MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
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STAFF REPORT

BIOLOGICAL SURVEYS OF SELECTED TRIBUTARIES IN THE SAGINAW RIVER WATERSHED BAY, SAGINAW, AND TUSCOLA COUNTIES JULY-SEPTEMBER 2014

As part of the five-year watershed monitoring cycle, staff from the Michigan Department of Environmental Quality (MDEQ), Water Resources Division (WRD), Surface Water Assessment Section (SWAS), conducted biological sampling in tributaries within the Saginaw River watershed between July and September 2014. Qualitative macroinvertebrate and habitat surveys were conducted within the watershed (Figure 1, Table 1) following the SWAS Procedure 51 (P51) (MDEQ, 1990; Creal et al., 1996). These surveys were used to qualitatively characterize the biotic integrity of macroinvertebrate communities with respect to existing habitat conditions at randomly selected sites within this watershed. The results are used by the SWAS's Status and Trends Program to estimate the percentage of the watershed that is supporting the other indigenous aquatic life and wildlife 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.

OBJECTIVES

These biological surveys were conducted to:

- Assess the current status and condition of individual water bodies and determine whether Michigan Water Quality Standards (WQS) are being met.
- Evaluate biological integrity temporal trends.
- Satisfy monitoring requests submitted by external and internal customers.
- Identify potential nonpoint source pollution problems.

BACKGROUND AND HISTORICAL SAMPLING EFFORTS

The Saginaw River tributaries are located in Bay, Saginaw, and Tuscola Counties. The Saginaw River main stem and tributaries are all located in the Huron-Erie Lake Plain ecoregion within the United States Geological Survey Hydrologic Unit Code 04080206 (Omernik and Gallant, 1988). This ecoregion is a broad, fertile plain punctuated by relic sand dunes and moraines. Originally, drainage was poor and elm-ash swamp and beech forests were dominant. Today, most of the area has been cleared and artificially drained and contains highly productive row crop, vegetable, and livestock farms. Urban and industrial areas are also extensive and stream habitat has been degraded by channelization, ditching, and agricultural activity (United States Environmental Protection Agency [USEPA], 2013). The watershed also drains streams that are commonly channelized and seasonally intermittent (Walker, 2011).

Previous surveys were conducted within the Saginaw River watershed in 1994, 2004, and 2009. Data from these surveys are summarized below, by year. Detailed information on biological community metrics and water chemistry are available within the individual reports.

In 1994, surveys were conducted at 1 station on Cheboyganing Creek and 1 station on Squaconning Creek (Morse, 1994). Fish communities at both reaches were scored as good. The macroinvertebrate community was scored as fair at the Cheboyganing Creek station and poor at the Squaconning Creek station. Habitat condition was scored as poor at both stations. Significant impairments included channelization, limited epifaunal substrates, and extensive deposition. Agricultural fields within the watershed were also maintained to the edge of stream banks. Nitrate, nitrite, conductivity, and total dissolved solids were elevated at Squaconning Creek and Cheboyganing Creek.

In 2004, the reaches on Squaconning and Cheboyganing Creek were revisited (Roush, 2008) and an additional site was established on the Kochville and Frankenlust Drain. Fish surveys were not conducted. Macroinvertebrate communities at all 3 sites were scored as poor. Habitat quality at all 3 sites was scored as marginal. Stream reaches were negatively impacted by narrow riparian zones, dredging, and a lack of canopy. Epifaunal substrates were buried in sediments, when present. Roush (2008) noted oil sheens, the smell of manure, and persistent anoxic conditions as identified by rocks that were black where submerged in sediment. All water chemistry parameters at Cheboyganing Creek and Squaconning Creek met WQS. However, total copper was above the chronic WQS at Kochville and Frankenlust Drain. Roush (2008) suggested that P51 may not be appropriate under flow conditions at several stations within the watershed and noted that flow at 1 site appeared to be reversed.

