

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
WATER RESOURCES DIVISION  
MARCH 2015

STAFF REPORT

BIOLOGICAL SURVEY OF THE ST. JOSEPH RIVER WATERSHED (MAUMEE RIVER),  
BEAN CREEK WATERSHED, AND TRIBUTARIES TO LAKE ERIE  
HILLSDALE, LENAWEE, AND MONROE COUNTIES, MICHIGAN  
JUNE-SEPTEMBER 2010

**INTRODUCTION**

During summer 2010, staff of the Department of Environment Quality (DEQ), Water Resources Division, assessed biological, chemical, and habitat conditions in watersheds in Hillsdale, Lenawee, and Monroe Counties in southern Michigan. The specific watersheds included the St. Joseph (Maumee) River and Bean Creek, as well as numerous Lake Erie coastal streams south of the Raisin River. The objectives of the investigation were to:

1. Assess the current status and condition of individual water bodies and determine whether Michigan Water Quality Standards (WQS) are being met, using a probabilistic sampling design.
2. Identify nonpoint sources (NPS) of water quality impairment, and evaluate the effectiveness of specific NPS water quality improvement projects.
3. Support water quality-based effluent limit development for existing National Pollutant Discharge Elimination System (NPDES) permits in the watershed.
4. Satisfy monitoring requests submitted by internal and external customers.
5. Determine if the water quality is changing over time.

Watershed Description

*St. Joseph River and Bean Creek (Maumee Watershed)*

A portion of the Maumee River watershed begins in Michigan as the St. Joseph River in western and south central Hillsdale County and a small portion of southeastern Branch County; and as the Bean Creek watershed in eastern Hillsdale County and western Lenawee County (Figure 1). The St. Joseph River flows south into northern Indiana where it joins the Maumee River, while Bean Creek flows south into Ohio where it confluences with the Tiffin River, which subsequently joins the Maumee in northern Ohio. The Maumee flows eastward and empties into Lake Erie in northeast Ohio. The St. Joseph River and Bean Creek are within the Eastern Corn Belt Plains (ECBP) Ecoregion (Omernik and Gallant, 1988).

Soils in these portions of the watershed are described as "...nearly level to steep, very deep, well drained to somewhat poorly drained, clayey soils on ground moraines and end moraines" (United States Department of Agriculture [USDA], 1991 and 1997). Oak-hickory forests are found on the loamy soils and beech-sugar maple forest occurs on the clay-rich soils and moderate slopes, while deciduous swamps occur in the lower areas. However, land use in southeastern Hillsdale and southwestern Lenawee Counties is dominated by agriculture and contains several dairy Concentrated Animal Feeding Operations (CAFOs). Many smaller streams in the watershed have been modified (dredged) to enhance surface drainage to support agriculture. Bean Creek is

primarily classified as coldwater, but most of the other streams and rivers in this area are considered warmwater.

The most recent DEQ surveys in the St. Joseph River (Maumee) and Bean Creek watersheds were conducted in June 2005 (Cooper, 2005) and July-August 2000 (Lipsey, 2005). Even earlier surveys suggest relatively high nutrient loads have existed in the subject watersheds (Kosek, 1996), in part, due to a lack of agricultural-related NPS controls. Many of the smaller streams in these watersheds have been dredged to accelerate surface drainage. Functional riparian buffers are sometimes completely absent. A number of dairy CAFOs are located in southern Hillsdale and Lenawee Counties that routinely apply animal waste to tiled fields adjacent to surface waters. Numerous discharges of contaminated surface runoff and field tile discharge from excessively applied animal waste and have resulted in a reduction in water quality in the watershed (Cooper, 2005). Two specific CAFOs located adjacent to Durfee Creek and the Medina Drain amended their manure management program in an attempt to minimize nutrient impacts to these water bodies.

Detailed information on water body attainment status, as well as a list of point source discharges in the St. Joseph River (Maumee) and Bean Creek watersheds, can be found in the watershed study plan.

#### *Lake Erie Tributaries*

This survey assessed tributaries draining to Lake Erie, which are located between the Raisin River to the north and the Michigan-Ohio state line to the south (Figure 2). Most streams in this area are classified as warmwater, and all of the streams sampled during this survey were warmwater. The tributaries are in Monroe County and within the Huron-Erie Lake Plains (HELP) Ecoregion (Omernik and Gallant, 1988). The topography of this lake-plain area is predominantly flat, resulting in little hydraulic diversity in these streams. Soil type along the lakeshore is mainly wet clayish, while some upstream portions of these waters flow through wet loamy or sandy soils. Land use in this part of the state is heavily dominated by agriculture and grass/pasture with small pockets of forested, residential, and commercial areas (Wolf, 2006). The main industrial and residential areas include the city of Monroe (north of the survey area) and the city of Toledo (south of the survey area).

Many of the streams in this area have stagnant or no water during low flow conditions, due to low groundwater inputs, low stream gradients, and small watersheds. Seiches in Lake Erie can influence flow direction near the mouths of these streams. Dredging to assist in drainage for agriculture is common in the area, and the DEQ classifies the majority of the streams as "highly modified" (Wolf, 2006).

The most recent DEQ surveys of these tributaries occurred in June 2005 (Wolf, 2006) and September 2000 (Lipsey, 2004). These surveys, as well as even earlier ones in 1993 (Oemke, 1994) and 1995 (Walterhouse, 1997), have found impacts primarily from dredging, channelization, other NPS, and lack of suitable substrate.

## METHODS

Biological (macroinvertebrate) and habitat surveys were conducted using the Surface Water Assessment Section (SWAS) Procedure 51 (MDEQ, 1990). A total of 40 sites were sampled during 2010 (Table 1 and Figure 1). To develop a statistically-based estimate of attainment status in the area encompassed by the St. Joseph River watershed, Bean Creek watershed, and Lake Erie coastal tributaries, a total of 35 randomly selected stream/river sites were assessed. Both the macroinvertebrate and habitat components of Procedure 51 were performed at 16 sites in the Lake Erie coastal tributaries, 10 sites in the St. Joseph River, and 9 in Bean Creek (Figures 1 and 2). Seven additional sites were targeted for sampling based on requests from interested parties. In addition, water samples were collected at eight stations, and a few locations were visited and were subject only to visual observations. This study was designed to provide statistically sound conclusions on the status and condition for the entire area sampled (all watersheds) and not the individual watershed level. Assessment at the watershed level in this study may not possess sufficient statistical power, and any results and/or discussion at the watershed level should be considered with caution.

The biological and habitat data were analyzed using the methods outlined in Creal *et al.*, 1996. Macroinvertebrate communities were ranked from excellent to poor based on a scale from 9 to -9. A site score of +5 or greater is considered excellent, -5 or less poor, and -4 to +4 are classified as acceptable/moderately impaired. Ten metrics were measured to determine the habitat scores. The highest possible habitat score is 200. Sites with a score >154 are considered excellent, between 105 and 154 are good, 56 to 104 marginal, and <56 poor.

## RESULTS AND DISCUSSION

### Current Status/Attainment of WQS

#### *Benthic Macroinvertebrates*

Of the 35 probabilistic sites, 33 (94% ± 8%) were supporting the Other Indigenous Aquatic Life designated use component of Rule 100 (R 323.1100)[1][e] of the Part 4, WQS (Part 4 Rules), promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended), using Procedure 51. Percent attainment was calculated by dividing the number of random sites that met WQS by the total number of random locations (33/35 = 0.94). This value is coupled with a 95% confidence interval to provide our estimate of certainty, meaning there is 95% certainty that true proportion of attainment in sampled watersheds is within ± 8% of the 94% result. The mean Procedure 51 score for macroinvertebrates among the random sites was 1.9. All 19 sites in the Maumee River watershed were supporting the Other Indigenous Aquatic Life designation with a mean macroinvertebrate score of 4.0 and scores ranging from +7 to +2. Fourteen of the 16 (87.5%) Lake Erie Coastal Tributary sites were supporting of the Other Indigenous Aquatic Life designation. The average macroinvertebrate score was -1.2, and ranged from -5 to +4. Bay Creek (Site 32) and Plum Creek (Site 19) in this watershed were nonattaining, both with scores of -5.

Total taxa numbers ranged from 10 to 32 at the probabilistic stations. By watershed, total taxa ranged from 19 to 32 for Maumee River and 10 to 28 for Lake Erie tributaries. The number of Ephemeroptera, Plecoptera, and Trichoptera families ranged from 4 to 9 and 1 to 7 in the Maumee River and Lake Erie watersheds, respectively. Stoneflies were only found in 3 of the 35 probabilistic sites; 2 in the Maumee River watershed (both in Bean Creek, Sites 9 and 12) and one in a Lake Erie tributary (Otter Creek, Site 37).

Macroinvertebrate sampling results and metric evaluations for all sites sampled can be found in Table 2.

#### *Habitat*

Overall stream habitat quality was good to marginal at most probabilistic stations, with little to moderate evidence of habitat alterations. Of the 35 sites surveyed for habitat, 2 were rated as excellent (5%), 23 were rated as good (66%), and 10 were rated as marginal (29%). Nine of the marginal sites were located in the Lake Erie tributaries. These tributaries have been heavily channelized and suffer from sedimentation, lack of available substrate, bank erosion, flashy flow, a lack of velocity/depth regimes, and lack of riparian buffers. The natural characteristics of these streams also play an important role in habitat quality. The Lake Erie tributaries are dominated by low gradient streams, which often have little to no flow. The clay soils surrounding these streams are prone to increased sedimentation. Nile Ditch (Site 36) was the only site in the Maumee River watershed that scored a marginal habitat rating. Bank stability, sediment deposition, evidence of flashiness, and lack of available submerged habitat were factors that influenced the score. Livestock grazing along the banks upstream of the reach sampled may be impacting the habitat conditions.

Habitat metric scores, ratings, weather, and stream conditions for all sites sampled can be found in Table 3.

#### *Algae and Aquatic Plants*

Nuisance aquatic algal/plant conditions were present in 2 of the 35 sites (6%). The sites were Hooper Run Drain (Site 39) in the Lake Erie tributary watershed and Toad Creek (Site 31) in the Bean Creek watershed. Approximately 90% of the reach at The Hooper Run Drain had nuisance levels of algae and slimes. The Toad Creek had Cladophora covering 95% of the sampled stream reach.

#### *Water Chemistry*

Water grab samples were collected at three probabilistic sample sites during 2010 and analyzed for nutrients and conventional parameters (Table 4). Halfway Creek (Site 13), located in the Lake Erie tributary watershed, exceeded the WQS for total dissolved solids (TDS) by being greater than 750 milligrams per liter (mg/L) at any time, as defined in Rule 51 of the Part 4 rules. The other sites sampled met WQS for the parameters tested.

#### Targeted Monitoring Requests

##### *Durfee Creek (Site 1)*

Located in the Bean Creek watershed, this site was targeted in an effort to monitor changes in water quality after manure management program improvements were initiated at a nearby CAFO facility. The Procedure 51 score was acceptable (4) and 26 macroinvertebrate taxa were observed. The habitat rank was good at this site. Pool variability and riparian width (both left and right sides) ranked poorly. Sixty percent of the reach had floating algae present but nuisance levels were not documented. The water quality parameters tested were within normal ranges (Table 4).

The macroinvertebrate scores for this site have shown signs of improvement during each sampling event since 2003 (Table 5). While early increases in score were small (and possibly a

result in natural population variability) the positive jump in score from the 2005 sampling is promising.

