.

The Grand River basin is the second largest watershed in Michigan and encompasses approximately 5,570 square miles (Michigan Water Resources Commission, 1961). The slope of the river bed is approximately 1.9 feet per mile from Jackson to Grand Ledge, and 3.2 feet per mile from Grand Ledge to Ionia (Michigan Water Resources Commission, 1961). The entire watershed is contained within the Southern Michigan Northern Indiana Till Plains (SMNITP) ecoregion. The upper portion of the watershed, from south of Jackson to Portland, was evaluated during this survey. The Upper Grand River flows through several urbanized areas including Jackson, Eaton Rapids, Dimondale, Lansing, Grand Ledge, and Portland.

The Grand River from Tompkins Road upstream to the city of Jackson has been included on the list of water bodies that has an approved TMDL, but does not attain designated uses because of untreated sewage discharges, dissolved oxygen (D.O.) levels which do not attain the Michigan Water Quality Standards (WQS), and biological communities that are considered poor. The Grand River in the vicinity of Lansing and Grand Ledge is not attaining designated uses due to combined sewer overflows (CSOs), the discharge of pathogens, and the violation of the D.O. WQS. The Grand River from the Lake Michigan confluence upstream to Jackson has a fish consumption advisory due to elevated levels of polychlorinated biphenyl (PCBs) in the fish tissue. The entire Grand River has had exceedances of water quality standards for elevated levels of PCBs.

In addition to the main branch of the upper Grand River, the following tributaries to the upper Grand River were examined during this survey: McCain Drain, Chittenden (Grass Lake) Drain, Center Lake Outlet (North Branch of the Grand River), Wildcat Creek, Portage River, Portage (Cahogan) Creek, Pickett Drain, Batteese Creek, Perry Creek, Mackey Creek, Sandstone Creek, Spring Brook, North Onondaga Drain, Carrier Creek, and Sebewa Creek.

SUMMARY

Locations of macroinvertebrate community sampling, physical habitat evaluations, and chemical sampling are indicated in Figure 1 and Table 1. The macroinvertebrate community, physical habitat, sediment chemistry, and water chemistry data are presented in Tables 2-5. Forty sites were evaluated for macroinvertebrate community and habitat and one fish community assessment was conducted. Water chemistry was sampled at eight stations and sediment chemistry was sampled at five stations.

Scoring the macroinvertebrate communities was conducted using a scoring system which rated the communities on a scale from +9 to -9. Stations with a score greater than or equal to +5 are considered excellent. Stations with a score less than or equal to -5 are classified as poor. Stations with a score of -4 through +4 are classified as acceptable (moderately impaired). Thirty-two of the forty stations where the macroinvertebrate community was evaluated received a rating of acceptable, five of the stations received a rating of excellent, and three stations received a rating of poor (Table 2).

Stream habitat was evaluated at each station using a scoring system which ranged in values from 0 to 200. Seventeen of the 40 stations received a rating of good, slightly impaired, and fourteen stations were rated as marginal, moderately impaired. Nine stations received a rating of excellent and no stations received a rating of poor.

The Grand River upstream of Jackson has historically had good water quality with biological communities that would be characteristic of unimpaired water bodies (Sylvester and Grant, 1977). The Grand River in Jackson has been channelized and was previously routed underground for approximately one half of a mile. This stretch of the river flows through a highly industrialized and urbanized area of Jackson. The discharge of wastewater from industrial facilities, the Jackson Wastewater Treatment Plant (WWTP), along with storm water discharges and (CSOs) were combining to cause degradation of the Grand River for 14 miles downstream from Jackson (Sylvester and Grant, 1977).

Previous work on the Grand River has documented depressed D.O. levels downstream from Jackson that would not meet the warmwater D.O. WQS (Argiroff, 1995 and 1999). Further D.O. monitoring was conducted downstream of Jackson during the summer of 2001. The monitoring revealed that 69 percent of the logged D.O. data points were below the minimum warmwater D.O. WQS of 5.0 milligrams per liter (Sunday, 2002). Sunday (2002) has concluded that the elimination of the combined sewer overflows have not eliminated all of the negative wet weather D.O. effects. The continuing negative wet weather D.O. effects may in part be caused by nonpoint source pollution (Sunday, 2002).

Macroinvertebrate Communities

The macroinvertebrate community was evaluated at forty locations during this survey. The rating of the macroinvertebrate communities varied from poor at three locations to excellent at five locations. The most impaired locations were Batteese Creek off of Williamston Road (Station 17), Spring Brook at Deveraux Road (Station 24), and Carrier Creek at Mount Hope Highway (Station 32). These locations had macroinvertebrate communities that were considered poor, although the habitat at these stations ranked good or marginal. All of these streams are wetland drainages and Stations 17 and 32 have been dredged in the past. Station 17, Batteese Creek, had very little flow, extensive fine organic material, and very little

habitat for macroinvertebrates. The macroinvertebrates found at this station were dominated by air breathing and tolerant taxa. Station 24 is located in the headwaters of Spring Brook and is a small wetland stream. The substrate in Spring Brook at Deveraux Road consisted of one to two feet of fine organic material. Seventy-five percent of the macroinvertebrates collected were midge larvae and there were almost no sensitive organisms found. Station 32, Carrier Creek at Mount Hope Highway, was very small and appeared to be originating from a wetland. A third of the organisms collected at Station 32 were amphipods, and the other most common taxa were worms, midge larvae, snails, and an assortment of other air breathers.

The remaining stations were ranked as either acceptable or excellent. The stations with higher scores tended to be located where the river has more gradient and where there is more habitat available for colonization by macroinvertebrates. Four of the five stations with excellent macroinvertebrate community rankings were on the Grand River. All of the excellent stations on the Grand River are downstream of Jackson County, two are near Birchfield Park in southern Ingham County (Stations 30 and 31), and two are downstream of Grand Ledge in Clinton and Ionia Counties (Stations 38 and 40). The other excellent station was on Spring Brook (Station 25). The macroinvertebrates at these stations are indicative of high quality warmwater streams, with a large number and diversity of mayflies and caddisflies, low percentages of air breathing taxa, and an even, diverse community that was not dominated by a single taxon.

The stations with acceptable rankings had scores that ranged from -4 to 4. Generally, the stations that had scores in the higher end of the acceptable ranking were streams with stable substrate, some gradient, and a variety of depths and velocities. Many of the stations in the higher range of acceptable (scores of 2 to 4), were stations on the Grand River, either upstream of Jackson (Station 1) or downstream of Tompkins Road in northern Jackson County (Stations 19, 36, 37, and 39), or tributaries located in the upstream portion of the watershed (Stations 4, 5, 9) or downstream of Jackson (Stations 23 and 29). Macroinvertebrates at these stations were very similar to the excellent stations, but did not have as many mayfly taxa or individuals, or had one taxa that represented a larger percentage of the community.

Alternatively, stations in the lower range of acceptable (-2 to -4), were mostly streams that have been dredged, drain wetlands, have extensive amounts of fine organic material, and little available macroinvertebrate habitat. These stations were located in either the Portage River Watershed (Stations 10, 11, 13 – 16), which is a large tributary to the Upper Grand draining southeast Ingham and northeast Jackson Counties, or were small tributaries (Stations 2, 27, 28, 33, 34, and 41). The macroinvertebrate communities at these stations had either low diversity or numbers of taxa sensitive to pollution (such as mayflies, caddisflies, or stoneflies) and were likely to be dominated by a single taxon and have a large percentage of isopods, snails, and leeches.

The biological community downstream from Jackson at Parnell Road (Station 8) has been monitored repeatedly for over 30 years and has slowly improved as the water quality in the Grand River has improved. During a biological survey in 1970, only six species of macroinvertebrates were identified at this location (Wilson, 1970). Subsequently, in 1988, Waggoner (1989) identified nine species of invertebrates at the same location. The surveys conducted in 2001 (Rockafellow, 2003 (a)) identified 23 taxa and this survey identified 25 taxa of aquatic invertebrates.

Habitat

The physical habitat was also evaluated at forty locations during this survey (Table 3). The habitat varied from marginal (moderately impaired) to excellent (non-impaired). The most severely impaired habitat was located on Portage River at Hawkins Road (Station 10). Historic dredging at this location has destroyed the natural meandering pattern of the river and made the channel much larger than it was before dredging. The river is very straight and dominated by a slow pool with several feet of fine sediment and silt covering all habitat. Although the macroinvertebrates at this location rated acceptable, the numeric score was the lowest in the acceptable range (-4).

The overall habitat of Center Lake Outlet at Falahee Road (Station 5) ranked good, but the entire channel was full of aquatic macrophytes that grew up to the top of the water column. At 5th Street, just below the Leoni Township WWTP outfall, Center Lake Outlet has cladophera and algae growing on most of the bottom of the river. The Center Lake Outlet (also known as north branch Grand River) has been documented to have large D.O. diurnal variations and is part of the D.O. TMDL for the Upper Grand (Sunday, 2002). Reducing the nutrient load to Center Lake Outlet will reduce plant growth and possibly reduce the large diurnal D.O. concentrations.

Fish

The fish community of Sebewa Creek was sampled at Keefer Highway (Station 43) during this survey (Table 4). Consistent with previous surveys, the fish community continued to contain trout. Rainbow trout comprised approximately nine percent of the fish community at Keefer Highway, suggesting that Sebewa Creek is attaining its coldwater fish designated use.

Water Chemistry

Water samples were collected from eight locations during this survey (Table 5). Most of the parameters analyzed were present at levels which were within the range documented at reference sites in the SMNITP ecoregion (Lundgren, 1994). Stations 1 (Loomis Road) and 8 (Parnell Road) were located on the Grand River, upstream and downstream from the city of Jackson (and the Jackson WWTP). Stations 35 (Waverly Road) and 36 (Hunter Orchard Park) were located on the Grand River, upstream and downstream from the city of Lansing. Station 4 (5th Street) was located immediately downstream from the Leoni Township WWTP discharge and Station 5 (Falahee Road) was located further downstream on the same water body. Water chemistry data were also collected from Station 3 (Chittenden Drain/aka Grass Lake Drain) as a surrogate for data upstream of Leoni Township WWTP, however this data may have been influenced by storms and may not represent base flow water chemistry. No exceedances of the WQS were documented during this survey.

Sediments

Sediment samples were collected and analyzed for nutrient concentrations at four locations during the survey (Table 6). In addition, organics and metals data were collected from sediment upstream (Grand River at Loomis, Station 1) and downstream (Grand River at Parnall, Station 8) of the city of Jackson.

The level of pollutants that were present in the sediment was compared to reference site sediments collected from within the SMNITP ecoregion (Jones, 1999). Copper, lead, silver, and zinc were present at Station 8 at levels which exceeded the level of these contaminants

identified at reference sites within the SMNITP ecoregion. The pollutant levels within the sediments were also compared to the sediment quality guidelines (MacDonald et al., 2000). The pollutant levels were compared to the threshold effect concentration (TEC) and the probable effect concentration (PEC). The TEC describes a level of contamination in the sediment below which adverse effects are not expected to occur. The PEC describes a level of contamination in the sediment above which adverse effects are expected to occur more often than not (MacDonald et al., 2000). However, this information is typically considered with additional studies, such as sediment toxicity tests, before any conclusions are made regarding sediment toxicity. The following metals exceeded the TEC at Station 8: arsenic, cadmium, chromium, copper, lead, and zinc. The following polycyclic aromatic hydrocarbons (PAHs) exceeded the PEC at Station 8: benzo[a]anthracene, benzo[a]pyrene, chrysene, flouranthene, phenanthrene, and pyrene. In addition, benzo[b]flouranthene and ideno(1,2,3-c,d)pyrene were found at detectable concentrations, but TEC and PEC values for these chemicals were not available. The calculated total PAHs concentration at Station 8 exceeded the PEC concentration for total PAHs.

Nonpoint Source Monitoring

Nonpoint source impacts on water quality in the Upper Grand River Watershed include wetland drainage, drain construction, tiling, ongoing drain maintenance activities, and storm water runoff from urban and agricultural land uses; all of which alter flows, reduce habitat, and limit macroinvertebrate community diversity. Two water bodies in the watershed, Carrier Creek and Portage River, have approved TMDLs for macroinvertebrate communities that do not support the other indigenous aquatic life designated use. As the result of discussions with Nonpoint Source Unit and Water Bureau District Staff, three sites on Carrier Creek and nine sites in the Portage River Watershed were selected for assessment to determine the status of the macroinvertebrate community and provide a thorough assessment of the Portage River Watershed before Best Management Practices are implemented.

