

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
MARCH 2014

STAFF REPORT

A BIOLOGICAL SURVEY OF THE GALIEN RIVER WATERSHED
BERRIEN COUNTY, MICHIGAN
SEPTEMBER 2012

INTRODUCTION

Objective

Qualitative biological surveys of the Galien River watershed (Hydrologic Unit Code 04040001) were conducted by staff of the Michigan Department of Environmental Quality (MDEQ), Surface Water Assessment Section (SWAS), during September 2012. The surveys were performed according to the SWAS Procedure 51 (MDEQ 1990; Creal et al., 1996) at five sites (Figure 1) to evaluate biological communities and physical conditions of selected locations. The specific objectives of the survey were to:

- Assess the current status and condition of individual waters of the state and determine whether Michigan Water Quality Standards are being met.
- Assess biological integrity and temporal trends in the watershed.

Background and Historical Sampling

The Galien River watershed is within the Southern Michigan Northern Indiana Till Plain (SMNITP) ecoregion (Omernik and Gallant, 1988). The SMNITP is characterized by lacustrine clay and silt soils, and historically white oak-white pine forest. The Galien River watershed is located in Berrien County and flows primarily through agricultural land. The watershed originates at the outlet of Dayton Lake and connects with Lake Michigan in the town of New Buffalo. This watershed has experienced channelization and dredging of streams and draining of wetlands making it difficult to sustain adequate habitat in various stream locations. Numerous biological surveys have been conducted by MDEQ staff in the Galien River watershed including 1997 (Bonnette, 2000), 2002 (Walterhouse, 2003), and 2007 (Wesener, 2009).

The Galien River watershed was last sampled by the MDEQ in September 2007. The 2007 survey included Procedure 51 sampling at six (five status and one targeted) sites. Habitat evaluations showed sites to be Good (two sites), Marginal (three sites), and Poor (one site) (Wesener, 2009). All of the sites showed signs of flashiness with bank scour and sediment input. Spring Creek at Avery Road scored Poor due to the lack of structure in the stream, lack of sinuosity, and poor vegetative protection along the banks. The surrounding agricultural area has manipulated the topography and created nonpoint source issues throughout the watershed. Macroinvertebrate communities were rated as Acceptable (ranging from -4 to 3) at all sites (Wesener, 2009). Five of the six sites were dominated by Amphipods. Deer Creek at Basswood Road was the only site without any amphipods and was dominated by chironomids. The Other Indigenous Aquatic Life and Wildlife designated use was being met based on Procedure 51 macroinvertebrate communities at all sites where sampling occurred.

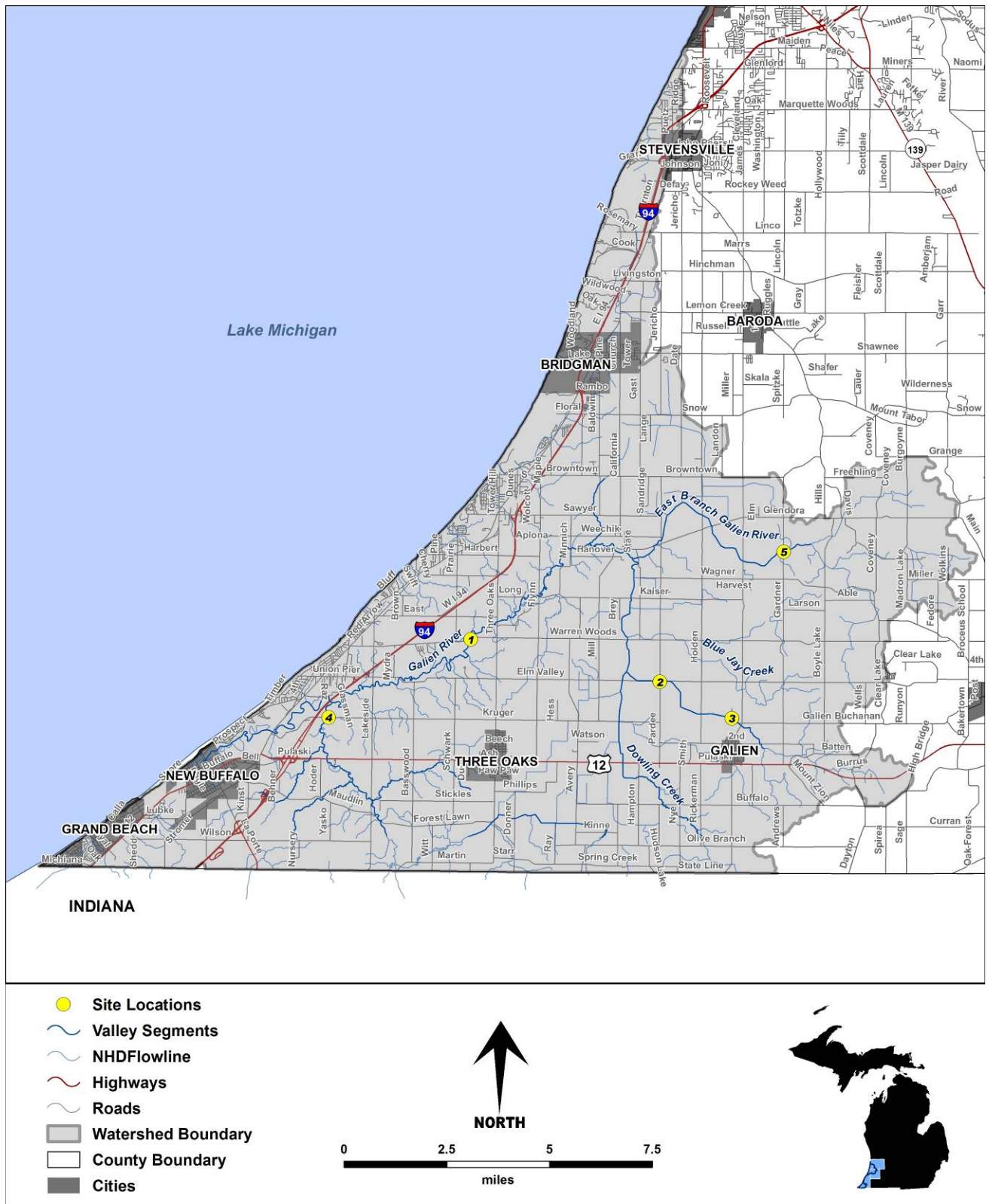


Figure 1. Galien River Watershed, 2012 Survey Site Locations.

METHODS

Procedure 51 describes the methodology for macroinvertebrate, fish, and habitat surveys of wadeable streams and rates macroinvertebrate communities as Poor (-9 to -5), Acceptable (-4 to +4), and Excellent (+5 to +9), based on the proportions of each taxa found, and the sensitivity of the community assemblage to water quality. Habitat is rated on a scale of Poor (<56), Marginal (56-104), Good (105-154), or Excellent (>154) based on in-stream and riparian characteristics and impairments.

The site-selection method used to assess the Galien River watershed in 2012 was *stratified random* to address statewide, regional, and watershed questions about water quality. There were four randomly selected status sites and one randomly selected trend site that is fixed to be sampled every five years (Table 1). Macroinvertebrates (targeting 300 individual) and habitat were assessed at each monitoring site.

RESULTS

Status and Trend Surveys

Macroinvertebrate communities (Tables 2A and 2B) and Habitat (Table 3) in wadeable streams were sampled and scored using Procedure 51. All sites had Acceptable macroinvertebrate community ratings, with scores ranging from -2 to 4. Two sites had Marginal habitat scores while the other three had Good habitat scores.



Site 1. Galien River upstream of Warren Woods Road.

Site 1. This glide/pool site had an Acceptable (2) macroinvertebrate score and a Good (125) habitat score. The stream was surrounded with a hardwood floodplain and large woody debris was within the stream. Silt was the dominant substrate in this low gradient, meandering river. The site is also flashy with signs of bank scour along the sampled stretch. Hydropsychids and chironomids were the dominant macroinvertebrates.



Site 2. Galien River upstream of Pardee Road.

Site 2. This glide/pool site had an Acceptable (0) macroinvertebrate score and a Marginal (90) habitat score. This site had been recently dredged, had a thin riparian wooded buffer, and was completely surrounded by corn fields. Some rootwads and large woody debris were in this sandy stretch of river. The macroinvertebrate community was dominated by oligochaetes and amphipods.



Site 3. Galien River at Hess Road.

Site 3. This riffle/run site had an Acceptable (4) macroinvertebrate community and a Good (115) habitat score. The substrate was dominated by gravel with moderate levels of rootwads. The site is surrounded by soybean fields and has a limited vegetative buffer zone. The macroinvertebrate community was at the high end of Acceptable with a dominance of hydropsychids and amphipods. This site had a relatively large number of caddisfly taxa.



Site 4. South Branch Galien River at Kruger Road.

Site 4. This glide/pool site had an Acceptable (2) macroinvertebrate score and a Good (130) habitat score. The river had recent bank stabilization installed along this sandy, low gradient stream. This site had the highest number of total taxa out of all five sites. The majority of macroinvertebrates consisted of corixids.



Site 5. East Branch Galien River upstream Gardner Road.

Site 5. This glide/pool site had an Acceptable (-2) macroinvertebrate community and a Marginal (99) habitat score. The substrate is primarily sand with signs of recent dredging. The surrounding landscape consists of soybean and corn fields as well as a thin riparian buffer of mature hardwoods. The macroinvertebrate community consisted primarily of amphipods (91 percent).

Table 1. 2012 Sampling Locations in the Galien River Watershed.

Site Number	Stream	Survey Location	County	Latitude	Longitude	Basis of Survey Trend (T) Status (S)	Sampling Parameters	Habitat Evaluation		Macroinvertebrate Community	
1	Galien River	Warren Woods Road	Berrien	41.84152	86.62224	S	Bugs and Habitat	Good	125	Acceptable	2
2	Galien River	Pardee Road	Berrien	41.827	86.5329	T	Bugs and Habitat	Marginal	90	Acceptable	0
3	Galien River	Hess Road	Berrien	41.81424	86.49894	S	Bugs and Habitat	Good	115	Acceptable	4
4	South Branch Galien River	West Kruger Road	Berrien	41.81369	86.68892	S	Bugs and Habitat	Good	130	Acceptable	2
5	East Branch Galien River	Gardner Road	Berrien	41.87308	86.47485	S	Bugs and Habitat	Marginal	99	Acceptable	-2

DISCUSSION

The streams in the Galien River watershed have experienced heavy manipulation as a result of agricultural practices and channelization/dredging of drains. When a stream is dredged, it removes most of the habitat that existed within the streambed including large woody debris, leaf packs, and cobble. The removal of this habitat increases the flow of the stream since the water has less resistance and changes the dynamics of that stretch of stream. An area that once was a slow pool area may become a glide. An increase in water velocity can scour the banks and remove vegetative protection in its path. The macroinvertebrate community continues to score as Acceptable despite the lack of stable habitat and the changing dynamics of flow. The macroinvertebrate community would benefit from the termination of dredging, installation of bank stabilization, and placement of cobble/gravel substrate. The increase in available habitat and reduction of flow flashiness within the watershed would increase diversity in the macroinvertebrate community.

Field work by: Seth Wright, Aquatic Biologist
Great Lakes Environmental Center

Mike Walterhouse, Aquatic Biologist
Surface Water Assessment Section
Water Resources Division

Report by: Marcy Knoll Wilmes, Aquatic Biologist
Surface Water Assessment Section
Water Resources Division

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Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Galien River u/s Warren Woods Rd 9/18/2012 STATION 1		Galien River u/s Pardee Rd 9/18/2012 STATION 2		Galien River Hess Rd 9/18/2012 STATION 3		South Branch Galien River Kruger Rd 9/18/2012 STATION 4	
	Value	Score	Value	Score	Value	Score	Value	Score
PLATYHELMINTHES (flatworms)								
Turbellaria					2			
ANNELIDA (segmented worms)								
Hirudinea (leeches)					2			
Oligochaeta (worms)	40		108		15		9	
ARTHROPODA								
Crustacea								
Amphipoda (scuds)	10		127		85		43	
Decapoda (crayfish)	1		1		2		1	
Isopoda (sowbugs)			1				2	
Arachnoidea								
Hydracarina	19		1				6	
Insecta								
Ephemeroptera (mayflies)								
Baetidae	35		9		47		13	
Ephemerellidae					1			
Heptageniidae	9		7		13		2	
Odonata								
Anisoptera (dragonflies)								
Aeshnidae	1				1			
Gomphidae	1						3	
Libellulidae					1			
Zygoptera (damselflies)								
Calopterygidae	23		28		1		25	
Coenagrionidae			2		1			
Plecoptera (stoneflies)								
Perlidae							1	
Hemiptera (true bugs)								
Corixidae			5				100	
Ceridae	1		1		2		2	
Veliidae	2		1				1	
Megaloptera								
Corydalidae (dobson flies)	1				1		2	
Sialidae (alder flies)	13		1				5	
Trichoptera (caddisflies)								
Brachycentridae	6		3		3		21	
Glossomatidae					1			
Hydropsychidae	99		8		93		24	
Hydroptilidae							2	
Leptoceridae	1						7	
Limnephilidae	1				1		1	
Uenoidae					5			
Coleoptera (beetles)								
Halipidae (adults)							1	
Hydrophilidae (total)					1		1	
Elmidae	22		4		24		9	
Diptera (flies)								
Athericidae					10			
Ceratopogonidae			2				1	
Chironomidae	73		43		23		33	
Simuliidae	3				10		2	
Tabanidae	8		5		2		2	
Tipulidae					1			
MOLLUSCA								
Gastropoda (snails)								
Hydrobiidae							13	
Physidae			1				6	
Pelecypoda (bivalves)								
Corbiculidae							10	
Sphaeriidae (clams)	1		2					
TOTAL INDIVIDUALS								
	370		360		348		348	
METRIC								
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	0	21	0	26	1	30	1
NUMBER OF MAYFLY TAXA	2	0	2	0	3	0	2	0
NUMBER OF CADDISFLY TAXA	4	0	2	0	5	1	5	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	1	1
PERCENT MAYFLY COMP.	11.89	0	4.44	0	17.53	0	4.31	0
PERCENT CADDISFLY COMP.	28.92	1	3.06	-1	29.60	1	15.80	0
PERCENT DOMINANT TAXON	26.76	0	35.28	0	26.72	0	28.74	0
PERCENT ISOPOD, SNAIL, LEECH	0.00	1	0.56	1	0.57	1	6.03	0
PERCENT SURF. AIR BREATHERS	0.81	1	1.94	1	0.86	1	30.17	-1
TOTAL SCORE								
		2		0		4		2
MACROINV. COMMUNITY RATING								
	ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.	

Table 2B. Qualitative macroinvertebrate sampling results for
 East Branch Galien River
 u/s Gardner Rd
 9/18/2012
 TAXA STATION 5

ANNELEIDA (segmented worms)	
Hirudinea (leeches)	1
Oligochaeta (worms)	2
ARTHROPODA	
Crustacea	
Amphipoda (scuds)	360
Decapoda (crayfish)	1
Insecta	
Ephemeroptera (mayflies)	
Heptageniidae	4
Odonata	
Zygoptera (damselflies)	
Calopterygidae	5
Coenagrionidae	1
Hemiptera (true bugs)	
Corixidae	1
Gerridae	1
Veliidae	1
Megaloptera	
Sialidae (alder flies)	1
Trichoptera (caddisflies)	
Hydropsychidae	1
Limnephilidae	1
Coleoptera (beetles)	
Elmidae	8
Diptera (flies)	
Chironomidae	1
Tipulidae	1
MOLLUSCA	
Gastropoda (snails)	
Hydrobiidae	1
Planorbidae	1
Viviparidae	1
Pelecypoda (bivalves)	
Sphaeriidae (clams)	2
TOTAL INDIVIDUALS	395

East Branch Galien River u/s Gardner Rd 9/18/2012 STATION 5		
METRIC	Value	Score
TOTAL NUMBER OF TAXA	20	0
NUMBER OF MAYFLY TAXA	1	0
NUMBER OF CADDISFLY TAXA	2	0
NUMBER OF STONEFLY TAXA	0	-1
PERCENT MAYFLY COMP.	1.01	-1
PERCENT CADDISFLY COMP.	0.51	-1
PERCENT DOMINANT TAXON	91.14	-1
PERCENT ISOPOD, SNAIL, LEECH	1.01	1
PERCENT SURF. AIR BREATHERS	0.76	1
TOTAL SCORE		-2
MACROINV. COMMUNITY RATING	ACCEPT.	

Table 3. Habitat evaluation for

	Galien River u/s Warren Woods Rd GLIDE/POOL	Galien River u/s Pardee Rd GLIDE/POOL	Galien River Hess Rd RIFFLE/RUN	South Branch Galien River Kruger Rd GLIDE/POOL	East Branch Galien River u/s Gardner Rd GLIDE/POOL
HABITAT METRIC					
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	10	8	13	8	10
Embeddedness (20)*			13		
Velocity/Depth Regime (20)*			15		
Pool Substrate Characterization (20)**	10	8		8	10
Pool Variability (20)**	11	8		13	10
Channel Morphology					
Sediment Deposition (20)	10	10	13	13	11
Flow Status - Maint. Flow Volume (10)	6	6	7	7	6
Flow Status - Flashiness (10)	2	2	3	2	3
Channel Alteration (20)	15	11	13	16	11
Frequency of Riffles/Bends (20)*			8		
Channel Sinuosity (20)**	11	3		15	6
Riparian and Bank Structure					
Bank Stability (L) (10)	6	7	5	8	5
Bank Stability (R) (10)	6	7	5	8	5
Vegetative Protection (L) (10)	9	8	8	9	8
Vegetative Protection (R) (10)	9	8	8	9	8
Riparian Veg. Zone Width (L) (10)	10	2	2	10	3
Riparian Veg. Zone Width (R) (10)	10	2	2	4	3
TOTAL SCORE (200):	125	90	115	130	99
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY 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:	9/18/2012	9/18/2012	9/18/2012	9/18/2012	9/18/2012
Weather:	Partly Cloudy	Rainy	Cloudy	Partly Cloudy	Cloudy
Air Temperature:	63 Deg. F.	61 Deg. F.	60 Deg. F.	60 Deg. F.	62 Deg. F.
Water Temperature:	64 Deg. F.	60 Deg. F.	59 Deg. F.	62 Deg. F.	60 Deg. F.
Ave. Stream Width:	40 Feet	15 Feet	14 Feet	30 Feet	10 Feet
Ave. Stream Depth:	2 Feet	0.75 Feet	0.3 Feet	1 Feet	0.2 Feet
Surface Velocity:	0.4 Ft./Sec.	0.5 Ft./Sec.	0.7 Ft./Sec.	0.6 Ft./Sec.	0.4 Ft./Sec.
Estimated Flow:	32 CFS	5.625 CFS	2.94 CFS	18 CFS	0.8 CFS
Stream Modifications:	None	Dredged	Dredged	Bank Stabilization	Dredged
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	110797	110651	110795	110796	110648
Stream Name:	Galien River	Galien River	Galien River	South Branch Galien River	East Branch Galien River
Road Crossing/Location:	u/s Warren Woods Rd	u/s Pardee Rd	Hess Rd	Kruger Rd	u/s Gardner Rd
County Code:	11	11	11	11	11
TRS:	07S20W27	07S19W33	07S19W34	08S21W1	07S19W12
Latitude (dd):	41.84152	41.827198	41.81424	41.81369	41.87308
Longitude (dd):	-86.62224	-86.532659	-86.49894	-86.68892	-86.47485
Ecoregion:	SMNITP	SMNITP	SMNITP	SMNITP	SMNITP
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4040001	4040001	4040001	4040001	4040001

* Applies only to Riffle/Run stream Surveys

** Applies only to Glide/Pool stream Surveys