#### *Unnamed tributary to Bean Creek (Site 2)*

Located in the Bean Creek watershed this site was sampled based on visual observation while driving between sites. The portion of the reach sampled had nuisance levels of bacterial slimes, with 100% coverage. The macroinvertebrate score was at the low end of acceptable at -4. The habitat scored good with epifaunal substrate/available cover and pool variability both having poor scores. There was sufficient wood present in the system, but the presence of excessive slime precluded colonization by macroinvertebrates. Total phosphorus at the site was 0.39 mg/L and ortho-phosphate was 0.30 mg/L. The Total Organic Carbon (TOC) measured 13 mg/L.

Aerial imagery suggests that the upstream land use is mainly comprised of croplands, wetlands, and livestock. The nutrient concentrations, and in turn nuisance bacterial slimes, are likely a result of the agricultural activities with the wetlands serving as either a nutrient source or sink. It may be possible to more definitively determine the nutrient sources by further investigating upstream portions of the stream.

#### *West Fork West Branch St. Joseph River (Site 3)*

The impetus for sampling this site was a request from district staff concerned about possible impacts from livestock operations in the area. The macroinvertebrate score was acceptable at 3. The habitat was considered good with a score of 128. The sample site had >150 foot riparian buffer on each side, which was dominated by trees, shrubs, and grasses, and there was no evidence of impacts to the banks from livestock along the sample reach. However, bovine vocalizations were heard and the odor of manure was in the air. No aquatic algae or plants were observed during sampling. Water chemistry samples were not collected for this site.

The macroinvertebrate and habitat scores at this site were similar to others in the watershed, which suggests that the nearby livestock operations are not having a significant negative impact on the stream. While not blatantly obvious the livestock operations may still negatively affect the stream water quality. The site scored as marginal for flashiness, good for maintained flow volume (estimated surface velocity of 1.0 feet/second at the time of sampling), and marginal for sediment deposition. Based on these conditions it is perceivable that pulses of nutrients quickly enter the stream during wet weather events and settle and remain during baseflow conditions.

#### *Halfway Creek (Site 4)*

Located at the Secor Road crossing near Underhill Road, this site was targeted to evaluate water quality conditions related to two NPDES permitted facilities. District staff had previously observed oily sheens and cloudy water conditions downstream of these facilities. At the time of sampling surface oils were not present and the water color was clear. The macroinvertebrates score was acceptable with a -1. The habitat ranked good with only the left bank riparian vegetated zone scoring poorly. Aquatic algae or plants were not observed at the time of sampling. The WQS TDS concentration of 790 mg/L exceeded the 750 mg/L maximum during a single sample event.

#### *Ottawa Lake Outlet (Site 5)*

Suspected sewage discharge to elicit storm drain connections as well as failing septic system releases were the justification for sampling this site. The macroinvertebrate ranked poor with a score of -5. The habitat rank was marginal with all categories scoring either good or marginal.

Algae and aquatic plants were not at nuisance levels with 5% attached algae coverage. The water color observed during sampling was opaque/cloudy.

*Indian Creek (Site 45)*

Complaints about oily sheens and cloudy water led to the sampling of this site. Procedure 51 was not performed at this site. A water chemistry sample was collected and analyzed for this site. None of the parameters tested exceeded WQS. The TDS concentration of 409 mg/L was slightly below the monthly maximum average of 500 mg/L, but was well below the 750 mg/L acute level. Additional water chemistry samples were not collected from the site so a monthly average could not be determined.

## CONCLUSIONS

The surveys performed during 2010 in the St. Joseph (Maumee) River and Bean Creek watersheds, and numerous Lake Erie coastal streams south of the Raisin River indicate that the macroinvertebrate community, habitat quality, and water chemistry generally meet WQS. The majority of the macroinvertebrate and habitat scored in the acceptable or good categories. These scores are likely a reflection of the natural hydrology (e.g., low groundwater inputs and low gradients) in the ecoregion in which the watersheds lie as well as anthropogenic impacts (e.g., channel alteration, riparian buffer loss, and agricultural and livestock nutrient inputs). The degree to which natural and anthropogenic conditions impact each site varies, and distinguishing the level of impact on stream biota is difficult to parse out.

At the watershed spatial scale some generalities can be made about natural and human influences. Natural factors (hydrology and clay content in the soil) likely have sufficient influence on the Lake Erie tributaries to preclude excellent macroinvertebrate scores. In the Maumee River and St. Joseph River watersheds, natural factors are less limiting. Therefore, reducing anthropogenic impacts in these watersheds may realize improvements in macroinvertebrate scores. Based on past biological survey reports, visual observations while travelling in the watershed, and the basis for sampling several of the targeted sites; livestock access and manure management appear to be the main stressors in the watersheds. Implementing best management practices in the Maumee River and St. Joseph River watersheds to address these human-related disturbances may improve macroinvertebrate scores in these streams.

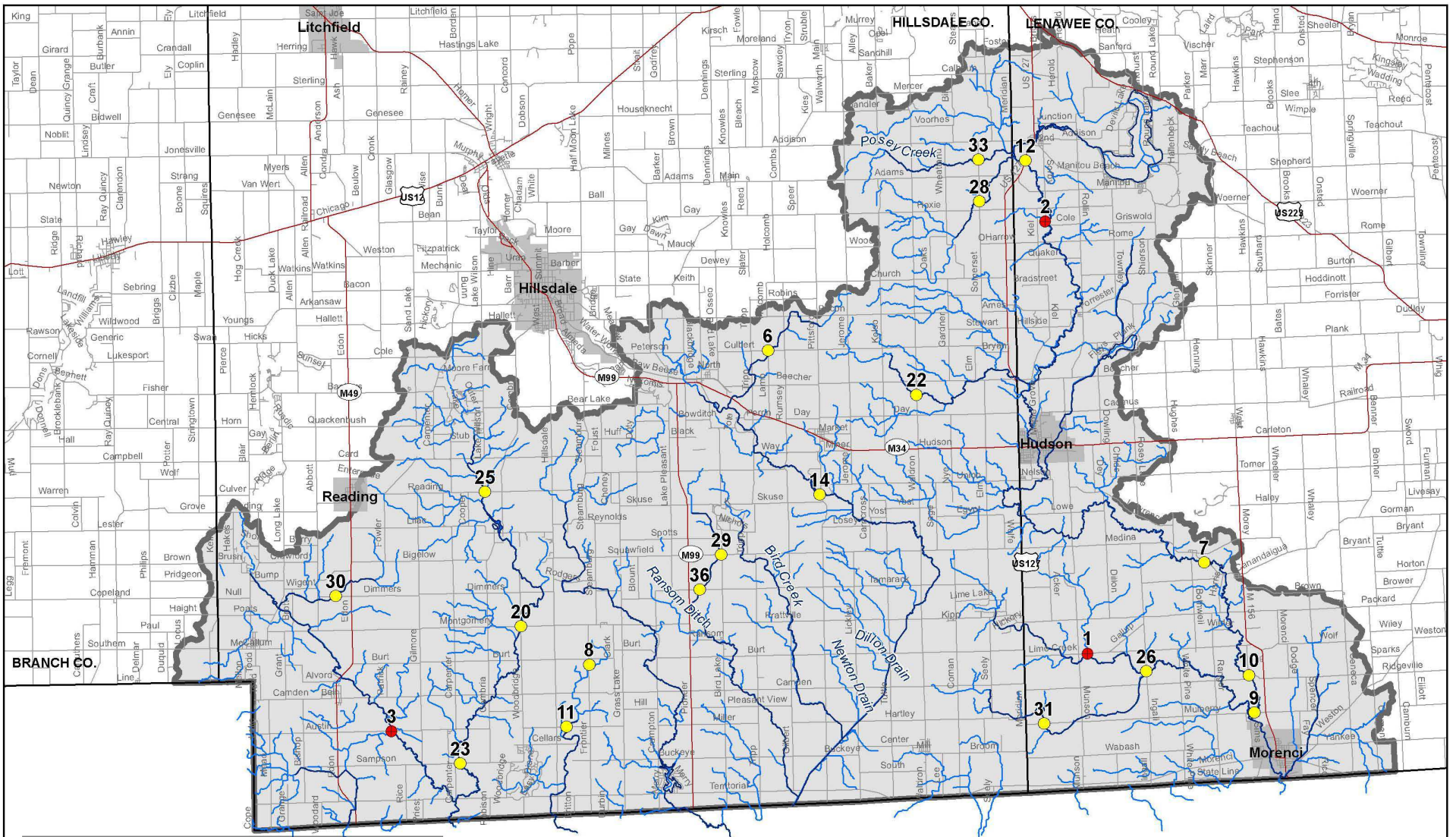
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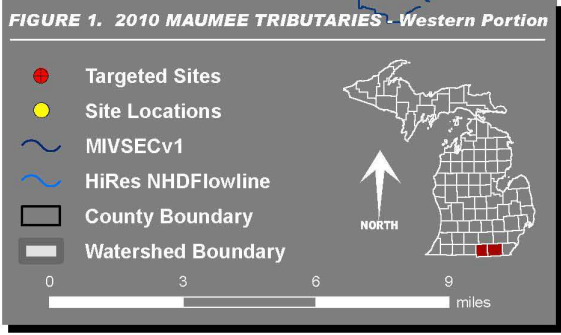
Report by: Tom Alwin, Aquatic Biologist  
Bill Keiper, Aquatic Biologist  
Gary Kohlhepp, Aquatic Biologist  
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## LITERATURE CITED