In 2009, 5 stations were sampled for macroinvertebrate and habitat quality on the Saginaw River and its tributaries (Walker, 2011). These stations included sites near the reaches sampled in 1994 and 2004 on the Cheboyganing and Squaconning Creek as well as 3 additional sites on the Richville Drain, Sheboygan Drain, and main branch of the Saginaw River. Fish surveys were not conducted. Macroinvertebrate scores at 4 of the sites ranged from acceptable (3 sites) to poor (1 site). The fifth site (Squaconning Creek) was not sampled for macroinvertebrate quality. Habitat quality was scored as moderately impaired (3 sites). The other two sites (Saginaw River and Squaconning Creek) were not assessed for habitat quality. Water samples were taken from Squaconning Creek only and all analytes were below WQS, at concentrations similar to the 1994 survey. Similar to the 2004 survey (Roush, 2008), several initial sites exhibited low and or reverse flows (Walker, 2011). Sites that exhibited these conditions at the time of sampling were rejected and alternate sites were chosen, when appropriate. Reverse flows in the lower Saginaw River watershed can occur as a result of seiche activity in Saginaw Bay, and these reversals can even extend into the river's tributaries (Freedman, 1974).

METHODS

Two site-selection methods were used to assess the Saginaw River watershed in 2014; these include targeted site selection and probabilistic site selection. Targeted selection includes sites chosen to fulfil specific monitoring requests, assess known or potential areas of concern, or to collect data where more information is needed. The single targeted site for 2014 (Blumfield Creek) was selected to assess attainment of WQS in an area where historic survey information was lacking. However, this site was rejected because it had stagnant flow and was not deemed appropriate for assessment with P51 protocols.

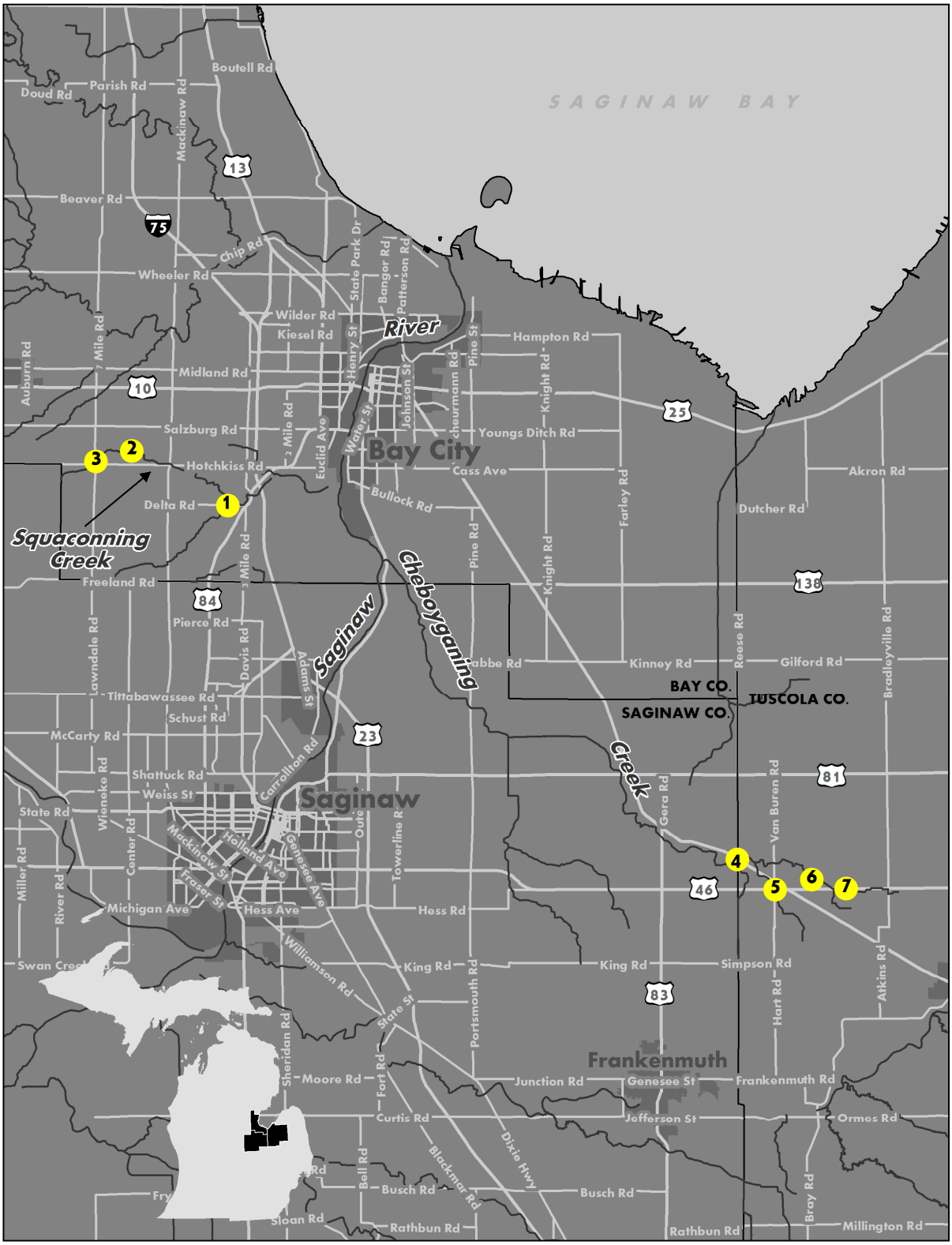
Probabilistic selection includes sites chosen at random to make status conclusions about a broader area. Following the Biological Monitoring Status and Trend Procedure, SWAS Procedure 27 (MDEQ, 2015), sampling stations were distributed among valley segment classifications in the Saginaw River and tributaries based upon the percentage of river miles each classification represents within the total stream miles of the basin.

