MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
OCTOBER 2011

STAFF REPORT

A BIOLOGICAL SURVEY OF SITES IN THE UPPER ST. JOSEPH RIVER WATERSHED BRANCH, CALHOUN, CASS, HILLSDALE, KALAMAZOO, AND ST. JOSEPH COUNTIES, MICHIGAN AUGUST AND SEPTEMBER 2010

INTRODUCTION

Staff of the Michigan Department of Environmental Quality (MDEQ), Surface Water Assessment Section (SWAS), conducted qualitative biological surveys during the summer of 2010 to assess point and nonpoint source (NPS) pollution throughout the upper St. Joseph River watershed (Figure 1). The goals of the monitoring were to: (1) support the development of water quality-based effluent limits for National Pollutant Discharge Elimination System permits; (2) support the NPS Program; (3) determine if waters are attaining Michigan's Water Quality Standards (WQS); and (4) determine if the quality of the water body is changing over time. The specific objective of this survey was to qualitatively characterize the biotic integrity of macroinvertebrate communities with respect to existing habitat conditions at randomly selected sites throughout the upper St. Joseph River watershed and estimate the amount of the watershed that is supporting the other indigenous aquatic life designated use component of R 323.1100(1)(e) of the Part 4 rules, WQS, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

The St. Joseph River watershed is located in the Southern Michigan/Northern Indiana Till Plain ecoregion. Wesley and Duffy (1999) provided a comprehensive review of the St. Joseph River watershed summarizing the geography, history, geology and hydrology, soils and land use, dams, water quality, biological communities, and recreational use. The locations evaluated during this survey are located in what the St. Joseph River assessment refers to as the headwaters, upper, and middle portions of the St. Joseph River watershed. The management options portion of the report details options for consideration addressing history, geology and hydrology, soils and land use patterns, channel morphology, dams and barriers, water quality, special jurisdictions, biological communities, fishery management, recreational use, and citizen involvement. The management options are based upon a watershed approach that is consistent with the goal of maintaining biotic integrity.

The Friends of the St. Joseph River Association, Inc. was established in April 1994, for the purpose of bringing together the people of the communities located within the St. Joseph River watershed, working as one unit to clean and restore the St. Joseph River and all tributaries in the St. Joseph River watershed. The organization published the St. Joseph River Watershed Management Plan in 2005 (DeGraves, 2005), which describes the watershed's location and size, land use and natural history, population, geology, topography, hydrology, and the impaired and threatened designated uses. The plan identifies critical pollutants and concerns, identifies the sources and causes, and establishes seven goals designed to preserve, protect, and restore the watershed. The St. Joseph River Watershed Management Plan as well as additional information regarding the St. Joseph River watershed can be accessed on the Internet at http://www.stjoeriver.net. Kieser & Associates of Kalamazoo, Michigan, provided the technical services and Web site design and programming for the watershed project.

Watershed management plans have also been developed for the Rocky River, Swan Creek, Hog Creek, Nottawa Creek, and Hodunk Messenger Chain of Lakes watersheds. The watershed management plans for these subwatersheds of the upper St. Joseph River watershed serve as guides for communities to protect and improve the water quality. Additional information regarding the watershed management plans for these areas of the upper St. Joseph River watershed can be found on the Web at (The link provided was broken and has been removed).

Sites throughout the upper St. Joseph River watershed were sampled by SWAS biologists in 2005 (Walterhouse, 2007). Qualitative macroinvertebrate community and stream habitat sampling was conducted at 38 sites geographically scattered throughout the watershed. Fish community sampling was conducted at 25 of the locations. The macroinvertebrate sampling results revealed that the only site not supporting the other indigenous aquatic life designated use component of the Part 4 rules was the channelized portion of the St. Joseph River upstream of the Hillsdale Wastewater Treatment Plant. Fish community sampling documented that Four County Drain (Kalamazoo County), Little Portage Creek (Kalamazoo County), Fisher Creek
(Branch County), and Sand Creek (Hillsdale County) were not supporting the warmwater fishery designated use component of the Part 4 rules. The fish sampling at sites on Sheldon Creek (Cass County), Flowerfield Creek (Kalamazoo County), Prairie River (St. Joseph County), and Spring Creek (St. Joseph County), which are designated cold water streams, revealed the need for additional monitoring, particularly temperature monitoring, because trout were not found. In general, the remainder of the sites harbored fish and macroinvertebrate communities that rated excellent to acceptable, indicative of minimal impairment and attainment of Michigan's WQS.

Sampling was conducted by SWAS biologists throughout the upper St. Joseph River watershed in 2000 and reported in separate reports by subwatershed, including the Rocky River (Walterhouse, 2002a), Hog Creek (Walterhouse, 2002b), Fawn River (Walterhouse, 2002c), Coldwater River (Walterhouse, 2002d), Swan Creek (Walterhouse, 2002e), Prairie River (Walterhouse, 2002f), Portage River (Walterhouse, 2003a), Nottawa Creek (Walterhouse, 2003b) and sites on the main stem of the St. Joseph River and smaller direct tributaries (Walterhouse, 2003c). The sampling was limited to the collection of macroinvertebrates and qualitative habitat data. In general, the surveys documented the presence of acceptable to excellent macroinvertebrate communities indicative of good water quality. Instream habitat limitations were identified in portions of the Hog Creek, Swan Creek, Prairie River, Portage River, and Nottawa Creek watersheds, and portions of smaller direct tributaries to the St. Joseph River. The primary source of the in-stream habitat limitations were activities associated with efforts to maintain homogenous channels designed to rapidly convey excess storm water from the agricultural landscape. The activities included cutting and spraying herbicides to control the growth of woody vegetation in the riparian zone and the removal of large woody debris and sediments from the stream channel.

A limited number of sites on the mainstem of the St. Joseph River were evaluated by SWAS biologists in 1989 (Oemke, 1991c), 1990 (Oemke, 1991d), and 1995 (Kosek, 1996a). The surveys documented fair biological communities and habitat in the headwaters near Hillsdale. The stations further downstream were found to provide fair to good habitat that was harboring good macroinvertebrate communities. Surveys at other streams in the upper St. Joseph River watershed were conducted by SWAS biologists in 1990 (Gerard and Heaton, 2000; Heaton 1991; Oemke, 1991a; Oemke, 1991b; Oemke, 1991e), 1993 (Kosek, 1994a), 1994 (Kosek, 1994b), and 1995 (Gerard and Heaton, 2000; Kosek, 1996b).

METHODS

All 31 of the sites selected for this survey were chosen with a probabilistic monitoring approach,

using stratified random site selection to address statewide and regional questions about water quality (MDEQ, 2006 draft).

The surveys described in this report were conducted according to the guidelines of the SWAS Procedure 51 (MDEQ, 1990). The macroinvertebrate communities were scored with metrics that rate water bodies from excellent (+5 to +9) to poor (-5 to -9). Macroinvertebrate ratings from (+4 to -4) are considered acceptable. Negative ratings that are acceptable are indicative of water bodies that are strongly tending toward poor, while positive ratings that are acceptable indicate slight impairment (Creal et al., 1996). Stream habitat was qualitatively evaluated at each station using a scoring system, which ranged in value from 0 to 135. Sampling locations are shown in Figure 1. Macroinvertebrate community scores and ratings, and habitat evaluations are given in Tables 1A and 1B and Table 2, respectively. A summary of the station locations and sampling results from this survey are presented in Table 3.

Digital images were taken upstream and downstream at each of the sites that were surveyed during this investigation. The photographs were transferred to a Microsoft PowerPoint presentation and are available upon request.

SAMPLING RESULTS

Stratified Random Sample Results

In 2010, 96 +/- 12 percent of the streams in the upper St. Joseph River watershed were estimated to be supporting the other indigenous aquatic life designated use component of the Part 4 rules. This estimate is based on the results of sampling at 31 randomly selected sites in the upper St. Joseph River watershed. Details of these results along with statewide random sampling results will be available in a separate report.

Macroinvertebrate Communities

The macroinvertebrate community scores ranged from (7 to -5) at the 31 sites that were evaluated throughout the watershed. The only site rated as poor, indicative of not meeting its designated use, was the Miller Lake Outlet at Tripp Road (Station 23). Ten sites were rated as excellent and 20 sites were rated as acceptable. Of the 20 sites that were rated as acceptable, only 5 of the sites scored in the negative range. The 5 sites with negative scores, tending toward poor that would be considered moderately impaired, were located at the following locations: Spring Creek at Muskrat Lake Road (Station 11), Blackwell Drain at Girard Road (Station 20), Cold Creek at Marshall Road (Station 24), North Branch Hog Creek at Crandall Road (Station 27), and Beebe Creek at Slater Road (Station 31). The abundance of sites throughout the watershed that support macroinvertebrate communities that rate either excellent or acceptable with minimal impairment demonstrates the attainment of WQS throughout the watershed.

Habitat

Overall stream habitat scores, which consider in-stream habitat as well as the adjacent stream banks and riparian habitat at the 31 sites in the St Joseph River watershed ranged from 56 (marginal) to 157 (excellent). Glide/pool metrics were used to evaluate habitat at 21 of the sites and riffle/run metrics were used at the remaining 10 sites. None of the sites in the watershed were rated as poor with the overall stream habitat rating protocol. Overall, stream habitat at 2 of the sites was rated as excellent, 18 sites were rated as good, and 11 were rated as marginal. The only sites with better overall habitat that scored excellent included: Coldwater River at Blackwell Road (Station 21) and the Coldwater River at Gower Road (Station 22). The sites where habitat scores were better tended to be natural (unmodified) stream channels with a

diversity of substrates including coarse substrates, an abundance of large woody debris, and wide, wooded, or wetland corridors adjacent to the stream channel.