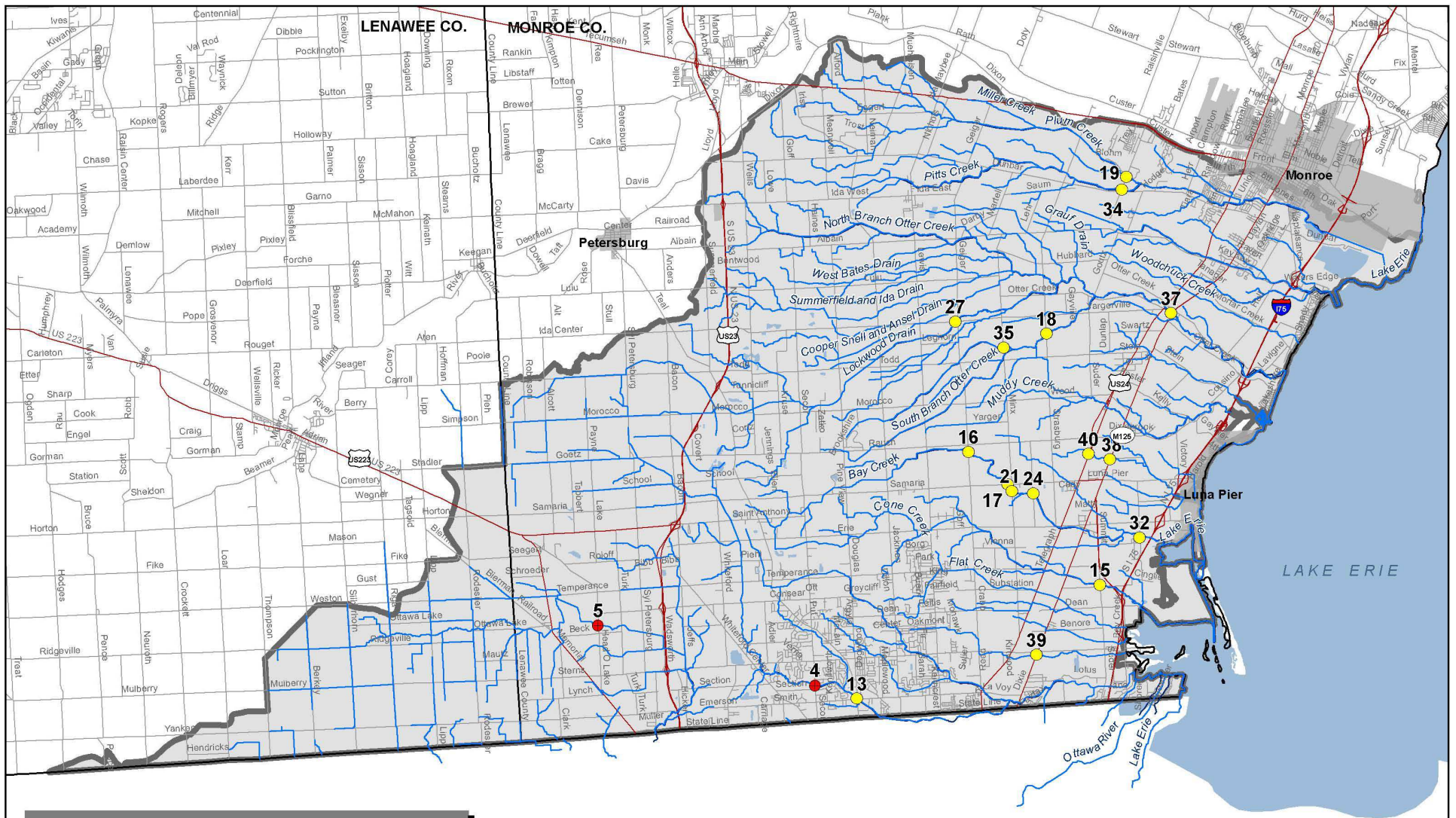
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**FIGURE 2. 2010 MAUMEE TRIBUTARIES - Eastern Portion**

- Targeted Sites
- Site Locations
- HiRes NHDFlowline
- MIVSECV1
- County Boundary
- Watershed Boundary



NORTH



OHIO

Table 1. 2010 St. Joseph River, Bean Creek, and Lake Erie Tributaries Monitoring.

	Site #	Storet	Waterbody	Location	County	Lat.	Long.	Macroinvert	Habitat	
<i>Lake Erie Tributaries</i>	4	580586	Halfway Creek	Secor and Underhill Rds	Monroe	41.74065	-83.62529	Acceptable	Good	
	5	580589	Ottawa Lake Outlet	Head O Lake Rd	Monroe	41.76376	-83.72579	Poor	Marginal	
	13	580056	Halfway Creek	Smith Rd	Monroe	41.73556	-83.60599	Acceptable	Marginal	
	15	580584	Little Lake Creek	M125	Monroe	41.77279	-83.49096	Acceptable	Marginal	
	16	580577	Bay Creek	Crabb Rd	Monroe	41.82069	-83.5506	Acceptable	Good	
	17	580581	Bay Creek	Sumaria Rd	Monroe	41.80888	-83.53264	Acceptable	Good	
	18	580580	S B Otter Creek	Strasburg Rd	Monroe	41.86124	-83.51254	Acceptable	Marginal	
	19	580576	Plum Creek	Raisinville Rd	Monroe	41.9153	-83.47284	Poor	Good	
	21	580582	Bay Creek	Minx Rd	Monroe	41.80655	-83.53078	Acceptable	Good	
	24	580583	Bay Creek	Cemetary Rd	Monroe	41.80556	-83.52091	Acceptable	Good	
	27	580579	Lockwood Drain	Geiger Rd	Monroe	41.86643	-83.55498	Acceptable	Marginal	
	32	580451	Bay Creek	Bay Creek Rd	Monroe	41.78899	-83.47192	Poor	Good	
	34	580575	Pitts Creek	Raisinville Rd	Monroe	41.91091	-83.47526	Acceptable	Marginal	
	35	580578	M B Otter Creek	Minx Rd	Monroe	41.85685	-83.53276	Acceptable	Marginal	
	37	580403	Otter Creek	M125	Monroe	41.86714	-83.45387	Acceptable	Good	
	38	580585	Whitewood Creek	M125	Monroe	41.81657	-83.48466	Acceptable	Marginal	
	39	580587	Hooper Run Drain	M125	Monroe	41.74898	-83.52159	Acceptable	Marginal	
	40	580588	Whitewood Creek	Telegraph Rd (La Fiesta Restaurant)	Monroe	41.81877	-83.49443	Acceptable	Marginal	
	<i>St. Joseph River</i>	3	300007	West Fork West Branch Saint Joseph River	Austin Rd	Hillsdale	41.73791	-84.72625	Acceptable	Good
		6	300281	Otto Drain	Culbert Rd	Lenawee	41.89827	-84.50548	Excellent	Good
8		300218	Clear Fork E B St. Joseph	Hillsdale Rd	Hillsdale	41.76503	-84.61186	Excellent	Good	
11		300279	Clear Fork	Harmon Road	Hillsdale	41.73848	-84.62549	Excellent	Good	
14		300111	E B Saint Joseph River	Pittsford Rd	Hillsdale	41.83611	-84.47724	Excellent	Excellent	
20		300284	East Fork W B Saint Joseph River	Montgomery Rd	Hillsdale	41.7819	-84.65071	Acceptable	Good	
23		300285	East Fork W B Saint Joseph River	Sampson Rd	Hillsdale	41.72359	-84.68701	Acceptable	Good	
25		300283	East Fork W B Saint Joseph River	Reading Rd	Hillsdale	41.83978	-84.67039	Acceptable	Good	
29		300280	Nile Ditch	Squawfield Rd	Hillsdale	41.81117	-84.53475	Acceptable	Good	
30		300165	Prouty Drain	Dimmer Rd	Hillsdale	41.79623	-84.75725	Excellent	Good	
36	300228	Nile Ditch	Tamarack Rd	Hillsdale	41.7963	-84.54735	Acceptable	Marginal		
<i>Bean Creek</i>	1	460348	Durfee Creek	Lime Creek Rd	Lenawee	41.7659	-84.32455	Acceptable	Good	
	2	460424	Unnamed Tributary to Bean Creek	Sorby Rd	Lenawee	41.95154	-84.34381	Acceptable	Good	
	7	460428	Bean Creek	Warwick Rd	Lenawee	41.80376	-84.25624	Acceptable	Good	
	9	460426	Bean Creek	Mulberry Rd	Lenawee	41.73894	-84.22936	Excellent	Good	
	10	460427	Bean Creek	Ridgeville Rd	Lenawee	41.75507	-84.23197	Acceptable	Good	
	12	460002	Bean Creek	US127	Lenawee	41.97761	-84.35494	Acceptable	Good	
	22	300202	St. Joseph Creek	Waldron Rd	Hillsdale	41.87811	-84.42028	Acceptable	Excellent	
	26	460343	Lime Creek	Ingall Hwy	Lenawee	41.75769	-84.29107	Acceptable	Good	
	28	300198	Branch Creek	Somersset Rd	Hillsdale	41.960555	-84.38194	Acceptable	Good	
	31	460425	Toad Creek	Mulberry Rd	Lenawee	41.73615	-84.35049	Acceptable	Good	
33	300282	Posey Creek	Somersset Rd	Hillsdale	41.97846	-84.38192	Acceptable	Good		

Table 2. Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Targeted 1 Durfee Creek Lime Creek Rd 8/16/2010 Site #1		Targeted 2 Unnamed Tributary to Bean Creek Sorby Rd 7/1/2010 Site # 2		Targeted 3 West Fork West Branch Saint Joseph River Austin Rd 7/28/2010 Site # 3	
	Value	Score	Value	Score	Value	Score
ANNELIDA (segmented worms)						
Hirudinea (leeches)	1		28			
Oligochaeta (worms)	2		18		5	
ARTHROPODA						
Crustacea						
Amphipoda (scuds)	1		8		9	
Decapoda (crayfish)	9				1	
Isopoda (sowbugs)			1		1	
Arachnoidea						
Hydracarina	1		2			
Insecta						
Ephemeroptera (mayflies)						
Baetidae	3				2	
Caenidae	34				1	
Ephemerellidae					6	
Heptageniidae	8				6	
Odonata						
Anisoptera (dragonflies)						
Cordulegastridae	2					
Libellulidae	1					
Zygoptera (damselflies)						
Calopterygidae					1	
Coenagrionidae	32				2	
Hemiptera (true bugs)						
Belostomatidae	3		2			
Corixidae	5		1		4	
Gerridae	1				2	
Nepidae	9					
Notonectidae			1			
Veliidae					5	
Megaloptera						
Corydalidae (dobson flies)					1	
Trichoptera (caddisflies)						
Hydropsychidae	1				37	
Leptoceridae	1				5	
Philopotamidae					1	
Coleoptera (beetles)						
Dytiscidae (total)	3		16		3	
Halipidae (adults)	1				1	
Hydrophilidae (total)	1		1			
Elmidae	6				15	
Diptera (flies)						
Ceratopogonidae			1			
Chironomidae	37		54		13	
Culicidae	1				2	
Dixidae	1					
Simuliidae			3		1	
Stratiomyidae			1		5	
Tabanidae			2			
Tipulidae					1	
MOLLUSCA						
Gastropoda (snails)						
Hydrobiidae	1					
Lymnaeidae			6		2	
Physidae			64		1	
Pelecypoda (bivalves)						
Sphaeriidae (clams)	21		22			
TOTAL INDIVIDUALS	186		231		133	
METRIC	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	26	1	18	0	27	1
NUMBER OF MAYFLY TAXA	3	1	0	-1	4	1
NUMBER OF CADDISFLY TAXA	2	0	0	-1	3	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	24.19	1	0.00	-1	11.28	0
PERCENT CADDISFLY COMP.	1.08	0	0.00	-1	32.33	1
PERCENT DOMINANT TAXON	19.89	1	27.71	1	27.82	1
PERCENT ISOPOD, SNAIL, LEECH	1.08	1	42.86	-1	3.01	0
PERCENT SURF. AIR BREATHERS	12.90	0	9.52	1	16.54	0
TOTAL SCORE		4		-4		3
MACROINV. COMMUNITY RATING	ACCEPTABLE		ACCEPTABLE		ACCEPTABLE	

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Targeted 4 Halfway Creek Secor and Underhill Rds 6/30/2010 Site # 4		Targeted 5 Ottawa Lake Outlet Head O Lake Rd 6/30/2010 Site # 5	
	Value	Score	Value	Score
PLATYHELMINTHES (flatworms)				
Turbellaria	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		9	
Oligochaeta (worms)	2		1	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	1		11	
Decapoda (crayfish)	17		18	
Isopoda (sowbugs)	11		27	
Arachnoidea				
Hydracarina	3		1	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	14			
Caenidae			10	
Heptageniidae	2		5	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	3			
Libellulidae			1	
Zygoptera (damselflies)				
Calopterygidae	5			
Coenagrionidae			1	
Hemiptera (true bugs)				
Corixidae			4	
Gerridae			10	
Veliidae			3	
Megaloptera				
Sialidae (alder flies)			1	
Trichoptera (caddisflies)				
Hydropsychidae	94			
Leptoceridae			2	
Limnephilidae	1			
Coleoptera (beetles)				
Halplidae (adults)			2	
Dryopidae	1			
Elmidae	36		9	
Diptera (flies)				
Chironomidae	39		38	
Simuliidae	4			
Stratiomyidae			1	
Tabanidae	2		1	
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	6			
Lymnaeidae	1			
Physidae	1		1	
Planorbidae			6	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1		15	
TOTAL INDIVIDUALS	246		177	
METRIC	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	0	23	0
NUMBER OF MAYFLY TAXA	2	0	2	0
NUMBER OF CADDISFLY TAXA	2	0	1	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1
PERCENT MAYFLY COMP.	6.50	-1	8.47	-1
PERCENT CADDISFLY COMP.	38.62	1	1.13	-1
PERCENT DOMINANT TAXON	38.21	-1	21.47	0
PERCENT ISOPOD, SNAIL, LEECH	8.13	0	24.29	-1
PERCENT SURF. AIR BREATHERS	0.00	1	11.30	0
TOTAL SCORE		-1		-5
MACROINV. COMMUNITY RATING	ACCEPTABLE		POOR	

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Otto Drain Culbert Road 7/29/2010 Site # 6		Bean Creek Warwick Road 7/27/2010 Site # 7		Clear Fork of E B St. Joseph Hillsdale Rd 7/28/2010 Site # 8		Bean Creek Mulberry Road 7/27/2010 Site # 9	
	Value	Score	Value	Score	Value	Score	Value	Score
ANNELIDA (segmented worms)								
Hirudinea (leeches)	3							
Oligochaeta (worms)	11		2		19		3	
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	50		12		37		14	
Decapoda (crayfish)	3		2		3		1	
Isopoda (sowbugs)	1						1	
Arachnoidea								
Hydracarina	7				1			
Insecta								
Ephemeroptera (mayflies)								
Baetidae	2		122		10		16	
Caenidae	28				1			
Ephemerellidae							2	
Ephemeridae							16	
Heptageniidae	2		17		18		31	
Isonychiidae			20				6	
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	3				2			
Gomphidae			1					
Zygoptera (damselflies)								
Calopterygidae	13		4		3		1	
Coenagrionidae			1					
Plecoptera (stoneflies)								
Perlodidae							2	
Hemiptera (true bugs)								
Belostomatidae			1					
Corixidae			13				3	
Gerridae	3		3		1		2	
Veliidae	7		4				1	
Megaloptera								
Sialidae (alder flies)	5				9			
Trichoptera (caddisflies)								
Hydropsychidae	114		8		59		13	
Lepidostomatidae	1							
Leptoceridae	1				2		6	
Limnephilidae					1		1	
Philopotamidae			1					
Polycentropodidae					3			
Coleoptera (beetles)								
Dytiscidae (total)	1				1			
Halipidae (adults)			2					
Dryopidae	1							
Elmidae	26		6		67		4	
Diptera (flies)								
Ceratopogonidae	1							
Chironomidae	46		25		12		6	
Culicidae					1			
Simuliidae	1						2	
Tabanidae	2		1		8			
Tipulidae	1		3		1		1	
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)	1		2		7			
Physidae	1				1			
Valvatidae	2							
Pelecypoda (bivalves)								
Sphaeriidae (clams)	9				2			
TOTAL INDIVIDUALS	346		250		269		132	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	29	1	21	1	24	1	21	1
NUMBER OF MAYFLY TAXA	3	1	3	0	3	1	5	1
NUMBER OF CADDISFLY TAXA	3	1	2	0	4	1	3	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	1	1
PERCENT MAYFLY COMP.	9.25	0	63.60	1	10.78	0	53.79	1
PERCENT CADDISFLY COMP.	33.53	1	3.60	0	24.16	0	15.15	0
PERCENT DOMINANT TAXON	32.95	1	48.80	0	24.91	1	23.48	1
PERCENT ISOPOD, SNAIL, LEECH	2.31	1	0.80	1	2.97	1	0.76	1
PERCENT SURF. AIR BREATHERS	3.18	1	9.20	1	1.12	1	4.55	1
TOTAL SCORE		6		3		5		7
MACROINV. COMMUNITY RATING		EXCELLENT		ACCEPTABLE		EXCELLENT		EXCELLENT

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Bean Creek Ridgeville Rd 7/27/2010 Site # 10		Clear Fork Harmon Rd 7/28/2010 Site # 11		Bean Creek US127 7/1/2010 Site # 12		Halfway Creek Smith Rd 6/30/2010 Site # 13	
ANNELIDA (segmented worms)								
Hirudinea (leeches)			1					
Oligochaeta (worms)	7		11		1		4	
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	26		58		36		1	
Decapoda (crayfish)	10		2		4		8	
Arachnoidea								
Hydracarina			2					
Insecta								
Ephemeroptera (mayflies)								
Baetidae	15				16		9	
Caenidae	1		1		6			
Ephemerellidae			1				3	
Heptageniidae	25		6		2			
Isonychiidae	3							
Odonata								
Anisoptera (dragonflies)								
Aeshnidae			1		1		1	
Macromiidae	1							
Zygoptera (damselflies)								
Calopterygidae	3		6		1		2	
Coenagrionidae			2		4		3	
Plecoptera (stoneflies)								
Perlidae					2			
Hemiptera (true bugs)								
Belostomatidae					1			
Corixidae	14		5		2			
Gerridae	3		1		1		1	
Veliidae	1		1				1	
Megaloptera								
Sialidae (alder flies)			14		5			
Trichoptera (caddisflies)								
Hydropsychidae	29		31		15		26	
Leptoceridae	5		2		5			
Limnephilidae			1					
Philopotamidae	1		2					
Coleoptera (beetles)								
Dytiscidae (total)	6				1			
Halplidae (adults)	1				1			
Dryopidae	2							
Elmidae	15		68		6		16	
Diptera (flies)								
Athericidae					1			
Ceratopogonidae					2			
Chironomidae	8		13		33		32	
Culicidae			1					
Simuliidae					130		7	
Tabanidae			2					
Tipulidae			1					
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)			2					
Lymnaeidae					3			
Physidae	2		4		4			
Pelecypoda (bivalves)								
Pisidiidae							1	
Sphaeriidae (clams)			17		1		1	
Unionidae (mussels)			1					
TOTAL INDIVIDUALS	178		257		284		116	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	21	1	28	1	26	1	16	-1
NUMBER OF MAYFLY TAXA	4	1	3	1	3	0	2	0
NUMBER OF CADDISFLY TAXA	3	0	4	1	2	0	1	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	1	1	0	-1
PERCENT MAYFLY COMP.	24.72	1	3.11	0	8.45	0	10.34	-1
PERCENT CADDISFLY COMP.	19.66	0	14.01	0	7.04	0	22.41	0
PERCENT DOMINANT TAXON	16.29	1	26.46	1	45.77	0	27.59	-1
PERCENT ISOPOD, SNAIL, LEECH	1.12	1	2.72	1	2.46	1	0.00	1
PERCENT SURF. AIR BREATHERS	14.04	0	3.11	1	2.11	1	1.72	1
TOTAL SCORE		4		5		4		-3
MACROINV. COMMUNITY RATING	ACCEPTABLE		EXCELLENT		ACCEPTABLE		ACCEPTABLE	

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	E B Saint Joseph River Pittsford Rd 7/29/2010 Site # 14		Little Lake Creek M125 6/30/2010 Site # 15		Bay Creek Crabbe Rd 6/29/2010 Site # 16		Bay Creek Sumaria Rd 6/29/2010 Site # 17	
PLATYHELMINTHES (flatworms)								
Turbellaria					1			
ANNELIDA (segmented worms)								
Hirudinea (leeches)			2		2			
Oligochaeta (worms)	6		19		1		1	
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	41				25		23	
Decapoda (crayfish)	2		10		19		13	
Isopoda (sowbugs)			36					
Arachnoidea								
Hydracarina	6				1		2	
Insecta								
Ephemeroptera (mayflies)								
Baetidae	1				55		24	
Caenidae	1				11			
Ephemeridae	1							
Heptageniidae	25						7	
Isorychiidae	17							
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	2		3		1			
Zygoptera (damselflies)					1			
Calopterygidae	1				1		1	
Coenagrionidae			2		19		4	
Hemiptera (true bugs)								
Belostomatidae					1			
Corixidae			10		7		2	
Gerridae	1		1		4		1	
Veliidae	3							
Megaloptera								
Corydalidae (dobson flies)	5							
Trichoptera (caddisflies)								
Hydropsychidae	76		3		37		173	
Hydroptilidae					4		17	
Leptoceridae	2				29			
Limnephilidae	10							
Philopotamidae	1							
Coleoptera (beetles)								
Dytiscidae (total)			1		1			
Gyrinidae (adults)			1					
Halplidae (adults)					6		1	
Hydrophilidae (total)							1	
Elmidae	17		24		23		15	
Halplidae (larvae)			1					
Diptera (flies)								
Ceratopogonidae			3					
Chironomidae	11		150		15		4	
Culicidae					1			
Simuliidae	4		3		10		7	
Stratiomyidae			3					
Tabanidae	1							
Tipulidae	2							
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)	1							
Physidae	1		55		25			
Planorbidae			3		7		8	
Pelecypoda (bivalves)								
Sphaeriidae (clams)	19		4		1		1	
TOTAL INDIVIDUALS	257		334		308		305	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	26	1	20	1	27	1	19	1
NUMBER OF MAYFLY TAXA	5	1	0	-1	2	1	2	1
NUMBER OF CADDISFLY TAXA	4	1	1	0	3	1	2	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	17.51	1	0	-1	21.43	0	10.16	-1
PERCENT CADDISFLY COMP.	34.63	1	0.90	-1	22.73	1	62.30	1
PERCENT DOMINANT TAXON	29.57	1	44.91	-1	17.86	0	56.72	-1
PERCENT ISOPOD, SNAIL, LEECH	0.78	1	28.74	-1	11.04	0	2.62	1
PERCENT SURF. AIR BREATHERS	1.56	1	4.79	1	6.49	1	1.64	1
TOTAL SCORE		7		-4		4		3
MACROINV. COMMUNITY RATING	EXCELLENT		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE	

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	S B Otter Creek Strasburg Rd 6/28/2010 Site # 18		Plum Creek Raisinville Rd 6/28/2010 Site # 19		E F W B Saint Joseph River Montgomery Rd 9/3/2010 Site # 20		Bay Creek Minx Rd 6/29/2010 Site # 21	
PLATYHELMINTHES (flatworms)								
Turbellaria			2				6	
ANNELIDA (segmented worms)								
Hirudinea (leeches)	1		1				1	
Oligochaeta (worms)	3		4		3			
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	10		3		1		29	
Decapoda (crayfish)	1		1		1		23	
Isopoda (sowbugs)	1		14					
Arachnoidea								
Hydracarina	1						2	
Insecta								
Ephemeroptera (mayflies)								
Baetiscidae					1			
Baetidae	9		1		2		17	
Caenidae			1				1	
Ephemeridae			1					
Heptageniidae	2		1		8		36	
Isonychiidae					3			
Leptophlebiidae	2							
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	2		5		3			
Libellulidae			1					
Zygoptera (damselflies)								
Calopterygidae			1		13		1	
Coenagrionidae	1		19		1		2	
Hemiptera (true bugs)								
Corixidae	52		126				4	
Gerridae	1		2		2			
Notonectidae			1					
Veliidae			1		1			
Trichoptera (caddisflies)								
Helicopsychidae					1			
Hydropsychidae	5				17		102	
Hydroptilidae	2						1	
Lepidostomatidae	1						1	
Leptoceridae	7		3		3		1	
Philopotamidae					1			
Coleoptera (beetles)								
Dytiscidae (total)			3				2	
Gyrinidae (adults)			3					
Halplidae (adults)	2		6				1	
Elmidae	2				20		40	
Psephenidae (larvae)					2			
Diptera (flies)								
Ceratopogonidae							1	
Chironomidae	25		47		22		18	
Culicidae					1			
Dixidae			1					
Simuliidae	6		1				2	
Tabanidae					3			
Tipulidae					1		2	
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)					26			
Hydrobiidae	1				1			
Physidae	175		15		1		2	
Planorbidae			1				2	
Pleuroceridae					5			
Pelecypoda (bivalves)								
Sphaeriidae (clams)	7		6		8		3	
Unionidae (mussels)					13			
TOTAL INDIVIDUALS	319		271		164		300	
METRIC	Value	Score	Values	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	24	1	28	0	28	1	25	1
NUMBER OF MAYFLY TAXA	3	1	4	1	4	1	3	1
NUMBER OF CADDISFLY TAXA	4	1	1	-1	4	1	4	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	4.08	-1	1.48	-1	8.54	0	18.00	0
PERCENT CADDISFLY COMP.	4.70	0	1.11	-1	13.41	0	35.00	1
PERCENT DOMINANT TAXON	54.86	-1	46.49	-1	15.85	1	34.00	-1
PERCENT ISOPOD, SNAIL, LEECH	55.80	-1	11.44	0	20.12	-1	1.67	1
PERCENT SURF. AIR BREATHERS	17.24	0	52.40	-1	2.44	1	2.33	1
TOTAL SCORE		-1		-5		3		4
MACROINV. COMMUNITY RATING	ACCEPTABLE		POOR		ACCEPTABLE		ACCEPTABLE	



Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	St. Joseph Creek Waldron Rd 8/16/2010 Site # 22	E F W B Saint Joseph River Sampson Rd 9/3/2010 Site # 23	Bay Creek Cemetery Rd 6/29/2010 Site # 24	E F W B Saint Joseph River Reading Rd 9/3/2010 Site # 25				
ANNELIDA (segmented worms)								
Hirudinea (leeches)			2					
Oligochaeta (worms)	1							
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	1	4		18				
Decapoda (crayfish)			14	1				
Isopoda (sowbugs)	1							
Arachnoidea								
Hydracarina		3						
Insecta								
Ephemeroptera (mayflies)								
Baetidae	8	20	16	15				
Caenidae				2				
Heptageniidae	9	14	40	4				
Isorychiidae		2						
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	1	3	1	2				
Libellulidae		1						
Zygoptera (damselflies)								
Calopterygidae	5	2		97				
Coenagrionidae		1		23				
Hemiptera (true bugs)								
Corixidae		20	5	1				
Gerridae	2	1	1	2				
Nepidae	1							
Veliidae	1							
Megaloptera								
Sialidae (alder flies)		1						
Trichoptera (caddisflies)								
Glossosomatidae	1							
Hydropsychidae	60	74	57	11				
Leptoceridae		6		7				
Limnephilidae				1				
Philopotamidae	2	1						
Phryganeidae				2				
Coleoptera (beetles)								
Dytiscidae (total)				1				
Haliplidae (adults)				1				
Dryopidae	5							
Elmidae	44	28	32	24				
Psephenidae (larvae)		1						
Diptera (flies)								
Athericidae	1							
Ceratopogonidae	1							
Chironomidae	82	29	25	14				
Simuliidae	28	3		1				
Tabanidae	6	2		1				
Tipulidae	10	1						
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)		18		1				
Physidae		1		5				
Planorbidae				1				
Viviparidae				1				
Pelecypoda (bivalves)								
Sphaeriidae (clams)	1	2		10				
Unionidae (mussels)				2				
TOTAL INDIVIDUALS	271	238	193	248				
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	1	24	1	10	-1	26	1
NUMBER OF MAYFLY TAXA	2	0	3	0	2	1	3	1
NUMBER OF CADDISFLY TAXA	3	1	3	0	1	-1	4	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	6.27	0	15.13	1	29.02	1	8.47	0
PERCENT CADDISFLY COMP.	23.25	0	34.03	1	29.53	1	8.47	0
PERCENT DOMINANT TAXON	30.26	1	31.09	1	29.53	-1	39.11	0
PERCENT ISOPOD, SNAIL, LEECH	0.37	1	7.98	0	1.04	1	3.23	0
PERCENT SURF. AIR BREATHERS	1.48	1	8.82	1	3.11	1	2.02	1
TOTAL SCORE		4		4		1		3
MACROINV. COMMUNITY RATING	ACCEPTABLE		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE	

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Lime Creek Ingall Hwy 8/16/2010 Site # 26		Lockwood Drain Geiger Rd 6/28/2010 Site # 27		Branch Creek Somerset Rd 7/1/2010 Site # 28		Nile Ditch Squawfield Rd 6/28/2010 Site # 29	
ANNELIDA (segmented worms)								
Hirudinea (leeches)			1				2	
Oligochaeta (worms)	1		8		2			
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	1		12		41		3	
Decapoda (crayfish)	8		6				1	
Isopoda (sowbugs)							2	
Arachnoidea								
Hydracarina			2				6	
Insecta								
Ephemeroptera (mayflies)								
Baetidae	11		23		2		2	
Caenidae			19				18	
Ephemerellidae							4	
Heptageniidae	8		3				14	
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	2		1		4		2	
Libellulidae	1							
Zygoptera (damselflies)								
Calopterygidae	11				2		40	
Coenagrionidae			5		1		5	
Hemiptera (true bugs)								
Corixidae			6		1			
Gerridae	1		2		1		4	
Notonectidae							1	
Pleidae					1			
Veliidae	3						3	
Megaloptera								
Sialidae (alder flies)					2		15	
Trichoptera (caddisflies)								
Brachycentridae					7			
Glossosomatidae					3			
Hydropsychidae	30		22		28		39	
Lepidostomatidae			2					
Leptoceridae	8		16				1	
Molannidae							1	
Coleoptera (beetles)								
Dytiscidae (total)			2				1	
Gyrinidae (adults)							27	
Halplidae (adults)			59				1	
Hydrophilidae (total)	7							
Elmidae	34		3		23		13	
Diptera (flies)								
Ceratopogonidae	1		5					
Chaoboridae	1							
Chironomidae	35		30		14		15	
Dixidae	1							
Simuliidae			9		2			
Tabanidae					2		2	
Tipulidae	8		1		1		1	
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)	7						1	
Lymnaeidae	1							
Physidae			4		6		1	
Planorbidae			7				18	
Pelecypoda (bivalves)								
Sphaeriidae (clams)	81		8				47	
Unionidae (mussels)			1					
TOTAL INDIVIDUALS	261		257		143		290	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	1	26	0	19	1	30	1
NUMBER OF MAYFLY TAXA	2	0	3	1	1	-1	4	1
NUMBER OF CADDISFLY TAXA	2	0	3	0	3	0	3	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	7.28	0	17.51	0	1.40	0	13.10	0
PERCENT CADDISFLY COMP.	14.56	0	15.56	0	26.57	1	14.14	0
PERCENT DOMINANT TAXON	31.03	1	22.96	-1	28.67	1	16.21	1
PERCENT ISOPOD, SNAIL, LEECH	3.07	0	4.67	1	4.20	0	8.28	0
PERCENT SURF. AIR BREATHERS	4.60	1	26.85	-1	2.10	1	12.76	0
TOTAL SCORE		2		-1		2		2
MACROINV. COMMUNITY RATING	ACCEPTABLE		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE	

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Prouty Drain Dimmer Rd 7/28/2010 Site # 30	Toad Creek Mulberry Rd 7/27/2010 Site # 31	Bay Creek Bay Creek Rd 6/29/2010 Site #32	Posey Creek Somerset Rd 8/16/2010 Site # 33				
ANNELIDA (segmented worms)								
Hirudinea (leeches)	1	4	2					
Oligochaeta (worms)	23	2	4	46				
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	30		64	33				
Decapoda (crayfish)	1	2	11	2				
Isopoda (sowbugs)		1	3	1				
Arachnoidea								
Hydracarina	13	3	2					
Insecta								
Ephemeroptera (mayflies)								
Baetidae	3	7	1	9				
Caenidae	6	108	1	2				
Ephemeridae				1				
Heptageniidae	2	2	1	6				
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	3			6				
Gomphidae	1							
Libellulidae		1						
Zygoptera (damselflies)								
Calopterygidae	1			43				
Coenagrionidae	3	59	1	1				
Hemiptera (true bugs)								
Belostomatidae		1						
Corixidae	2	2	53	1				
Gerridae	1	1	9	1				
Nepidae	1			1				
Notonectidae	1	1	1	1				
Pleidae				1				
Veliidae	1			1				
Megaloptera								
Sialidae (alder flies)	1	3						
Trichoptera (caddisflies)								
Hydropsychidae	57		1	6				
Hydroptilidae			1					
Lepidostomatidae	2		2					
Leptoceridae	5		1	1				
Limnephilidae		1						
Philopotamidae	2							
Lepidoptera (moths)								
Pyrilidae				1				
Coleoptera (beetles)								
Dytiscidae (total)	1	3	1					
Gyrinidae (adults)		1						
Halplidae (adults)			1					
Dryopidae	1	1						
Elmidae	91	2	2	17				
Diptera (flies)								
Athericidae				1				
Ceratopogonidae				1				
Chaoboridae				2				
Chironomidae	31	37	50	28				
Culicidae	2	2		2				
Simuliidae	1			2				
Tabanidae	1			1				
Tipulidae		1		2				
MOLLUSCA								
Gastropoda (snails)								
Ancylidae (limpets)				13				
Bithyniidae				18				
Physidae	1	27	41					
Planorbidae			9					
Pelecypoda (bivalves)								
Sphaeriidae (clams)	7	46	9	8				
Unionidae (mussels)		1						
TOTAL INDIVIDUALS	296	319	271	259				
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	31	1	26	1	24	0	32	1
NUMBER OF MAYFLY TAXA	3	1	3	1	3	0	4	1
NUMBER OF CADDISFLY TAXA	4	1	1	0	4	1	2	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	3.72	0	36.68	1	1.11	-1	6.95	0
PERCENT CADDISFLY COMP.	22.30	0	0.31	-1	1.85	-1	2.70	0
PERCENT DOMINANT TAXON	30.74	1	33.86	1	23.62	-1	17.76	1
PERCENT ISOPOD, SNAIL, LEECH	0.68	1	10.03	0	20.30	-1	12.36	0
PERCENT SURF. AIR BREATHERS	3.04	1	3.45	1	23.99	-1	3.86	1
TOTAL SCORE		5		3		-5		4

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Pitts Creek Raisinville Rd 6/28/2010 Site # 34		M B Otter Creek Minx Rd 6/29/2010 Site # 35		Nile Ditch Tamarack Rd 7/29/2010 Site # 36		Otter Creek M125 6/28/2010 Site # 37	
ANNELIDA (segmented worms)								
Hirudinea (leeches)	1		3					
Oligochaeta (worms)	4		5		13		1	
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	2		24		7			
Decapoda (crayfish)	5		1		1		11	
Isopoda (sowbugs)	9		54				13	
Arachnoidea								
Hydracarina			7		8		4	
Insecta								
Ephemeroptera (mayflies)								
Baetidae	11		20		8		54	
Caenidae	2				6		1	
Heptageniidae	4				6		25	
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	1		2		1		2	
Libellulidae	1		1					
Zygoptera (damselflies)								
Calopterygidae					6		1	
Coenagrionidae					3		2	
Plecoptera (stoneflies)								
Perlidae							1	
Hemiptera (true bugs)								
Corixidae	29		69					
Gerridae	1		1		1		12	
Veliidae					2			
Megaloptera								
Sialidae (alder flies)					6			
Trichoptera (caddisflies)								
Hydropsychidae	1		1		139		12	
Hydroptilidae							1	
Leptoceridae	3		2				12	
Limnephilidae			1					
Coleoptera (beetles)								
Dytiscidae (total)			1		2		1	
Gyrinidae (adults)							1	
Halplidae (adults)	4		3					
Hydrophilidae (total)	1		2					
Dryopidae							4	
Elmidae	25		1		43		11	
Psephenidae (larvae)							2	
Diptera (flies)								
Athericidae					4			
Ceratopogonidae	1		1		1			
Chironomidae	27		44		36		9	
Culicidae			1					
Simuliidae	6		1				5	
Tabanidae					3			
Tipulidae					1			
MOLLUSCA								
Gastropoda (snails)								
Lymnaeidae	2							
Physidae	32		55				2	
Planorbidae	2		1		1			
Pelecypoda (bivalves)								
Sphaeriidae (clams)	67		11		7		3	
TOTAL INDIVIDUALS	241		312		305		190	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	24	1	25	1	23	1	24	0
NUMBER OF MAYFLY TAXA	3	1	1	1	3	1	3	0
NUMBER OF CADDISFLY TAXA	2	0	3	1	1	0	3	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	1	1
PERCENT MAYFLY COMP.	7.05	-1	6.41	-1	6.56	0	42.11	1
PERCENT CADDISFLY COMP.	1.66	-1	1.28	-1	45.57	1	13.16	0
PERCENT DOMINANT TAXON	27.80	-1	22.12	0	45.57	0	28.42	-1
PERCENT ISOPOD, SNAIL, LEECH	19.09	-1	36.22	-1	0.33	1	7.89	0
PERCENT SURF. AIR BREATHERS	14.52	0	24.68	-1	1.64	1	7.37	1
TOTAL SCORE		-3		-2		4		2
MACROINV. COMMUNITY RATING		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE		ACCEPTABLE

Table 2 (cont.). Qualitative Macroinvertebrate Sampling Results and Metric Evaluations for the Maumee River Watershed, June-August 2010.

TAXA	Whitewood Creek M125 6/29/2010 Site # 38		Hooper Run Drain M125 6/30/2010 Site # 39		Whitewood Creek off Telegraph Road (La Fiesta Restaurant) 6/30/2010 Site # 40	
	Value	Score	Value	Score	Value	Score
PLATYHELMINTHES (flatworms)						
Turbellaria			248		1	
ANNELIDA (segmented worms)						
Hirudinea (leeches)	9		18		2	
Oligochaeta (worms)	10		16		6	
ARTHROPODA						
Crustacea						
Amphipoda (scuds)	1				1	
Decapoda (crayfish)	3		5		1	
Isopoda (sowbugs)	12					
Arachnoidea						
Hydracarina			7		1	
Insecta						
Ephemeroptera (mayflies)						
Baetidae	5				2	
Ephemerellidae			1			
Odonata						
Anisoptera (dragonflies)						
Aeshnidae	3		2		2	
Zygoptera (damselflies)						
Coenagrionidae	1		48		2	
Hemiptera (true bugs)						
Corixidae	14		3		25	
Gerridae	1		1		2	
Notonectidae			1			
Veliidae	1		1			
Megaloptera						
Sialidae (alder flies)	1					
Trichoptera (caddisflies)						
Hydropsychidae	4					
Coleoptera (beetles)						
Dytiscidae (total)	6				6	
Gyrinidae (adults)			1			
Halplidae (adults)	10		1		7	
Elmidae	1		48			
Diptera (flies)						
Ceratopogonidae	63		4		6	
Chironomidae	19		25		59	
Culicidae			1		3	
Simuliidae	3				1	
Stratiomyidae	1					
MOLLUSCA						
Gastropoda (snails)						
Lymnaeidae	1				18	
Physidae	95		1		207	
Viviparidae			1			
Pelecypoda (bivalves)						
Sphaeriidae (clams)			2			
TOTAL INDIVIDUALS	264		435		352	
METRIC	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	1	21	1	19	1
NUMBER OF MAYFLY TAXA	1	1	1	1	1	1
NUMBER OF CADDISFLY TAXA	1	0	0	-1	0	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	1.89	-1	0.23	-1	0.57	-1
PERCENT CADDISFLY COMP.	1.52	-1	0.00	-1	0.00	-1
PERCENT DOMINANT TAXON	35.98	-1	57.01	-1	58.81	-1
PERCENT ISOPOD, SNAIL, LEECH	44.32	-1	4.60	1	64.49	-1
PERCENT SURF. AIR BREATHERS	12.50	0	2.07	1	12.22	0
TOTAL SCORE		-3		-1		-4
MACROINV. COMMUNITY RATING	ACCEPTABLE		ACCEPTABLE		ACCEPTABLE	

Table 3. Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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

HABITAT METRIC (Max. score)	Targeted 1 Durfee Creek Lime Creek Rd (Site #1) GLIDE/POOL	Targeted 2 Unnamed Trib to Bean Creek Sorby Rd (Site #2) GLIDE/POOL	Targeted 3 West Fork W B St Joseph River Austin Rd (Site #3) GLIDE/POOL	Targeted 4 Halfway Creek Secor and Underhill Rds (Site #4) RIFFLE/RUN	Targeted 5 Ottawa Lake Outlet Head O Lake Rd (Site # 5) GLIDE/POOL
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	8	4	10	11	13
Embeddedness (20)*				12	
Velocity/Depth Regime (20)*				12	
Pool Substrate Characterization (20)**	7	6	8		6
Pool Variability (20)**	3	3	11		7
<b>Channel Morphology</b>					
Sediment Deposition (20)	13	15	7	9	14
Flow Status - Maint. Flow Volume (10)	8	6	8	8	7
Flow Status - Flashiness (10)	10	7	4	8	4
Channel Alteration (20)	16	14	15	13	9
Frequency of Riffles/Bends (20)*				12	
Channel Sinuosity (20)**	7	10	8		7
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	9	7	8	5	7
Bank Stability (R) (10)	9	7	9	7	7
Vegetative Protection (L) (10)	7	7	10	3	6
Vegetative Protection (R) (10)	7	7	10	7	6
Riparian Veg. Zone Width (L) (10)	1	7	10	1	3
Riparian Veg. Zone Width (R) (10)	1	7	10	8	3
<b>TOTAL SCORE (200):</b>	106	107	128	116	99
<b>HABITAT RATING:</b>	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)
Date:	8/16/2010	7/1/2010	7/28/2010	6/30/2010	6/30/2010
Weather:	Sunny	Sunny	Sunny	Sunny	Sunny
Air Temperature (°F):	80	75	85	75	75
Water Temperature (°F):	76		73	62	
Ave. Stream Width (ft):	10	7	35	15	20
Ave. Stream Depth (ft):	0.75	0.33	1.5	1.5	2
Surface Velocity (ft/sec):	0.1	0.5	1	1	0.2
Estimated Flow (CFS):	0.8	1.2	52.5	22.5	8.0
Stream Modifications:	None		None		Dredged
Nuisance Plants (Y/N):	N	Y	N	N	N
Report Number:					
STORET No.:	460348	460424	300007	580586	580589
County Code:	46	46	30	58	58
TRS:	08S01E17	06S01E17	08S04W25	08S07E31	08S06E20
Latitude (dd):	41.7659	41.95154	41.73791	41.74065	41.76376
Longitude (dd):	-84.324546	-84.34381	-84.72625	-83.62529	-83.72579
Ecoregion:	ECBP	ECBP	ECBP	HELP	HELP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4100006	410006	4100003	4100001	4100001

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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

HABITAT METRIC (Max. score)	Otto Drain Culbert Rd (Site #6) RIFFLE/RUN	Bean Creek Warwick Rd (Site #7) RIFFLE/RUN	Clear Fork E B St. Joseph Hillsdale Rd (Site # 8) RIFFLE/RUN	Bean Creek Mulberry Rd (Site #9) RIFFLE/RUN	Bean Creek Ridgeville Rd (Site #10) RIFFLE/RUN
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	14	6	6	7	7
Embeddedness (20)*	13	15	5	16	15
Velocity/Depth Regime (20)*	8	10	14	11	10
Pool Substrate Characterization (20)**					
Pool Variability (20)**					
<b>Channel Morphology</b>					
Sediment Deposition (20)	14	17	5	11	12
Flow Status - Maint. Flow Volume (10)	9	10	7	10	10
Flow Status - Flashiness (10)	8	4	6	4	3
Channel Alteration (20)	14	19	19	20	20
Frequency of Riffles/Bends (20)*	12	11	18	12	12
Channel Sinuosity (20)**					
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	9	9	7	4	10
Bank Stability (R) (10)	9	9	7	9	10
Vegetative Protection (L) (10)	9	9	5	9	10
Vegetative Protection (R) (10)	8	9	5	9	10
Riparian Veg. Zone Width (L) (10)	5	4	6	8	3
Riparian Veg. Zone Width (R) (10)	7	5	6	6	3
<b>TOTAL SCORE (200):</b>	139	137	116	136	135
<b>HABITAT RATING:</b>	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)
Date:	7/29/2010	7/27/2010	7/28/2010	7/27/2010	7/27/2010
Weather:	Sunny	Sunny	Partly Cloudy	Sunny	Sunny
Air Temperature (°F):	80	80	90	85	85
Water Temperature (°F):	70	72	73	73	73
Ave. Stream Width (ft):	8	40	8	50	40
Ave. Stream Depth (ft):	1	3	1	3.5	3.5
Surface Velocity (ft/sec):	1	1.5	0.75	1.5	1.5
Estimated Flow (CFS):	8.0	180.0	6.0	262.5	210.0
Stream Modifications:	Dredged	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	300281	460428	300218	460426	460427
County Code:	30	46	30	46	46
TRS:	06S02W35	08S01E02	09S03W02	08S02E30	08S02E19
Latitude (dd):	41.89827	41.80376	41.76503	41.73894	41.75507
Longitude (dd):	-84.50548	-84.25624	-84.61186	-84.22936	-84.23197
Ecoregion:	ECBP	ECBP	ECBP	ECBP	ECBP
Stream Type:	Coldwater	Coldwater		Coldwater	Coldwater
USGS Basin Code:	4100003	4100006	4100003	4100006	4100006

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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).

HABITAT METRIC (Max. score)	Clear Fork Harmon Rd (Site #11) RIFFLE/RUN	Bean Creek US127 (Site #12) GLIDE/POOL	Halfway Creek Smith Rd (Site #13) GLIDE/POOL	E B Saint Joseph River Pittsford Rd (Site 14) RIFFLE/RUN
<b>Substrate and Instream Cover</b>				
Epifaunal Substrate/ Avail Cover (20)	7	6	11	18
Embeddedness (20)*	10			15
Velocity/Depth Regime (20)*	11			14
Pool Substrate Characterization (20)**		13		7
Pool Variability (20)**		17		16
<b>Channel Morphology</b>				
Sediment Deposition (20)	5	12	12	17
Flow Status - Maint. Flow Volume (10)	7	9	8	9
Flow Status - Flashiness (10)	5	1	5	6
Channel Alteration (20)	20	13	8	20
Frequency of Riffles/Bends (20)*	15			15
Channel Sinuosity (20)**		8	9	
<b>Riparian and Bank Structure</b>				
Bank Stability (L) (10)	6	8	4	10
Bank Stability (R) (10)	7	8	4	10
Vegetative Protection (L) (10)	10	6	5	10
Vegetative Protection (R) (10)	10	6	5	10
Riparian Veg. Zone Width (L) (10)	10	8	5	10
Riparian Veg. Zone Width (R) (10)	10	9	5	10
TOTAL SCORE (200):	133	124	104	174
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	EXCELLENT (NON-IMPAIRED)
Date:	7/28/2010	7/1/2010	6/30/2010	7/29/2010
Weather:	Cloudy	Sunny	Sunny	Sunny
Air Temperature (°F):	75		75	80
Water Temperature (°F):	76		66	72
Ave. Stream Width (ft):	8	30	15	30
Ave. Stream Depth (ft):	0.33	3	2.5	0.83
Surface Velocity (ft/sec):	0.5	0.75	1	1.5
Estimated Flow (CFS):	1.3	67.5	37.5	37.4
Stream Modifications:	None	Dredged		None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	300279	460002	580056	300111
County Code:	30	46	58	30
TRS:	08S03W26	06S01E06	08S07E32	07S02W25
Latitude (dd):	41.73848	41.97761	41.73556	41.83611
Longitude (dd):	-84.62549	-84.35494	-83.60599	-84.47724
Ecoregion:	ECBP	ECBP	HELP	ECBP
Stream Type:	Coldwater	Coldwater	Warmwater	Warmwater
USGS Basin Code:	4100003	4100006	4100001	4100003

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys



Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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).

	Little Lake Creek M125 (Site #15) GLIDE/POOL	Bay Creek Crabbe Rd (Site #16) RIFFLE/RUN	Bay Creek Sumaria Rd (Site #17) RIFFLE/RUN	S B Otter Creek Strasburg Rd (Site #18) GLIDE/POOL	Plum Creek Raisinville Rd (Site #19) RIFFLE/RUN
<b>HABITAT METRIC (Max. score)</b>					
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	5	12	17	16	7
Embeddedness (20)*		15	14		17
Velocity/Depth Regime (20)*		7	9		3
Pool Substrate Characterization (20)**	9			6	
Pool Variability (20)**	10			1	
<b>Channel Morphology</b>					
Sediment Deposition (20)	14	12	12	13	18
Flow Status - Maint. Flow Volume (10)	9	8	9	8	9
Flow Status - Flashiness (10)	9	7	9	3	4
Channel Alteration (20)	1	6	6	0	8
Frequency of Riffles/Bends (20)*		4	13		7
Channel Sinuosity (20)**	5			7	
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	8	9	9	3	9
Bank Stability (R) (10)	8	9	9	3	9
Vegetative Protection (L) (10)	5	10	6	0	7
Vegetative Protection (R) (10)	5	10	6	0	7
Riparian Veg. Zone Width (L) (10)	1	9	0	0	4
Riparian Veg. Zone Width (R) (10)	1	2	0	0	4
<b>TOTAL SCORE (200):</b>	90	120	119	60	113
<b>HABITAT RATING:</b>	<b>MARGINAL (MODERATELY IMPAIRED)</b>	<b>GOOD (SLIGHTLY IMPAIRED)</b>	<b>GOOD (SLIGHTLY IMPAIRED)</b>	<b>MARGINAL (MODERATELY IMPAIRED)</b>	<b>GOOD (SLIGHTLY IMPAIRED)</b>
<b>Date:</b>	6/30/2010	6/29/2010	6/29/2010	6/28/2010	6/28/2010
<b>Weather:</b>	Sunny	Sunny	Partly Cloudy	Sunny	Partly Cloudy
<b>Air Temperature (°F):</b>	70	75	75	85	80
<b>Water Temperature (°F):</b>			72	82	68
<b>Ave. Stream Width (ft):</b>	6	6	5	10	14
<b>Ave. Stream Depth (ft):</b>	1	0.33	0.25	0.66	1
<b>Surface Velocity (ft/sec):</b>	0.1	0.5	1.5	0.25	0.2
<b>Estimated Flow (CFS):</b>	0.6	1.0	1.9	1.7	2.8
<b>Stream Modifications:</b>	Dredged	Dredged	Dredged	Dredged	Dredged
<b>Nuisance Plants (Y/N):</b>	N	N	N	N	N
<b>Report Number:</b>					
<b>STORET No.:</b>	580584	580577	580581	580580	580576
<b>County Code:</b>	58	58	58	58	58
<b>TRS:</b>	08S08E20	08S07E02	08S07E01	07S08E19	06S08E33
<b>Latitude (dd):</b>	41.77279	41.82069	41.80888	41.86124	41.9153
<b>Longitude (dd):</b>	-83.49096	-83.5506	-83.53264	-83.51254	-83.47284
<b>Ecoregion:</b>	HELP	HELP	HELP	HELP	HELP
<b>Stream Type:</b>	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
<b>USGS Basin Code:</b>	4100001	4100001	4100001	4100001	4100001

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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).

HABITAT METRIC (Max. score)	East Fork W B Saint Joseph River Montgomery Rd (Site # 20) RIFFLE/RUN	Bay Creek Minx Rd (Site #21) RIFFLE/RUN	St. Joseph Creek Waldron Rd (Site #22) RIFFLE/RUN	East Fork W B Saint Joseph River Sampson Rd (Site #23) RIFFLE/RUN
<b>Substrate and Instream Cover</b>				
Epifaunal Substrate/ Avail Cover (20)	14	16	10	14
Embeddedness (20)*	14	14	13	13
Velocity/Depth Regime (20)*	18	9	12	19
Pool Substrate Characterization (20)**				
Pool Variability (20)**				
<b>Channel Morphology</b>				
Sediment Deposition (20)	14	12	12	11
Flow Status - Maint. Flow Volume (10)	9	8	7	9
Flow Status - Flashiness (10)	8	3	9	9
Channel Alteration (20)	13	14	20	12
Frequency of Riffles/Bends (20)*	10	12	18	17
Channel Sinuosity (20)**				
<b>Riparian and Bank Structure</b>				
Bank Stability (L) (10)	8	8	10	8
Bank Stability (R) (10)	4	8	9	8
Vegetative Protection (L) (10)	8	8	10	8
Vegetative Protection (R) (10)	5	8	10	8
Riparian Veg. Zone Width (L) (10)	8	2	10	3
Riparian Veg. Zone Width (R) (10)	3	2	6	3
TOTAL SCORE (200):	136	124	156	142
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON-IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)
Date:	9/3/2010	6/29/2010	8/16/2010	9/3/2010
Weather:	Partly Cloudy	Partly Cloudy	Sunny	Partly Cloudy
Air Temperature ( <sup>o</sup> F):	70	75	70	70
Water Temperature ( <sup>o</sup> F):	70	72	63	71
Ave. Stream Width (ft):	25	10	8	30
Ave. Stream Depth (ft):	1.5	0.5	0.25	1.5
Surface Velocity (ft/sec):	0.75	0.5	1	1
Estimated Flow (CFS):	28.1	2.5	2.0	45.0
Stream Modifications:	None	Dredged	None	None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	300284	580582	300202	300285
County Code:	30	58	30	30
TRS:	08S03E10	08S07E12	07S01W09	08S03W32
Latitude (dd):	41.7819	41.80655	41.87811	41.72359
Longitude (dd):	-84.65071	-83.53078	-84.42028	-84.68701
Ecoregion:	ECBP	HELP	ECBP	ECBP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4100003	4100001	4100006	4100003

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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).

HABITAT METRIC (Max. score)	Bay Creek Cemetery Rd (Site #24) RIFFLE/RUN	East Fork W B Saint Joseph River Reading Rd (Site #25) GLIDE/POOL	Lime Creek Ingall Hwy (Site #26) RIFFLE/RUN	Lockwood Drain Geiger Rd (Site # 27) GLIDE/POOL
<b>Substrate and Instream Cover</b>				
Epifaunal Substrate/ Avail Cover (20)	16	7	15	6
Embeddedness (20)*	15		15	
Velocity/Depth Regime (20)*	9		12	
Pool Substrate Characterization (20)**		8		10
Pool Variability (20)**		9		1
<b>Channel Morphology</b>				
Sediment Deposition (20)	13	6	12	8
Flow Status - Maint. Flow Volume (10)	7	9	5	7
Flow Status - Flashiness (10)	6	9	1	2
Channel Alteration (20)	13	14	14	7
Frequency of Riffles/Bends (20)*	7		8	
Channel Sinuosity (20)**		8		8
<b>Riparian and Bank Structure</b>				
Bank Stability (L) (10)	6	9	6	8
Bank Stability (R) (10)	5	9	8	8
Vegetative Protection (L) (10)	7	9	8	9
Vegetative Protection (R) (10)	7	3	8	9
Riparian Veg. Zone Width (L) (10)	2	9	3	1
Riparian Veg. Zone Width (R) (10)	2	5	3	1
<b>TOTAL SCORE (200):</b>	115	114	118	85
<b>HABITAT RATING:</b>	<b>GOOD</b> (SLIGHTLY IMPAIRED)	<b>GOOD</b> (SLIGHTLY IMPAIRED)	<b>GOOD</b> (SLIGHTLY IMPAIRED)	<b>MARGINAL</b> (MODERATELY IMPAIRED)
Date:	6/29/2010	9/3/2010	8/16/2010	6/28/2010
Weather:	Partly Cloudy	Partly Cloudy	Sunny	Sunny
Air Temperature (°F):	75	70	75	85
Water Temperature (°F):	68	71		84
Ave. Stream Width (ft):	10	9	15	12
Ave. Stream Depth (ft):	0.33	1.5	1	0.5
Surface Velocity (ft/sec):	0.2	0.75	0.2	0.75
Estimated Flow (CFS):	0.7	10.1	3.0	4.5
Stream Modifications:	Dredged	None	None	Dredged
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	580583	300283	460343	580579
County Code:	58	30	46	58
TRS:	08S08E07	07S03W20	08S01E21	07S07E14
Latitude (dd):	41.80556	41.83978	41.75769	41.86643
Longitude (dd):	-83.52091	-84.67039	-84.29107	-83.55498
Ecoregion:	HELP	ECBP	ECBP	HELP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4100001	4100003	4100003	4100001

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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).

HABITAT METRIC (Max. score)	Branch Creek Somerset Rd (Site #28) GLIDE/POOL	Nile Ditch Squawfield Rd (Site #29) GLIDE/POOL	Prouty Drain Dimmer Rd (Site #30) RIFFLE/RUN	Toad Creek Mulberry Rd (Site #31) GLIDE/POOL
<b>Substrate and Instream Cover</b>				
Epifaunal Substrate/ Avail Cover (20)	12	7	7	9
Embeddedness (20)*			14	
Velocity/Depth Regime (20)*			10	
Pool Substrate Characterization (20)**	8	8		6
Pool Variability (20)**	15	4		2
<b>Channel Morphology</b>				
Sediment Deposition (20)	11	4	7	13
Flow Status - Maint. Flow Volume (10)	7	8	10	7
Flow Status - Flashiness (10)	1	9	10	9
Channel Alteration (20)	12	14	15	17
Frequency of Riffles/Bends (20)*			9	
Channel Sinuosity (20)**	11	10		10
<b>Riparian and Bank Structure</b>				
Bank Stability (L) (10)	4	9	10	10
Bank Stability (R) (10)	4	10	10	10
Vegetative Protection (L) (10)	6	5	6	4
Vegetative Protection (R) (10)	6	10	6	4
Riparian Veg. Zone Width (L) (10)	4	4	4	3
Riparian Veg. Zone Width (R) (10)	4	10	4	3
<b>TOTAL SCORE (200):</b>	105	112	122	107
<b>HABITAT RATING:</b>	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)
Date:	7/1/2010	6/28/2010	7/28/2010	7/27/2010
Weather:	Sunny	Cloudy	Partly Cloudy	Sunny
Air Temperature (°F):	75	70	80	80
Water Temperature (°F):		78	70	86
Ave. Stream Width (ft):	25	10	6	6
Ave. Stream Depth (ft):	2	0.67	1	1
Surface Velocity (ft/sec):	1	0.5	0.75	0.1
Estimated Flow (CFS):	50.0	3.4	4.5	0.6
Stream Modifications:	Dredged	None	None	None
Nuisance Plants (Y/N):	N	N	N	Y
Report Number:				
STORET No.:	300198	300280	300165	460425
County Code:	30	30	30	46
TRS:	06S01W12	07S02W33	08S04W03	08S01E30
Latitude (dd):	41.960555	41.81117	41.79623	41.73615
Longitude (dd):	-84.381944	-84.53475	-84.75725	-84.35049
Ecoregion:	ECBP	ECBP	ECBP	ECBP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4100006	4100003	4100003	4100006

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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

HABITAT METRIC (Max. score)	Bay Creek Bay Creek Rd (Site #32) GLIDE/POOL	Posey Creek Somerset Rd (Site #33) GLIDE/POOL	Pitts Creek Raisinville Rd (Site #34) GLIDE/POOL	M B Otter Creek Minx Rd (Site #35) GLIDE/POOL	Nile Ditch Tamarack Rd (Site #36) RIFFLE/RUN
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	7	8	9	7	9
Embeddedness (20)*					11
Velocity/Depth Regime (20)*					11
Pool Substrate Characterization (20)**	12	7	7	9	
Pool Variability (20)**	6	12	2	1	
<b>Channel Morphology</b>					
Sediment Deposition (20)	14	17	18	17	6
Flow Status - Maint. Flow Volume (10)	9	9	7	8	7
Flow Status - Flashiness (10)	9	5	2	9	4
Channel Alteration (20)	9	19	6	7	16
Frequency of Riffles/Bends (20)*					8
Channel Sinuosity (20)**	8	18	4	6	
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	9	8	6	9	5
Bank Stability (R) (10)	9	8	6	9	3
Vegetative Protection (L) (10)	9	6	6	9	6
Vegetative Protection (R) (10)	9	6	6	9	6
Riparian Veg. Zone Width (L) (10)	4	4	1	1	4
Riparian Veg. Zone Width (R) (10)	9	7	1	1	5
TOTAL SCORE (200):	123	134	81	102	101
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)
Date:	6/29/2010	8/16/2010	6/28/2010	6/29/2010	7/29/2010
Weather:	Partly Cloudy	Sunny	Sunny	Cloudy	Sunny
Air Temperature (°F):	75	75	80	65	70
Water Temperature (°F):	66		71	62	78
Ave. Stream Width (ft):	25	5	10	5	8
Ave. Stream Depth (ft):	0.75	1	0.75	0.33	0.67
Surface Velocity (ft/sec):	0.2	0.2	0.1	0.1	0.75
Estimated Flow (CFS):	3.8	1.0	0.8	0.2	4.0
Stream Modifications:	Dredged	None	Dredged	Dredged	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	580451	300282	580575	580578	300228
County Code:	58	30	58	58	30
TRS:	08S08E16	06S01W02	06S08E33	07S07E24	08S02W04
Latitude (dd):	41.78899	41.97846	41.91091	41.85685	41.7463
Longitude (dd):	-83.47192	-84.38192	-83.47526	-83.53276	-84.54747
Ecoregion:	HELP	ECBP	HELP	HELP	ECBP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4100006	4100006	4100001	4100001	4100003

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 3 (cont.). Habitat Evaluation for the Maumee River Watershed, June-August 2010.

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).

HABITAT METRIC (Max. score)	Otter Creek M125 (Site #37) RIFFLE/RUN	Whitewood Creek M125 (Site #38) GLIDE/POOL	Hooper Run Drain M125 (Site #39) GLIDE/POOL	Whitewood Creek off Telegraph Rd (La Fiesta Restaurant) (Site #40) GLIDE/POOL
<b>Substrate and Instream Cover</b>				
Epifaunal Substrate/ Avail Cover (20)	19	4	4	2
Embeddedness (20)*	17			
Velocity/Depth Regime (20)*	12			
Pool Substrate Characterization (20)**		6	7	6
Pool Variability (20)**		0	6	2
<b>Channel Morphology</b>				
Sediment Deposition (20)	17	8	16	9
Flow Status - Maint. Flow Volume (10)	10	6	8	7
Flow Status - Flashiness (10)	8	9	9	9
Channel Alteration (20)	14	6	3	7
Frequency of Riffles/Bends (20)*	11			
Channel Sinuosity (20)**		3	2	4
<b>Riparian and Bank Structure</b>				
Bank Stability (L) (10)	9	6	9	8
Bank Stability (R) (10)	4	6	9	8
Vegetative Protection (L) (10)	8	4	7	7
Vegetative Protection (R) (10)	5	4	7	7
Riparian Veg. Zone Width (L) (10)	5	0	1	4
Riparian Veg. Zone Width (R) (10)	3	0	1	4
<b>TOTAL SCORE (200):</b>	142	62	89	84
<b>HABITAT RATING:</b>	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)
Date:	6/28/2010	6/29/2010	6/30/2010	6/30/2010
Weather:	Sunny	Sunny	Sunny	Sunny
Air Temperature (°F):	85	70	75	70
Water Temperature (°F):	75	74	74	
Ave. Stream Width (ft):	25	4	5	5
Ave. Stream Depth (ft):	0.75	0.25	0.33	0.25
Surface Velocity (ft/sec):	0.75	0.1	0.1	0.1
Estimated Flow (CFS):	14.1	0.1	0.2	0.1
Stream Modifications:	Dredged	Dredged	Dredged	Dredged
Nuisance Plants (Y/N):	N	N	Y	N
Report Number:				
STORET No.:	580403	580585	580587	580588
County Code:	58	58	58	58
TRS:	07S08E23	08S08E04	08S08E31	08S08E05
Latitude (dd):	41.86714	41.81657	41.74898	41.81877
Longitude (dd):	-83.45387	-83.48466	-83.52159	-83.49443
Ecoregion:	HELP	HELP	HELP	HELP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4100001	4100001	4100001	4100001

\* Applies only to Riffle/Run stream Surveys

\*\* Applies only to Glide/Pool stream Surveys

Table 4. Water Quality Sampling Results for the Maumee River Watershed and Lake Erie Tributaries, June-August 2010.  
 ND = Not Detected NS = Not Sampled

Parameter	Station							
	Durfee Creek - Packard Road (Site #1)	Unnamed tributary to Bean Creek - Sorby Road (Site #2)	Halfway Creek - Secor Road (Site #4)	Ottawa Lake outlet - Head O Lake Road (Site #5)	Halfway Creek - Smith Road (Site #13)	Toad Creek - Mullerry Road (Site #31)	Nile Creek - Tamarack Road (Site #36)	Indian Creek - Dean Road (Site #45)
Alkalinity - Bicarbonate (mg/L)	190	ND	184	284	191	ND	NS	273
Alkalinity - (CaCO <sub>3</sub> )	190	ND	184	284	191	ND	NS	273
Chloride (mg/L)	13	ND	49	28	55	ND	NS	69
Sulfate (mg/L)	24	ND	255	10	256	ND	NS	32
BOD - total 5 days (mg/L)	3	ND	ND	ND	ND	ND	ND	2
COD (mg/L)	14	33	8.2	16	7.9	28	26	17
Total Dissolved Solids (TDS) (mg/L)	260	420	790	400	780	ND	440	490
Total Kjeldahl Nitrogen (mg N/L)	0.76	0.89	0.32	0.65	0.36	1.06	0.88	0.72
Total Phosphorus (mg N/L)	0.064	0.39	0.01	0.085	0.048	0.067	0.097	0.078
Ammonia (mg N/L)	0.123	0.077	0.022	875	0.027	ND	0.107	0.089
Nitrate - Calculated (mg N/L)	0.19	0.003	0.189	1.85	0.23	ND		0.59
Nitrate + Nitrite (mg N/L)	0.21	0.006	0.194	1.87	0.24	3.7	0.88	0.61
Nitrite (mg N/L)	0.022	0.003	0.005	0.020	0.006	ND	0.048	0.025
Ortho-phosphate (mg P/L)	0.005	0.30	0.016	0.050	0.025	ND	0.055	0.049
Conductance (µmho/cm)	457		1023	645	1060	ND	694	777
pH	8.05	ND	8.17	7.79	8.16	ND		7.84
Suspended Solids (mg/L)	22	17	12	10	7	ND		ND
TOC (mg/L)	5.2	13	3.5	5.6	3	9.9	8.2	6.5
Turbidity (NTU)	11	27	5.3	14	4.9	ND	15	4.1

Table 5. Macroinvertebrate metric evaluation of Durfee Creek at Packard Rd. from 2003-2010.

METRIC	6/11/2003		6/8/2004		6/14/2005		8/16/2010	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL TAXA	17	0	14	0	19	1	26	1
MAYFLY TAXA	0	-1	0	-1	0	-1	3	1
CADDISFLY TAXA	0	-1	1	-1	1	-1	2	0
STONEFLY TAXA	0	-1	0	-1	1	1	0	-1
% MAYFLY	0.00	-1	0.00	-1	0.00	-1	24.19	1
% CADDISFLY	0.00	-1	7.14	0	1.96	0	1.08	0
% DOMINANT TAXON	40.40	0	35.71	1	44.12	0	19.89	1
% ISOPOD, SNAIL, LEECH	28.28	-1	18.57	-1	7.84	0	1.08	1
% SURFACE AIR BREATHERS	12.12	0	18.57	0	6.86	1	12.90	0
<b>TOTAL SCORE</b>		<b>-6</b>		<b>-4</b>		<b>0</b>		<b>4</b>
<b>COMMUNITY RATING</b>		<b>POOR</b>		<b>ACCEPTABLE</b>		<b>ACCEPTABLE</b>		<b>ACCEPTABLE</b>