Six probabilistically derived status sites are identified in Table 1. In addition, the present survey included 1 trend site (Table 1). Trend sites are previously selected sites that are revisited each watershed year (i.e., every 5 years). The data from probabilistic sites are used by the SWAS's Status and Trend Program to estimate the watershed attainment status for the other indigenous aquatic life and wildlife designated use component of R 323.1100(e) of the Michigan WQS, and as a baseline to measure biological integrity and temporal trends.

Qualitative macroinvertebrate and habitat surveys were performed at the wadable sites described above according to P51. Macroinvertebrate communities were scored with metrics that rate water bodies from excellent (greater than +4), to acceptable (+4 to -4), or poor (less than -4). Stream habitat was qualitatively evaluated at each station, ranging from 0 to 200. Using this scoring system, stations with scores >150 are classified as excellent, 105-154 are good, 56-104 are marginal, and <56 are classified as poor.

Digital photographs were taken upstream and downstream at each of the sites that were surveyed during this investigation, and some representative photographs are included in this report for illustrative purposes. Other photographs are available upon request.

Figure 1. Map of Saginaw River tributary monitoring stations.



2014 SURVEY RESULTS

Stations surveyed in 2014 are shown in Figure 1 and Table 1. The macroinvertebrate community and habitat assessments were performed at 7 locations within the Saginaw River tributary watersheds, including 6 status sites and 1 trend site.

Figure 2. Unnamed tributary to Richville Drain, upstream of Quanicassee Road (Station 6).

MACROINVERTEBRATES

The macroinvertebrate communities at these sites were rated (using P51 metrics) as acceptable (3 sites) to poor (4 sites), with scores ranging from -2 to -8 (Table 1 and Tables 2a and 2b). In general, macroinvertebrate communities were characterized by the absence or low abundance of stoneflies, mayflies, and caddisflies. Communities were also dominated by a high abundance of a single dominant taxa. Damselflies in the family Coenagrionidae dominated at sites 2 and 3; gastropods in the family Physidae dominated at sites 1, 4, and 7; dipterans in the family Simuliidae dominated at site 5, and amphipods dominated at site 6.

Sites that scored as acceptable (sites 5, 6, and 7) were typically characterized by a higher number of overall taxa; >1 mayfly taxa; a low percent of isopods, snails, and leeches; and a low percentage of surface breathing taxa.

HABITAT

Habitat quality at the probabilistic sites was rated as marginal (5 sites) to good (2 sites). Similar to previous studies by Walker (2011), Roush (2008) and Morse (1994), scores were negatively impacted by dredging and channelization, and stream morphology of the sampling reaches was largely homogenized (Table 3). Where present, epifaunal substrate was largely embedded in fine sediments and gravel and cobble were sparse throughout the watershed. Reaches were also characterized by flashiness and narrow (i.e., <10 feet) riparian zones adjacent to urban or agricultural land (Figures 2 and 3). Water was typically stagnant or slow-moving and algal growth was often extensive.