Fourteen of the sites had been dredged to facilitate drainage in the respective watersheds. At 11 of the 14 dredged sites the overall habitat was scored as marginal. These dredged stream reaches were the only sites in the watershed where habitat was scored as marginal. The other 3 dredged sites had not recently been maintained and were scored as good. The macroinvertebrate communities at 13 of the 14 dredged sites were rated as acceptable, which indicates that despite overall stream habitat deficiencies, water quality is good. Habitat deficiencies from dredging activities, riparian maintenance, and limited flow were responsible for the nonattainment documented at Miller Lake Outlet (Station 23).

NPS Problem Summary

A tremendous amount of energy and resources were devoted to developing the St. Joseph River Watershed Management Plan (DeGraves, 2005) and the St. Joseph River Assessment (Wesley and Duffy, 1999). The documents provide a thorough review of many issues in the St. Joseph River watershed and include sections devoted to identification of NPS problems and solutions. Together, the two documents form a solid foundation for guiding future activities in the watershed.

Overall, water quality in the upper portion of the St. Joseph River and its tributaries is good. Limitations to the biological communities can be primarily attributed to habitat limitations created by historic and current efforts to quickly drain water from agricultural portions of the watershed. The following site-specific and general problems were observed:

- Many of the smaller tributaries have been dredged to facilitate drainage of the historic abundant wetland habitat in the watershed. Recovery of these streams is hampered by continued dredging activities, large woody debris removal, and riparian management activities that prevent trees and shrubs from becoming established along the stream banks and providing stability. The drain maintenance efforts have also produced flashy flow regimes in homogenous stream channels where the unstable sand and silt substrates are slowly being transported downstream.

- Buffer strips are absent along many of the agricultural drains and streams in the watershed and row crops are currently planted to the top of the stream bank. Property owners at many locations maintain nearly all of their property along the stream channel by mowing to the water's edge. Trees and shrubs along the stream banks provide shade and in-stream cover, help stabilize stream banks, and serve as a source for large woody debris in the future.

- Adoption of best management practices in the watershed designed to reduce upland erosion and slow the rate of stream flow throughout the watershed will benefit the aquatic biota residing in the streams throughout the watershed.

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REFERENCES

Creal, W., S. Hanshue, S. Kosek, M. Oemke, and M. Walterhouse. 1996. Update of GLEAS Procedure 51 Metric Scoring and Interpretation. MDEQ Report #MI/DEQ/SWQ-96/068 (revised May 1998).

DeGraves, A. 2005. St. Joseph River Watershed Management Plan, June 2005, Friends of the St. Joseph River Association, P.O. Box 354, Athens, MI 49011.

Gerard, K. and S. Heaton. 2000. A Biological Survey of Sites in the Upper St. Joseph Watershed, Cass, Kalamazoo, and St. Joseph Counties, September 1990; August and September 1995. MDEQ, SWQD, Report #MI/DEQ/SWQ-99/012.

Heaton, S. 1991. A Biological Survey of Fawn River, St. Joseph County, July 18, 1990. MDNR, SWQD, Report #MI/DEQ/SWQ-91/089.

Kosek, S. 1994a. A Biological Survey of the Prairie River, Branch County, July 23, 1993. MDNR, SWQD, Report #MI/DNR/SWQ-93/063.

Kosek, S. 1994b. A Biological Survey of Fisher and Tallahassee Creeks, Branch County, August, 1994. MDNR, SWQD, Report #MI/DNR/SWQ-94/090.

Kosek, S. 1996a. A Biological Survey of the St. Joseph River Watershed, Hillsdale, Calhoun, and Branch Counties, July-August, 1995. MDEQ, SWQD, Report #MI/DEQ/SWQ-96/015.

Kosek, S. 1996b. A Biological survey of Nottawa Creek, Calhoun County, August 24-25, 1995. MDEQ, SWQD, Report #MI/DEQ/SWQ-96/014.

MDEQ. 1990. SWAS Procedure 51 - Qualitative Biological and Habitat Survey Protocols for Wadeable Streams and Rivers, April 24, 1990. Revised June 1991, August 1996, January 1997, May 2002, and December 2008.

MDEQ. 2006. Draft SWAS Procedure (# to be assigned). Biological Status and Trend Monitoring Procedure. Effective May 22, 2006.

Oemke, M. 1991a. A Biological Survey of the Coldwater River, Branch County, September 6-7, 1990. MDNR, SWQD, Report #MI/DNR/SWQ-91/083.

Oemke, M. 1991b. A Biological Survey of Fisher and Tallahassee Creeks, Branch County, September 22, 1990. MDNR, SWQD, Report #MI/DNR/SWQ-91/093.

Oemke, M. 1991c. A Biological Survey of the St. Joseph River and Beebe Creek, Hillsdale County, Michigan, May 18, 1989. MDNR, SWQD, Report #MI/DNR/SWQ-91/077.

Oemke, M. 1991d. A Biological Survey of the St. Joseph River in the Vicinity of Hillsdale, Hillsdale County, August 30, 1990. MDNR, SWQD, Report #MI/DNR/SWQ-91/076.

Oemke, M. 1991e. A Biological Survey of the South Branch Hog Creek, Branch County, August 23-24, 1990. MDEQ, SWQD, Report #MI/DNR/SWQ-91/084.

Walterhouse, M. 2002a. A Biological Survey of Sites in the Rocky River Watershed, Cass, Kalamazoo, and St. Joseph Counties, Michigan, July 18, 2000. MDEQ, SWQD, Report #MI/DEQ/SWQ-02/006.

Walterhouse, M. 2002b. A Biological Survey of Sites in the Hog Creek Watershed, Branch and Hillsdale Counties, Michigan, July 6 and 7, 2000. MDEQ, SWQD, Report #MI/DEQ/SWQ-02/018.

Walterhouse, M. 2002c. A Biological Survey of Sites in the Fawn River Watershed, St. Joseph County, Michigan, August 16, 2000. MDEQ, SWQD, Report #MI/DEQ/SWQ-02/022.

Walterhouse, M. 2002d. A Biological Survey of Sites in the Coldwater River Watershed, Branch County, Michigan, July 10 and 11, 2000. MDEQ, SWQD, Report #MI/DEQ/SWQ-02/069.

Walterhouse, M. 2002e. A Biological Survey of Sites in the Swan Creek Watershed, Branch and St. Joseph Counties, Michigan, July and August, 2000. MDEQ, SWQD, Report #MI/DEQ/SWQ-02/071.

Walterhouse, M. 2002f. A Biological Survey of Sites in the Prairie Watershed, Branch and St. Joseph Counties, Michigan, July 19 and 20, 2000. MDEQ, SWQD, Report #MI/DEQ/SWQ-02/072.

Walterhouse, M. 2003a. A Biological Survey of Sites in the Portage River and Little Portage Creek Watersheds, Kalamazoo and St. Joseph Counties, Michigan, August 17and 18, 2000. MDEQ, SWQD, Report #MI/DEQ/WD-03/006.

Walterhouse, M. 2003b. A Biological Survey of Sites in the Nottawa Creek Watershed, Calhoun, Kalamazoo, and St. Joseph Counties, Michigan, July 13-15, 2000. MDEQ, SWQD, Report #MI/DEQ/WD-03/007.

Walterhouse, M. 2003c. A Biological Survey of Sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, and St. Joseph Counties, Michigan, July and September 2000. MDEQ, SWQD, Report #MI/DEQ/WD-03/013.

Walterhouse, M. 2007. A Biological Survey of Sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, Michigan, August and September 2005. MDEQ, WB, SWAS, Report #MI/DEQ/WB-07/048.

Wesley, J. and J. Duffy. 1999. St. Joseph River Assessment. Michigan Department of Natural Resources, Fisheries Division, Special Report 24. Ann Arbor, Michigan.

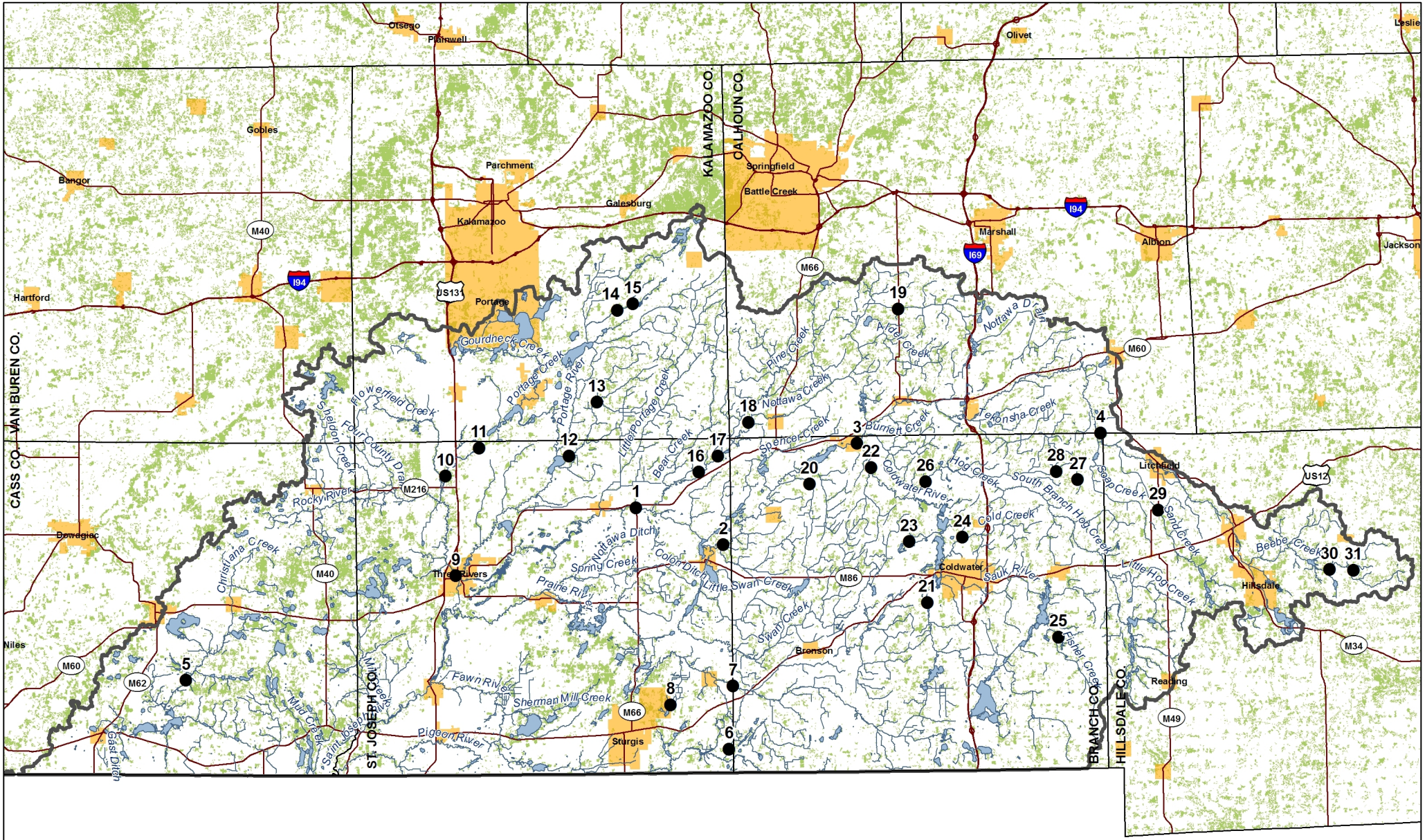

Figure 1: UPPER ST. JOSEPH RIVER BIOSURVEY STATION LOCATIONS, 2010.