The three sites on Carrier Creek were located on East Mount Hope Highway (Station 32), off of Williamsburg Road (Station 33), and Willow Creek Drive (Station 34). Stream restoration activities have been implemented at Station 34, where the channel has been narrowed, meanders have been created, and stable substrate has been added to the channel, which have dramatically improved bank stability and in-stream habitat for macroinvertebrates. However, the macroinvertebrate community is still impacted at Station 34. Although the Procedure 51 value is in the acceptable range (-3), the macroinvertebrate community was dominated by midge larvae (Chironomidae) and snails. However, Station 34 was the only station on Carrier Creek where mayflies were collected or more than one individual caddisfly was found. With additional recruitment the macroinvertebrate community in the restored section of Carrier Creek should continue to improve.

Macroinvertebrate community and habitat were evaluated at nine stations in the Portage River Watershed (Stations 9-17). Station 10 (Portage River at Hawkins Road) is within the TMDL reach and Station 11 (Portage River at Wooster Road) is located just above the beginning of the TMDL reach. Station 12 (Dunn Road) is also on the Portage River and the remaining stations are located on tributaries to the Portage River. The habitat at most of the sites in the Portage River Watershed rated marginal or moderately impacted due to historic dredging of wetlands, which left the streams with little to no sinuosity or pool variability, and increased flashiness and embeddedness. The macroinvertebrate communities almost all scored below zero, with most stations receiving Procedure 51 values between -2 and -4. The macroinvertebrate communities in the Portage River Watershed are lacking many sensitive taxa (Ephemeroptera, Plecoptera,

and Tricoptera), have higher proportions of isopods, snails, leeches, and surface breathers, and often had one taxa which represented a large percentage of the community. In general, macroinvertebrate communities in the Portage River Watershed would benefit greatly from increases in epifaunal substrate and available cover habitat.

PROBABLISTIC SAMPLING

Site Selection

Rivers in Michigan have been delineated into individual classifications called river segments that are based on flow and temperature characteristics as related to available groundwater and local geology/geomorphology. The Upper Grand and Red Cedar River Watershed (the entirety of HUC 4050004) was divided into six different flow/temperature characteristic types based on an assemblage of valley segment data provided by the Michigan Department of Natural Resources (MDNR) Fisheries Division (Wehrly et al., 1997 and 1999; Seelbach and Wiley, 1997; Baker et al., 2001). These characteristics are:

1. Small Cool/Cold (SC) - small headwater streams with moderate groundwater influence draining a basin that is less than 40 mi².
2. Small Warm (SW) - considered to be low volume warmwater headwater streams with insignificant groundwater influence draining a basin that is less than 40 mi².
3. Medium Cool/Cold (MC) – medium sized cool/cold water streams with relatively stable flows as the source of flows is a relatively significant groundwater yield. Drainage area is 41 mi² - 179 mi².
4. Medium Warm (MW) - medium sized warmwater streams. Summer flows may be reduced significantly as source flows are of relatively low yield. Drainage area is 41 mi² - 179 mi².
5. Large Warm (LW) - includes the larger tributaries and/or portions of the main stem of a river system. Drainage areas are 180 mi² - 620 mi² and contain large fish species.
6. Very Large Warm (VLW) - Drainage areas are greater than 620 mi² and are likely to be unwadeable.

The Upper Grand and Red Cedar River Watershed is comprised of approximately 438 miles of stream channel (as determined from the RF3 database) divided into segments, each identified as falling into one of the six temperature/flow classifications. Each segment was divided into one-mile reaches and each reach was assigned a number. Forty reaches were selected randomly without replacement. Sampling location was chosen as the closest road crossing within the one mile reach. The forty sampling locations were distributed (stratified) by the percentage of the total wadeable stream miles each respective classification represented (e.g., 48 percent of the streams were classified as small warm, 48 percent of the total sampling effort would be used for small warm streams, 48 percent of 40 total sampling locations equals about 19 locations in small warm streams).

The Upper Grand and Red Cedar River Watershed classification percentages were determined. Each percentage is followed by an estimate of the number of sampling stations to proportionately represent the entire watershed (Table 7).

Classification	River Miles	Percent of River Miles	Number of sites	Percent Attaining
Small Cold	32.4	7	3	100
Small Warm	210.4	48	19	84
Medium Cold	7.9	2	1	100
Medium Warm	76.2	17	7	100
Large Warm	56.6	13	5	100
V. Large Warm	54.7	12	5	100
TOTAL	438.2		40	

Alternative sites were selected to allow for contingencies in the field. Targeted sites were identified prior to random site selection. If targeted sites were subsequently chosen in the random draw, they are considered random. Targeted sites that were not selected in the random selection process were surveyed in addition to the 40 random sites; but, the results of these surveys were not considered for the probabilistic analysis.

Watershed Attainment Status

Summary statistics were calculated from the probabilistic monitoring results (N=40) to address regional attainment status for the Upper Grand and Red Cedar River Watershed. The probabilistic monitoring results can be extrapolated to the entire watershed.

- Results for the Upper Grand and Red Cedar River Watershed were derived from 40 aquatic macroinvertebrate stream samples collected in six valley segment types.
 - The average Procedure 51 macroinvertebrate score for the Upper Grand and Red Cedar River Watershed was -0.37.
 - The 95 percent confidence interval for the average value of Procedure 51 was +/- 1.09.
 - Ninety percent of the Upper Grand and Red Cedar River Watershed was supporting the other indigenous aquatic life and wildlife designated use component of R.323.1100(1)(e) of the WQS.
 - The 95 percent confidence interval for the percentage of sites supporting the other indigenous aquatic life and wildlife designated use was (84 percent to 100 percent).

Macroinvertebrate Community by Stream Type

Although the average Procedure 51 macroinvertebrate score across all stream classes was -0.37, there are noticeable differences in Procedure 51 values between large and non-large streams. The average Procedure 51 value in medium and small streams (Small-Cold, Small-Warm, Medium-Cold, and Medium Warm stream classes) was -1.7 and the average

was 3.6. This is a statistically significant difference and is a numeric description of the macroinvertebrate communities in different types of streams in the Upper Grand and Red Cedar River Watershed.

Many small and medium streams in the Upper Grand and Red Cedar River Watershed have been dredged to improve drainage of what is now farmland. Dredging reduces habitat for macroinvertebrates, widens channels, and reduces base flow stream velocity, all of which results in lower Procedure 51 values. Most of the sections of the Upper Grand and Red Cedar Rivers that are classified as Large or Very Large are on the main branch of the Grand River. As the Upper Grand drains to the north and west the gradient improves, historic dredging activity goes down dramatically, and macroinvertebrate communities become more diverse, as seen in the improvement in the Procedure 51 values.

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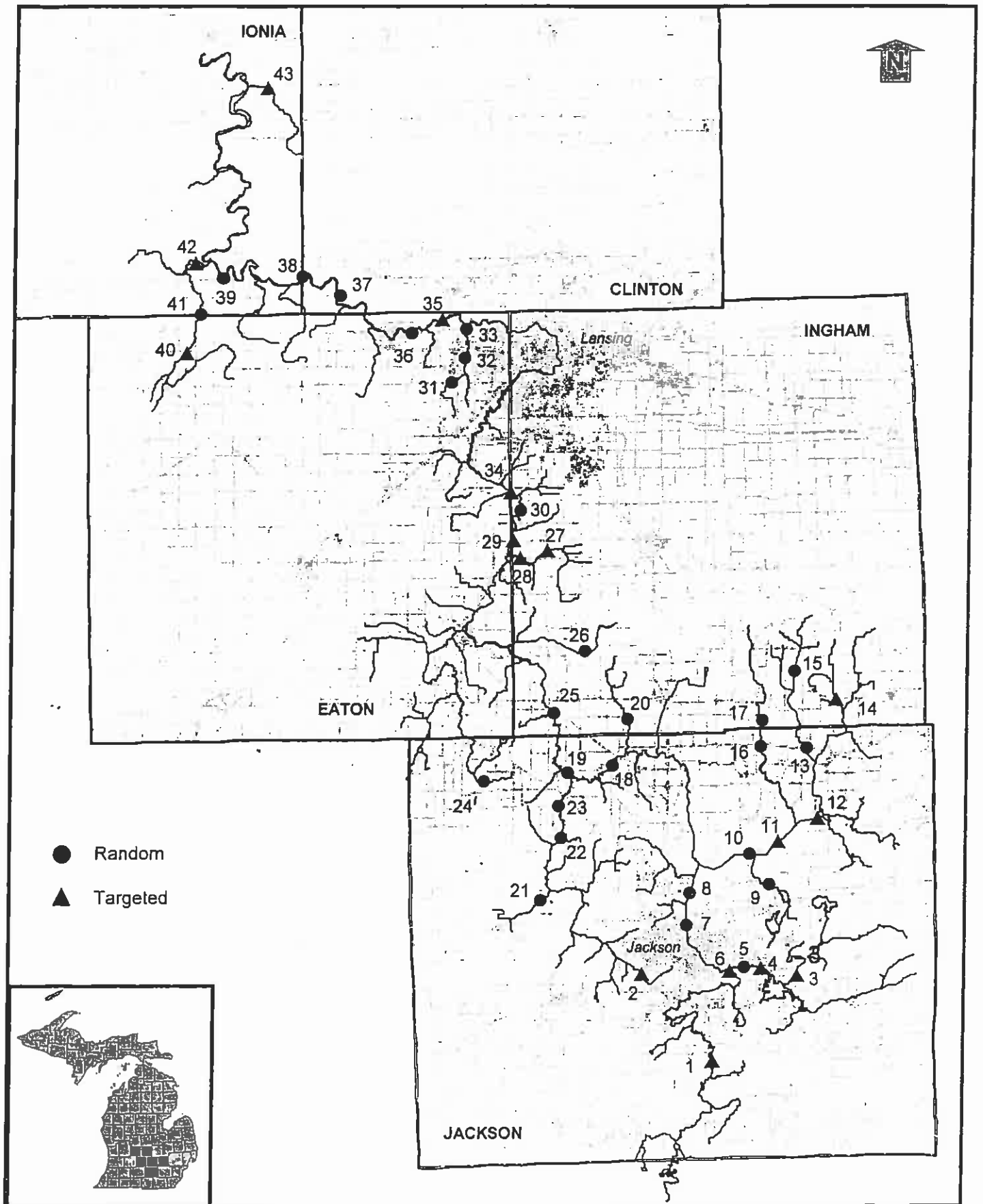


Figure 1: Sampling locations in the Upper Grand River watershed, Clinton, Eaton, Ingham, Ionia, and Jackson, Counties, June – August, 2006.

Table 1. Monitoring sites in the Upper Grand River watershed (excluding the Looking Glass and Red Cedar Rivers). F-Fish; B-Macroinvertebrates; H-Habitat, WC-Water Chemistry; SC-Sediment Chemistry; R = Random Selection; T = Targeted Selection; Stream Type and Segment # are only listed for Random Sites.