Figure 3. Sheboygan Creek downstream of M-46 (Station 5).

Sites with habitat quality scored as good were characterized by the presence of in-stream epifaunal substrate (i.e., cobble and woody debris); bank undercuts; alternating riffle/run or glide/pool sequences; vegetated, stable banks; and small shrubs (Figure 4).

Figure 4. Squaconning Creek downstream of Fraser Road (Station 2).

NONPOINT SOURCE

An objective of the 2014 biological survey of the Saginaw River tributaries was to identify sources of pollution that are, or have the potential to, adversely impact biological, chemical, or physical integrity of the river system. No specific nonpoint source-targeted projects were identified by the MDEQ staff for monitoring. In general, agricultural and urban development within these watersheds has overwhelming effects on hydrology and water quality. Historic physical channel manipulation (straightening) also continues to homogenize available habitat within these streams.

WATERSHED ATTAINMENT STATUS

In this 2014 study, 6 randomly selected sites within the Saginaw River watershed group were sampled to support attainment status calculation. Based on the probabilistic monitoring aspect of this watershed survey, 33.3% +/- 47.7% of the randomly selected sites supported the other indigenous aquatic life and wildlife designated use using biological monitoring procedures. Percent attainment was calculated by dividing the number of random sites that met WQS by the total number of random locations ((2/6)*100 = 33.3%). This value is coupled with a 95% confidence interval to provide our estimation of certainty, meaning there is 95% certainty that the true proportion of attainment in the Saginaw River tributaries is between 0% and 81%.

CONCLUSION

The macroinvertebrate community and habitat quality collected during the 2014 biological survey in the selected Saginaw River tributaries indicate that habitat health was marginal at 5 sites and good at 2 sites. Similar to previous reports, habitat scores were impacted by dredging, channelization, and agricultural land use. Out of the 7 sites surveyed for macroinvertebrate quality, 4 sites were rated as poor and 3 sites were rated as acceptable. These results reflect tolerant taxa, which result from flashy stream flows, siltation, and marginal in-stream bank habitat.

Finally, it has been found that strong and persistent winds along the axis of Saginaw Bay can generate seiches that cause discharge rate reductions within the Saginaw River and its tributaries. Combined with flat topography and low gradients in the ecoregion, certain locations (e.g., Dutch Creek, Saginaw River main stem) originally considered for sampling in 2014 were avoided due to the high likelihood of their being periodically influenced by reversals of flow and/or stagnant current (Saginaw Bay National Watershed Initiative, 1994). These conditions make application of P51 problematic within the Saginaw River watershed; therefore, alternate, replacement stations were sampled in this survey. Future survey work should consider the

extent and duration of regular flows to minimize the impacts that reverse flows have on survey results.

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Table 1. Station summary for the Saginaw River watershed. Data collected June-August 2014.

ID	Survey Type	Stream Name	Location	Latitude	Longitude	AUID	Macroinvertebrate Community Score and Rating		Habitat Score and Rating	
1	Status	Kochville & Frankenlust Drain	Delta Rd.	43.55177	-83.96336	040802060203-01	-6	Poor	97	Marginal
2	Status	Squaconning Creek	Fraser Rd.	43.57234	-84.01332	040802060203-01	-7	Poor	92	Marginal
3	Status	Squaconning Creek	7 Mile Rd.	43.56831	-84.03187	040802060203-01	-6	Poor	106	Good
4	Status	Cheboyganing Creek	Saginaw Rd (M15)	43.41862	-83.69845	040802060101-01	-8	Poor	90	Marginal
5	Trend	Sheboygan Drain	u/s Sanilac Rd. (M-46)	43.40717	-83.67894	040802060101-01	-2	Acceptable	109	Good
6	Status	Unnamed Tributary	Quanicassee Rd.	43.41093	-83.65987	040802060101-01	-1	Acceptable	87	Marginal
7	Status	Unnamed Tributary	off Sanilac Rd (M-46); d/s of railroad tracks	43.40764	-83.64200	040802060101-01	-4	Acceptable	99	Marginal

Table 2A. Qualitative macroinvertebrate sampling results for Saginaw River, June-August 2014