- Station Locations
- Watershed Boundary
- County Boundary
- Urban Area
- HiRes NHDFlowline
- Highways

0 10 20 30 40

miles

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SURFACE WATER ASSESSMENT SECTION
WATER RESOURCES DIVISION

Table 1A. Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Cass, Calhoun, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	St. Joseph River M-66 at 28140 Talon Dr. 09/02/2010 STATION 1	St. Joseph River Stowell Road 09/02/2010 STATION 2	St. Joseph River Broadway St. at Riverview Park 09/02/2010 STATION 3	St. Joseph River County Line Road 08/31/2010 STATION 4
ANNELIDA (segmented worms)				
Hirudinea (leeches)		1		
Oligochaeta (worms)	3	6	1	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	12	2	18	114
Decapoda (crayfish)		1	3	13
Isopoda (sowbugs)	1	2		
Arachnoidea				
Hydracarina		2		4
Insecta				
Ephemeroptera (mayflies)				
Baetiscidae			1	
Baetidae	16	29	9	14
Caenidae	9		6	
Ephemerellidae	8	6	4	3
Ephemeridae		2	1	1
Heptageniidae	6	7	11	12
Isonychiidae		4	5	1
Potamanthidae	4	1		
Tricorythidae	63	2	11	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	2		1	1
Gomphidae	1	4	1	3
Macromiidae			1	
Zygoptera (damselflies)				
Calopterygidae	5		5	7
Coenagrionidae	15	11	1	
Plecoptera (stoneflies)				
Perlidae			7	13
Pteronarcyidae		1	4	3
Hemiptera (true bugs)				
Belostomatidae	1			
Corixidae	16			1
Gerridae	8	4	1	1
Mesoveliidae	2	3	1	
Nepidae		1		
Pleidae	1			
Megaloptera				
Sialidae (alder flies)	1			
Trichoptera (caddisflies)				
Brachycentridae	4	29	26	5
Glossosomatidae			4	
Helicopsychidae	1	4	6	4
Hydropsychidae	32	15	13	2
Hydroptilidae		1	1	
Leptoceridae	29	31	21	1
Limnephilidae		6	1	11
Molannidae				1
Philopotamidae		1		
Phryganeidae		1		
Polycentropodidae	10	1	2	
Uenoidae		2	19	13
Coleoptera (beetles)				
Dytiscidae (total)	1			
Gyrinidae (adults)	1	7	1	
Hydrophilidae (total)				2
Psephenidae (adults)				1
Elmidae	10	14	26	6
Gyrinidae (larvae)	1	1		
Psephenidae (larvae)		2	1	
Diptera (flies)				
Ceratopogonidae		1		
Chironomidae	72	32	24	24
Culicidae				1
Simuliidae	4	21	14	2
Tabanidae	1		3	1
Tipulidae				1
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1	2	1	7
Hydrobiidae		1	2	
Lymnaeidae	1	12	26	3
Physidae	2			1
Planorbidae		1		
Pelecypoda (bivalves)				
Corbiculidae	6	1	11	9
Dreissenidae		4	1	
Sphaeriidae (clams)	1		18	
TOTAL INDIVIDUALS	351	279	313	286

Table 1B. Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Cass, Calhoun, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

METRIC	St. Joseph River M-66 at 28140 Talon Dr 09/02/2010 STATION 1 Value	Score	St. Joseph River Stowell Road 09/02/2010 STATION 2 Value	Score	St. Joseph River Broadway St at Riverview Park 09/02/2010 STATION 3 Value	Score	St. Joseph River County Line Road 08/31/2010 STATION 4 Value	Score
TOTAL NUMBER OF TAXA	35	1	41	1	41	1	34	1
NUMBER OF MAYFLY TAXA	6	1	7	1	8	1	5	1
NUMBER OF CADDISFLY TAXA	5	1	10	1	9	1	7	1
NUMBER OF STONEFLY TAXA	0	-1	1	1	2	1	2	1
PERCENT MAYFLY COMP.	30.20	1	18.28	0	15.34	0	10.84	0
PERCENT CADDISFLY COMP.	21.65	0	32.62	1	29.71	1	12.94	0
PERCENT DOMINANT TAXON	20.51	0	11.47	1	8.31	1	39.86	-1
PERCENT ISOPOD, SNAIL, LEECH	1.42	1	6.81	0	9.27	0	3.85	1
PERCENT SURF. AIR BREATHERS	8.55	0	5.38	1	0.96	1	2.10	1
TOTAL SCORE	4		7		7		5	
MACROINV. COMMUNITY RATING	ACCEPT.		EXCELLENT		EXCELLENT		EXCELLENT	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Christiana Creek Cassopolis Road 09/13/2010 STATION 5	Himebaugh Drain Fawn River Road 08/12/2010 STATION 6	Prairie River St. Joseph Road 09/03/2010 STATION 7	Stewart Lake Drain Witt Lake Road 08/12/2010 STATION 8
PLATYHELMINTHES (flatworms)				
Turbellaria		1		
ANNELIDA (segmented worms)				
Hirudinea (leeches)			1	15
Oligochaeta (worms)	2	4	4	5
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	41	1	8	148
Decapoda (crayfish)	1			1
Isopoda (sowbugs)	3			
Arachnoidea				
Hydracarina		10	1	1
Insecta				
Ephemeroptera (mayflies)				
Baetidae	122		12	5
Caenidae	1			5
Ephemerellidae	1	2		
Ephemeridae	2	1		
Heptageniidae	6			
Tricorythidae	1			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae			1	1
Gomphidae	2	17		1
Libellulidae	1			
Zygoptera (damselflies)				
Calopterygidae		23	17	23
Coenagrionidae	4	11	3	25
Plecoptera (stoneflies)				
Pteronarcyidae			1	
Hemiptera (true bugs)				
Belostomatidae	1			1
Corixidae	12		38	3
Gerridae		1	1	
Naucoridae				1
Nepidae				1
Notonectidae			1	1
Megaloptera				
Corydalidae (dobson flies)	1			
Sialidae (alder flies)	1			
Trichoptera (caddisflies)				
Brachycentridae	7	1	2	
Helicopsychidae	7	28	5	
Hydropsychidae	33	5	1	9
Hydroptilidae	3		2	
Lepidostomatidae		2		
Leptoceridae	21	13	11	5
Limnephilidae	2	2	4	
Molannidae			1	
Philopotamidae	2			
Phryganeidae		4		3
Polycentropodidae	1			
Uenoidae	5		4	
Lepidoptera (moths)				
Pyralidae	4			
Coleoptera (beetles)				
Gyrinidae (adults)		20	1	1
Haliplidae (adults)	1	2	2	6
Hydrophilidae (total)			1	
Dryopidae			1	
Elmidae	2	34		
Gyrinidae (larvae)			2	
Psephenidae (larvae)	1			
Diptera (flies)				
Ceratopogonidae				1
Chironomidae	28	28	9	5
Simuliidae	14			7
Tabanidae		1		
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	23	4	6	
Hydrobiidae	4	3	60	1
Physidae	2	19	10	3
Planorbidae	1	5	80	1
Viviparidae		1		
Pelecypoda (bivalves)				
Corbiculidae	1	42	19	
Sphaeriidae (clams)	6	4	6	5
Unionidae (mussels)		1		
TOTAL INDIVIDUALS	370	290	315	284

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

METRIC	Christiana Creek Cassopolis Road 09/13/2010 STATION 5 Value	Score	Himebaugh Drain Fawn River Road 08/12/2010 STATION 6 Value	Score	Prairie River St. Joseph Road 09/03/2010 STATION 7 Value	Score	Stewart Lake Drain Witt Lake Road 08/12/2010 STATION 8 Value	Score
TOTAL NUMBER OF TAXA	38	1	30	1	31	1	28	1
NUMBER OF MAYFLY TAXA	6	1	2	0	1	-1	2	1
NUMBER OF CADDISFLY TAXA	9	1	7	1	8	1	3	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	1	1	0	-1
PERCENT MAYFLY COMP.	35.95	1	1.03	-1	3.81	0	3.52	0
PERCENT CADDISFLY COMP.	21.89	0	18.97	0	9.52	0	5.99	0
PERCENT DOMINANT TAXON	32.97	0	14.48	1	25.40	0	52.11	-1
PERCENT ISOPOD, SNAIL, LEECH	8.92	0	11.03	-1	49.84	-1	7.04	0
PERCENT SURF. AIR BREATHERS	3.78	1	7.93	0	13.97	0	4.93	1
TOTAL SCORE	4		0		1		1	
MACROINV. COMMUNITY RATING	ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Rocky River Memory Isle Park 08/11/2010 STATION 9	Spring Creek Johnson Road 08/11/2010 STATION 10	Spring Creek Muskrat Lake Road 09/13/2010 STATION 11	Bear Creek Hallam Road 08/11/2010 STATION 12
PORIFERA (sponges)			1	
PLATYHELMINTHES (flatworms)				
Turbellaria		2	26	
ANNELIDA (segmented worms)				
Hirudinea (leeches)			4	
Oligochaeta (worms)	2	2		3
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	38	56	48	59
Decapoda (crayfish)	1		3	1
Isopoda (sowbugs)			57	20
Arachnoidea				
Hydracarina	3	2	1	3
Insecta				
Ephemeroptera (mayflies)				
Baetidae	12	12		
Caenidae	2	9		1
Ephemeridae		1		
Heptageniidae	28	5		9
Isonychiidae	1			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1			1
Gomphidae	1			2
Libellulidae				3
Zygoptera (damselflies)				
Calopterygidae	1	24	11	3
Coenagrionidae		4	1	85
Plecoptera (stoneflies)				
Perlidae	1			
Hemiptera (true bugs)				
Belostomatidae				6
Corixidae	5	10		7
Gerridae		1	3	1
Naucoridae	1			
Nepidae				2
Notonectidae			3	1
Pleidae	5	5		1
Saldidae	1			1
Veliidae	1			4
Megaloptera				
Sialidae (alder flies)		3		3
Trichoptera (caddisflies)				
Brachycentridae	12	11		1
Hydropsychidae	28	20		2
Hydroptilidae		4		
Leptoceridae	20	35	1	10
Limnephilidae			1	
Phryganeidae	7	2		1
Polycentropodidae	1		1	
Uenoidae	1			
Coleoptera (beetles)				
Dytiscidae (total)		3		
Gyrinidae (adults)	4		1	
Haliplidae (adults)	2			1
Elmidae	5	6		20
Diptera (flies)				
Ceratopogonidae	1	1	2	
Chironomidae	12	14	72	14
Culicidae		1		
Simuliidae	38		1	
Tabanidae			3	2
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	30		2	1
Hydrobiidae		2		5
Physidae	2	1		3
Planorbidae		1	5	
Pelecypoda (bivalves)				
Corbiculidae	19	22	5	1
Sphaeriidae (clams)		3	14	22
TOTAL INDIVIDUALS	286	262	266	299

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

METRIC	Rocky River Memory Isle Park 08/11/2010 STATION 9 Value	Score	Spring Creek Johnson Road 08/11/2010 STATION 10 Value	Score	Spring Creek Muskrat Lake Road 09/13/2010 STATION 11 Value	Score	Bear Creek Hallam Road 08/11/2010 STATION 12 Value	Score
TOTAL NUMBER OF TAXA	32	1	29	1	23	0	34	1
NUMBER OF MAYFLY TAXA	4	1	4	1	0	-1	2	0
NUMBER OF CADDISFLY TAXA	6	1	5	1	3	0	4	0
NUMBER OF STONEFLY TAXA	1	1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	15.03	0	10.31	0	0.00	-1	3.34	0
PERCENT CADDISFLY COMP.	24.13	0	27.48	0	1.13	-1	4.68	0
PERCENT DOMINANT TAXON	13.29	1	21.37	0	27.07	0	28.43	0
PERCENT ISOPOD, SNAIL, LEECH	11.19	-1	1.53	1	25.56	-1	9.70	0
PERCENT SURF. AIR BREATHERS	6.64	1	7.63	0	2.63	1	8.03	0
TOTAL SCORE	5		3		-4		0	
MACROINV. COMMUNITY RATING	EXCELLENT		ACCEPT.		ACCEPT.		ACCEPT.	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Bear Creek 31st Avenue 09/13/2010 STATION 13	Unnamed Trib to Portage River 34th Street 08/11/2010 STATION 14	Unnamed Trib to Portage River 36th Avenue 08/11/2010 STATION 15	Nottawa Creek Correll Road 08/12/2010 STATION 16
PLATYHELMINTHES (flatworms)				
Turbellaria		1		
ANNELIDA (segmented worms)				
Hirudinea (leeches)	2	5	2	1
Oligochaeta (worms)	4	15		1
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	54	48	143	190
Decapoda (crayfish)	1	1		1
Isopoda (sowbugs)	3		1	5
Arachnoidea				
Hydracarina				4
Insecta				
Ephemeroptera (mayflies)				
Baetidae	7	8	7	7
Caenidae		2		
Ephemerellidae		1		
Ephemeridae			1	1
Heptageniidae	12	7	3	1
Leptophlebiidae				2
Tricorythidae		7	6	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	2	5	
Gomphidae		1		1
Zygoptera (damselflies)				
Calopterygidae	5	30	23	3
Coenagrionidae			1	27
Plecoptera (stoneflies)				
Perlodidae			1	
Hemiptera (true bugs)				
Corixidae	4			22
Gerridae	1		1	2
Notonectidae				1
Pleidae	1			1
Veliidae			1	
Megaloptera				
Sialidae (alder flies)	1			
Trichoptera (caddisflies)				
Brachycentridae	1	5		6
Helicopsychidae		17		3
Hydropsychidae	84	28	14	1
Hydroptilidae				2
Leptoceridae		12	16	1
Limnephilidae			3	1
Molannidae		1		
Philopotamidae		3	1	
Phryganeidae		2	1	1
Polycentropodidae			3	1
Uenoidae		1		1
Coleoptera (beetles)				
Dytiscidae (total)	1			1
Gyrinidae (adults)	1			1
Haliplidae (adults)				12
Hydrophilidae (total)				1
Elmidae	7	15	1	
Gyrinidae (larvae)			2	
Diptera (flies)				
Ceratopogonidae	1	1		
Chironomidae	64	6	6	17
Culicidae	1			2
Dixidae	1			
Simuliidae	1			1
Tabanidae	1			
Tipulidae	5			
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	2	8		1
Hydrobiidae				2
Physidae	3	1		2
Planorbidae				1
Viviparidae				1
Pelecypoda (bivalves)				
Corbiculidae		2		6
Sphaeriidae (clams)	1	37	17	1
TOTAL INDIVIDUALS	270	267	259	336

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

	Bear Creek 31st Avenue 09/13/2010 STATION 13		Unnamed Trib to Portage River 34th Street 08/11/2010 STATION 14		Unnamed Trib to Portage River 36th Avenue 08/11/2010 STATION 15		Nottawa Creek Correll Road 08/12/2010 STATION 16	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	28	1	28	1	23	0	40	1
NUMBER OF MAYFLY TAXA	2	0	5	1	4	1	4	1
NUMBER OF CADDISFLY TAXA	2	0	8	1	6	1	9	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	1	1	0	-1
PERCENT MAYFLY COMP.	7.04	0	9.36	0	6.56	0	3.27	0
PERCENT CADDISFLY COMP.	31.48	1	25.84	0	14.67	0	5.06	0
PERCENT DOMINANT TAXON	31.11	0	17.98	1	55.21	-1	56.55	-1
PERCENT ISOPOD, SNAIL, LEECH	3.70	1	5.24	0	1.16	1	3.87	1
PERCENT SURF. AIR BREATHERS	3.33	1	0.00	1	0.77	1	12.80	0
TOTAL SCORE	3		4		4		2	
MACROINV. COMMUNITY RATING	ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Nottawa Creek Shorts Road 09/03/2010 STATION 17	Nottawa Creek V Drive 09/03/2010 STATION 18	Nottawa Creek 11 Mile Road 08/31/2010 STATION 19	Blackwell Drain Girard Road 08/12/2010 STATION 20
PORIFERA (sponges)	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1			4
Oligochaeta (worms)	1	2	2	40
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	49	27	6	3
Decapoda (crayfish)	1			1
Isopoda (sowbugs)	2	2		
Arachnoidea				
Hydracarina			3	6
Insecta				
Ephemeroptera (mayflies)				
Baetidae	7	14	52	
Caenidae	1			
Ephemerellidae		1	9	
Ephemeridae	1			
Heptageniidae	3	7	18	
Leptophlebiidae		1		
Tricorythidae	2			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		1	1	5
Gomphidae		2		
Libellulidae	1		1	
Zygoptera (damselflies)				
Calopterygidae	2	9	17	6
Coenagrionidae	2	2	8	5
Plecoptera (stoneflies)				
Perlidae		5		
Pteronarcyidae		3	1	
Hemiptera (true bugs)				
Belostomatidae		1		
Corixidae	1	1	4	
Gerridae	1	1	1	
Mesoveliidae	1			
Pleidae		1		
Megaloptera				
Corydalidae (dobson flies)		1		
Sialidae (alder flies)	3			
Trichoptera (caddisflies)				
Brachycentridae	62	141	3	
Helicopsychidae	7		5	
Hydropsychidae	4	4	15	2
Hydroptilidae	1	3		
Lepidostomatidae			1	
Leptoceridae	13	9	5	1
Limnephilidae	1	1		1
Philopotamidae			2	
Polycentropodidae	4			
Uenoidae	17		4	
Lepidoptera (moths)				
Pyralidae		1		
Coleoptera (beetles)				
Gyrinidae (adults)	1	1	4	
Haliplidae (adults)	3			
Elmidae	3	2	3	20
Diptera (flies)				
Chironomidae	12	19	13	80
Culicidae		1	5	
Dixidae			2	
Simuliidae	20	2	115	
Tabanidae		2	1	
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1	5		
Hydrobiidae	2			
Lymnaeidae	5		1	
Physidae		1		
Planorbidae	3		1	2
Pelecypoda (bivalves)				
Corbiculidae	51	9	7	
Sphaeriidae (clams)	26	1		11
Unionidae (mussels)			1	
TOTAL INDIVIDUALS	316	283	311	187

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

METRIC	Nottawa Creek Shorts Road 09/03/2010 STATION 17 Value	Score	Nottawa Creek V Drive 09/03/2010 STATION 18 Value	Score	Nottawa Creek 11 Mile Road 08/31/2010 STATION 19 Value	Score	Blackwell Drain Girard Road 08/12/2010 STATION 20 Value	Score
TOTAL NUMBER OF TAXA	37	1	34	1	31	1	15	0
NUMBER OF MAYFLY TAXA	5	1	4	1	3	0	0	-1
NUMBER OF CADDISFLY TAXA	8	1	5	1	7	1	3	0
NUMBER OF STONEFLY TAXA	0	-1	2	1	1	1	0	-1
PERCENT MAYFLY COMP.	4.43	0	8.13	0	25.40	1	0.00	-1
PERCENT CADDISFLY COMP.	34.49	1	55.83	1	11.25	0	2.14	-1
PERCENT DOMINANT TAXON	19.62	1	49.82	-1	36.98	0	42.78	-1
PERCENT ISOPOD, SNAIL, LEECH	4.43	0	2.83	1	0.64	1	3.21	1
PERCENT SURF. AIR BREATHERS	2.22	1	2.12	1	4.50	1	0.00	1
TOTAL SCORE	5		6		6		-3	
MACROINV. COMMUNITY RATING	EXCELLENT		EXCELLENT		EXCELLENT		ACCEPT.	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Coldwater River Blackhawk Road 08/12/2010 STATION 21	Coldwater River Gower Road 09/02/2010 STATION 22	Miller Lake Outlet Tripp Road 08/12/2010 STATION 23	Cold Creek Marshall Road 09/13/2010 STATION 24
PORIFERA (sponges)				1
ANNELIDA (segmented worms)				
Hirudinea (leeches)	2		3	
Oligochaeta (worms)		1	8	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	33	14	2	24
Decapoda (crayfish)	1	2		1
Arachnoidea				
Hydracarina	1		3	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	8	8		1
Caenidae	3	3		
Ephemerellidae	3	5		
Ephemeridae		3		
Heptageniidae	20	18		15
Isonychiidae	4	9		
Leptophlebiidae			1	
Tricorythidae		1		
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	3		
Gomphidae	2	3		
Macromiidae		1		
Zygoptera (damselflies)				
Calopterygidae	12	9		8
Coenagrionidae	13	2	1	5
Plecoptera (stoneflies)				
Perlidae		12		
Pteronarcyidae		5		
Hemiptera (true bugs)				
Belostomatidae			1	1
Corixidae			1	80
Gerridae		1	1	1
Mesoveliidae		4		1
Nepidae				1
Notonectidae			1	6
Pleidae				1
Veliidae			1	
Megaloptera				
Corydalidae (dobson flies)		1	1	
Sialidae (alder flies)				5
Trichoptera (caddisflies)				
Brachycentridae	1	5		
Glossosomatidae		1		
Helicopsychidae	8	6		
Hydropsychidae	41	17		
Leptoceridae	3	18		1
Limnephilidae	11	4		1
Molannidae	1			1
Philopotamidae	3	1		
Phryganeidae	3	1		
Polycentropodidae		1		
Uenoidae	21	17		
Coleoptera (beetles)				
Haliplidae (adults)			2	1
Hydrophilidae (total)			1	3
Psephenidae (adults)	13			
Elmidae	21	30		4
Psephenidae (larvae)		6		
Diptera (flies)				
Ceratopogonidae			1	1
Chironomidae	11	29	211	23
Culicidae				5
Simuliidae	1			
Tabanidae				4
Tipulidae	1	1		
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1	4		3
Hydrobiidae	4	2		
Lymnaeidae	2	4	1	
Physidae		1	18	5
Planorbidae	3		12	
Pelecypoda (bivalves)				
Corbiculidae	1	9		
Dreissenidae	11	1		
Sphaeriidae (clams)	11	2	22	5
Unionidae (mussels)		1		
TOTAL INDIVIDUALS	275	266	292	208

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

	Coldwater River Blackhawk Road 08/12/2010 STATION 21		Coldwater River Gower Road 09/02/2010 STATION 22		Miller Lake Outlet Tripp Road 08/12/2010 STATION 23		Cold Creek Marshall Road 09/13/2010 STATION 24	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	34	1	42	1	20	0	28	1
NUMBER OF MAYFLY TAXA	5	1	7	1	1	0	2	0
NUMBER OF CADDISFLY TAXA	9	1	10	1	0	-1	3	0
NUMBER OF STONEFLY TAXA	0	-1	2	1	0	-1	0	-1
PERCENT MAYFLY COMP.	13.82	0	17.67	0	0.34	-1	7.69	0
PERCENT CADDISFLY COMP.	33.45	1	26.69	0	0.00	-1	1.44	-1
PERCENT DOMINANT TAXON	14.91	1	11.28	1	72.26	-1	38.46	-1
PERCENT ISOPOD, SNAIL, LEECH	4.36	0	4.14	0	11.64	-1	3.85	1
PERCENT SURF. AIR BREATHERS	4.73	1	1.88	1	2.74	1	48.08	-1
TOTAL SCORE	5		6		-5		-2	
MACROINV. COMMUNITY RATING	EXCELLENT		EXCELLENT		POOR		ACCEPT.	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Fisher Creek Bennett Road 09/22/2010 STATION 25	Hog Creek Girard Road 08/13/2010 STATION 26	North Branch Hog Creek Crandall Road 08/13/2010 STATION 27	North Branch Hog Creek Burbank Road 08/13/2010 STATION 28
PLATYHELMINTHES (flatworms)				
Turbellaria	2			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	2			
Oligochaeta (worms)	3	2	1	10
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	50	91	192	158
Decapoda (crayfish)	1	12		1
Isopoda (sowbugs)				2
Arachnoidea				
Hydracarina		3		19
Insecta				
Ephemeroptera (mayflies)				
Baetidae	11	1	1	9
Caenidae	4			
Heptageniidae	63	22		
Leptophlebiidae		1		
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	6	4	7
Gomphidae		6		
Zygoptera (damselflies)				
Calopterygidae	19	34	4	4
Coenagrionidae	2			3
Plecoptera (stoneflies)				
Perlidae		4		
Pteronarcyidae		2		
Hemiptera (true bugs)				
Belostomatidae			1	
Corixidae		1		
Gerridae	1	1	2	1
Mesoveliidae	2			
Nepidae		1	1	1
Notonectidae			3	
Pleidae			8	
Saldidae			2	
Veliidae				1
Megaloptera				
Corydalidae (dobson flies)		1		
Sialidae (alder flies)			25	
Trichoptera (caddisflies)				
Glossosomatidae			1	
Helicopsychidae	1	4		
Hydropsychidae	44	5		11
Hydroptilidae	1			1
Leptoceridae	3	1	1	1
Limnephilidae		2	2	4
Philopotamidae	46			
Phryganeidae		13	1	
Uenoidae	3	8		
Lepidoptera (moths)				
Pyralidae		1		
Coleoptera (beetles)				
Gyrinidae (adults)				1
Haliplidae (adults)			1	
Dryopidae	1			
Elmidae	22	25		3
Psephenidae (larvae)	7	1		
Diptera (flies)				
Ceratopogonidae				1
Chironomidae	33	14	26	36
Culicidae			1	1
Dixidae			1	
Simuliidae	13			5
Tabanidae	6	1		
Tipulidae	3			
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1	11		5
Lymnaeidae		1		
Physidae		3		1
Planorbidae	1		1	
Pleuroceridae		1		
Pelecypoda (bivalves)				
Corbiculidae		1		
Sphaeriidae (clams)	10	3	1	4
TOTAL INDIVIDUALS	356	283	280	290

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

METRIC	Fisher Creek Bennett Road 09/22/2010 STATION 25 Value	Score	Hog Creek Girard Road 08/13/2010 STATION 26 Value	Score	North Branch Hog Creek Crandall Road 08/13/2010 STATION 27 Value	Score	North Branch Hog Creek Burbank Road 08/13/2010 STATION 28 Value	Score
TOTAL NUMBER OF TAXA	29	1	33	1	22	0	25	1
NUMBER OF MAYFLY TAXA	3	0	3	0	1	0	1	0
NUMBER OF CADDISFLY TAXA	6	1	6	1	4	0	4	1
NUMBER OF STONEFLY TAXA	0	-1	2	1	0	-1	0	-1
PERCENT MAYFLY COMP.	21.91	1	8.48	0	0.36	-1	3.10	0
PERCENT CADDISFLY COMP.	27.53	0	11.66	0	1.79	-1	5.86	0
PERCENT DOMINANT TAXON	17.70	1	32.16	0	68.57	-1	54.48	-1
PERCENT ISOPOD, SNAIL, LEECH	1.12	1	5.65	0	0.36	1	2.76	1
PERCENT SURF. AIR BREATHERS	0.84	1	1.06	1	6.79	1	1.72	1
TOTAL SCORE	5		4		-2		2	
MACROINV. COMMUNITY RATING	EXCELLENT		ACCEPT.		ACCEPT.		ACCEPT.	

Table 1A (cont). Qualitative macroinvertebrate sampling results for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

TAXA	Sand Creek Genessee Road 08/31/2010 STATION 29	Beebe Creek Mauck Road 08/13/2010 STATION 30	Beebe Creek Slater Road (north) 09/22/2010 STATION 31
PLATYHELMINTHES (flatworms)			
Turbellaria	12		
ANNELIDA (segmented worms)			
Oligochaeta (worms)		3	1
ARTHROPODA			
Crustacea			
Amphipoda (scuds)	230	64	280
Decapoda (crayfish)	1	1	1
Arachnoidea			
Hydracarina	7	1	
Insecta			
Ephemeroptera (mayflies)			
Baetiscidae	2		
Baetidae	4	30	
Ephemerellidae	1		
Ephemeridae	1		
Heptageniidae	5	3	
Leptophlebiidae		1	
Odonata			
Anisoptera (dragonflies)			
Aeshnidae	2	9	2
Gomphidae	1		
Zygoptera (damselflies)			
Calopterygidae	16	24	3
Coenagrionidae	1	1	
Hemiptera (true bugs)			
Belostomatidae	1		
Gerridae		1	1
Nepidae			1
Notonectidae			1
Pleidae		1	
Saldidae		1	
Trichoptera (caddisflies)			
Helicopsychidae	2	5	
Hydropsychidae	14	22	7
Hydroptilidae		2	
Leptoceridae	2	6	
Limnephilidae	1	4	1
Phryganeidae		2	
Uenoidae		17	
Coleoptera (beetles)			
Gyrinidae (adults)		1	
Haliplidae (adults)	5		
Hydrophilidae (total)	2		
Elmidae		9	18
Diptera (flies)			
Ceratopogonidae	1	2	
Chironomidae	13	33	1
Culicidae		1	
Simuliidae	1	31	
Tabanidae		4	1
Tipulidae	1		
MOLLUSCA			
Gastropoda (snails)			
Ancylidae (limpets)	16	5	1
Physidae			6
Planorbidae		3	
Pelecypoda (bivalves)			
Corbiculidae	2	1	
Sphaeriidae (clams)		2	2
Unionidae (mussels)		1	
TOTAL INDIVIDUALS	344	291	327

Table 1B (cont). Macroinvertebrate metric evaluation of sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

	Sand Creek Genessee Road 08/31/2010 STATION 29		Beebe Creek Mauck Road 08/13/2010 STATION 30		Beebe Creek Slater Road (north) 09/22/2010 STATION 31	
METRIC	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	26	1	32	1	16	1
NUMBER OF MAYFLY TAXA	5	1	3	0	0	-1
NUMBER OF CADDISFLY TAXA	4	0	7	1	2	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	3.78	0	11.68	0	0.00	-1
PERCENT CADDISFLY COMP.	5.52	0	19.93	0	2.45	-1
PERCENT DOMINANT TAXON	66.86	-1	21.99	0	85.63	-1
PERCENT ISOPOD, SNAIL, LEECH	4.65	0	2.75	1	2.14	1
PERCENT SURF. AIR BREATHERS	2.33	1	1.72	1	0.92	1
TOTAL SCORE	1		3		-1	
MACROINV. COMMUNITY RATING	ACCEPT.		ACCEPT.		ACCEPT.	

Table 2. Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

HABITAT METRIC	St. Joseph River M-66 at 28140 Talon Dr GLIDE/POOL STATION 1	St. Joseph River Stowell Road RIFFLE/RUN STATION 2	St. Joseph River Broadway St at Riverview Park RIFFLE/RUN STATION 3	St. Joseph River County Line Road RIFFLE/RUN STATION 4	Christiana Creek Cassopolis Road GLIDE/POOL STATION 5
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	13	15	16	16	13
Embeddedness (20)*		15	16	18	
Velocity/Depth Regime (20)*		16	13	16	
Pool Substrate Characterization (20)**	13				15
Pool Variability (20)**	13				8
Channel Morphology					
Sediment Deposition (20)	16	11	16	13	8
Flow Status - Maint. Flow Volume (10)	8	8	9	9	9
Flow Status - Flashiness (10)	6	7	5	7	9
Channel Alteration (20)	18	16	18	13	16
Frequency of Riffles/Bends (20)*		11	15	11	
Channel Sinuosity (20)**	15				15
Riparian and Bank Structure					
Bank Stability (L) (10)	9	6	8	7	9
Bank Stability (R) (10)	9	9	8	7	9
Vegetative Protection (L) (10)	7	6	4	10	6
Vegetative Protection (R) (10)	9	9	4	5	8
Riparian Veg. Zone Width (L) (10)	5	8	2	10	5
Riparian Veg. Zone Width (R) (10)	5	10	2	4	8
TOTAL SCORE (200):	146	147	136	146	138
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)

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

Date:	09/02/2010	09/02/2010	09/02/2010	08/31/2010	09/13/2010
Weather:	Rainy	Rainy	Rainy	Sunny	Sunny
Air Temperature:	80 Deg. F.	75 Deg. F.	75 Deg. F.	90 Deg. F.	68 Deg. F.
Water Temperature:	73 Deg. F.	71 Deg. F.	71 Deg. F.	70 Deg. F.	68 Deg. F.
Ave. Stream Width:	330 Feet	150 Feet	120 Feet	45 Feet	65 Feet
Ave. Stream Depth:	1.4 Feet	2.5 Feet	1 Feet	2 Feet	1 Feet
Surface Velocity:	0.8 Ft./Sec.	0.6 Ft./Sec.	0.9 Ft./Sec.	0.6 Ft./Sec.	0.5 Ft./Sec.
Estimated Flow:	369.6 CFS	225 CFS	108 CFS	54 CFS	32.5 CFS
Stream Modifications:	None	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N	N
STORET No.:	750326	750001	120237	120238	140118
Stream Name:	St. Joseph River	St. Joseph River	St. Joseph River	St. Joseph River	Christiana Creek
Road Crossing/Location:	M-66 at 28140 Talon Dr	Stowell Road	Broadway St at Riverview Park	County Line Road	Cassopolis Road
County Code:	75	75	12	12	14
TRS:	05S10W25	06S09W01	05S07W04	05S05W01	07S14W20
Latitude (dd):	42.00758	41.97248	42.06582	42.07248	41.8485
Longitude (dd):	-85.41126	-85.30265	-85.13417	-84.82881	-85.9736
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050001	4050001	4050001	4050001	4050001

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 2 (cont.). Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010

HABITAT METRIC	Himebaugh Drain Fawn River Rd GLIDE/POOL STATION 6	Prairie River St. Joseph Rd GLIDE/POOL STATION 7	Stewart Lake Drain Witt Lake Rd GLIDE/POOL STATION 8	Rocky River Memory Isle Pk RIFFLE/RUN STATION 9	Spring Creek Johnson Rd GLIDE/POOL STATION 10
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	5	8	6	10	15
Embeddedness (20)*				15	
Velocity/Depth Regime (20)*				16	
Pool Substrate Characterization (20)**	8	15	10		13
Pool Variability (20)**	3	8	1		6
Channel Morphology					
Sediment Deposition (20)	8	10	6	13	6
Flow Status - Maint. Flow Volume (10)	8	8	9	8	10
Flow Status - Flashiness (10)	8	6	9	9	9
Channel Alteration (20)	1	3	1	15	18
Frequency of Riffles/Bends (20)*				6	
Channel Sinuosity (20)**	1	6	1		16
Riparian and Bank Structure					
Bank Stability (L) (10)	6	6	8	9	10
Bank Stability (R) (10)	6	6	8	9	10
Vegetative Protection (L) (10)	1	2	4	5	10
Vegetative Protection (R) (10)	1	2	4	5	10
Riparian Veg. Zone Width (L) (10)	0	5	4	4	10
Riparian Veg. Zone Width (R) (10)	0	5	4	4	10
TOTAL SCORE (200):	56	90	75	128	153
HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)

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

Date:	08/12/2010	09/03/2010	08/12/2010	08/11/2010	08/11/2010
Weather:	Sunny	Sunny	Sunny	Cloudy	Partly Cloudy
Air Temperature:	90 Deg. F.	72 Deg. F.	85 Deg. F.	80 Deg. F.	85 Deg. F.
Water Temperature:	82 Deg. F.	67 Deg. F.	86 Deg. F.	74 Deg. F.	72 Deg. F.
Ave. Stream Width:	18 Feet	25 Feet	6 Feet	90 Feet	30 Feet
Ave. Stream Depth:	0.3 Feet	2 Feet	0.4 Feet	1.5 Feet	1 Feet
Surface Velocity:	0.75 Ft./Sec.	0.6 Ft./Sec.	0.5 Ft./Sec.	1 Ft./Sec.	0.5 Ft./Sec.
Estimated Flow:	4.1 CFS	30.0 CFS	1.2 CFS	135.0 CFS	15.0 CFS
Stream Modifications:	Dredged Canopy Removal Snagging	Dredged Canopy Removal Snagging	Dredged	Impounded	None
Nuisance Plants (Y/N):	N	N	N	N	N
STORET No.:	750329	130325	750330	750280	750324
Stream Name:	Himebaugh Drain	Prairie River	Stewart Lake Drain	Rocky River	Spring Creek
Road Crossing/Location:	Fawn River Rd	St. Joseph Rd	Witt Lake Rd	Memory Isle Pk	Johnson Rd
County Code:	75	13	75	75	75
TRS:	08S09W13	07S08W19	07S09W32	06S11W18	05S12W13
Latitude (dd):	41.78171	41.84061	41.82344	41.945093	42.03811
Longitude (dd):	-85.2973	-85.29175	-85.36974	-85.637014	-85.64919
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050001	4050001	4050001	4050001	4050001

* Applies only to Riffle/Run stream Survey
** Applies only to Glide/Pool stream Surveys

Table 2 (cont.). Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010

HABITAT METRIC	Spring Creek Muskrat Lake Rd GLIDE/POOL STATION 11	Bear Creek Hallam Rd GLIDE/POOL STATION 12	Bear Creek 31st Ave RIFFLE/RUN STATION 13	Unnamed Trib to Portage River 34th St GLIDE/POOL STATION 14	Unnamed Trib to Portage River 36th Ave GLIDE/POOL STATION 15
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	8	5	5	11	10
Embeddedness (20)*			10		
Velocity/Depth Regime (20)*			11		
Pool Substrate Characterization (20)**	10	6		13	11
Pool Variability (20)**	6	6		8	6
Channel Morphology					
Sediment Deposition (20)	6	6	3	11	11
Flow Status - Maint. Flow Volume (10)	5	8	8	9	9
Flow Status - Flashiness (10)	8	9	6	8	9
Channel Alteration (20)	16	11	11	8	16
Frequency of Riffles/Bends (20)*			8		
Channel Sinuosity (20)**	13	8		8	13
Riparian and Bank Structure					
Bank Stability (L) (10)	9	9	8	8	9
Bank Stability (R) (10)	9	9	8	8	9
Vegetative Protection (L) (10)	6	8	6	6	9
Vegetative Protection (R) (10)	6	8	6	1	9
Riparian Veg. Zone Width (L) (10)	5	8	4	9	8
Riparian Veg. Zone Width (R) (10)	5	8	4	1	8
TOTAL SCORE (200):	112	109	98	109	137
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)

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

Date:	09/13/2010	08/11/2010	09/13/2010	08/11/2010	08/11/2010
Weather:	Sunny	Sunny	Sunny	Sunny	Sunny
Air Temperature:	70 Deg. F.	85 Deg. F.	66 Deg. F.	90 Deg. F.	85 Deg. F.
Water Temperature:	57 Deg. F.	74 Deg. F.	57 Deg. F.	76 Deg. F.	76 Deg. F.
Ave. Stream Width:	17 Feet	25 Feet	20 Feet	18 Feet	20 Feet
Ave. Stream Depth:	0.6 Feet	2 Feet	2 Feet	0.4 Feet	0.3 Feet
Surface Velocity:	0.75 Ft./Sec.	0.2 Ft./Sec.	0.1 Ft./Sec.	0.6 Ft./Sec.	0.5 Ft./Sec.
Estimated Flow:	7.7 CFS	10.0 CFS	4.0 CFS	4.3 CFS	3.0 CFS
Stream Modifications:	None	Impounded	Dredged	Dredged	None
Nuisance Plants (Y/N):	N	N	N	N	N
STORET No.:	750275	750325	390609	390608	390607
Stream Name:	Spring Creek	Bear Creek	Bear Creek	Unnamed Trib to Portage River	Unnamed Trib to Portage River
Road Crossing/Location:	Muskrat Lake Rd	Hallam Rd	31st Ave	34th St	36th Ave
County Code:	75	75	39	39	39
TRS:	05S11W04	05S10W08	04S10W22	03S10W24	03S09W19
Latitude (dd):	42.06419	42.05632	42.10633	42.19192	42.19779
Longitude (dd):	-85.60689	-85.49404	-85.45914	-85.43244	-85.41293
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050001	4050001	4050001	4050001	4050001

* Applies only to Riffle/Run stream Survey
** Applies only to Glide/Pool stream Surveys

COMMENTS: Beaver Dams

Table 2 (cont.). Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010

HABITAT METRIC	Nottawa Creek Correll Rd GLIDE/POOL STATION 16	Nottawa Creek Shorts Rd GLIDE/POOL STATION 17	Nottawa Creek V Dr GLIDE/POOL Station 18	Nottawa Creek 11 Mile Rd GLIDE/POOL STATION 19	Blackwell Drair Girard Rd RIFFLE/RUN STATION 20
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	13	15	10	8	6
Embeddedness (20)*					11
Velocity/Depth Regime (20)*					10
Pool Substrate Characterization (20)**	16	15	11	13	
Pool Variability (20)**	10	13	11	6	
Channel Morphology					
Sediment Deposition (20)	15	11	8	8	2
Flow Status - Maint. Flow Volume (10)	9	8	8	6	2
Flow Status - Flashiness (10)	8	6	6	4	0
Channel Alteration (20)	11	11	13	5	16
Frequency of Riffles/Bends (20)*					16
Channel Sinuosity (20)**	11	15	15	1	
Riparian and Bank Structure					
Bank Stability (L) (10)	8	9	9	6	0
Bank Stability (R) (10)	8	8	9	6	0
Vegetative Protection (L) (10)	8	9	10	6	6
Vegetative Protection (R) (10)	8	9	10	6	6
Riparian Veg. Zone Width (L) (10)	6	10	10	8	6
Riparian Veg. Zone Width (R) (10)	6	9	10	8	6
TOTAL SCORE (200):	137	148	140	91	87
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)

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

Date:	08/12/2010	09/03/2010	09/03/2010	08/31/2010	08/12/2010
Weather:	Sunny	Sunny	Partly Cloudy	Sunny	Sunny
Air Temperature:	90 Deg. F.	73 Deg. F.	75 Deg. F.	85 Deg. F.	80 Deg. F.
Water Temperature:	76 Deg. F.	70 Deg. F.	66 Deg. F.	78 Deg. F.	76 Deg. F.
Ave. Stream Width:	135 Feet	60 Feet	75 Feet	50 Feet	8 Feet
Ave. Stream Depth:	3 Feet	3 Feet	2 Feet	1 Feet	0.2 Feet
Surface Velocity:	0.8 Ft./Sec.	0.6 Ft./Sec.	0.5 Ft./Sec.	0.8 Ft./Sec.	0.4 Ft./Sec.
Estimated Flow:	303.8 CFS	108.0 CFS	75.0 CFS	40.0 CFS	0.6 CFS
Stream Modifications:	None	None	None	Dredged Snagging	Relocated
Nuisance Plants (Y/N):	N	N	N	N	N
STORET No.:	750327	750328	130407	130408	120245
Stream Name:	Nottawa Creek	Nottawa Creek	Nottawa Creek	Nottawa Creek	Blackwell Drair
Road Crossing/Location:	Correll Rd	Shorts Rd	V Dr	11 Mile Rd	Girard Rd
County Code:	75	75	13	13	12
TRS:	05S09W14	05S09W12	04S08W29	03S07W24	05S08W24
Latitude (dd):	42.04024	42.05513	42.08626	42.1907	42.02827
Longitude (dd):	-85.33234	-85.30815	-85.26925	-85.08024	-85.19361
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050001	4050001	4050001	4050001	4050001

* Applies only to Riffle/Run stream Survey
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 2 (cont.). Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010

HABITAT METRIC	Coldwater River Blackhawk Rd RIFFLE/RUN STATION 21	Coldwater River Gower Rd RIFFLE/RUN STATION 22	Miller Lake Outlet Tripp Rd GLIDE/POOL STATION 23	Cold Creek Marshall Rd GLIDE/POOL STATION 24	Fisher Creek Bennett Rd RIFFLE/RUN STATION 25
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	15	16	1	5	13
Embeddedness (20)*	16	16			16
Velocity/Depth Regime (20)*	16	20			16
Pool Substrate Characterization (20)**			10	8	
Pool Variability (20)**			2	8	
Channel Morphology					
Sediment Deposition (20)	16	13	0	5	16
Flow Status - Maint. Flow Volume (10)	8	7	9	4	8
Flow Status - Flashiness (10)	8	5	9	4	2
Channel Alteration (20)	16	16	3	3	13
Frequency of Riffles/Bends (20)*	13	16			16
Channel Sinuosity (20)**			1	5	
Riparian and Bank Structure					
Bank Stability (L) (10)	8	6	8	4	6
Bank Stability (R) (10)	8	6	8	4	6
Vegetative Protection (L) (10)	8	9	3	5	7
Vegetative Protection (R) (10)	8	9	3	5	7
Riparian Veg. Zone Width (L) (10)	8	9	2	9	6
Riparian Veg. Zone Width (R) (10)	8	9	2	9	6
TOTAL SCORE (200):	156	157	61	78	138
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)

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

Date:	08/12/2010	09/02/2010	08/12/2010	09/13/2010	09/22/2010
Weather:	Partly Cloudy	Cloudy	Cloudy	Sunny	Partly Cloudy
Air Temperature:	78 Deg. F.	76 Deg. F.	80 Deg. F.	70 Deg. F.	70 Deg. F.
Water Temperature:	78 Deg. F.	72 Deg. F.	70 Deg. F.	67 Deg. F.	69 Deg. F.
Ave. Stream Width:	25 Feet	65 Feet	8 Feet	20 Feet	18 Feet
Ave. Stream Depth:	0.5 Feet	1 Feet	0.5 Feet	1 Feet	1 Feet
Surface Velocity:	1.0 Ft./Sec.	1.0 Ft./Sec.	0.01 Ft./Sec.	0.1 Ft./Sec.	0.5 Ft./Sec.
Estimated Flow:	12.5 CFS	65.0 CFS	0.04 CFS	2.0 CFS	9.0 CFS
Stream Modifications:	None	None	Dredged Canopy Removal	Dredged Snagging	None
Nuisance Plants (Y/N):	N	N	N	N	N
STORET No.:	120241	120001	120246	120239	120240
Stream Name:	Coldwater River	Coldwater River	Miller Lake Outlet	Cold Creek	Fisher Creek
Road Crossing/Location:	Blackhawk Rd	Gower Rd	Tripp Rd	Marshall Rd	Bennett Rd
County Code:	12	12	12	12	12
TRS:	06S06W30	05S07W10	06S07W01	06S06W04	07S05W9
Latitude (dd):	41.91661	42.043059	41.97344	41.97696	41.88267
Longitude (dd):	-85.04814	-85.116392	-85.06974	-85.00365	-84.88526
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050001	4050001	4050001	4050001	4050001

* Applies only to Riffle/Run stream Survey
** Applies only to Glide/Pool stream Surveys

COMMENTS: Impounded upstream

Table 2 (cont.). Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010

HABITAT METRIC	Hog Creek Girard Rd GLIDE/POOL STATION 26	N B Hog Creek Crandall Rd GLIDE/POOL STATION 27	N B Hog Creek Burbank Rd RIFFLE/RUN STATION 28	Sand Creek Genessee Rd GLIDE/POOL STATION 29	Beebe Creek Mauck Rd RIFFLE/RUN STATION 30
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	13	2	13	6	11
Embeddedness (20)*			12		13
Velocity/Depth Regime (20)*			8		13
Pool Substrate Characterization (20)**	13	6		11	
Pool Variability (20)**	10	6		5	
Channel Morphology					
Sediment Deposition (20)	13	11	13	10	15
Flow Status - Maint. Flow Volume (10)	8	8	8	6	9
Flow Status - Flashiness (10)	7	8	8	6	9
Channel Alteration (20)	15	3	11	3	11
Frequency of Riffles/Bends (20)*			11		10
Channel Sinuosity (20)**	15	1		2	
Riparian and Bank Structure					
Bank Stability (L) (10)	8	9	8	7	8
Bank Stability (R) (10)	8	9	8	7	9
Vegetative Protection (L) (10)	9	3	7	6	9
Vegetative Protection (R) (10)	9	3	7	6	9
Riparian Veg. Zone Width (L) (10)	8	5	5	6	8
Riparian Veg. Zone Width (R) (10)	8	3	5	6	8
TOTAL SCORE (200):	144	77	124	87	142
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)

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

Date:	08/13/2010	08/13/2010	08/13/2010	08/31/2010	08/13/2010
Weather:	Partly Cloudy	Sunny	Sunny	Sunny	Sunny
Air Temperature:	85 Deg. F.	89 Deg. F.	78 Deg. F.	80 Deg. F.	89 Deg. F.
Water Temperature:	72 Deg. F.	68 Deg. F.	68 Deg. F.	70 Deg. F.	74 Deg. F.
Ave. Stream Width:	60 Feet	8 Feet	5 Feet	24 Feet	15 Feet
Ave. Stream Depth:	1 Feet	0.5 Feet	0.4 Feet	0.5 Feet	1 Feet
Surface Velocity:	0.8 Ft./Sec.	0.2 Ft./Sec.	0.5 Ft./Sec.	0.8 Ft./Sec.	0.8 Ft./Sec.
Estimated Flow:	45.0 CFS	0.8 CFS	1.0 CFS	9.0 CFS	11.3 CFS
Stream Modifications:	None	Dredged Canopy Removal Snagging	Dredged	Dredged Canopy Removal Snagging Bank Stabilization	Dredged Canopy Removal
Nuisance Plants (Y/N):	N	N	N	N	N
STORET No.:	120242	120243	120244	300288	300286
Stream Name:	Hog Creek	N B Hog Creek	N B Hog Creek	Sand Creek	Beebe Creek
Road Crossing/Location:	Girard Rd	Crandall Rd	Burbank Rd	Genessee Rd	Mauck Rd
County Code:	12	12	12	30	30
TRS:	05S06W18	05S05W23	05S05W15	05S04W34	06S02W16
Latitude (dd):	42.02921	42.0293	42.03714	42	41.94186
Longitude (dd):	-85.04859	-84.85846	-84.88487	-84.7583	-84.54541
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4050001	4050001	4050001	4050001	4050001

* Applies only to Riffle/Run stream Survey
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 2 (cont.). Habitat evaluation for sites in the Upper St. Joseph River Watershed, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph Counties, 2010.

HABITAT METRIC	Beebe Creek Slater Rd (north) GLIDE/POOL STATION 31
Substrate and Instream Cover	
Epifaunal Substrate/ Avail Cover (20)	6
Embeddedness (20)*	
Velocity/Depth Regime (20)*	
Pool Substrate Characterization (20)**	6
Pool Variability (20)**	6
Channel Morphology	
Sediment Deposition (20)	6
Flow Status - Maint. Flow Volume (10)	3
Flow Status - Flashiness (10)	3
Channel Alteration (20)	11
Frequency of Riffles/Bends (20)*	
Channel Sinuosity (20)**	15
Riparian and Bank Structure	
Bank Stability (L) (10)	7
Bank Stability (R) (10)	7
Vegetative Protection (L) (10)	9
Vegetative Protection (R) (10)	9
Riparian Veg. Zone Width (L) (10)	8
Riparian Veg. Zone Width (R) (10)	5
TOTAL SCORE (200):	101
HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)

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

Date:	09/22/2010	
Weather:	Partly Cloudy	
Air Temperature:	73	Deg. F.
Water Temperature:	70	Deg. F.
Ave. Stream Width:	3	Feet
Ave. Stream Depth:	0.2	Feet
Surface Velocity:	0.4	Ft./Sec.
Estimated Flow:	0.2	CFS
Stream Modifications:	Dredged	
Nuisance Plants (Y/N):	N	
STORET No.:	300287	
Stream Name:	Beebe Creek	
Road Crossing/Location:	Slater Rd (north)	
County Code:	30	
TRS:	06S02W23	
Latitude (dd):	41.94068	
Longitude (dd):	-84.51576	
Ecoregion:	SMNITP	
Stream Type:	Warmwater	
USGS Basin Code:	4050001	

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Summary of P-51 sampling results at randomly selected sites in the upper St. Joseph River watershed, August and September 2010.

Report Station Number	Stream Size & Temperature Classification	Habitat Score & Rating (Riffle/Run or Glide/Pool)	Channel Modifications	Macroinvertebrate Score & Rating	Report Stream Name & Rd Crossing	County	LAT	LONG
1	WVL1	146-good (G/P)	None	4-good	St Joseph River at Talon Dr.	ST JOSEPH	42.00758	-85.4113
2	WL1	147-good (R/R)	None	7-excellent	St Joseph River at Stowell Rd	ST JOSEPH	41.97248	-85.3027
3	WM7	136-good (R/R)	None	7-excellent	St Joseph River at Broadway St	BRANCH	42.06582	-85.1342
4	WM6	146-good (G/P)	None	5-excellent	St Joseph River at County Line Rd	BRANCH	42.07248	-84.8288
5	WM5	138-good (G/P)	None	4-good	Christiana Creek at Cassopolis Rd	CASS	41.8485	-85.9736
6	CS4	56-marginal (G/P)	Dredged-new	0-acceptable	Himebaugh Drain at Fawn River Rd	ST JOSEPH	41.78171	-85.2973
7	WM-ALT 1	90-marginal (G/P)	Dredged-new	1-acceptable	Prairie River at St Joseph Rd	BRANCH	41.84061	-85.2918
8	CS9	75-marginal (G/P)	Dredged-new	1-acceptable	Stewart Lake Drain at Witt Lake Rd	ST JOSEPH	41.82344	-85.3697
9	CM1	128-good (R/R)	Impound	5-excellent	Rocky River at Memory Isle Park	ST JOSEPH	41.94509	-85.637
10	CS1	153-good (G/P)	None	3-acceptable	Spring Creek at Johnson Rd	ST JOSEPH	42.03811	-85.6492
11	CS6	112-good (G/P)	None	-4-acceptable	Spring Creek at Muskrat Lake Rd	ST JOSEPH	42.06419	-85.6069
12	CS3	109-good (G/P)	Beavers	0-acceptable	Bear Creek at Hallam Rd	ST JOSEPH	42.05632	-85.494
13	CS-Alt 2	98-marginal R/R)	Dredged-wooded	3-acceptable	Bear Creek at 31st Ave	KALAMAZOO	42.10633	-85.4591
14	CS12	109-good (G/P)	Dredged-new	4-good	UnNamed Trib to Portage River at 34th St	KALAMAZOO	42.19192	-85.4324
15	CS2	137-good (G/P)	None	4-good	UnNamed Trib to Portage River at 36th St	KALAMAZOO	42.19779	-85.4129
16	WM2	137-good (G/P)	None	2-acceptable	Nottawa Creek at Correll	ST JOSEPH	42.04024	-85.3323
17	WM10	148-good (G/P)	None	5-excellent	Nottawa Creek at Shorts Rd	ST JOSEPH	42.05513	-85.3082
18	WM8	140-good (G/P)	None	6-excellent	Nottawa Creek at V Drive	CALHOUN	42.08626	-85.2693
19	WM9	91-marginal (G/P)	Dredged-new	6-excellent	Nottawa Creek at 11 Mile Rd	CALHOUN	42.1907	-85.0802
20	WS1	87-marginal (R/R)	Dredged-u/s	-3-acceptable	Blackwell Drain at Girard Rd	BRANCH	42.02827	-85.1936
21	WM1	156-excellent (R/R)	None	5-excellent	Coldwater River at Blackhawk Rd	BRANCH	41.91661	-85.0481
22	WL2	157-excellent (R/R)	None	6-excellent	Coldwater River at Gower Rd	BRANCH	42.04306	-85.1164
23	WS2	61-marginal (G/P)	Dredged-new	-5-poor	Miller Lake Outlet at Tripp Rd	BRANCH	41.97344	-85.0697
24	WS-ALT 1	78-marginal (G/P)	Dredged-new	-2-acceptable	Cold Creek at Marshall Rd	BRANCH	41.97696	-85.0037
25	WS-ALT 2	138-good (R/R)	None	5-excellent	Fisher Creek at Bennett Rd	BRANCH	41.88267	-84.8853
26	WM4	144-good (G/P)	None	4-good	Hog Creek at Girard Rd	BRANCH	42.02921	-85.0486
27	CS5	77-marginal (G/P)	Dredged-new	-2-acceptable	N. Br Hog Creek at Crandall Rd	BRANCH	42.0293	-84.8585
28	CS10	124-good (R/R)	Dredged-new	2-acceptable	N. Br. Hog Creek at Burbank Rd	BRANCH	42.03714	-84.8849
29	CS11	87-marginal (G/P)	Dredged-new	1-acceptable	Sand Creek at Genessee Rd	HILLSDALE	42.00000	-84.7583
30	CS7	142-good (R/R)	Dredged-new	3-acceptable	Beebe Creek at Mauck Rd	HILLSDALE	41.94186	-84.5454
31	CS-Alt 1	101-marginal (G/P)	Dredged-new	-1-acceptable	Beebe Creek at Slater Rd (north)	HILLSDALE	41.94068	-84.5158
	CS8	DRY		Not Sampled	UnNamed Trib at 32nd St.	KALAMAZOO	42.15262	-85.4516
	WS3	DRY		Not Sampled	Goose Lake Drain at Edgerton Rd	ST JOSEPH	41.9839	-85.6058
	WS4	DRY		Not Sampled	Goose Lake Drain at Moore Park Rd	ST JOSEPH	42.01303	-85.6033
	WM3	IMPOUNDMENT		Not Sampled	Nottawa Creek at King Rd	ST JOSEPH	42.02387	-85.3739