Site #	R/T	Stream Type	Segment #	Stream Name	Waterbody Name	Location	County	Latitude	Longitude	T/R/S	F	B	H	WC	SC	Macroinvertebrate Rating	Habitat Rating
1	T			Grand River	Grand River	Loomis Road	Jackson	42.15343	-84.38193	T4S R1W S1	X	X	X	X		Acceptable	Good
2	T			McCain Drain	McCain Drain	Spring Arbor Road	Jackson	42.225593	-84.460539	T3S R1W S8						Acceptable	Marginal
3	T			(Grass Lake Drain)	Chittenden Drain	Noon Road	Jackson	42.222800	-84.288110	T3S R1E S11			X	X			
4	T			Center Lake Outlet	Center Lake Outlet	5th Street	Jackson	42.228651	-84.327643	T3S R1E S8	X	X	X	X		Acceptable	Good
5	R	Warm Medium	1017	Center Lake Outlet	Center Lake Outlet	Falahae Rd	Jackson	42.228700	-84.346220	T3S R1E S8	X	X	X	X		Acceptable	Good
6	T			Grand River	Grand River	High Street	Jackson	42.22746	-84.36315	T3S R1E S7	X	X	X	X		Acceptable	Marginal
7	R	Warm Large	1016	Grand River	Grand River	W Monroe St	Jackson	42.265030	-84.409600	T2S R1W S27	X	X	X	X		Acceptable	Marginal
8	R	Warm Large	1016	Grand River	Grand River	W Permal Rd	Jackson	42.291060	-84.405610	T2S R1W S22	X	X	X	X		Acceptable	Good
9	R	Cold Small	1007	Wildcat Creek	Wildcat Creek	Seymour Rd	Jackson	42.296510	-84.317810	T2N R1E S16	X	X	X	X		Acceptable	Good
10	R	Warm Medium	275	Portage River	Portage River	Hawkins Rd	Jackson	42.321610	-84.338870	T2S R1E S5	X	X	X	X		Acceptable	Marginal
11	T			Portage River	Portage River	Woolster Road (Seymour Ave)	Jackson	42.332032	-84.308652	T2S R1E S3	X	X	X	X		Acceptable	Marginal
12	T			Portage River Drain	Portage River Drain	Dunn Road	Jackson	42.348980	-84.263580	T1S R1E S25	X	X	X	X		Acceptable	Marginal
13	R	Cold Medium	425	(Cahogan Creek)	(Cahogan Creek)	Territorial Rd	Jackson	42.407250	-84.275380	T1S R1E S11	X	X	X	X		Acceptable	Marginal
14	T			Pickett Drain	Pickett Drain	Heaney Road	Ingham	42.447256	-84.24215	T1N R2E S30	X	X	X	X		Acceptable	Marginal
15	R	Cold Small	1005	Cahaogan Creek	Cahaogan Creek	Decamp Rd	Ingham	42.470120	-84.287620	T1N R1E S14	X	X	X	X		Acceptable	Marginal
16	R	Warm Small	1009	Batteese Creek	Batteese Creek	d/s Territorial Rd	Jackson	42.408060	-84.326280	T1S R1E S9	X	X	X	X		Acceptable	Good
17	R	Warm Small	1009	Batteese Creek	Batteese Creek	off Williamston Rd	Ingham	42.431270	-84.323020	T1N R1E S33	X	X	X	X		Poor	Marginal
18	R	Warm Large	287	Grand River	Grand River	Dixon Rd	Jackson	42.395895	-84.490359	T1S R2W S12	X	X	X	X		Acceptable	Good
19	R	Warm Large	287	Grand River	Grand River	Tompkins Rd	Jackson	42.390840	-84.541460	T1S R2W S15	X	X	X	X		Acceptable	Good
20	R	Warm Small	421	Perry Creek	Perry Creek	d/s Olds Rd	Ingham	42.433910	-84.473500	T1N R1W S31	X	X	X	X		Acceptable	Good
21	R	Cold Small	423	Mackey Creek	Mackey Creek	Wellman Road	Jackson	42.286648	-84.572583	T2S R2W S20	X	X	X	X		Acceptable	Good
22	R	Warm Medium	277	Sandstone Creek	Sandstone Creek	d/s Springfield Rd	Jackson	42.337720	-84.548870	T1S R2W S33	X	X	X	X		Acceptable	Marginal
23	R	Warm Medium	280	Sandstone Creek	Sandstone Creek	Gordon Rd	Jackson	42.363980	-84.550710	T1S R2W S28	X	X	X	X		Acceptable	Good
24	R	Warm Medium	280	Spring Brook	Spring Brook	Deveraux Rd	Jackson	42.316260	-84.660980	T2S R3W S8	X	X	X	X		Poor	Good
25	R	Warm Medium	280	Spring Brook	Spring Brook	Robbins Rd	Jackson	42.384680	-84.634870	T1S R3W S14	X	X	X	X		Excellent	Excellent
26	R	Warm Large	287	Grand River	Grand River	u/s Baldwin Park	Ingham	42.439380	-84.555880	T1N R2W S28	X	X	X	X		Acceptable	Excellent
27	R	Warm Small	427	North Onondaga Dr.	North Onondaga Dr.	Aurelius Rd	Ingham	42.481100	-84.521650	T1N R2W S11	X	X	X	X		Acceptable	Marginal
28	T			Columbia Creek	Columbia Creek	Onondaga Rd	Ingham	42.568172	-84.592859	T2N R1W S1	X	X	X	X		Acceptable	Marginal
29	T			Grand River	Grand River	Curlice Rd	Ingham	42.58318	-84.80066	T2N R3W S1	X	X	X	X		Excellent	Good
30	T			Grand River	Grand River	d/s Columbia Rd	Ingham	42.505920	-84.592090	T2N R2W S6	X	X	X	X		Excellent	Excellent
31	R	Warm Very Large	73	Carrier Creek	Carrier Creek	off Waverly Rd (Birchfield Park)	Eaton	42.712120	-84.670020	T4N R3W S21	X	X	X	X		Poor	Good
32	R	Warm Small	429	Carrier Creek	Carrier Creek	E Mount Hope Hwy	Eaton	42.732180	-84.654910	T4N R3W S15	X	X	X	X		Acceptable	Marginal
33	R	Warm Small	429	Carrier Creek	Carrier Creek	off Williamburg Rd	Eaton	42.752369	-84.655159	T4N R3W S10	X	X	X	X		Acceptable	Good
34	R	Warm Small	429	Carrier Creek	Carrier Creek	Willow Creek Drive	Eaton	42.622228	-84.602782	T3N R3W S25	X	X	X	X		Acceptable	Good
35	T			Grand River	Grand River	Waverly Hwy	Eaton	42.764160	-84.680450	T4N R3W S4	X	X	X	X		Acceptable	Excellent
36	T			Grand River	Grand River	Hunter Orchard Park	Eaton	42.753240	-84.714660	T4N R3W S7	X	X	X	X		Acceptable	Excellent
37	R	Warm Very Large	286	Grand River	Grand River	off Willow Hwy	Eaton	42.784690	-84.784070	T5N R4W S32	X	X	X	X		Excellent	Excellent
38	R	Warm Very Large	286	Grand River	Grand River	W State Rd	Clinton	42.800880	-84.837170	T5N R5W S24	X	X	X	X		Acceptable	Excellent
39	R	Warm Very Large	286	Grand River	Grand River	Clintonia Rd	Ionia	42.800880	-84.837170	T5N R5W S24	X	X	X	X		Acceptable	Excellent
40	R	Warm Very Large	286	Grand River	Grand River	off Musgrave Hwy	Ionia	42.800140	-84.925910	T5N R5W S20	X	X	X	X		Excellent	Excellent
41	T			Sebewa Creek	Sebewa Creek	Saginaw Hwy	Eaton	42.770350	-84.951240	T4N R6W S13	X	X	X	X		Acceptable	Good
42	R	Warm Small	434	Sebewa Creek	Sebewa Creek	Eaton Hwy	Eaton	42.813335	-84.955588	T4N R5W S6	X	X	X	X		Acceptable	Good
43	T			Sebewa Creek	Sebewa Creek	Kaefler Highway	Ionia	42.813335	-84.955588	T5N R6W S24	X	X	X	X		Acceptable	Good

Total Number Of Sites: 1 40 40 B 5

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Table 2A Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	Grand River Loomis Rd 8/16/2006 STATION 1	McCain Drain Spring Arbor Rd 8/17/2006 STATION 2	Center Lake Outlet Fifth Avenue 8/17/2006 STATION 4	Center Lake Outlet Felahee 8/16/2006 STATION 5
PLATYHELMINTHES (flatworms)				
Turbellaria		17	23	19
ANNELIDA (segmented worms)				
Hirudinea (leeches)		9	1	6
Oligochaeta (worms)	1	8	4	1
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	77	160	20	75
Decapoda (crayfish)		1	1	
Isopoda (sowbugs)			3	1
Arachnoidea				
Hydracarina	1		1	2
Insecta				
Ephemeroptera (mayflies)				
Baetidae	6		2	18
Caenidae	3	17	10	35
Ephemerellidae	4			
Hepageniidae	12		2	
Tricorythidae			9	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	6	3		
Gomphidae	1			
Libellulidae	1	7		4
Zygotera (damselflies)				
Calopterygidae	4		1	10
Coenagrionidae		17	14	20
Hemiptera (true bugs)				
Corixidae	2	1		
Gerridae			1	1
Notonectidae	1			
Pleidae	2			2
Saldidae			1	
Veliidae	2			1
Megaloptera				
Corydalidae (dobson flies)	1			
Sialidae (alder flies)		6		
Trichoptera (caddisflies)				
Brachycentridae	79			
Hydropsychidae	10		21	33
Hydroptilidae				18
Leptoceridae			2	1
Limnephilidae	4		1	5
Philopotamidae	1			1
Polycentropodidae				1
Lepidoptera (moths)				
Pyralidae			1	4
Coleoptera (beetles)				
Dytiscidae (total)		1		1
Gyrinidae (adults)	1			
Halipilidae (adults)		1		1
Hydrophilidae (total)			1	
Scirtidae (adults)				1
Dryopidae		1		
Elmidae	32	1	4	8
Diptera (flies)				
Ceratopogonidae		1	1	1
Chironomidae	15	47	119	15
Culicidae				1
Dixidae	1			
Simuliidae	12		16	
Tabanidae		2		
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)				4
Hydrobiidae		1		1
Lymnaeidae	1			
Physidae		1	3	
Planorbidae		2	1	7
Pelecypoda (bivalves)				
Corbiculidae			1	
Sphaeriidae (clams)	1	2	1	3
TOTAL INDIVIDUALS	281	306	265	301

Table 2B. Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Grand River Loomis Rd 8/16/2006 STATION 1		McCain Drain Sprng Arbor Rd 8/17/2006 STATION 2		Center Lake Outlet Fifth Avenue 8/17/2006 STATION 4		Center Lake Outlet Falahee 8/16/2006 STATION 5	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	27	1	22	1	28	1	12	1
NUMBER OF MAYFLY TAXA	4	1	1	0	4	1	2	0
NUMBER OF CADDISFLY TAXA	4	0	0	-1	3	0	6	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP	8.90	0	5.56	0	8.68	0	17.61	0
PERCENT CADDISFLY COMP	33.45	1	0.00	-1	9.06	0	19.60	0
PERCENT DOMINANT TAXON	28.11	0	52.29	-1	44.91	-1	24.92	0
PERCENT ISOPOD, SNAIL, LEECH	0.36	1	4.25	0	3.02	1	6.31	0
PERCENT SURF AIR BREATHERS	2.85	1	0.98	1	1.13	1	2.66	1
TOTAL SCORE		4		-2		2		2
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT		ACCEPT

Table 2A. Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006.

TAXA	Grand River High St &/15/2006 STATION 6	Grand River W Monroe Ave &/15/2006 STATION 7	Grand River U/S Parnell Road &/17/2006 STATION 8	Wildcat Creek Seymour Road 7/27/2006 STATION 9
PLATYHELMINTHES (flatworms)				
Turbellaria	5	1	5	4
ANNELIDA (segmented worms)				
Hirudinea (leeches)	3		3	
Oligochaeta (worms)	2	8	84	4
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	56	99	60	7
Decapoda (crayfish)		1	1	
Isopoda (sowbugs)	1	4	1	3
Insecta				
Ephemeroptera (mayflies)				
Baetidae	3	6		2
Caenidae	1	1		
Ephemerellidae	8	15	3	
Heptageniidae	18	13	8	4
Tricorythidae	1		1	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		1	2	8
Gomphidae			1	1
Macromiidae			2	
Zygoptera (damselflies)				
Calopterygidae	7	2	8	11
Coenagrionidae	5			
Hemiptera (true bugs)				
Belostomatidae	1			
Corixidae	17			
Gerridae	1	1	2	1
Mesoveliidae		1		
Nepidae			1	
Trichoptera (caddisflies)				
Brachycentridae	38	18	6	
Helicopsychidae				15
Hydropsychidae	9	15	102	89
Hydroptilidae	1			
Leptoceridae	1	6	1	1
Limnephilidae	1		4	4
Molannidae				1
Philopotamidae	7	2		2
Phryganeidae		2		
Polycentropodidae	2		1	
Uenoidae				6
Lepidoptera (moths)				
Pyalidae	3	1		
Coleoptera (beetles)				
Dytiscidae (total)	1			
Gyrinidae (adults)	2	1		
Hydrophilidae (total)				1
Elmidae	13	22	34	35
Diptera (flies)				
Ceratopogonidae				1
Chironomidae	12	22	15	65
Simuliidae	3			27
Tabanidae				2
Tipulidae	1			15
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	21	1	2	
Physidae	1			
Viviparidae		1		
Pelecypoda (bivalves)				
Corbiculidae	1	4	1	
Sphaeriidae (clams)	4	2	21	14
TOTAL INDIVIDUALS	250	250	369	323

Table 2B Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Grand River High St 8/15/2006 STATION 6		Grand River W Monroe Ave 8/15/2006 STATION 7		Grand River U/S Parnell Road 8/17/2006 STATION 8		Wildcat Creek Seymour Road 7/27/2006 STATION 9	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	33	1	26	1	25	1	25	1
NUMBER OF MAYFLY TAXA	5	1	4	1	3	0	2	0
NUMBER OF CADDISFLY TAXA	7	1	5	1	5	1	7	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	12.40	0	14.00	0	3.25	0	1.86	-1
PERCENT CADDISFLY COMP.	23.60	0	17.20	0	30.89	1	36.53	1
PERCENT DOMINANT TAXON	22.40	0	39.60	-1	27.64	0	27.55	0
PERCENT ISOPOD, SNAIL, LEECH	10.40	0	2.40	1	1.63	1	0.93	1
PERCENT SURF. AIR BREATHERS	8.80	0	1.20	1	0.81	1	0.62	1
TOTAL SCORE		2		3		4		3
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A. Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006.

TAXA	Portage River Hawkins Rd 7/27/2006 STATION 10	Portage River Wooster Road 7/27/2006 STATION 11	Portage River Dunn Rd 7/27/2006 STATION 12	Portage River Drain Territorial Rd 7/27/2006 STATION 13
PLATYHELMINTHES (flatworms)				
Turbellaria	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1	1		1
Oligochaeta (worms)	2	4	2	4
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	3	11	27	62
Decapoda (crayfish)	1			1
Isopoda (sowbugs)	100	71	13	66
Insecta				
Ephemeroptera (mayflies)				
Baetidae				2
Caenidae	3	4	4	1
Heptageniidae	1		2	3
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	1		3
Libellulidae				1
Zygoptera (damselflies)				
Calopterygidae				7
Coenagrionidae	43	14	2	30
Hemiptera (true bugs)				
Belostomatidae	2		1	1
Corixidae	13	8	21	33
Gerridae	1			1
Mesoveliidae	3			
Pleidae	1			
Megaloptera				
Corydalidae (dobson flies)				
Sialidae (alder flies)	1		1	1
Trichoptera (caddisflies)				
Hydropsychidae	1	5	10	6
Hydroptilidae		2		
Leptoceridae			2	
Limnephilidae	1	1		1
Molannidae		1		7
Philopotamidae				1
Phryganeidae				3
Polycentropodidae		5	8	1
Coleoptera (beetles)				
Dytiscidae (total)	1			1
Gyrinidae (adults)	1			2
Hydrophilidae (total)	1			4
Elmidae	7	12	1	13
Diptera (flies)				
Ceratopogonidae			1	
Chironomidae	70	107	57	117
Simuliidae		1	1	7
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		1	1	
Lymnaeidae		1		1
Physidae	1	1		54
Planorbidae		1	1	163
Pelecypoda (bivalves)				
Sphaeriidae (clams)	2	1	1	2
TOTAL INDIVIDUALS	262	253	156	600

Table 2B. Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006.

METRIC	Portage River Hawkins Rd 7/27/2006 STATION 10		Portage River Wooster Road 7/27/2006 STATION 11		Portage River Dunn Rd 7/27/2006 STATION 12		Portage River, Drain Territorial Rd 7/27/2006 STATION 13	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	25	1	21	0	19	0	32	1
NUMBER OF MAYFLY TAXA	2	0	1	-1	2	0	3	.0
NUMBER OF CADDISFLY TAXA	2	0	5	1	3	0	6	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	1.53	-1	1.58	-1	3.85	0	1.00	-1
PERCENT CADDISFLY COMP.	0.76	-1	5.53	0	12.82	0	3.17	-1
PERCENT DOMINANT TAXON	38.17	-1	42.29	-1	36.54	0	27.17	0
PERCENT ISOPOD, SNAIL, LEECH	38.93	-1	30.04	-1	9.62	0	47.50	-1
PERCENT SURF. AIR BREATHERS	8.78	0	3.16	1	14.10	0	7.00	0
TOTAL SCORE		-4		-3		-1		-2
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A. Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006.

TAXA	Pickett Drain Heeneey Rd 6/28/2006 STATION 14	Cahaogan Creek Decamp Road 6/26/2006 STATION 15	Batteese Creek D/S Territorial Road 6/28/2006 STATION 16	Batteese Creek Off Williamston Road 6/28/2006 STATION 17
PORIFERA (sponges)				1
PLATYHELMINTHES (flatworms)				
Turbellaria	1		1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)	12	11		
Oligochaeta (worms)	3	6	1	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	38	38	83	61
Decapoda (crayfish)		5	15	1
Isopoda (sowbugs)	22	38		6
Insecta				
Ephemeroptera (mayflies)				
Heptageniidae			1	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1			
Libellulidae	5	7	1	1
Zygoptera (damselflies)				
Calopterygidae		1	5	
Coenagrionidae		1	4	
Hemiptera (true bugs)				
Belostomatidae			1	
Corixidae		1	60	47
Gerridae	1	1		1
Pleidae			1	32
Megaloptera				
Sialidae (alder flies)	2		1	1
Trichoptera (caddisflies)				
Hydropsychidae	23	7	6	
Hydroptilidae			1	
Lépidostomatidae		2		
Limnephilidae	24			1
Philopotamidae	3			
Coleoptera (beetles)				
Dytiscidae (total)	1		3	4
Gyrinidae (adults)		1		
Halplidae (adults)	2	1		2
Hydrophilidae (total)		1	2	1
Dryopidae		1		
Elmidae	3		6	3
Diptera (flies)				
Ceratopogonidae	1	2		
Chironomidae	34	132	73	21
Simuliidae	4			
Stratiomyidae				1
Tabanidae		2	1	
MOLLUSCA				
Gastropoda (snails)				
Lymnaeidae	5		1	3
Physidae	38	20	4	7
Planorbidae	21		3	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	9	10	2	
TOTAL INDIVIDUALS	253	288	276	194

Table 2B. Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006.

METRIC	Pickett Drain Heeney Rd 6/28/2006 STATION 14		Cahaogan Creek Decamp Road 6/26/2006 STATION 15		Batteese Creek D/S Territorial Road 6/28/2006 STATION 16		Battlesse Creek Williamston Road (in campgr 6/28/2006 STATION 17	
	Value	Score	Value	Score	Value	Score	Value	Score
	TOTAL NUMBER OF TAXA	22	0	21	1	23	0	18
NUMBER OF MAYFLY TAXA	0	-1	0	-1	1	-1	0	-1
NUMBER OF CADDISFLY TAXA	3	0	2	0	2	0	1	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	0.00	-1	0.00	-1	0.36	-1	0.00	-1
PERCENT CADDISFLY COMP.	19.76	0	3.13	-1	2.54	-1	0.52	-1
PERCENT DOMINANT TAXON	15.02	1	45.83	-1	30.07	0	31.44	0
PERCENT ISOPOD, SNAIL, LEECH	38.74	-1	23.96	-1	2.90	1	8.25	0
PERCENT SURF. AIR BREATHERS	1.58	1	1.74	1	24.28	-1	45.36	-1
TOTAL SCORE		-2		-4		-4		-6
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		POOR

Table 2A Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	Grand River Dixon Road 8/18/2006 STATION 18	Grand River Tompkins Road 7/28/2006 STATION 19	Perry Creek Olds Road 6/26/2006 STATION 20	Mackey Creek Wellman Road 8/29/2006 STATION 21
PLATYHELMINTHES (flatworms)				
Turbellaria	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		3	2
Oligochaeta (worms)		2	49	3
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	148	1	72	78
Decapoda (crayfish)			5	1
Isopoda (sowbugs)	14	1	1	
Arachnoidea			2	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	1	18	5	5
Caenidae		1		
Heptageniidae	17	11		2
Odonata				
Anisoptera (dragonflies)				
Aeshnidae				1
Gomphidae		1		1
Libellulidae			1	
Zygoptera (damselflies)				
Calopterygidae	40	7	18	38
Coenagrionidae	4	4		1
Plecoptera (stoneflies)				
Perlidae		1	2	
Hemiptera (true bugs)				
Belostomatidae	1	4		
Corixidae	1	1	10	1
Gerridae		1	1	2
Notonectidae	1			
Pleidae			1	
Velidae				1
Megaloptera				
Corydalidae (dobson flies)	1			
Sialidae (alder flies)				4
Trichoptera (caddisflies)				
Brachycentridae	4	39		
Helicopsychidae		1		
Hydropsychidae		8	3	39
Lepidostomatidae			1	
Leptoceridae		3		2
Limnephilidae		3	1	
Molannidae		1		
Philopotamidae	2	3		
Polycentropodidae	8	4		
Lepidoptera (moths)				
Pyralidae	1			
Coleoptera (beetles)				
Dytiscidae (total)		1	1	
Gyrinidae (adults)		1		
Halplidae (adults)			1	
Elmidae	14	11	6	4
Diptera (flies)				
Ceratopogonidae			12	
Chironomidae	2	18	72	20
Simuliidae	1	122		13
Tabanidae				1
Tipulidae	1		2	6
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1		2	2
Hydrobiidae	2			
Lymnaeidae		1		
Physidae	1	1	14	8
Planorbidae			1	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1	9		15
TOTAL INDIVIDUALS	268	279	286	250

Table 2B Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Grand River Dixon Road 8/18/2006 STATION 18		Grand River Tompkins Road 7/28/2006 STATION 19		Perry Creek Olds Road 6/26/2006 STATION 20		Mackey Creek Wellman Road 8/29/2006 STATION 21	
	Value	Score	Value	Score	Value	Score	Value	Score
	TOTAL NUMBER OF TAXA	24	0	29	1	25	1	24
NUMBER OF MAYFLY TAXA	2	0	3	0	1	0	2	0
NUMBER OF CADDISFLY TAXA	3	0	8	1	3	0	2	0
NUMBER OF STONEFLY TAXA	0	-1	1	1	1	1	0	-1
PERCENT MAYFLY COMP	6.72	0	10.75	0	1.75	-1	2.80	-1
PERCENT CADDISFLY COMP	5.22	0	22.22	0	1.75	-1	16.40	0
PERCENT DOMINANT TAXON	55.22	-1	43.73	-1	25.17	0	31.20	0
PERCENT ISOPOD, SNAIL, LEECH	7.09	0	1.08	1	7.34	0	4.80	0
PERCENT SURF AIR BREATHERS	1.12	1	2.87	1	4.90	1	1.60	1
TOTAL SCORE		-1		4		1		-1
MACROINV. COMMUNITY RATING		ACCEPT		ACCEPT		ACCEPT		ACCEPT

Table 2A. Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	Sandstone Creek d/s Springport Road 8/15/2006 STATION 22	Sandstone Creek Gordon Road 7/28/2006 STATION 23	Spring Brook Devereaux Rd 7/26/2006 STATION 24	Spring Brook Robbins Road 7/26/2006 STATION 25	Grand River U/S Baldwin Park on Onondaga Rd 7/26/2006 STATION 26
PORIFERA (sponges)				1	
ANNELIDA (segmented worms)					
Hirudinea (leeches)	1	1	2	3	10
Oligochaeta (worms)	9	8	8	11	7
ARTHROPODA					
Crustacea					
Amphipoda (scuds)	58	37	1	11	81
Decapoda (crayfish)	9	5		1	1
Isopoda (sowbugs)	18	1			116
Arachnida					
Hydracarina	1		1		1
Insecta					
Ephemeroptera (mayflies)					
Baetidae	3	3		27	4
Caenidae				8	
Ephemeridae				1	1
Heptageniidae	7	20		2	10
Odonata					
Anisoptera (dragonflies)					
Aeshnidae	1	4	1		
Gomphidae	3	4		1	
Libellulidae			1		
Zygoptera (damselflies)					
Calopterygidae		10		2	
Coenagrionidae		1		3	3
Plecoptera (stoneflies)					
Perlodidae		1			
Hemiptera (true bugs)					
Belostomatidae	1				1
Corixidae		27	1		4
Gerridae		1		1	1
Mesoveliidae			1	2	
Nepidae			1		1
Notonectidae				1	
Psephenidae			1		1
Megaloptera					
Sialidae (slder flies)				2	
Trichoptera (caddisflies)					
Brachycentridae		1			25
Hydropsychidae	3	7		36	2
Hydropsyllidae	1			1	
Leptoceridae	4	10		15	2
Limnephilidae	1	7	1	8	1
Molannidae				3	
Philopotamidae		4		1	2
Phryganeidae		5		7	
Polycentropodidae	4			1	2
Uenoidae		2			
Coleoptera (beetles)					
Dytiscidae (total)			1		
Gyrinidae (adults)			1	1	
Halplidae (adults)			32		2
Psephenidae (adults)	5	1			
Elmidae	5	19		45	3
Diptera (flies)					
Ceratopogonidae	3		1		2
Chironomidae	13	17	337	41	2
Culicidae			1	2	1
Simuliidae		1		7	1
Tabanidae		1	1		
MOLLUSCA					
Gastropoda (snails)					
Ancyliidae (limpets)				1	1
Lymnaeidae	22	2			1
Physidae		1	2	1	3
Planorbidae			14	1	
Viviparidae		2	1	1	1
Pelecypoda (bivalves)					
Corbiculidae	1				
Pisidiidae	101				
Sphaeriidae (clams)		65	6	1	3
Unionidae (mussels)	1				
TOTAL INDIVIDUALS	275	268	316	250	296

Table 2B Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Sandstone Creek d/s Springport Road 8/15/2006 STATION 22		Sandstone Creek Gordon Road 7/28/2006 STATION 23		Spring Brook Devereaux Rd 7/26/2006 STATION 24		Spring Brook Robbins Road 7/26/2006 STATION 25		Grand River US Baldwin Park on 7/26/2006 STATION 26	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	24	0	30	1	22	0	34	1	32	1
NUMBER OF MAYFLY TAXA	2	0	2	0	0	-1	4	1	3	0
NUMBER OF CADDISFLY TAXA	5	1	7	1	1	-1	8	1	6	1
NUMBER OF STONEFLY TAXA	0	-1	1	1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP	1.64	0	8.58	0	0.00	-1	15.20	0	5.07	0
PERCENT CADDISFLY COMP	4.73	0	13.43	0	0.32	-1	28.80	1	11.49	0
PERCENT DOMINANT TAXON	16.73	0	24.25	0	75.00	-1	18.00	1	39.19	-1
PERCENT ISOPOD, SNAIL, LEECH	14.91	-1	2.61	1	6.01	0	2.80	1	44.59	-1
PERCENT SURF AIR BREATHERS	2.18	1	10.82	0	12.34	0	2.80	1	3.72	1
TOTAL SCORE		0		4		-6		6		0
MACROINV. COMMUNITY RATING		ACCEPT		ACCEPT		POOR		EXCELLENT		ACCEPT

Table 2A. Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	North Onondaga Drain	Columbia Creek	Columbia Creek Columbia Creek Park on Curtice Road	Grand River d/s Columbia Rd at Park
	Aurelius Road 6/28/2006 STATION 27	Onondaga Rd 8/14/2006 STATION 28	8/14/2006 STATION 29	7/26/2006 STATION 30
PLATYHELMINTHES (flatworms)				
Turbellaria		1	1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)		1	1	
Oligochaeta (worms)	40	9	56	4
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	21	55	40	9
Decapoda (crayfish)			1	
Isopoda (sowbugs)	191	30	6	
Arachnoidea				
Hydracarina	1			
Insecta				
Ephemeroptera (mayflies)				
Baetidae		5	10	19
Caenidae				2
Ephemeridae				1
Heptageniidae			8	17
Isonychiidae				24
Tricorythidae				1
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		1	1	
Gomphidae				1
Zygoptera (damselflies)				
Calopterygidae		2	15	
Coenagrionidae	1			
Plecoptera (stoneflies)				
Perlodidae				1
Hemiptera (true bugs)				
Corixidae	1	1		5
Gerridae	1	1	2	1
Mesoveliidae		1	1	
Notonectidae		1	1	
Megaloptera				
Simuliidae (alder flies)		1		
Trichoptera (caddisflies)				
Brachycentridae				79
Glossosomatidae			1	
Hydropsychidae	1	23	50	29
Hydroptilidae		3	1	2
Lepidostomatidae	6			
Leptoceridae	2			16
Limnephilidae	1			9
Coleoptera (beetles)				
Halplidae (adults)		1		
Hydrophilidae (total)		2	1	
Elmidae		76	27	7
Diptera (flies)				
Ceratopogonidae		2	1	
Chironomidae	9	40	50	20
Dixidae			1	
Simuliidae		6	6	11
Tabanidae	2	2		
Tipulidae			7	
MOLLUSCA				
Gastropoda (snails)				
Hydrobiidae			1	
Physidae	5	10	2	
Planorbidae	1	2		
Viviparidae			1	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1	8	9	6
Unionidae (mussels)				1
TOTAL INDIVIDUALS	284	284	301	265

Table 2B. Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	North Onondaga Drain		Columbia Creek		Columbia Creek Columbia Creek Park on		Grand River	
	Aurelius Road 6/28/2006 STATION 27		Onondaga Rd 8/14/2006 STATION 28		Curtice Road 8/14/2006 STATION 29		d/s Columbia Rd at Park 7/26/2006 STATION 30	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	16	1	25	1	27	1	22	0
NUMBER OF MAYFLY TAXA	0	-1	1	-1	2	0	6	1
NUMBER OF CADDISFLY TAXA	4	1	2	0	3	0	5	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	1	1
PERCENT MAYFLY COMP.	0.00	-1	1.76	-1	5.98	0	24.15	1
PERCENT CADDISFLY COMP.	3.52	-1	9.15	0	17.28	0	50.94	1
PERCENT DOMINANT TAXON	67.25	-1	26.76	0	18.60	1	29.81	0
PERCENT ISOPOD, SNAIL, LEECH	69.37	-1	15.14	-1	3.65	1	0.00	1
PERCENT SURF. AIR BREATHERS	0.70	1	2.46	1	1.66	1	2.26	1
TOTAL SCORE		-3		-2		3		7
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		EXCELLENT

Table 2A Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	Grand River Off Waverly Road (Birchfield Park) 8/29/2006 STATION J1	Carrier Creek Mt Hope Hwy 6/27/2006 STATION J2	Carrier Creek Off Williamsburg Rd 6/27/2006 STATION J3	Carrier Creek Willow Cr Dr 6/29/2006 STATION J4
PORIFERA (sponges)	1			
PLATYHELMINTHES (flatworms)				
Turbellaria			1	
BRYOZOA (moss animals)	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1	14	18	1
Oligochaeta (worms)	9	20	12	1
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	10	85	81	2
Decapoda (crayfish)	11	3	1	3
Isopoda (sowbugs)	1	25	43	22
Arachnoidea				
Hydracarina	1			
Insecta				
Ephemeroptera (mayflies)				
Baetidae	20			25
Caenidae	10			
Ephemeridae	1			
Heptageniidae	62			
Isoperla	7			
Pisania	9			
Tricoptera	16			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		1		1
Gomphidae	12			
Libellulidae		2		
Zygoptera (damselflies)				
Calopterygidae				1
Coenagrionidae	1	1		1
Plecoptera (stoneflies)				
Perlidae	1			
Hemiptera (true bugs)				
Belostomatidae	1	2		
Corixidae	5	12	6	
Geridae	3	1		
Veliidae	1			1
Trichoptera (caddisflies)				
Hydropsychidae	9		1	31
Hydropsilidae				3
Leptoceridae	28			
Limnephilidae			1	
Polycentropodidae	1			
Psychomyiidae	1			
Coleoptera (beetles)				
Dytiscidae (total)		2	1	
Gyrinidae (adults)	1			
Halipidae (adults)		1		
Hydrophilidae (total)	1	1		
Elmidae	58	2	1	
Diptera (flies)				
Ceratopogonidae		3		
Chironomidae	26	38	89	142
Dixidae	1			
Simuliidae	3			28
Tabanidae	1			
Tipulidae	2	2		2
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	5			
Hydrobiidae	6			
Physidae	2	15	5	50
Planorbidae		1		1
Pleuroceridae	1			
Pelecypoda (bivalves)				
Corbiculidae	1			
Sphaeriidae (clams)	22	4	2	6
TOTAL INDIVIDUALS	353	255	262	321

Table 2B Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Grand River Off Waverly Road (Birchfield Park) 8/29/2006 STATION 11		Carrier Creek Mt Hope Hwy 6/27/2006 STATION 12		Carrier Creek Off Williamsburg Rd 6/27/2006 STATION 13		Carrier Creek Willow Cr Dr 6/29/2006 STATION 14	
	Value	Score	Value	Score	Value	Score	Value	Score
	TOTAL NUMBER OF TAXA	40	1	21	1	14	0	18
NUMBER OF MAYFLY TAXA	7	1	0	-1	0	-1	1	-1
NUMBER OF CADDISFLY TAXA	4	0	0	-1	2	0	2	0
NUMBER OF STONEFLY TAXA	1	1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP	35.41	1	0.00	-1	0.00	-1	7.79	0
PERCENT CADDISFLY COMP	11.05	0	0.00	-1	0.76	-1	10.59	0
PERCENT DOMINANT TAXON	17.56	1	33.33	0	33.97	0	44.24	-1
PERCENT ISOPOD, SNAIL, LEECH	4.53	0	21.57	-1	25.19	-1	23.05	-1
PERCENT SURF AIR BREATHERS	3.40	1	15.29	0	2.67	1	0.31	1
TOTAL SCORE		6		-5		-4		-3
MACROINV. COMMUNITY RATING		EXCELLENT		POOR		ACCEPT		ACCEPT.

Table 2A. Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	Grand River Hunter Orchard Park 8/14/2006 STATION J6	Grand River off Willow Hwy 7/25/2006 STATION J7	Grand River State Rd 7/24/2006 STATION J8	Grand River Clintonia Rd 7/24/2006 STATION J9
PORIFERA (sponges)				1
PLATYHELMINTHES (flatworms)				
Turbellaria	16	1		
ANNELIDA (segmented worms)				
Hirudinea (leeches)	2	2	2	
Oligochaeta (worms)	4	3	7	5
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	51	24	16	51
Decapoda (crayfish)			1	2
Isopoda (sowbugs)		1	2	3
Arachnoidea				
Hydracarina	1			
Insecta				
Ephemeroptera (mayflies)				
Baetidae	1	23	32	26
Caenidae		5	2	3
Ephemerellidae	3	3	8	5
Heptageniidae	9	10	17	29
Isomychiidae			4	8
Leptophlebiidae			1	
Tricorythidae	18	1	2	4
Odonata				
Anisoptera (dragonflies)				
Aeshnidae			1	
Cordulegastriidae			1	
Gomphidae	1	1	1	
Zygoptera (damselflies)				
Calopterygidae	2	4	7	1
Coenagrionidae	34	9	7	3
Hemiptera (true bugs)				
Belostomatidae	1		1	
Corixidae			1	
Gerridae	1		1	1
Mesoveliidae		2	2	6
Pleidae	1	2		
Megaloptera				
Siniidae (alder flies)				3
Trichoptera (caddisflies)				
Brachycentridae	10	6	16	1
Glossosomatidae		1	9	2
Helicopsychidae			5	2
Hydropsychidae	5	48	53	57
Hydroptilidae			1	
Lepidostomatidae	2	1		
Leptoceridae	6	3	2	4
Limnephilidae		3	5	3
Philopotamidae		1		
Phryganeidae			4	3
Polycentropodidae		2	2	1
Psychomyiidae				1
Uenoidae		1	3	4
Lepidoptera (moths)				
Pyralidae			2	
Coleoptera (beetles)				
Gyrinidae (adults)				1
Psephenidae (adults)	1		1	
Elmidae	14	5	17	11
Diptera (flies)				
Ceratopogonidae	4	6		
Chironomidae	37	67	6	1
Culicidae	2	1		
Simuliidae	1	4	8	2
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	17	11	7	6
Hydrobiidae	1			
Lymnaeidae	2		1	4
Physidae	1	4	8	1
Planorbidae	2	2	2	1
Pelecypoda (bivalves)				
Corbiculidae	1	1	3	15
Pisidiidae		1		
Sphaeriidae (clams)	3		3	6
TOTAL INDIVIDUALS	254	259	274	277

Table 2B. Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Grand River Hunter Orchard Park 8/14/2006 STATION 36		Grand River off Willow Hwy 7/25/2006 STATION 37		Grand River State Rd 7/24/2006 STATION 38		Grand River Clintonia Rd 7/24/2006 STATION 39	
	Value	Score	Value	Score	Value	Score	Value	Score
	TOTAL NUMBER OF TAXA	32	1	34	1	42	1	36
NUMBER OF MAYFLY TAXA	4	1	5	1	7	1	6	1
NUMBER OF CADDISFLY TAXA	4	0	9	1	10	1	10	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP	12.20	0	16.22	0	24.09	1	27.08	1
PERCENT CADDISFLY COMP	9.06	0	25.48	0	36.50	1	28.16	0
PERCENT DOMINANT TAXON	20.08	0	25.87	0	19.34	1	20.58	0
PERCENT ISOPOD, SNAIL, LEECH	9.84	0	7.72	0	8.03	0	5.42	0
PERCENT SURF. AIR BREATHERS	2.36	1	1.93	1	2.19	1	2.89	1
TOTAL SCORE		2		3		6		4
MACROINV. COMMUNITY RATING		ACCEPT		ACCEPT.		EXCELLENT		ACCEPT

Table 2A Qualitative macroinvertebrate sampling results for the upper Grand River watershed, 2006

TAXA	Grand River off Musgrove Rd 7/24/2006 STATION 40	Sebewa Creek Saginaw Hwy 7/25/2006 STATION 41	Sebewa Creek Eaton Hwy 7/25/2006 STATION 42
PORIFERA (sponges)	1		
PLATYHELMINTHES (flatworms)			
Turbellaria	1		1
ANNELIDA (segmented worms)			
Hirudinea (leeches)		3	6
Oligochaeta (worms)	4	2	10
ARTHROPODA			
Crustacea			
Amphipoda (scuds)	24	11	75
Decapoda (crayfish)	1	7	2
Arachnoidea			
Hydracarina		5	1
Insecta			
Ephemeroptera (mayflies)			
Baetidae	27	9	41
Caenidae	2		
EphemereIIDae	9		
Heptageniidae	17	1	5
Isonychidae	5		
Polymitarcyidae	2		
Tricorythidae	16		
Odonata			
Anisoptera (dragonflies)			
Aeshnidae		5	1
Zygoptera (damselflies)			
Calopterygidae	2	1	5
Coenagrionidae	1	3	1
Hemiptera (true bugs)			
Belostomatidae		1	
Corixidae		175	18
Gerridae	4		1
Mesovelidae	1	1	2
Nepidae		1	
Notonectidae		3	
Megaloptera			
Sialidae (wider flies)	1	3	
Trichoptera (caddisflies)			
Brachycentridae	58		
Glossosomatidae	15		
Helicopsychidae	3		4
Hydropsychidae	40		18
Hydroptilidae	1		
Lepidostomatidae	1		
Leptoceridae	2		
Limnephilidae	5	3	1
Molannidae			2
Phryganeidae			5
Polycentropodidae	1		
Uenoidae	1		1
Coleoptera (beetles)			
Dytiscidae (total)		8	
Gyrinidae (adults)	1	1	
Halplidae (adults)		3	1
Hydrophilidae (total)			2
Elmidae	20	3	15
Diptera (flies)			
Ceratopogonidae		9	
Chironomidae	12	21	33
Simuliidae	5		4
Tipulidae			1
MOLLUSCA			
Gastropoda (snails)			
Ancylidae (limpeta)	1	2	10
Lymnaeidae	1		
Physidae		6	23
Planorbidae		14	8
Valvatidae			1
Pelecypoda (bivalves)			
Corbiculidae	1		
Sphaeriidae (clams)	6	2	7
Unionidae (mussels)	1		
TOTAL INDIVIDUALS	293	303	305

Table 2B Macroinvertebrate metric evaluation of the upper Grand River watershed, 2006

METRIC	Grand River off Musgrove Rd 7/24/2006 STATION 40		Sebewa Creek Saginaw Hwy 7/25/2006 STATION 41		Sebewa Creek Eaton Hwy 7/25/2006 STATION 42	
	Value	Score	Value	Score	Value	Score
	TOTAL NUMBER OF TAXA	36	1	27	1	31
NUMBER OF MAYFLY TAXA	7	1	2	0	2	0
NUMBER OF CADDISFLY TAXA	10	1	1	-1	6	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP	26.62	1	3.30	0	15.08	0
PERCENT CADDISFLY COMP	43.34	1	0.99	-1	10.16	0
PERCENT DOMINANT TAXON	19.80	1	57.76	-1	24.59	0
PERCENT ISOPOD, SNAIL, LEECH	0.68	1	8.25	0	15.74	-1
PERCENT SURF AIR BREATHERS	2.05	1	63.70	-1	7.87	0
TOTAL SCORE		7		-4		0
MACROINV. COMMUNITY RATING		EXCELLENT		ACCEPT		ACCEPT

Table 3. Habitat evaluation for the upper Grand River watershed, 2006.

	STATION 1 Grand River Loomis Rd GLIDE/POOL	STATION 2 McCain Drain Spring Arbor Rd GLIDE/POOL	STATION 4 Center Lake Outlet Fifth Avenue GLIDE/POOL	STATION 5 Center Lake Outlet Falahee GLIDE/POOL	STATION 6 Grand River High St GLIDE/POOL
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover Embeddedness*	9	6	15	11	2
Velocity/Depth Regime*					
Pool Substrate Characterization**	13	9	18	13	6
Pool Variability**	13	3	18	8	8
Channel Morphology					
Sediment Deposition	7	2	16	13	2
Flow Status - Maint. Flow Volume	8	8	10	9	7
Flow Status - Flashiness	8	9	10	9	7
Channel Alteration	16	6	13	18	15
Frequency of Riffles/Bends*					
Channel Sinuosity**	16	5	15	10	13
Riparian and Bank Structure					
Bank Stability (L)	8	9	8	9	7
Bank Stability (R)	8	9	8	9	7
Vegetative Protection (L)	9	4	6	9	8
Vegetative Protection (R)	9	4	6	9	8
Riparian Veg. Zone Width (L)	10	0	2	8	4
Riparian Veg. Zone Width (R)	10	2	3	2	4
TOTAL SCORE (200)	144	76	148	137	98

HABITAT RATING.	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)
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Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	8/16/2006	8/17/2006	8/17/2006	8/16/2006	8/15/2006
Weather:	Sunny	Sunny	Sunny	Sunny	Sunny
Air Temperature:	72 Deg. F.	72 Deg. F.	80 Deg. F.	80 Deg. F.	80 Deg. F.
Water Temperature:	70 Deg. F.	65 Deg. F.	82 Deg. F.	75 Deg. F.	72 Deg. F.
Ave. Stream Width:	20 Feet	5 Feet	30 Feet	50 Feet	50 Feet
Ave. Stream Depth:	0.7 Feet	0.5 Feet	1.2 Feet	2 Feet	1.5 Feet
Surface Velocity:	0.8 Ft./Sec.	0.8 Ft./Sec.	1.2 Ft./Sec.	0.3 Ft./Sec.	0.6 Ft./Sec.
Estimated Flow:	11.2 CFS	2 CFS	43.2 CFS	30 CFS	45 CFS
Stream Modifications:	None	Dredged	None	Canopy Removal	Dredged
Nuisance Plants (Y/N):	N	N	N	Y	N
Report Number:					
STORET No.:	380390	380466	380459	380258	380428
Stream Name	Grand River	McCain Drain	Center Lake Outlet	Center Lake Outlet	Grand River
Road Crossing/Location:	Loomis Rd	Spring Arbor Rd	Fifth Avenue	Falahee	High St
County Code:	38	38	38	38	38
TRS:	04S01W01	03S01W08	03S01E08	03S01E08	03S01E07
Latitude (dd):	42.15296	42.22497	42.228651	42.2297	42.22746
Longitude (dd)	-84.38125	-84.459997	-84.327643	-84.34622	-84.36315
Ecoregion	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050004	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 3. Habitat evaluation for the upper Grand River watershed, 2006.

	STATION 7 Grand River W Monroe Ave GLIDE/POOL	STATION 8 Grand River U/S Parnell Road GLIDE/POOL	STATION 9 Wildcat Creek Seymour Road RIFFLERUN	STATION 10 Portage River Hawkins Rd GLIDE/POOL	STATION 11 Portage River Wooster Road GLIDE/POOL
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover Embeddedness*	10	12	14	2	3
Velocity/Depth Regime*			16		
Pool Substrate Characterization	11	10	11	3	5
Pool Variability**	5	16		2	3
Channel Morphology					
Sediment Deposition	8	16	13	6	8
Flow Status - Maint. Flow Volu	9	9	8	7	8
Flow Status - Flashiness	4	2	8	3	3
Channel Alteration	13	13	20	6	8
Frequency of Riffles/Bends*			18		
Channel Sinuosity**	7	6		2	3
Riparian and Bank Structure					
Bank Stability (L)	5	5	8	5	6
Bank Stability (R)	5	5	8	5	6
Vegetative Protection (L)	9	7	10	8	6
Vegetative Protection (R)	9	7	10	8	6
Riparian Veg. Zone Width (L)	3	3	4	5	10
Riparian Veg. Zone Width (R)	4	10	4	4	8
TOTAL SCORE (200):	102	121	152	66	83

HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)
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Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	8/15/2006	8/17/2006	7/27/2006	7/27/2006	7/27/2006
Weather:	Sunny	Partly Cloudy	Sunny	Sunny	Sunny
Air Temperature:	78 Deg. F.	75 Deg. F.	85 Deg. F.	85 Deg. F.	80 Deg. F.
Water Temperature:	73 Deg. F.	74 Deg. F.	76 Deg. F.	74 Deg. F.	72 Deg. F.
Ave. Stream Width:	40 Feet	30 Feet	7 Feet	80 Feet	60 Feet
Ave. Stream Depth:	1.5 Feet	2.5 Feet	0.3 Feet	2 Feet	2 Feet
Surface Velocity:	1.2 Ft./Sec.	1 Ft./Sec.	0.8 Ft./Sec.	0.2 Ft./Sec.	0.3 Ft./Sec.
Estimated Flow:	72 CFS	75 CFS	1.68 CFS	32 CFS	36 CFS
Stream Modifications:	Dredged	Dredged	None	Dredged	Dredged
Nuisance Plants (Y/N)	N	N	N	N	N
Report Number:					
STORET No.:	380085	380463	380457	380405	380461
Stream Name:	Grand River	Grand River	Wildcat Creek	Portage River	Portage River
Road Crossing/Location:	W Monroe Ave	U/S Parnell Road	Seymour Road	Hawkins Rd	Wooster Road
County Code:	38	38	38	38	38
TRS:	02S01W27	02S01W22	02S01E16	02S01E05	02S01E03
Latitude (dd)	42.26525	42.29106	42.296923	42.32159	42.332032
Longitude (dd)	-84.40987	-84.40561	-84.318679	-84.3394	-84.006652
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050004	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 3. Habitat evaluation for the upper Grand River watershed, 2006

	STATION 12 Portage River Dunn Rd GLIDE/POOL	STATION 13 Portage River Drain Territorial Rd GLIDE/POOL	STATION 14 Pickett Drain Heeney Rd GLIDE/POOL	STATION 15 Cahaogan Creek Decamp Road GLIDE/POOL	STATION 16 Batteese Creek D/S Territorial Road GLIDE/POOL
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover Embeddedness*	5	10	8	7	11
Velocity/Depth Regime*					
Pool Substrate Characterization**	11	13	9	11	15
Pool Variability**	5	5	5	7	13
Channel Morphology					
Sediment Deposition	11	13	9	5	12
Flow Status - Maint. Flow Volume	6	10	6	7	9
Flow Status - Flashiness	5	10	6	6	9
Channel Alteration	10	6	6	8	15
Frequency of Riffles/Bends*					
Channel Sinuosity**	5	5	3	5	11
Riparian and Bank Structure					
Bank Stability (L)	6	10	8	8	9
Bank Stability (R)	6	10	8	8	9
Vegetative Protection (L)	6	4	7	8	8
Vegetative Protection (R)	6	4	7	8	8
Riparian Veg. Zone Width (L)	8	1	1	3	8
Riparian Veg. Zone Width (R)	6	1	1	3	6
TOTAL SCORE (200):	96	102	84	94	143

HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)
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Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	7/27/2006	7/27/2006	6/28/2006	6/26/2006	6/28/2006
Weather:	Cloudy	Cloudy	Cloudy	Sunny	Sunny
Air Temperature:	78 Deg. F.	76 Deg. F.	72 Deg. F.	70 Deg. F.	66 Deg. F.
Water Temperature:	72 Deg. F.	62 Deg. F.	72 Deg. F.	62 Deg. F.	67 Deg. F.
Ave. Stream Width:	40 Feet	12 Feet	9 Feet	6 Feet	14 Feet
Ave. Stream Depth:	1 Feet	0.7 Feet	0.3 Feet	0.3 Feet	1.8 Feet
Surface Velocity:	0.6 Ft./Sec.	0.7 Ft./Sec.	0.2 Ft./Sec.	0.6 Ft./Sec.	0.3 Ft./Sec.
Estimated Flow:	24 CFS	5.88 CFS	0.54 CFS	1.08 CFS	7.56 CFS
Stream Modifications:	Dredged	Dredged	Dredged	Dredged	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	380419	380467	330376	330422	380460
Stream Name:	Portage River	Portage River Drain	Pickett Drain	Cahaogan Creek	Batteese Creek
Road Crossing/Location:	Dunn Rd	Territorial Rd	Heeney Rd	Decamp Road	D/S Territorial Road
County Code:	38	38	33	33	38
TRS:	01S01E25	01S01E11	01N01E35	01N01E15	01S01W04
Latitude (dd):	42.34998	42.40725	42.44756	42.47012	42.424211
Longitude (dd):	-84.26358	-84.27538	-84.24215	-84.28762	-84.323261
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050004	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 3. Habitat evaluation for the upper Grand River watershed, 2006.

	STATION 17 Batesse Creek Off Williamston Road GLIDE/POOL	STATION 18 Grand River Dixon Road GLIDE/POOL	STATION 19 Grand River Tompkins Road GLIDE/POOL	STATION 20 Perry Creek Olds Road GLIDE/POOL	STATION 21 Mackey Creek Wellman Road GLIDE/POOL
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cove Embeddedness*	2	8	15	12	12
Velocity/Depth Regime*					
Pool Substrate Characterization*	7	12	16	14	13
Pool Variability**	5	16	13	15	8
Channel Morphology					
Sediment Deposition	3	8	15	15	11
Flow Status - Maint. Flow Volu	10	9	9	9	10
Flow Status - Flashiness	9	6	8	9	6
Channel Alteration	10	16	20	15	18
Frequency of Riffles/Bends*					
Channel Sinuosity**	4	15	18	9	15
Riparian and Bank Structure					
Bank Stability (L)	7	8	10	8	9
Bank Stability (R)	7	10	10	8	9
Vegetative Protection (L)	7	9	10	2	9
Vegetative Protection (R)	7	9	10	4	9
Riparian Veg. Zone Width (L)	4	7	10	1	10
Riparian Veg. Zone Width (R)	8	10	10	2	10
TOTAL SCORE (200):	90	143	174	123	149

HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)
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Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	6/28/2006	8/18/2006	7/28/2006	6/26/2006	8/29/2006
Weather:	Sunny	Cloudy	Cloudy	Sunny	Cloudy, Rainy
Air Temperature:	72 Deg. F.	75 Deg. F.	80 Deg. F.	72 Deg. F.	70 Deg. F.
Water Temperature:	70 Deg. F.	74 Deg. F.	76 Deg. F.	68 Deg. F.	63 Deg. F.
Ave. Stream Width:	13 Feet	40 Feet	200 Feet	8 Feet	20 Feet
Ave. Stream Depth:	1.2 Feet	3 Feet	2.5 Feet	0.9 Feet	1.5 Feet
Surface Velocity:	0.1 Ft./Sec.	0.6 Ft./Sec.	0.6 Ft./Sec.	0.8 Ft./Sec.	0.8 Ft./Sec.
Estimated Flow:	1.56 CFS	72 CFS	300 CFS	5.76 CFS	24 CFS
Stream Modifications:	Dredged	None	None	Canopy Removal	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	330421	380458	380462	330419	380468
Stream Name:	Batesse Creek	Grand River	Grand River	Perry Creek	Mackey Creek
Road Crossing/Location:	Off Williamston Road	Dixon Road	Tompkins Road	Olds Road	Wellman Road
County Code:	33	38	38	33	38
TRS:	01N01E33	01S02W12	01S02W15	01N01W31	02S02W20
Latitude (dd):	42.428315	42.39599496	42.39084	42.43391	42.2866477
Longitude (dd):	-84.3237335	-84.49035938	-84.54146	-84.4735	-84.5725827
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Coldwater
USGS Basin Code:	4050004	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

COMMENTS: Site located in a campground

Table 3. Habitat evaluation for the upper Grand River watershed, 2006.

	STATION 22 Sandstone Creek d/s Springport Road RIFFLE/RUN	STATION 23 Sandstone Creek Gordon Road RIFFLE/RUN	STATION 24 Spring Brook Devereaux Rd GLIDE/POOL	STATION 25 Spring Brook Robbins Road GLIDE/POOL	STATION 26 Grand River on Onondaga Road GLIDE/POOL	STATION 27 North Onondaga Drain Aurelius Road GLIDE/POOL
HABITAT METRIC						
Substrate and Instream Cover						
Epifaunal Substrate/ Avail Cover	7	12	5	11	14	11
Embeddedness*	11	11				
Velocity/Depth Regime*	11	16				
Pool Substrate Characterization**			6	11	17	11
Pool Variability**			5	15	17	8
Channel Morphology						
Sediment Deposition	9	11	16	17	17	10
Flow Status - Maint. Flow Volum	9	10	10	10	10	9
Flow Status - Flashiness	8	7	10	10	8	3
Channel Alteration	13	13	18	20	20	5
Frequency of Riffles/Bends*	11	11				
Channel Sinuosity**			18	20	20	4
Riparian and Bank Structure						
Bank Stability (L)	3	10	10	10	10	6
Bank Stability (R)	6	10	10	10	10	6
Vegetative Protection (L)	3	10	10	10	6	5
Vegetative Protection (R)	6	10	10	10	10	5
Riparian Veg. Zone Width (L)	0	10	10	10	6	1
Riparian Veg. Zone Width (R)	2	10	8	10	10	1
TOTAL SCORE (200):	99	151	146	174	175	85
HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- IMPAIRED)	EXCELLENT (NON- IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)

Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	8/15/2006	7/28/2006	7/26/2006	7/26/2006	7/26/2006	6/28/2006
Weather:	Sunny	Cloudy	Rainy	Cloudy	Cloudy	Cloudy
Air Temperature:	80 Deg. F.	73 Deg. F.	80 Deg. F.	80 Deg. F.	80 Deg. F.	68 Deg. F.
Water Temperature:	73 Deg. F.	76 Deg. F.	72 Deg. F.	72 Deg. F.	78 Deg. F.	64 Deg. F.
Ave. Stream Width:	20 Feet	25 Feet	10 Feet	12 Feet	120 Feet	4 Feet
Ave. Stream Depth:	0.5 Feet	1 Feet	0.3 Feet	1 Feet	2.5 Feet	0.5 Feet
Surface Velocity:	1.2 Ft./Sec.	0.8 Ft./Sec.	0.1 Ft./Sec.	0.5 Ft./Sec.	0.5 Ft./Sec.	0.8 Ft./Sec.
Estimated Flow:	12 CFS	20 CFS	0.3 CFS	6 CFS	150 CFS	1.6 CFS
Stream Modifications:	Habitat Improvement	Dredged	None	None	None	Dredged
Nuisance Plants (Y/N):	N	N	N	N	N	N
Report Number:						
STORET No.:	380464	380455	380465	380456	330423	330418
Stream Name:	Sandstone Creek d/s Springport	Sandstone Creek	Spring Brook	Spring Brook	Grand River on Onondaga	Onondaga Drain
Road Crossing/Location:	Road	Gordon Road	Devereaux Rd	Robbins Road	Road	Aurelius Road
County Code:	38	38	38	38	33	33
TRS:	01S02W33	01S02W28	02S03W09	01S03W34	01N02W28	01N02W11
Latitude (dd):	42.33875	42.36398	42.31626	42.38468	42.43938	42.4911
Longitude (dd):	-84.547537	-84.55071	-84.66098	-84.63487	-84.55588	-84.52165
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050004	4050004	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 3. Habitat evaluation for the upper Grand River watershed, 2006

	STATION 28 Columbia Creek Onondaga Rd RIFLE/RUN	STATION 29 Columbia Creek Park on Curtice Road RIFLE/RUN	STATION 30 Grand River d/s Columbia Rd RIFLE/RUN	STATION 31 Grand River Road (Birchfield Park) GLIDE/POOL	STATION 32 Carrier Creek Mt Hope Hwy GLIDE/POOL
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover	8	11	11	18	5
Embeddedness*	10	15	11		
Velocity/Depth Regime*	10	11	16		
Pool Substrate Characterization**				16	10
Pool Variability**				15	7
Channel Morphology					
Sediment Deposition	5	13	10	18	11
Flow Status - Mainl. Flow Volum	9	8	9	9	9
Flow Status - Flashiness	5	8	3	9	8
Channel Alteration	5	13	20	20	18
Frequency of Riffles/Bends*	7	10	9		
Channel Sinuosity**				16	16
Riparian and Bank Structure					
Bank Stability (L)	6	7	9	3	8
Bank Stability (R)	6	7	9	3	8
Vegetative Protection (L)	6	4	10	4	9
Vegetative Protection (R)	6	9	10	4	9
Riparian Veg. Zone Width (L)	2	2	10	10	9
Riparian Veg. Zone Width (R)	3	9	10	10	9
TOTAL SCORE (200):	88	127	147	155	136
HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)

Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	8/14/2006	8/14/2006	7/26/2006	8/29/2006	6/27/2006
Weather:	Partly Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
Air Temperature:	78 Deg. F.	78 Deg. F.	75 Deg. F.	70 Deg. F.	63 Deg. F.
Water Temperature:	69 Deg. F.	69 Deg. F.	76 Deg. F.	73 Deg. F.	62 Deg. F.
Ave. Stream Width:	11 Feet	8 Feet	150 Feet	120 Feet	3 Feet
Ave. Stream Depth:	0.3 Feet	0.5 Feet	1 Feet	3.5 Feet	0.6 Feet
Surface Velocity:	0.9 Ft./Sec.	0.8 Ft./Sec.	0.8 Ft./Sec.	0.6 Ft./Sec.	0.1 Ft./Sec.
Estimated Flow:	2.97 CFS	3.2 CFS	120 CFS	252 CFS	0.18 CFS
Stream Modifications:	Dredged	Habitat Improvement	None	None	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	330410	330420	230236	330433	230234
Stream Name:	Columbia Creek	Columbia Creek	Grand River	Grand River	Carrier Creek
Road Crossing/Location:	Onondaga Rd	Park on Curtice Road	Columbia Rd at Park	Road (Birchfield Park)	Mt Hope Hwy
County Code:	33	33	23	33	23
TRS:	02N01W09	02N01W01	02N03W01	03N02W31	04N03W21
Latitude (dd):	42.57444	42.569172	42.58318	42.6023	42.71212
Longitude (dd):	-84.5625	-84.592659	-84.60066	-84.59364	-84.67002
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050004	4050004	4050004	0	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 3. Habitat evaluation for the upper Grand River watershed, 2006.

	STATION 33 Carrier Creek Off Williamsburg Rd GLIDE/POOL	STATION 34 Carrier Creek Willow Cr Dr RIFLE/RUN	STATION 36 Grand River Hunter Orchard Park GLIDE/POOL	STATION 37 Grand River off Willow Hwy GLIDE/POOL	STATION 38 Grand River State Rd RIFLE/RUN
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cove	2	13	19	16	18
Embeddedness*		18			18
Velocity/Depth Regime*		16			15
Pool Substrate Characterization	5		18	17	
Pool Variability**	1		17	13	
Channel Morphology					
Sediment Deposition	12	15	16	16	18
Flow Status - Maint. Flow Volu	7	8	9	9	10
Flow Status - Flashiness	3	6	8	6	10
Channel Alteration	8	16	20	18	18
Frequency of Riffles/Bends*		20			16
Channel Sinuosity**	5		15	19	
Riparian and Bank Structure					
Bank Stability (L)	2	8	6	10	10
Bank Stability (R)	2	8	6	9	10
Vegetative Protection (L)	7	7	9	8	10
Vegetative Protection (R)	7	7	9	10	10
Riparian Veg. Zone Width (L)	8	6	5	7	10
Riparian Veg. Zone Width (R)	8	6	3	9	10
TOTAL SCORE (200):	77	154	160	167	183

HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- IMPAIRED)	EXCELLENT (NON- IMPAIRED)	EXCELLENT (NON- IMPAIRED)
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Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	6/27/2006	6/29/2006	8/14/2006	7/25/2006	7/24/2006
Weather:	Sunny	Sunny	Cloudy	Sunny	Sunny
Air Temperature:	70 Deg. F.	68 Deg. F.	76 Deg. F.	85 Deg. F.	78 Deg. F.
Water Temperature:	62 Deg. F.	66 Deg. F.	75 Deg. F.	80 Deg. F.	76 Deg. F.
Ave. Stream Width:	7 Feet	12 Feet	120 Feet	300 Feet	350 Feet
Ave. Stream Depth:	1.2 Feet	0.5 Feet	2.5 Feet	3 Feet	1.5 Feet
Surface Velocity:	0.1 Ft./Sec.	0.8 Ft./Sec.	0.6 Ft./Sec.	0.4 Ft./Sec.	0.7 Ft./Sec.
Estimated Flow:	0.84 CFS	4.8 CFS	180 CFS	360 CFS	367.5 CFS
Stream Modifications:	Dredged tion, Habitat Improvement		None	Impounded	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	230233	230199	230235	230237	190011
Stream Name:	Carrier Creek	Carrier Creek	Grand River	Grand River	Grand River
Road Crossing/Location:	Williamsburg Rd	Willow Cr Dr	Hunter Orchard Park	off Willow Hwy	State Rd
County Code:	23	23	23	23	19
TRS:	04N03W15	04N03W10	04N03W22	04N03W05	05N04W33
Latitude (dd):	42.7310422	42.75237	42.760323	42.7566064	42.78486
Longitude (dd):	-84.6559573	-84.65516	-84.65338	-84.7015822	-84.79804
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050004	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 3. Habitat evaluation for the upper Grand River watershed, 2006.

	STATION 39 Grand River Clintonia Rd RIFFLE/RUN	STATION 40 Grand River off Musgrove Rd RIFFLE/RUN	STATION 41 Sebewa Creek Saginaw Hwy GLIDE/POOL	STATION 42 Sebewa Creek Eaton Hwy RIFFLE/RUN
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cov	18	18	9	14
Embeddedness*	13	18		15
Velocity/Depth Regime*	12	18		11
Pool Substrate Characterization**			11	
Pool Variability**			6	
Channel Morphology				
Sediment Deposition	13	15	6	12
Flow Status - Maint. Flow Volu	10	10	10	9
Flow Status - Flashiness	10	10	9	7
Channel Alteration	20	20	7	9
Frequency of Riffles/Bends*	15	16		10
Channel Sinuosity**			3	
Riparian and Bank Structure				
Bank Stability (L)	10	10	9	8
Bank Stability (R)	9	9	9	8
Vegetative Protection (L)	10	10	4	4
Vegetative Protection (R)	10	10	6	4
Riparian Veg. Zone Width (L)	10	8	9	2
Riparian Veg. Zone Width (R)	10	10	9	2
TOTAL SCORE (200):	170	182	107	115

HABITAT RATING:	EXCELLENT (NON- IMPAIRED)	EXCELLENT (NON- IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)
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Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).

Date:	7/24/2006	7/24/2006	7/25/2006	7/25/2006
Weather:	Sunny	Sunny	Rainy	Cloudy
Air Temperature:	74 Deg. F.	70 Deg. F.	Deg. F.	75 Deg. F.
Water Temperature:	76 Deg. F.	76 Deg. F.	64 Deg. F.	68 Deg. F.
Ave. Stream Width:	150 Feet	300 Feet	22 Feet	18 Feet
Ave. Stream Depth:	2.5 Feet	1.5 Feet	2 Feet	0.6 Feet
Surface Velocity:	0.5 Ft./Sec.	1.2 Ft./Sec.	0.2 Ft./Sec.	0.8 Ft./Sec.
Estimated Flow:	187.5 CFS	540 CFS	8.8 CFS	8.64 CFS
Stream Modifications:	None	None	Dredged	Dredged
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	340223	340224	230232	230206
Stream Name:	Grand River	Grand River	Sebewa Creek	Sebewa Creek
Road Crossing/Location:	Clintonia Rd	off Musgrove Rd	Saginaw Hwy	Eaton Hwy
County Code:	34	34	23	23
TRS:	05N05W24	05N05W20	04N06W13	04N06W12
Latitude (dd):	42.80088	42.80014	42.740754	42.77039
Longitude (dd):	-84.83717	-84.92591	-84.9673	-84.95127
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Coldwater	Coldwater
USGS Basin Code:	4050004	4050004	4050004	4050004

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys

Table 4A. Qualitative fish sampling results for upper Grand River watershed, 2006

TAXA	Sebewa Creek	
	Keefer Hwy	Keefer Hwy
	7/25/2006	9/6/2001
	STATION 1	STATION 2
Salmonidae (trouts)		
<i>Oncorhynchus mykiss</i> (Rainbow tr)	8	6
Cyprinidae (minnows and carps)		
<i>Campostoma anomahum</i> (Cent. stone.)	16	14
<i>Semotilus atromaculatus</i> (Creek)	1	9
<i>Luxilus cornutus</i> (Common shiner)	10	
<i>Rhinichthys atratulus</i> (Blacknose dace)		16
Catostomidae (suckers)		
<i>Catostomus commersoni</i> (W sucker)	10	13
Centrarchidae (sunfish)		
<i>Ambloplites rupestris</i> (Rock bass)	1	
<i>Micropterus salmoides</i> (Lm. bass)	1	
<i>Micropterus dolomieu</i> (Sm. bass)	4	5
Percidae (perch)		
<i>Etheostoma caeruleum</i> (Rainbow d)	36	36
<i>Etheostoma nigrum</i> (Johnny darter)		2
TOTAL INDIVIDUALS	87	101
Number of hybrid sunfish	0	0
Number of anomalies	0	0
Percent anomalies	0.000	0.000
Percent salmonids	9.195	5.941
Reach sampled (ft)	450	150
Area sampled (sq ft)	8,100	
Density (# fish/sq ft)	0.011	#DIV/0!
Gear	bps	bps

Table 4B. Fish metric evaluation of upper Grand River watershed, 2006.

METRIC	Sebewa Creek		Sebewa Creek	
	Keefer Hwy		Keefer Hwy	
	7/25/2006		9/6/2001	
	STATION 1		STATION 2	
	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	9		8	
NO OF DARTER, SCULPIN, MADTOM TAX	1		2	
NUMBER OF SUNFISH TAXA	1		0	
NUMBER OF SUCKER TAXA	1		1	
NUMBER OF INTOLERANT TAXA	4		3	
PERCENT TOLERANT	12.64		39.60	
PERCENT OMNIVOROUS TAXA	12.64		37.62	
PERCENT INSECTIVOROUS TAXA	52.87		37.62	
PERCENT PISCIVOROUS TAXA	6.90		4.95	
% SIMPLE LITHOPHILIC SPAWNER TAXA	64.37		64.36	
TOTAL SCORE				
FISH COMMUNITY RATING		Not scored	Not scored	0

Table 5. Water chemistry from the Upper Grand River, August 30, 2006.

	Chittenton Drain (Grass Lake Drain)	Chittenton Drain (Grass Lake Drain)	Center Lake Outlet	Center Lake Outlet	Grand River	Grand River	Grand River	Grand River	Grand River
	Lee Rd	Noon Street	5th Avenue	Falahee Road	Loomis	Monroe	Pamall	Waverly	Hunter Park
	Historic data 8/7/2001	Station 3	Station 4	Station 5	Station 1	Station 7	Station 8	Station 35	Station 36
Silver - Total					ND	ND	ND		
Arsenic - Total		ND	ND		2.4	2.3	1.8		
Barium - Total		3.1	3.2		70	59	53		
Calcium - Total	65.2	74.6	44		73.1	59.7	67.9		
Cadmium - Total		ND	49.8		ND	ND	ND		
Conductance	616	542	810	586	595	604	843	727	622
Chromium - Total		ND	ND		ND	ND	2.8		
Copper - Total		1.1	ND		8.7	1.3	2.2		
Hardness - Calculated	254	259	202		283	227	250		
Total Kjeldahl Nitrogen	0.5	1.26	1.13	.82	.79	.79	1.19	.71	.63
Magnesium - Total	22.2	17.6	18.8		24.4	18.8	19.6		
Nitrate + Nitrite	1.22	.68	4.2	1.59	.22	.74	5.3	2.2	2.2
Ammonia	0.024	.049	.09	.056	.054	.049	ND	.07	.05
Nitrite	0.007	.017	.189	.029	.008	.014	.023	.023	.038
Ortho-phosphate	0.015	.018	.080	.027	.008	.023	.090	.063	.105
Lead - Total		1.3	ND		ND	1.2	2.1		
Selenium - Total		ND	ND		ND	ND	ND		
Solids - Suspended	6	26	ND	4	27	8	11	9	6
Solids - Total Dissolved	420	360	460	350	390	380	510	460	370
Total Phosphorus	0.036	.076	.122	.055	.051	.061	.170	.105	.144
Zinc - Total		ND	ND		ND	ND	43		

Table 6. Sediment Chemistry results from the Upper Grand River, August 30, 2006.

	Grand River			Center Lake Outlet 5th Avenue Station 4
	Loomis Road Station 1	Parnall Road Station 8	Chittenden Drain Noon Road Station 3	
1,2,4-Trichlorobenzene	ug/Kg dry	ND	ND	ug/Kg dry
2,4,5-Trichlorophenol	ug/Kg dry	ND	ND	ug/Kg dry
2,4,6-Trichlorophenol	ug/Kg dry	ND	ND	ug/Kg dry
2,4-Dichlorophenol	ug/Kg dry	ND	ND	ug/Kg dry
2,4-Dimethylphenol	ug/Kg dry	ND	ND	ug/Kg dry
2,4-Dinitrophenol	ug/Kg dry	ND	ND	ug/Kg dry
2,4-Dinitrotoluene	ug/Kg dry	ND	ND	ug/Kg dry
2,6-Dinitrotoluene	ug/Kg dry	ND	ND	ug/Kg dry
2-Chloronaphthalene	ug/Kg dry	ND	ND	ug/Kg dry
2-Chlorophenol	ug/Kg dry	ND	ND	ug/Kg dry
2-Methyl-4,6-dinitrophenol	ug/Kg dry	ND	ND	ug/Kg dry
2-Methylnaphthalene	ug/Kg dry	ND	ND	ug/Kg dry
2-Methylphenol (o-Cresol)	ug/Kg dry	ND	ND	ug/Kg dry
2-Nitroaniline	ug/Kg dry	ND	ND	ug/Kg dry
2-Nitrophenol	ug/Kg dry	ND	ND	ug/Kg dry
3 & 4-Methylphenol	ug/Kg dry	ND	ND	ug/Kg dry
3-Nitroaniline	ug/Kg dry	ND	ND	ug/Kg dry
4-Bromophenyl phenyl ether	ug/Kg dry	ND	ND	ug/Kg dry
4-Chloro-3-methyl-phenol	ug/Kg dry	ND	ND	ug/Kg dry
4-Chlorodiphenylether	ug/Kg dry	ND	ND	ug/Kg dry
4-Nitroaniline	ug/Kg dry	ND	ND	ug/Kg dry
4-Nitrophenol	ug/Kg dry	ND	ND	ug/Kg dry
Acenaphthene	ug/Kg dry	ND	ND	ug/Kg dry
Acenaphthylene	ug/Kg dry	ND	ND	ug/Kg dry
Anthracene	ug/Kg dry	ND	ND	ug/Kg dry
Azobenzene	ug/Kg dry	ND	ND	ug/Kg dry
Benzo[a]anthracene	ug/Kg dry	ND	ND	ug/Kg dry
Benzo[a]pyrene	ug/Kg dry	ND	ND	ug/Kg dry
Benzo[b]fluoranthene*	ug/Kg dry	ND	ND	ug/Kg dry
Benzo[g,h,i] perylene	ug/Kg dry	ND	ND	ug/Kg dry
Benzo[k]fluoranthene	ug/Kg dry	ND	ND	ug/Kg dry
Benzyl Alcohol	ug/Kg dry	ND	ND	ug/Kg dry
Bis(2-chloroethoxy)methane	ug/Kg dry	ND	ND	ug/Kg dry
Bis(2-chloroethyl)ether	ug/Kg dry	ND	ND	ug/Kg dry
Bis(2-chloroisopropyl)ether	ug/Kg dry	ND	ND	ug/Kg dry
Bis(2-ethylhexyl)phthalate	ug/Kg dry	ND	ND	ug/Kg dry
Butyl benzyl phthalate	ug/Kg dry	ND	ND	ug/Kg dry
Carbazole	ug/Kg dry	ND	ND	ug/Kg dry
Chrysene	ug/Kg dry	ND	ND	ug/Kg dry
Dibenz[a,h]anthracene	ug/Kg dry	ND	ND	ug/Kg dry
Dibenzofuran	ug/Kg dry	ND	ND	ug/Kg dry
Diethylphthalate	ug/Kg dry	ND	ND	ug/Kg dry
Dimethyl phthalate	ug/Kg dry	ND	ND	ug/Kg dry
Di-n-butyl phthalate	ug/Kg dry	ND	ND	ug/Kg dry
Di-n-octyl phthalate	ug/Kg dry	ND	ND	ug/Kg dry
Fluoranthene	ug/Kg dry	ND	ND	ug/Kg dry
Fluorene	ug/Kg dry	ND	ND	ug/Kg dry
Hexachlorobenzene	ug/Kg dry	ND	ND	ug/Kg dry
Hexachlorobutadiene	ug/Kg dry	ND	ND	ug/Kg dry
Hexachlorocyclopentadiene	ug/Kg dry	ND	ND	ug/Kg dry
Hexachloroethane	ug/Kg dry	ND	ND	ug/Kg dry
Indeno(1,2,3-c,d)pyrene*	ug/Kg dry	ND	ND	ug/Kg dry
Isophorone	ug/Kg dry	ND	ND	ug/Kg dry
Naphthalene	ug/Kg dry	ND	ND	ug/Kg dry
Nitrobenzene	ug/Kg dry	ND	ND	ug/Kg dry
N-Nitrosodimethylamine	ug/Kg dry	ND	ND	ug/Kg dry
N-Nitrosodi-n-propylamine	ug/Kg dry	ND	ND	ug/Kg dry
N-Nitrosodiphenylamine	ug/Kg dry	ND	ND	ug/Kg dry
Pentachlorophenol	ug/Kg dry	ND	ND	ug/Kg dry
Phenanthrene	ug/Kg dry	ND	ND	ug/Kg dry
Phenol	ug/Kg dry	ND	ND	ug/Kg dry
Pyrene	ug/Kg dry	ND	ND	ug/Kg dry
Silver *	ug/Kg dry	ND	ND	ug/Kg dry
Arsenic	mg/Kg dry	ND	ND	mg/Kg dry
Barium *	mg/Kg dry	4800	ND	mg/Kg dry
Cadmium	mg/Kg dry	5700	ND	mg/Kg dry
Chromium	mg/Kg dry	8400	ND	mg/Kg dry
Copper	mg/Kg dry	ND	ND	mg/Kg dry
Nitrogen - Kjeldahl	mg/Kg dry	ND	ND	mg/Kg dry
Lead	mg/Kg dry	ND	ND	mg/Kg dry
Selenium *	mg/Kg dry	ND	ND	mg/Kg dry
Phosphorus - Total	mg/Kg dry	ND	ND	mg/Kg dry
Zinc	mg/Kg dry	ND	ND	mg/Kg dry
% Total Solids	%	24.8	27.9	20.9

ND = Non Dete; * TEC and PEC values not available; **Bold** = exceeds Probable Effect Concentration; *Italics* = exceeds Threshold Effect Concentration