TAXA	Kochville and Frankenlust Drain Delta Road 7/28/2014 STATION 1	Squaconning Creek Fraser Road 7/28/2014 STATION 2	Squaconning Creek 7 Mile Road 9/18/2014 STATION 3	Cheboyganing Creek M15 9/18/2014 STATION 4
ANNELIDA (segmented worms)				
Hirudinea (leeches)	7		2	13
Oligochaeta (worms)	1	1	1	3
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	5			2
Decapoda (crayfish)	1	1	1	
Isopoda (sowbugs)	37	15	74	
Arachnoidea				
Hydracarina	13	34	1	3
Insecta				
Ephemeroptera (mayflies)				
Baetidae				5
Caenidae	45	8	1	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	1	2	1
Cordulegastridae	1	1		
Corduliidae	1			
Libellulidae				1
Zygoptera (damselflies)				
Calopterygidae				1
Coenagrionidae	64	153	114	77
Hemiptera (true bugs)				
Belostomatidae	3	2	1	1
Corixidae	23	41	43	63
Gerridae	4	1		1
Nepidae		1		1
Notonectidae	1			1
Pleidae	3			1
Megaloptera				
Sialidae (alder flies)		1		
Trichoptera (caddisflies)				
Hydropsychidae			3	
Leptoceridae				6
Molannidae	1			
Coleoptera (beetles)				
Dytiscidae (total)	1			1
Gyrinidae (adults)			1	
Haliplidae (adults)	3	4	12	3
Elmidae	6		3	2
Diptera (flies)				
Ceratopogonidae	6	6		1
Chironomidae	20	3	2	16
Simuliidae			6	7
Stratiomyidae			1	
Tipulidae	1		1	5
MOLLUSCA				
Gastropoda (snails)				
Lymnaeidae			8	1
Physidae	68	53	11	82
Planorbidae	3	11	1	
Pleuroceridae	8	2		
Viviparidae			1	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1			
TOTAL INDIVIDUALS	328	339	290	298

Table 2B. Macroinvertebrate metric evaluation of Saginaw River, June-August 2014

METRIC	Kochville and Frankenlust Drain Delta Road 7/28/2014 STATION 1 Value	Score	Squaconning Creek Fraser Road 7/28/2014 STATION 2 Value	Score	Squaconning Creek 7 Mile Road 9/18/2014 STATION 3 Value	Score	Cheboyganing Creek M15 9/18/2014 STATION 4 Value	Score
TOTAL NUMBER OF TAXA	27	0	19	0	22	0	25	0
NUMBER OF MAYFLY TAXA	1	-1	1	-1	1	0	1	-1
NUMBER OF CADDISFLY TAXA	1	-1	0	-1	1	-1	1	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	13.72	-1	2.36	-1	0.34	-1	1.68	-1
PERCENT CADDISFLY COMP.	0.30	-1	0.00	-1	1.03	-1	2.01	-1
PERCENT DOMINANT TAXON	20.73	0	45.13	-1	39.31	-1	27.52	-1
PERCENT ISOPOD, SNAIL, LEECH	37.50	-1	23.89	-1	33.45	-1	32.21	-1
PERCENT SURF. AIR BREATHERS	11.59	0	14.45	0	20.00	0	24.16	-1
TOTAL SCORE		-6		-7		-6		-8
MACROINV. COMMUNITY RATING		POOR		POOR		POOR		POOR

Table 2A (continued). Qualitative macroinvertebrate sampling results for Saginaw River, June-August 2014

TAXA	Sheboygan Drain Upstream M-46 7/28/2014 STATION 5	Unnamed Trib. to Richville Drain Quanicassee Road 9/18/2014 STATION 6	Unnamed Trib. to Richville Drain off M46, downstream of railroad tracks 7/28/2014 STATION 7
PLATYHELMINTHES (flatworms)			
Turbellaria	9		2
ANNELIDA (segmented worms)			
Hirudinea (leeches)	2	6	
Oligochaeta (worms)	1	13	3
ARTHROPODA			
Crustacea			
Amphipoda (scuds)	1	205	2
Decapoda (crayfish)	1	1	1
Isopoda (sowbugs)		1	
Arachnoidea			
Hydracarina	2	6	3
Insecta			
Ephemeroptera (mayflies)			
Baetidae	4	3	
Caenidae	2	1	
Odonata			
Anisoptera (dragonflies)			
Aeshnidae	1	1	6
Libellulidae		1	
Zygoptera (damselflies)			
Calopterygidae		2	
Coenagrionidae	8	5	6
Hemiptera (true bugs)			
Belostomatidae		1	1
Corixidae	26	3	7
Gerridae		1	1
Notonectidae	1		
Trichoptera (caddisflies)			
Hydroptilidae			3
Coleoptera (beetles)			
Dytiscidae (total)	1		
Gyrinidae (adults)	1	1	
Haliplidae (adults)	1	1	3
Hydrophilidae (total)		1	
Dryopidae	1		
Elmidae	3		
Diptera (flies)			
Ceratopogonidae	1	1	1
Chironomidae	28	50	42
Culicidae		1	
Dixidae		2	
Simuliidae	235	9	14
MOLLUSCA			
Gastropoda (snails)			
Lymnaeidae		2	
Physidae		4	157
Planorbidae		3	9
Pleuroceridae			55
Pelecypoda (bivalves)			
Sphaeriidae (clams)		1	1
TOTAL INDIVIDUALS	329	326	317

Table 2B (continued). Macroinvertebrate metric evaluation of Saginaw River, June-August 2014

METRIC	Sheboygan Drain Upstream M-46 7/28/2014 STATION 5 Value	Score	Unnamed Trib. to Richville Drain Quanicassee Road 9/18/2014 STATION 6 Value	Score	Unnamed Trib. to Richville Drain off M46, downstream of railroad tracks 7/28/2014 STATION 7 Value	Score
TOTAL NUMBER OF TAXA	20	0	27	1	19	1
NUMBER OF MAYFLY TAXA	2	1	2	1	0	-1
NUMBER OF CADDISFLY TAXA	0	-1	0	-1	1	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	1.82	-1	1.23	-1	0.00	-1
PERCENT CADDISFLY COMP.	0.00	-1	0.00	-1	0.95	-1
PERCENT DOMINANT TAXON	71.43	-1	62.88	-1	49.53	-1
PERCENT ISOPOD, SNAIL, LEECH	0.61	1	4.91	1	69.72	-1
PERCENT SURF. AIR BREATHERS	9.12	1	2.76	1	3.79	1
TOTAL SCORE		-2		-1		-4
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.

Table 3. Habitat evaluation for Saginaw River watershed, June-August 2014

HABITAT METRIC	Kochville and Frankenlust Drain Delta Road GLIDE/POOL STATION 1	Squaconning Creek Fraser Road GLIDE/POOL STATION 2	Squaconning Creek 7 Mile Road GLIDE/POOL STATION 3	Cheboyganing Creek M15 RIFFLE/RUN STATION 4
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	6	7	11	11
Embeddedness (20)*				5
Velocity/Depth Regime (20)*				10
Pool Substrate Characterization (20)**	8	11	13	
Pool Variability (20)**	3	2	2	
Channel Morphology				
Sediment Deposition (20)	16	10	15	8
Flow Status - Maint. Flow Volume (10)	9	9	9	5
Flow Status - Flashiness (10)	4	8	4	2
Channel Alteration (20)	18	10	12	13
Frequency of Riffles/Bends (20)*				14
Channel Sinuosity (20)**	2	3	8	
Riparian and Bank Structure				
Bank Stability (L) (10)	6	8	6	2
Bank Stability (R) (10)	6	8	6	2
Vegetative Protection (L) (10)	5	6	8	5
Vegetative Protection (R) (10)	5	6	8	5
Riparian Veg. Zone Width (L) (10)	3	3	2	4
Riparian Veg. Zone Width (R) (10)	6	1	2	4
TOTAL SCORE (200):	97	92	106	90
HABITAT RATING:	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)

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

Date:	7/28/2014	7/28/2014	9/18/2014	9/18/2014
Weather:	Cloudy	Cloudy	Cloudy	Cloudy
Air Temperature:	66 Deg. F.	72 Deg. F.	55 Deg. F.	55 Deg. F.
Water Temperature:	66 Deg. F.	68 Deg. F.	55 Deg. F.	54 Deg. F.
Ave. Stream Width:	18.6 Feet	13.7 Feet	9.5 Feet	15.7 Feet
Ave. Stream Depth:	1 Feet	1.3 Feet	0.1 Feet	0.6 Feet
Surface Velocity:	0.06 Ft./Sec.	0.32 Ft./Sec.	0.24 Ft./Sec.	0.45 Ft./Sec.
Estimated Flow:	1.116 CFS	5.6992 CFS	0.228 CFS	4.239 CFS
Stream Modifications:	Dredged	Dredged	Dredged	Dredged
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	90295	90296	90297	790213
Stream Name:	Kochville and Frankenlust Drain	Squaconning Creek	Squaconning Creek	Cheboyganing Creek
Road Crossing/Location:	Delta Road	Fraser Road	7 Mile Road	M15
County Code:	09	09	09	79
TRS:	13N04E11	14N04E32	14N04E31	12N07E30
Latitude (dd):	43.551771	43.57234	43.56831	43.41862
Longitude (dd):	-83.96336	-84.01332	-84.03187	-83.69845
Ecoregion:	HELP	HELP	HELP	HELP
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4080206	4080206	4080206	4080206

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

COMMENTS:

Table 3 (continued). Habitat evaluation for Saginaw River, June-August 2014

HABITAT METRIC	Sheboygan Drain Upstream M-46 RIFFLE/RUN STATION 5	Unnamed Tributary to Richville Drain Quanicassee Road GLIDE/POOL STATION 6	Unnamed Tributary to Richville Drain off M46; d/s of railroad tracks GLIDE/POOL STATION 7
Substrate and Instream Cover			
Epifaunal Substrate/ Avail Cover (20)	8	7	10
Embeddedness (20)*	11		
Velocity/Depth Regime (20)*	15		
Pool Substrate Characterization (20)**		11	11
Pool Variability (20)**		1	9
Channel Morphology			
Sediment Deposition (20)	15	17	12
Flow Status - Maint. Flow Volume (10)	8	9	8
Flow Status - Flashiness (10)	8	8	6
Channel Alteration (20)	10	7	5
Frequency of Riffles/Bends (20)*	8		
Channel Sinuosity (20)**		3	8
Riparian and Bank Structure			
Bank Stability (L) (10)	6	5	7
Bank Stability (R) (10)	6	5	7
Vegetative Protection (L) (10)	6	6	6
Vegetative Protection (R) (10)	6	6	6
Riparian Veg. Zone Width (L) (10)	1	1	2
Riparian Veg. Zone Width (R) (10)	1	1	2
TOTAL SCORE (200):	109	87	99
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)

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

Date:	7/28/2014	9/18/2014	7/28/2014
Weather:	Partly Cloudy	Cloudy	Partly Cloudy
Air Temperature:	72 Deg. F.	55 Deg. F.	69 Deg. F.
Water Temperature:	66 Deg. F.	56 Deg. F.	66 Deg. F.
Ave. Stream Width:	9 Feet	6 Feet	5.5 Feet
Ave. Stream Depth:	0.6 Feet	0.7 Feet	0.9 Feet
Surface Velocity:	0.7 Ft./Sec.	0.81 Ft./Sec.	0.96 Ft./Sec.
Estimated Flow:	3.78 CFS	3.402 CFS	4.752 CFS
Stream Modifications:	Dredged	Dredged	Dredged
Nuisance Plants (Y/N):	N	N	N
STORET No.:	790196	790214	790212
Stream Name:	Sheboygan Drain	Unnamed Tributary to Richville Drain	Unnamed Tributary to Richville Drain
Road Crossing/Location:	Upstream M-46	Quanicassee Road	off M46; d/s of railroad tracks
County Code:	79	79	79
TRS:	12N07E32	12N07E29	12N07E03
Latitude (dd):	43.40717	43.41093	43.40764
Longitude (dd):	-83.67894	-83.65987	-83.642
Ecoregion:	HELP	HELP	HELP
Stream Type:	Warmwater	Warmwater	Warmwater
USGS Basin Code:	4080206	4080206	4080206

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

COMMENTS: