

Elkhart ~ South Bend Aquatic Community Monitoring



City of Elkhart
Public Works & Utilities

Rod Roberson, Mayor



Annual Report 2022

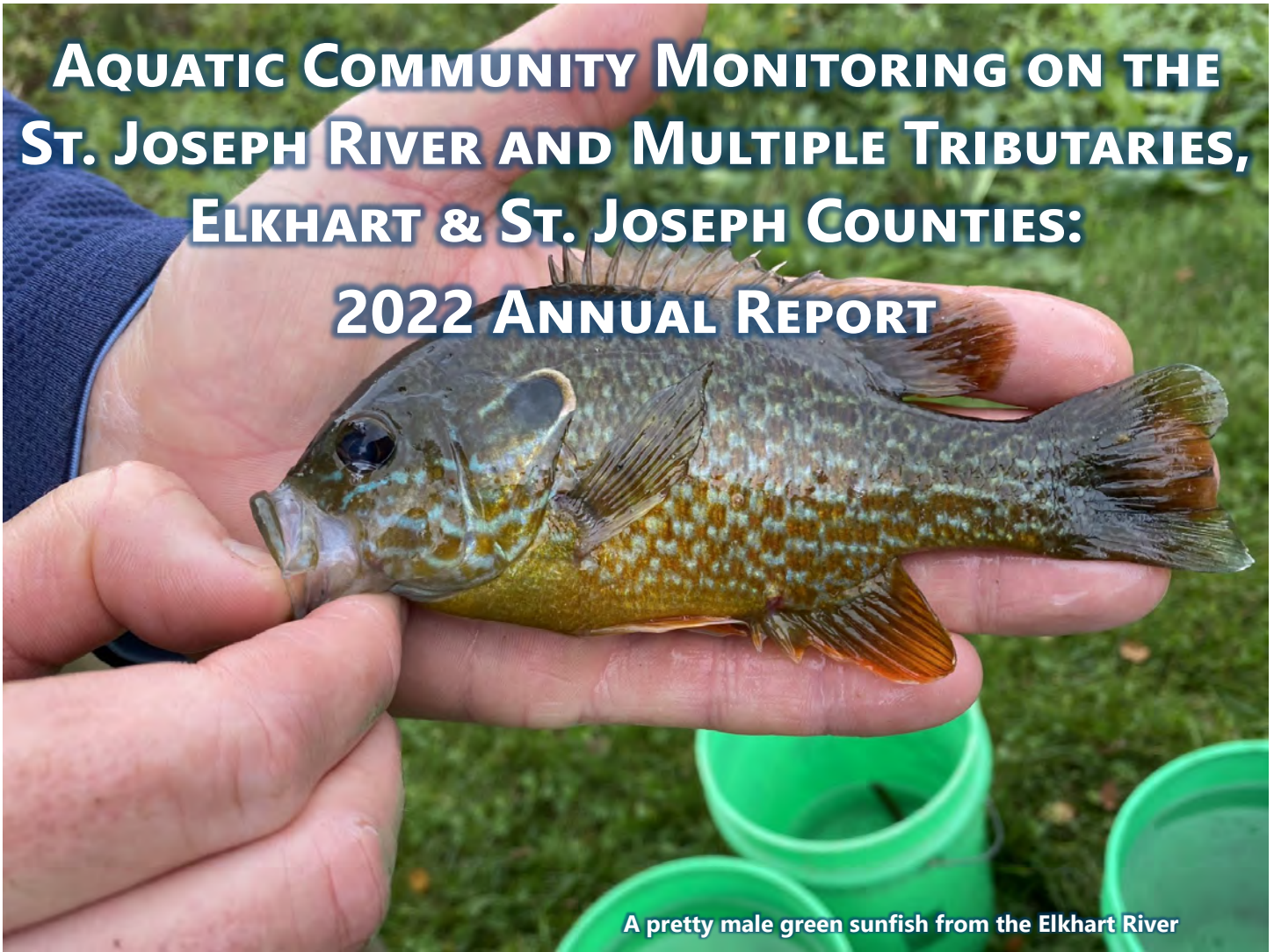


Cover Photo: A young greater redhorse collected from Sherman Street on the St. Joseph River in Elkhart

TABLE OF CONTENTS

INTRODUCTION AND METHODS	1
RESULTS AND DISCUSSION.....	5
ST. JOSEPH RIVER.....	5
ELKHART RIVER.....	7
BOWMAN CREEK.....	8
JUDAY CREEK.....	9
YELLOW CREEK.....	9
LILY CREEK	9
LITTLE ELKHART RIVER	9
CHRISTIANA CREEK.....	10
PUTERBAUGH CREEK	10
COBUS CREEK.....	10
BAUGO CREEK.....	11
FISH TISSUE	11
TURTLE SAMPLING	13
CRAYFISH SAMPLING	16
RAPID TRASH ASSESSMENTS	17
CONCLUSION.....	19
ACKNOWLEDGEMENTS.....	20
REFERENCES	20
APPENDICES	
APPENDIX A (Biological Assessment Introduction and Methodology)	
APPENDIX B (Fish tissue preparation and results)	
APPENDIX C (Summary of fish collected by county, 2022)	
APPENDIX D (Summary of fish collected by site, 2022)	
APPENDIX E (Summary of macroinvertebrates collected by site, 2022)	
APPENDIX F (Aerial site location maps)	
APPENDIX G (Rapid Trash Assessment Results)	
APPENDIX H (IBI Calculations)	

AQUATIC COMMUNITY MONITORING ON THE ST. JOSEPH RIVER AND MULTIPLE TRIBUTARIES, ELKHART & ST. JOSEPH COUNTIES: 2022 ANNUAL REPORT



A pretty male green sunfish from the Elkhart River

**PREPARED BY
DARAGH DEEGAN
AQUATIC BIOLOGIST
INTRODUCTION**

For many years, the cities of South Bend and Elkhart have collected surface water samples from our local rivers to evaluate pollutant concentrations. In 1998, the City of Elkhart initiated biological community monitoring to compliment chemical and microbial sampling and to establish a long-term stream monitoring program. The City of South Bend joined forces with Elkhart in 2001, and since then both communities have gathered a great deal of information on the health of our local waterways.

In 2022, the cities of South Bend and Elkhart, through the Aquatic Community Monitoring Program (Aquatics Program), continued to monitor local fish and macroinvertebrate communities in area rivers and streams. The information gathered was integrated into an overall water quality program for each city. While the cities measure the chemical and microbial composition of local stream water, the additional biological data provides a more accurate representation of the overall health of the stream. The way that biological communities are assembled can change as a result of a disturbance, such as a chemical spill or alteration of habitat. Chemical and microbial testing, which can play an important role in pinpointing contaminants, is simply a snapshot of current conditions. In many cases, having both sets of data can help determine the cause and effect of disturbances to our local streams.



A beautiful male bowfin from Christiana Creek. Male bowfin often have bright green markings and a prominent "false eye" on their tail

The Aquatics Program is a unique bi-community initiative that evaluates the health of the St. Joseph River in Elkhart County and St Joseph County. While the Program operates out of the City of Elkhart, the City of South Bend co-sponsors the program. The City of Goshen also sponsors educational activities in the Goshen area.

Baseline fish community monitoring was conducted in Elkhart County from 1998 to 2003 and in St. Joseph County it was conducted from 2001 to 2006.

Other biological monitoring efforts in the area include:

- Sampling in the Mishawaka area from 2007 to 2009.
- Sampling in the Goshen area in 2009 and 2010.
- An in-depth sampling initiative in the Cobus Creek Watershed in 2016.
- An evaluation of aquatic plant communities in the St. Joseph River Watershed in 2017 and 2018.

The Index of Biotic Integrity (IBI) (Simon, 1997) is the sys-



A stonecat collected from the St. Joe in South Bend

tem that is used to assess local fish communities. The IBI scores a stream based on a range of 0 to 60 with 0 being very poor and 60 being perfect. The IBI is a great tool in that complex biological information can be analyzed to provide measurements of stream quality for non-biologists and members of the general public. The IBI is comprised of 12 different categories known as metrics, which are used to evaluate ecological balance within the fish communities. Examples of metrics include the number of species present in the sample or the % of the sample that are insectivores.

Fish are not the only animal that are used to evaluate stream health. The Aquatics Program also monitors macroinvertebrates as a secondary group that provides additional information on stream health. The Invertebrate Community Index (ICI) (Ohio EPA, 1987) is used to evaluate macroinvertebrates and is similar in structure to the IBI, with numerous metrics and a score range of 0 to 60.

Habitat is also evaluated at every site where a fish community survey is completed using the Qualitative Habitat Evaluation Index (QHEI) (Rankin, 1989).

The QHEI is structured similarly to the IBI in that it is comprised of numerous metrics that tally-up to provide a score ranging from 0-100.

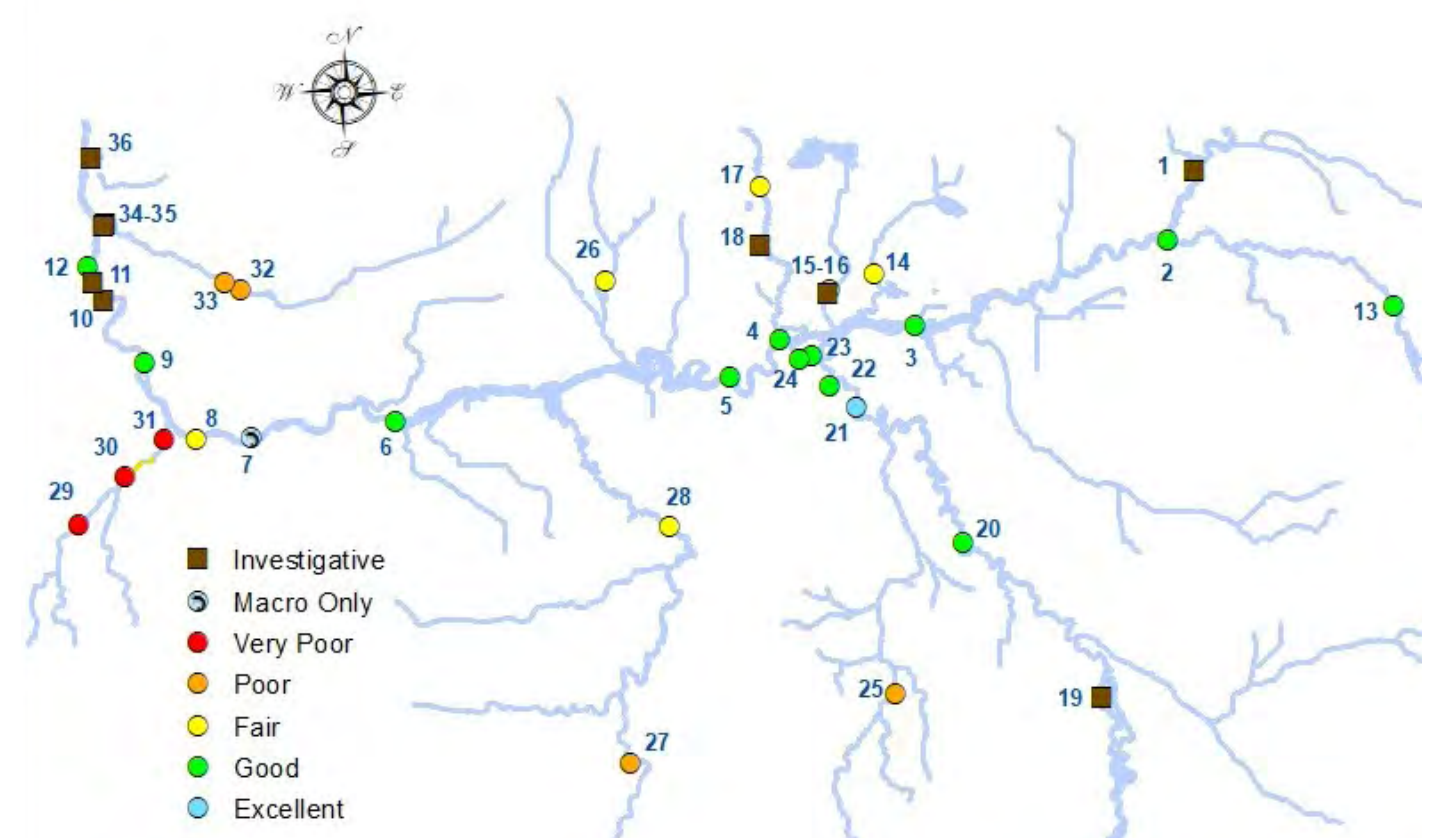
The Aquatics Program is comprised of a full-time biologist and college interns that help collect fish during the summer.

2022 Staff:

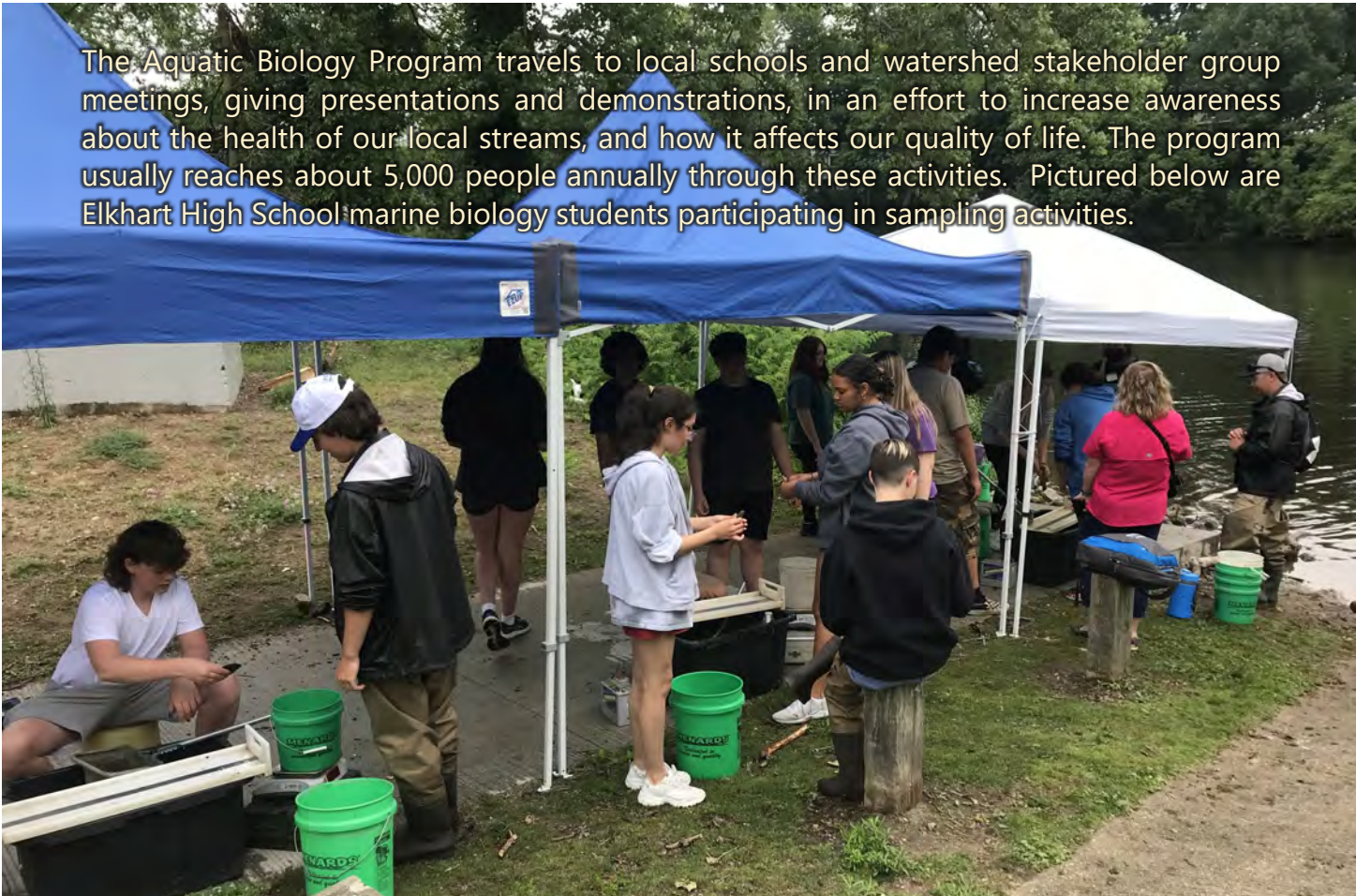
Daragh Deegan, Aquatic Biologist;
daragh.deegan@coei.org

Interns: Leo Thurin, Mel Hendrickson, Noah Haas, Owen Slater

Figure 1: Fish sampling sites in Elkhart and St. Joseph Counties and associated fish community conditions for 2022 (see Table 11 for site information)



The Aquatic Biology Program travels to local schools and watershed stakeholder group meetings, giving presentations and demonstrations, in an effort to increase awareness about the health of our local streams, and how it affects our quality of life. The program usually reaches about 5,000 people annually through these activities. Pictured below are Elkhart High School marine biology students participating in sampling activities.





A pretty pumpkinseed sunfish

Biological Survey Methods

Sites were sampled using two basic methods: Index and Investigative sampling. Investigative samples are more exploratory in nature and are generally used to gauge species composition and general stream characteristics. Index evaluations are more thorough; the data from Index samples are used to complete stream health measurements. Index samples include:

- Conducting electrofishing surveys on stream segments that are 15 times the width of the stream up to a maximum of 500 meters.
- Conducting 2 surveys on the same stream segment with a 5-week rest period (Index scores are averaged from the 2 surveys).
- Collecting length and weight data from each individual game fish.
- Collecting the maximum and minimum length and combined weight of all non-game species.

Macroinvertebrate sampling was also conducted at most Index sites. Hester-Dendy samplers (artificial substrates used to collect small aquatic organisms) (pictured below) were deployed at 22 Index sites in 2022. Additional sampling with a D-net is also conducted at each site for macroinvertebrates as a back-up for sites where Hester-Dendy samples are lost or disturbed.

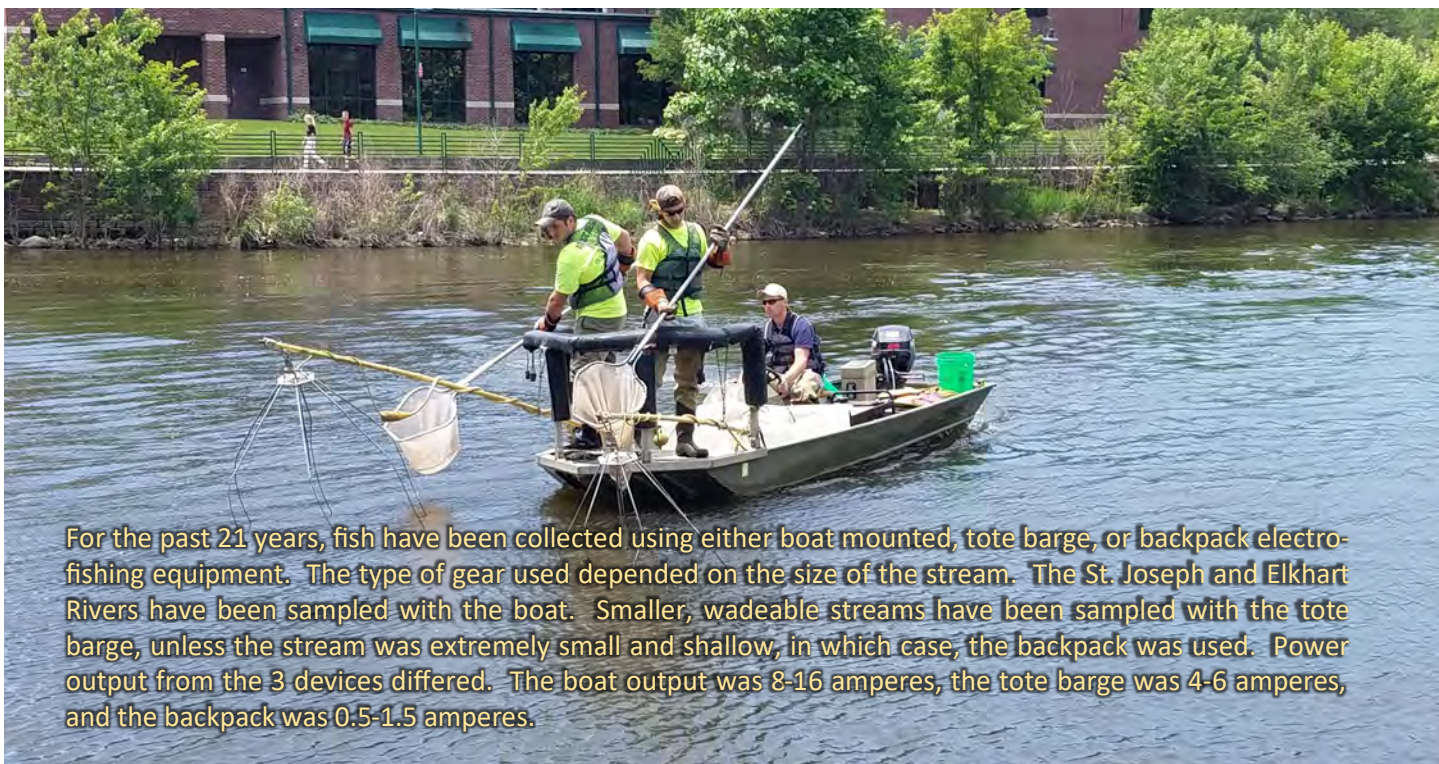
Long-term Index monitoring consists of rotational sampling of sites. Each station is visited at least once every 3 years to gather biological and chemical data and to compare against previous sampling results, and baseline data.

In 2022, 9 Index and 5 Investigative sites were sampled in St. Joseph County and 16 Index and 4 Investigative sites were sampled in Elkhart County. Fish community parameters were calculated for Index sites and averaged between the 2 surveys.

In the past few years, we have started to analyze various different aspects of the fish communities in addition to looking solely at IBI scores to describe fish community health. Some of these aspects are metrics that are part of the IBI. Additional information regarding some of these important metrics is presented in the table on the next page. Detailed methods are presented in Appendix A.



Hester-Dendy sampler placed into the stream bed



For the past 21 years, fish have been collected using either boat mounted, tote barge, or backpack electrofishing equipment. The type of gear used depended on the size of the stream. The St. Joseph and Elkhart Rivers have been sampled with the boat. Smaller, wadeable streams have been sampled with the tote barge, unless the stream was extremely small and shallow, in which case, the backpack was used. Power output from the 3 devices differed. The boat output was 8-16 amperes, the tote barge was 4-6 amperes, and the backpack was 0.5-1.5 amperes.

Fish Community Metrics Explained

- The # of species (species richness) is a powerful basic metric for evaluating the health of an ecosystem. Higher species richness reflects superior water quality and a higher diversity of habitats that supports more species.
- Sensitive species—sensitive species are those that cannot tolerate degraded water quality or habitat. Having a high number of sensitive species is a positive indication of stream health.
- Insectivores—insectivores are generally considered a sensitive group of fish. Their presence in high numbers suggests that there is an abundance of insects present in the stream as a forage base.
- Simple Lithophils—Fish that are simple lithophilic spawners are those that don't protect their nest and young. They require high quality, coarse substrate for reproduction. An increase in the % of simple lithophils at a site suggests an improvement. Sucker species are simple lithophils.
- Tolerant Species—Tolerant species are those that can survive in areas with degraded habitat or water quality. A decrease in the % of tolerant species collected suggests an improvement at a site.
- Omnivores—Omnivorous fish are generally those that are adaptable and usually tolerant. A decrease in the % of omnivores suggests an improvement at a site.

2022 Results and Discussion

IBI scores at the Index sites ranged from very poor (12) at Green Tech Dr. on Bowman Creek to excellent (55) at Indiana Ave. on the Elkhart River. Fish species richness was lowest at Gertrude St. on Bowman Creek, with 1 species being present, and highest at Sherman St. on the St. Joseph River, with 42 species being present. Macroinvertebrate community scores ranged from Poor (16) at Green Tech Drive on Bowman Creek to exceptional (54) at Oxbow Park and Indiana Avenue on the Elkhart River. Habitat quality ranged from poor (37) at Modrell Ave. on Lily Creek to excellent (94) at Indiana Ave. on the Elkhart River.

St. Joseph River

Fish, macroinvertebrate, and habitat index scores for the entire Indiana portion of the St. Joseph River are displayed in Table 1. The number of species collected (species richness) and the weight of all tolerant fish are also presented.

Fish IBI scores have remained pretty consistent for the St. Joseph River since the inception of monitoring. When the Aquatics Program started sampling in 1998, we found a healthy river, which was reflected by IBI scores in the good to excellent range. Those scores continue to

fall in the same range. We have, however, noticed that there have been changes in the fish communities in the river over the past 20 years. There have been significant changes in the abundances of certain species and a general trend in increased species richness is occurring (Deegan, 2020). Furthermore, the abundance of certain tolerant species (Common Carp in particular) has plummeted. While the IBI scores may not reflect changes, these other parameters (increased species richness and decreased tolerant species) are very positive signs.

In 2022, the IBI scores for the St. Joseph River were similar to baseline scores for all Elkhart County sites with the ex-

2022 Interesting Fish



This golden redbreasted darter had a major spinal deformity causing it tail to bend upwards. Despite having this deformity, the fish appeared to be in good health.



This largemouth bass has a "double-mouth" deformity. While this may be a genetic abnormality, it's likely that an early life injury caused this abnormality.

Fish by the Number

During the summer of 2022, a total of 24,852 fish, representing 18 families and 68 species, were collected in Elkhart County. In St. Joseph County, 7,872 fish, representing 13 families and 49 species were collected. In total, 70 different species were captured from the 2 counties.

Rock Bass (*Ambloplites rupestris*), Bluegill (*Lepomis macrochirus*), and Smallmouth Bass (*Micropterus dolomieu*) were the most abundant species collected in St. Joseph County, while Bluegill, Sand Shiner (*Notropis stramineus*) and Rockbass, were the most abundant in Elkhart County. For more detailed information on the number and types of fish species collected, see Appendix C.

Table 1. Index scores for St. Joseph River sites, Elkhart and St. Joseph Counties

Station	River Mile	Fish IBI Score		# of Species		Tolerant Fish Weight (kg)		2022 Habitat Scores	(ICI) Macroinvertebrate Scores	
		Baseline Average	2022	Baseline Average	2022	Baseline Average	2021		Baseline/ Previous	2022
SR 15 (Bristol)	86.8	53	52	36	35	57	4	85	42	Exceptional*
Homan Ave.	79	43	50	26	36	13	9	59		
Sherman St.	76.2	48	49	31	42	30	51	84	44	50
Nappanee St.	73.7	48	48	33	35	34	25	62		
Capital Ave.	64.4	43	47	28	35	113	17	60	52	50
Sample St.	58.4	40	45	29	30	35	46	59	46	46
Michigan St.	56.7	45	49	25	24	27	0.1	90	41	46
Pinhook (Below)	53.3	51	48	28	30	26	3	84	46	42

*Narrative rating base on last Hester Dendy sampler

ception of Homan Avenue, which had a very impressive score of 50. This site had an IBI score of 49 when it was sampled in 2019 which indicates potential improvement in the fish communities at this site. Species richness was also considerably higher at this site and at the Sherman Street site in 2022. The Sherman Street site, did however, have a significant increase in the weight of tolerant fish in 2022. Tolerant weights were down at other Elkhart County sites, especially at SR 15 (Bristol).

The macroinvertebrate community samples collected from two Elkhart County sites (SR 15 (Bristol) and Sherman Street) fell in the exceptional range in 2022 well above their respective baseline scores. Both of these sites also

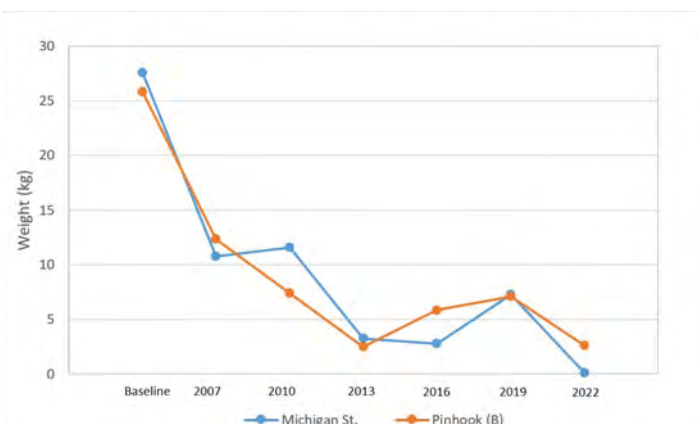


Figure 2: Total weight of tolerant species at the Michigan St. and Pinhook (B) sites have reduced since the inception of monitoring at most St. Joseph River sites.

Factors Influencing Fish Communities in the St. Joseph River Watershed

Interpreting changes in biological communities can be difficult because our rivers and streams are influenced by many factors. Change in water quality is only one reason for potential changes in the numbers and types of fish that we find. Other important factors include:

- Habitat
- Flooding, drought and climate effects
- The influence of dams
- How we manage and drain our land
- Nutrient input and stream productivity

had exceptional scores in 2019 suggesting improvements at these sites in the last decade.

IBI scores for the St. Joseph River in St. Joseph County were up significantly in 2022 with the exception of the Pinhook (B) site where the IBI score dropped to 48. Species richness was similar to baseline numbers at St. Joseph County sites, with the exception of Capital Avenue where 7 more species were recorded. The weight of tolerant fish plummeted at most sites (Figure 2), especially at Capital Avenue where the weight dropped from 113 kilograms during the baseline period to 17 in 2022. The IBI score at the Sample Street site of 45 was significantly higher than the baseline score of 40. This site also scored well above the baseline in 2019. Similar to Homan Avenue in Elkhart County (another impounded



Leo with a common carp. Carp are a large, non-native, tolerant fish. The species has declined at most St. Joseph River sites



Daragh with a steelhead from the St. Joseph River. Steelhead are a migratory form of rainbow trout that swim up the St. Joseph River from Lake Michigan.

site influenced by a dam), these improved IBI scores may be a reflection of a long-term improvement at this site. The weight of tolerant fish has not decreased at this site, however, as the impoundment area where this site is located is very good habitat for tolerant species like common carp. Macroinvertebrate community scores at Sample Street (very good range) and Capital Avenue (exceptional range) were similar to the last time both sites were sampled in 2019. The score at Michigan Street (46) was up significantly from its baseline value, however the score at Pinhook (B) of 42 was down from its previous score of 46. The Pinhook (B) site had a score of 44 in 2016, so the value from 2022 has not deviated much from previous scores and still falls within the “very good” range.

Elkhart River

Fish community scores and metrics for the Elkhart River were very impressive in 2022 (Table 2). The Oxbow Park site had a score of 53, which is the same as the baseline. This site had a score of 47 in 2019, but rebounded in 2022. The Indiana Avenue site (55) and the Middlebury Street site (54) both had scores well above their respective baselines of 46 and 43. All three Elkhart River sites also had significant increases in the number of species collected relative to the baseline period. The increase in species richness in the Elkhart River is undoubtedly linked to the removal of the Elkhart River Dam in 2020, although spe-

cies richness was on the rise in the Elkhart River prior to the dam removal.

The removal of this dam has opened up approximately 20 miles of the Elkhart River to new species that have been present downstream of the dam but blocked from swimming upstream. Twelve (12) new fish species were collected upstream of the dam at various Elkhart River sites between 2020 and 2022.

Macroinvertebrate community scores for the Elkhart River all fell within the exception range in 2022. The score at Oxbow Park of 54 was significantly higher than its baseline value of 44. The score at Indiana Avenue was also 54 which is the same as the baseline value. The score of 48 at Middlebury Street was down from its baseline value but still within the exceptional range.

In 2018 and 2019, biological monitoring was initiated immediately upstream (Prairie Street) and immediately downstream (Elkhart Avenue) of the former dam. The monitoring in 2018 and 2019 was conducted to provide an analysis of the fish community prior to the removal of the dam. These sites were sampled again in 2020, 2021, and 2022 to determine if there were changes in the fish communities above and below the dam site following its removal. Results from these pre and post monitoring events indicate substantial benefits to the fish community upstream of the dam (Table 3). Not only did the IBI

Table 2: Index scores for Elkhart River sites, Elkhart County

Station	River Mile	Fish IBI Score		# of Species		Sensitive Fish Weight (kg)		2022 Habitat Scores	(ICI) Macroinvertebrate Scores	
		Baseline	2022	Baseline Average	2022	Baseline Average	2022		2019	2022
Oxbow Park	10.8	53	53	22	33	61	77	89	44	54
Indiana Ave.	3.9	46	55	18	32	49	66	94	54	54
Middlebury St.	2.4	43	54	21	34	46	47	85	52	48

Table 3: Index scores for sites above and below the former Elkhart River Dam

	Pre-Implementation			Post-Implementation			
Elkhart Ave. (Below Dam)	2018	2019	Average	2020	2021	2022	Average
IBI Score	51	50	51	51	49	48	49
# Species	42	38	40	42	41	32	38
# Darters sp.	3	4	3.5	4	5	2	3.7
# Suckers sp.	7	6	6.5	6	6	4	5.3
# of Sensitive sp.	15	14	15	14	17	11	14
% Simple Lithophils	18	18	18	16	7	14	12.3
QHEI	78	83	81	81	80	82	81
Prairie St. (Above Dam)	2018	2019	Average	2020	2021	2022	Average
IBI Score	45	49	47	54	52	52	53
# Species	23	30	27	43	37	38	39
# Darters sp.	1	2	1.5	5	5	5	5
# Suckers sp.	5	5	5	7	7	7	7
# of Sensitive sp.	9	9	9	17	15	18	17
% Simple Lithophils	22	20	21	34	24	31	30
QHEI	52	57	55	79	80	80	80

score increase significantly upstream of the dam, but the IBI score was superior upstream compared to downstream. The average species richness increased from 27 to 39 between 2018 and 2022 and several other metrics including the number of darter species, the number of sucker species, and the number of sensitive species also increased significantly. Furthermore, the habitat score also increased very significantly between 2018 and 2022.

Bowman Creek

Similar to previous years, fish community scores for Bowman Creek were very poor in 2022 (Table 4). The intermittent qualities of this stream have a significant influence on the health of the fish communities. During the

second sampling event at Ravina Park in late June, the stream had run dry and pools of standing water remained at the site. Those pools did hold 2 fish (a small Large-mouth Bass and a small Creek Chub), but the result was obviously an impaired fish community. The two other Bowman Creek sites had flow during both sampling events in 2022. The score at Gertrude Street was down from the baseline but up from the last time it was sampled in 2019. After 3 consecutive years of sampling at Green Tech Drive, a baseline average score of 12 has been set for this site.

Due to flow issues at Ravina Park a macroinvertebrate sample was not collected. The ICI score at Gertrude Street (38) fell within the “good” range in 2022 and indicative that this site does support healthy communities of insects. The ICI score at Green Tech Drive (16) was down from the

Table 4: Index scores for Bowman Creek and Juday Creek sites, St. Joseph County

Stream	Station	Stream Mile	Fish IBI Scores (Coolwater IBI Scores)			2022 Habitat Scores	(ICI) Macroinvertebrate Scores	
			Baseline	2019	2022		Baseline/ Previous Score	2022
Bowman Creek	Gertrude Street	3.4	17	12	14	61	31	38
Bowman Creek	Green Tech Drive	2.0	13*		12	55	23	16
Bowman Creek	Ravina Park	0.5	6	12	14	52	34	
Juday Creek	SR 23	5.3	26(29)	31(37)	32(33)	68	48	44
Juday Creek	Ponader Park	3.7	31(31)	30(33)	28(26)	63	46	36

* In 2022 after 3 years of sampling at Green Tech Drive on Bowman Creek, baseline values have been established for future comparisons



baseline score of 22 that was established in 2021. This particular site is just downstream of an impounded section of Bowman Creek and warming influences from the pond upstream likely have an impact on the aquatic communities at this site. Furthermore, a trash assessment was completed at this site in 2022 revealing significant issues with solid waste at this site. See the Rapid Trash Assessment section of this report for additional information.

Juday Creek

The coolwater IBI scores for Juday Creek have been relatively stable in the past few monitoring events (Table 4). In 2019, a baseline value of 31 was established for the Ponader Park site. The result in 2022 of 26, was down from the baseline but in the general range of expected scores for this site. In 2022, 9 large common carp (a highly tolerant species) were collected from this site during the first sampling pass, which is unusual for a small coolwater stream like Juday Creek. Juday Lake, in close proximity to Ponader Park is good habitat for common carp and the likely source of this species. Beyond being a source for carp, Juday Lake likely also impacts Juday Creek in other ways by contributing warm water during the summer months and it is a likely source of other undesirable organisms. Curly-leaf pondweed (*Potamogeton crispus*), a non-native plant species is established in Juday Creek at Ponader Park, which is also likely sourced from Juday Lake. The macroinvertebrate score was also down significantly at this site in 2022. The Aquatics Program will be keeping a close eye on this site in future monitoring events.

The coolwater IBI score at the SR 23 site of 33 was up slightly from the baseline score of 29 but down from the last time this site was sampling in 2019. The macroinvertebrate score (44) was down from the score it received in 2019 but fell within the “very good” range.

Yellow Creek

Yellow Creek at CR 32 had a score of 29 in 2022, down from the baseline score of 36. This site also scored below the baseline in 2019, suggesting a decline in the fish community at this location. Other sites along Yellow Creek have also had declining scores in recent years and all scores for this stream have been lower than the “attainment score” of 36 which is considered in the impaired range. As discussed in depth in previous reports, the Yellow Creek Watershed has been highly modified for drainage and Yellow Creek suffers from having both water quality and quantity issues. Similar to the fish communities, the macroinvertebrates also demonstrate impairment and a decline in the health of this stream. The ICI score in 2022, was 28 which is down from the baseline score of 34.

Lily Creek

Lily Creek at Reckell Avenue had a high score of 36 in 2022, slightly above its baseline value of 34. This is the highest IBI score this site has received since 2004. As discussed in previous reports, some drainage maintenance activities at this site resulted in a significant impact to the fish community. For example, the previous IBI score in 2019 was only 20. The results from 2022 are very promising and suggest that there has been some level of recovery of the fish community at this site. We will continue to monitor this site closely. The macroinvertebrate community score in 2022 of 24 was down from when this site was previously sampled in 2019, but inline with scores this site received in previous years.

Little Elkhart River

In 2022, the IBI score at the Little Elkhart River at CR 10 (46) was up from the baseline score of 41, but down from

Table 5: Index scores for Yellow Creek and Lily Creek, Elkhart County

Stream	Station	River Mile	Fish IBI Scores				2022 Habitat Scores	Macroinvertebrate Scores	
			Baseline	2016	2019	2022		2019	2022
Yellow Creek	County Road 32	7.2	36	36	32	29	58	34	28
Lily Creek	Reckell Ave	1.1	34	19	20	36	42	30	24

Table 6: Index scores for sites on the Little Elkhart, Christiana Creek and Baugo Creek, Elkhart County

Stream	Station	River Mile	Fish IBI Scores (Coolwater IBI Scores)				2022 Habitat Scores	ICI Macroinvertebrate Scores	
			Baseline	2016	2019	2022		Baseline/Previous Scores	2022
Little Elkhart River	CR 10	7.3	41	43	49	46	81	40	Good*
Christiana Creek	CR 4	5.3	48	43	54	45	80	47	48
Puterbaugh Creek	CR 8	1	39	41	47	45	73	47	46
Cobus Creek	CR 8	2.2	30 (36)	28 (35)	36 (37)	39 (34)	66	42	34

*Narrative rating base on last Hester Dendy sampler

the score of 49 it received in 2019. In addition to the increased IBI score for this site, several metrics including the total number of species (Figure 4), the % of tolerant fish, and the % of insectivores have improved, suggesting a long term improvement in the fish community. Due to high flow issues in July of 2022, the macroinvertebrate sampler at CR 10 was lost. The qualitative rating of "good" is inline with the baseline score of 40, but down from the 2019 score. (Table 4).

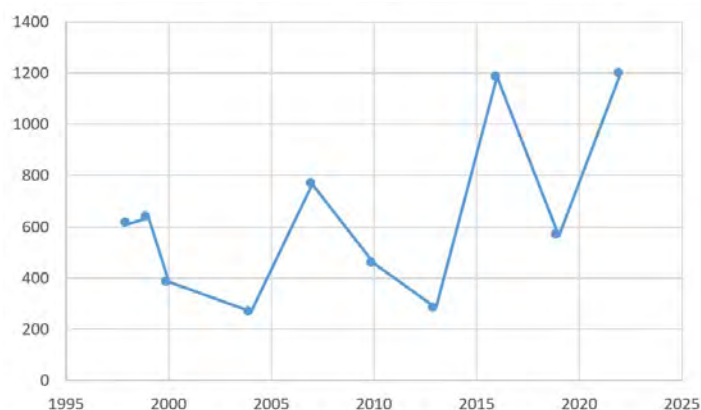
Christiana Creek

Christiana Creek at CR 4 had an IBI score of 45 in 2022, which was down from the baseline score of 48. As discussed in previous reports, there has been a significant increase in the total number of fish that are collected during fish surveys in Christiana Creek (Figure 3). This increase in total fish abundance has an influence on metrics within the IBI and has been negatively affecting scores in Christiana Creek in the last few years. The macroinvertebrate score was 48 in 2022, slightly higher than the baseline score of 47 and within the "exceptional" range.

Puterbaugh Creek

Puterbaugh Creek at CR 8 has relatively impressive species

Figure 3: The total # of fish collected from CR 4 on Christiana Creek



diversity for such a small stream. In 2022, 15 species were collected, several of which are considered sensitive or indicators of a healthy stream. The IBI score in 2022 was 45 at CR 8, which is significantly higher than the baseline and relatively close to the score from 2019 (Table 6). The macroinvertebrate community score in 2022 was 46 which is similar to the baseline score but down from the score of 50 it received in 2019.

Cobus Creek

Cobus Creek is a coolwater stream that supports coolwater species such as sculpin and trout. In recent years, we have been evaluating Cobus Creek with the coolwater calibration of the IBI. Cobus Creek at CR 8 has had relatively stable IBI scores over the years. However, it is apparent that the habitat at CR 8 has changed (Figure 5) with more fine sand moving through the site. The fine sand is likely a result of upstream development and land use activities in the watershed. The issues with fine sand may be the cause of the lower macroinvertebrate score of 34 this site received in 2022. However, the macroinvertebrate sampler was placed upstream of a beaver dam that was erected following the deployment of the sampler. The beaver dam reduced flow upstream which may have also negatively influenced the macroinvertebrate sample in 2022.

Figure 4: An increase in the fish species richness at CR 10 on the Little Elkhart River

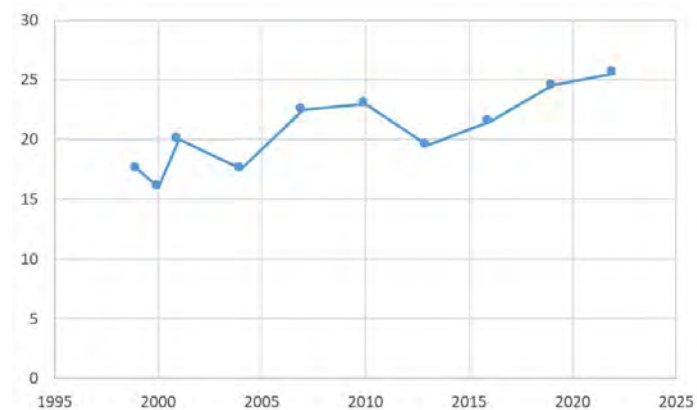
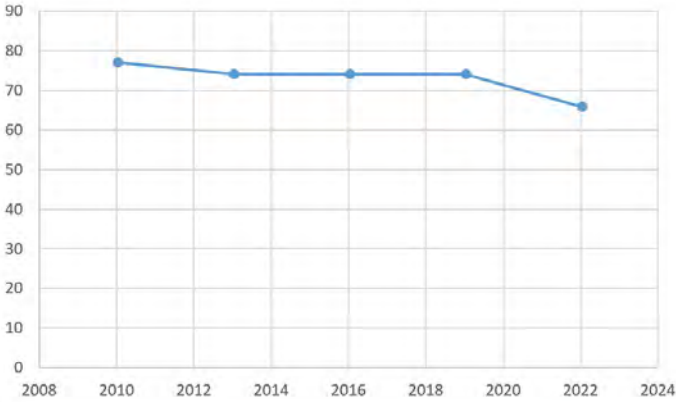


Figure 5: QHEI (habitat) scores for Cobus Creek at CR 8 from 2010 to 2022



Baugo Creek

Baugo Creek was sampled at CR 1 (S) and CR 3 (N) in 2022. The CR 1 (S) is higher in the watershed and the stream is much smaller relative the CR 3 (N) site. The CR 1 (S) site is also highly modified for agricultural drainage and the in-stream habitat is inferior to the CR 3 (N) site. As such, the biological communities at CR 3 (N) have always been superior; the fish IBI baseline value is 40, while the baseline value at CR 1 (S) is 30. In 2022, the IBI score of 35 at CR 1 (S) was significantly higher than the baseline but still in the impaired range. The score of 40 at CR 3 (N) was the same as the baseline value. While Baugo Creek has a high diversity of fish species including some sensitive species like the Longnose Dace (Indiana State Species of Special Concern), it has a high proportion of tolerant species like the White Sucker that are indicative of impaired conditions. Given the high agricultural intensity of the Baugo Creek Watershed, its use for land drainage and the fact that 90% of the wetlands have been lost in the watershed, Baugo Creek continues to host impaired biological communities. The macroinvertebrate communities at the CR 3 (N) site also reflect impaired conditions (Table 7).

Fish Tissue

In 2022, tissue was collected from fish in both Elkhart and St. Joseph Counties. Collections were based on the current Fish Consumption Advisory (FCA) for area streams

A beaver dam that was built during the summer of 2022



and potential data gaps within the FCA. The FCA provides guidance on the rate of consumption of local wild fishes (Tables 9-12) based on the concentration of polychlorinated biphenyl (PCB) or mercury (Hg) concentrations in their tissue. It should be noted that the State FCA has more restrictive guidance for individuals that are considered to be part of the “sensitive population.” Females under the age of 50 and males under the age of 18 are considered to be part of the sensitive population. For more information on local fish consumption, visit the Indiana State Department of Health’s (DOH) website (<http://www.in.gov/isdh/23650.htm>). In 2020, the DOH released a new interactive web map that features easily accessible fish consumption information for the St. Joseph River Watershed.

Many variables play a role in contaminant concentrations in fish. In general, larger fish will tend to have higher concentrations of contaminants in their tissue. Concentrations of contaminants can vary from one fish to another, so the methodology for collecting tissue samples requires collecting three fish and compositing all fish into one sample. Because of variability in concentrations, gathering multiple samples of the same species over the course of several years can provide a more accurate understanding of pollutant concentrations. The State of Indiana employs this idea and will average the concentrations of multiple samples to provide a more accurate representation of pollutant concentrations for that species. Given the high frequency in which samples are collected by the Aquatics Program, through collaboration

Table 7: Index Scores for Baugo Creek, Elkhart and St. Joseph County

Stream	Station	River Mile	Fish IBI Scores				2022 Habitat Scores	ICI Macroinvertebrate Scores	
			Baseline	2016	2019	2022		Baseline	2022
Baugo Creek	CR 1 (S)	5	30	29	34	35	66		
Baugo Creek	CR 3 (N)	1.5	40	43	46	40	84	25	28

with the State of Indiana, the FCA for the St. Joseph River is one of the most accurate of any waterbody in the State.

In 2022, 10 fish tissue samples were collected by the Aquatics Program. Tissue samples were collected for 5 species (Channel Catfish, Walleye, Quillback, White Sucker, and Bluegill). Multiple samples of the same species were collected in different stretches of the St. Joseph River.

Mercury was detected in relatively low concentrations in all tissue samples. In the years of collecting tissue samples from the St. Joseph River Watershed, the Aquatics Program has rarely encountered high concentrations of mercury in fish tissue. PCBs, on the other hand are found in relatively high concentrations in some fish species and PCBs generally drive the guidance for fish consumption for the St. Joseph River.

The following narrative describes results of the Aquatics Program's fish tissue collections from Elkhart and St. Joseph Counties in 2022 based on the concentration of PCBs and Hg:

Four (4) channel catfish samples were collected during the summer of 2022. One (1) sample (18.6 inch average size) was collected from Elkhart Avenue on the Elkhart River. Three (3) samples were collected from the St. Joseph River: 1 sample (26.5 inch size) was collected from SR 15 (Bristol), 1 sample (22.9 inch size) was collected from Sherman St. in Elkhart, and 1 sample (28.5 inch average size) was collected from Capital Avenue. PCBs were relatively high in all samples as has been observed with channel catfish samples in the past. Based on the PCB results

from Elkhart Avenue, the consumption guidance for channel catfish in downtown Elkhart would be 1 meal per month for fish less than 19 inches and 1 meal per month for fish greater than 19 inches. While slightly larger in size, the sample from Sherman Street (which is less than 1/2 mile downstream of the Elkhart Avenue site) actually had lower PCB concentrations. This is a great example of how tissue pollutant levels can vary from one fish to another.

The sample from the SR 15 (Bristol) site had the lowest concentration of PCBs for Channel Catfish in 2022. Based on the concentration of PCBs and slightly elevated concentrations of Hg in this sample, the consumption guidance would be 1 meal per week. The Channel Catfish sample from Capital Avenue had slightly higher concentrations of PCBs and Hg, and guidance based on this sample would be one meal per month.

White Sucker samples were collected from 2 locations on the St. Joseph River in Elkhart County: 1 sample was collected from SR 15 (Bristol) and 1 sample was collected from Nappanee Street in Elkhart. The sample from Bristol had slightly elevated concentrations of Hg. Guidance based on this sample would be unrestricted for the general population and 1 meal per week for the sensitive population. The sample from Elkhart had slightly elevated concentrations of PCBs. Guidance based on this sample would be unrestricted for fish less than 16 inches, and 1 meal per week for fish greater than 16 inches.

Bluegill (7.5 inch average size) were collected from Capital



Noah with a really big smallmouth bass from Christiana Creek



A northern pike from the Elkhart River

Avenue on the St. Joseph River in St. Joseph County. Up until around 2015, concentrations of PCBs in Bluegill samples from St. Joseph County had elevated concentrations of PCBs and FCA guidance was 1 meal every 2 months. Samples from 2016 onward in St. Joseph County have had

Bluegill FCA Guidance over the years		
Year	General Population	Sensitive Population
2019-2022	1 meal/week	1 meal/week
2017-2018	1 meal/month	1 meal/month
2012-2016	1 meal/2 months	DO NOT EAT
2007-2011	1 meal/2 months	No guidance

dramatically lower concentrations of PCBs to the point that the FCA is currently listing consumption guidance at one meal per week. If FCA guidance were based solely on the 2022 sample, consumption guidance would be unrestricted.

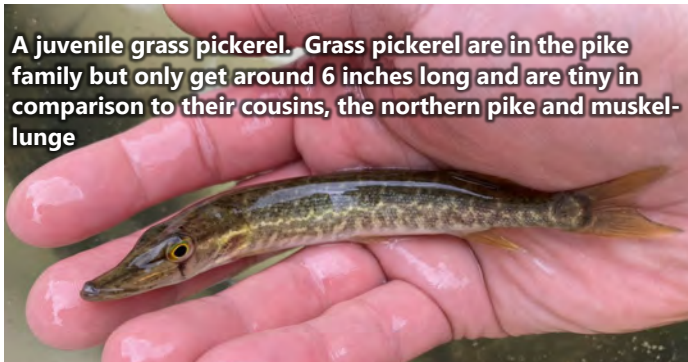
A walleye sample (18.1 inch average size) was also collected from Capital Avenue in St. Joseph County. Based on slightly elevated concentrations of Hg and PCBs, guidance would be 1 meal per week. The current FCA guidance is 1 meal per month.

Quillback were collected from 2 locations in the St. Joseph River in St. Joseph County in 2022. One (1) sample (18.8 inch average size) was collected from Sample Street while the other was collected from the Pinhook (B) site. The Sample Street site had elevated concentrations of PCBs which would warrant 1 meal every 2 months, while the sample from Pinhook (B) had lower concentrations that would warrant 1 meal per week. The current FCA guidance is 1 meal per month for the St. Joseph River in St. Joseph County.



Turtle Sampling

Beginning in 2020, the Aquatic Biology Program started to collect turtles during fish community surveys to document species, determine species distributions, and to help gain a general understanding of stream dwelling turtles in the St. Joseph River Watershed. Species that were collected include Northern Map Turtle (*Graptemys geographica*), Painted Turtle (*Chrysemys picta*), Red-eared Slider (*Trachemys scripta elegans*), Snapping Turtle (*Chelydra serpentina*), Spiny Softshell (*Apalone spinifera*), Eastern Musk Turtle (*Sternotherus odoratus*), and River Cooter (*Pseudemys concinna*). While not collected during surveys, Blandings Turtle (*Emydoidea blandingii*), a state endangered species, are known to exist in the St. Joseph River Watershed and have been observed by the Aquatics Program.



In total, there were 289 turtles collected over the course of the 3 seasons. Most the turtles were collected on the Elkhart River (total of 107) and the St. Joseph River (total of 156), while 26 were collected in the smaller tributaries. Collecting turtles during boat electrofishing surveys proved to be relatively productive around basking logs, although the vast majority of basking turtles would escape long before the boat got close. Some species, such as the Spiny Softshell were very quick and difficult to collect. Larger individuals of all species were also better at escaping, so the majority of the individuals collected were smaller and younger turtles.

Of the 289 turtles collected, the vast majority were Northern Map Turtles (total 200/69%). Snapping turtle was the second most commonly collected (32 total/11%). While the overall catch was low in the smaller tributaries,

Table 8: A summary of turtles collected during the summers of 2020, 2021, and 2022.

Species	# Collected	% Collected
Northern Map Turtle	200	69%
Snapping Turtle	32	11%
Painted Turtle	19	7%
Spiny Softshell	12	4%
Eastern Musk Turtle	12	4%
Redear slider	10	4%
River Cooter	4	1%
Total	289	

Table 9: Fish Consumption Advisory (Elkhart County)

Species	Fish Size (inches)	Contaminant	Consumption Guidance	<i>Sensitive</i> <i>Population Guidance</i>
Bluegill and other Sunfish	ALL	Hg	Unrestricted	1 meal/week
Bullhead Catfish	ALL	Hg	Unrestricted	Unrestricted
Channel Catfish	ALL	PCBs	1 meal/month	1 meal/month
Common Carp	ALL	PCBs	1 meal/month	1 meal/month
Crappie	All	Hg	Unrestricted	1 meal/week
Largemouth Bass	Up to 16	Hg	1 meal/week	1 meal/week
	16+	Hg	1 meal/week	1 meal/month
Northern Hogsucker	ALL	Hg	Unrestricted	1 meal/week
Northern Pike	Up to 30	Hg	1 meal/week	1 meal/week
	30+	Hg	1 meal/week	1 meal/month
Redhorse	ALL	PCBs/Hg	1 meal/week	1 meal/week
Rock Bass	ALL	Hg	Unrestricted	1 meal/week
Smallmouth Bass	Up to 17	Hg	Unrestricted	1 meal/week
	17+	Hg	1 meal/week	1 meal/week
Walleye	ALL	PCBs/Hg	1 meal/week	1 meal/month
White Sucker	ALL	Hg	Unrestricted	Unrestricted

Table 10: Fish Consumption Advisory (St. Joseph County—Baugo Bay to Twin Branch Dam)

Species	Fish Size (inches)	Contaminant	Consumption Guidance	<i>Sensitive</i> <i>Population Guidance</i>
Bluegill and other Sunfish	ALL	Hg	Unrestricted	1 meal/week
Bullhead Catfish	ALL	Hg	1 meal/week	1 meal/week
Channel Catfish	Up to 20	PCBs	1 meal/month	1 meal/month
	20+	PCBs	1 meal/2 months	1 meal/2 months
Common Carp	ALL	PCBs	1 meal/month	1 meal/month
Crappie	ALL	PCBs	1 meal/week	1 meal/week
Largemouth Bass	Up to 13	PCBs/Hg	Unrestricted	1 meal/week
	13+	PCBs/Hg	1 meal/week	1 meal/week
Redhorse	ALL	PCBs/Hg	1 meal/week	1 meal/week
Rock Bass	ALL	Hg	Unrestricted	1 meal/week
Spotted Sucker	Up to 15		Unrestricted	Unrestricted
	15+	Hg	Unrestricted	1 meal/week
<i>*Walleye</i>	<i>ALL</i>	<i>PCBs/Hg</i>	<i>1 meal/week</i>	<i>1 meal/month</i>
White Sucker	ALL	Hg	Unrestricted	1 meal/week

**Elkhart County data are included as this section of river is free flowing into Elkhart County and migratory behavior of walleye*

*

Sensitive Population— Females under the age of 50 and males under the age of 18

1 Meal—8oz. For adults, 3oz. for children ages 3 to 6

Table 11: Fish Consumption Advisory (St. Joseph County—Twin Branch Dam to State Line)

Species	Fish Size (inches)	Contaminant	Consumption Guidance	<u>Sensitive Population Guidance</u>
Bluegill and other Sunfish	ALL	PCBs/Hg	1 meal/week	1 meal/week
Bullhead Catfish	ALL	PCBs/Hg	Unrestricted	1 meal/week
Channel Catfish	ALL	PCBs	Do Not Eat	Do Not Eat
Coho Salmon	Up to 24	PCBS	1 meal/week	1 meal/week
	24+	PCBS	1 meal/month	1 meal/month
Common Carp	ALL	PCBs	Do Not Eat	Do Not Eat
Crappie	ALL	Hg	Unrestricted	1 meal/week
Largemouth Bass	ALL	PCBs/Hg	1 meal/week	1 meal/week
Northern Hogsucker	ALL	PCBs	1 meal/month	1 meal/month
Northern Pike	ALL	PCBs	1 meal/month	1 meal/month
Quillback Carpsucker	ALL	PCBs/Hg	1 meal/month	1 meal/month
Redhorse	ALL	PCBs	1 meal/2 months	1 meal/2 months
Rock Bass	ALL	PCBs/Hg	1 meal/week	1 meal/week
Smallmouth Bass	Up to 15	PCBs/Hg	1 meal/week	1 meal/month
	15+	PCBs/Hg	1 meal/month	1 meal/month
Steelhead	ALL	PCBs	1 meal/week	1 meal/week
Walleye	ALL	PCBs	1 meal/month	1 meal/month

Table 12: Fish Consumption Advisory (Elkhart River)

Species	Fish Size (inches)	Contaminant	Consumption Guidance	<u>Sensitive Population Guidance</u>
<i>*Bluegill and other Sunfish</i>	ALL		Unrestricted	1 meal/week
<i>*Bullhead Catfish</i>	ALL		Unrestricted	1 meal/week
Channel Catfish	Up to 20	PCBs	1 meal/month	1 meal/month
	20+	PCBs	1 meal/2 month	1 meal/2 month
Redhorse	ALL	Hg	1 meal/week	1 meal/month
Rock Bass	ALL	Hg	Unrestricted	1 meal/week
Smallmouth Bass	ALL	PCBs/Hg	1 meal/week	1 meal/week
Walleye	ALL	PCBs/Hg	1 meal/week	1 meal/week
White Sucker	Up to 16	Hg	1 meal/week	1 meal/week
	16+	Hg	1 meal/week	1 meal/month

*Tissue Samples for Bluegill, other sunfish and bullhead catfish are not covered in the FCA for the Elkhart River. Data presented are Indiana's general safe fish consumption guidelines

Sensitive Population— Females under the age of 50 and males under the age of 18
1 Meal—8oz. For adults, 3oz. for children ages 3 to 6

Table 13: A summary of crayfish collected during the summers of 2021 and 2022

Crayfish Species	# Collected	% Collected
Northern Clearwater	256	(44%)
Rusty	132	(22%)
Virile	117	(20%)
White River	65	(11%)
Calico	16	(3%)
Big Water	1	(<1%)
Total	587	

the same number of snapping turtles and map turtles were collected (total 9 for each species). Four (4) River Cooter, a state endangered species, were collected at 1 location close to Nappanee Street on the St. Joseph River. A small population of River Cooter has been documented in this area from the early 2000s, however, the population is believed to be sourced from human release as River Cooter are not native in Northern Indiana.

Crayfish Sampling

Sampling of crayfish began during the summer of 2021 and continued into 2022.. Similar to turtle sampling, crayfish were collected in an effort to document species and determine species distributions in the St. Joseph River Watershed. Six species were collected over the 2 summers which include the Northern Clearwater Crayfish (*Faxonius propinquus*), Rusty Crayfish (*Faxonius Rusticus*), Virile Crayfish (*Faxonius virilis*), Calico Crayfish (*Faxonius immunis*), White River Crayfish (*Procambarus acutus*), and Big Water Crayfish (*Cambarus robustus*).

In total, there were 587 crayfish collected (Table 13). Northern Clearwater Crayfish was the most commonly collected species (256 total) and represented almost 50% of the catch. Rusty Crayfish was the second most commonly collected (132 total), while Virile Crayfish was the third (117 total).

While Northern Clearwater Crayfish was the most commonly collected species, only 1 individual was collected from the Elkhart River and none were collected from the St. Joseph River. A total of 32 crayfish in total were collected from both the Elkhart River and the St. Joseph Rivers during boat electrofishing surveys and 31 or the 32 individuals were Rusty Crayfish. Northern Clearwater Crayfish were the dominant species in the smaller tributaries, but Rusty Crayfish appear to highly dominate the Elkhart and the St. Joseph. Rusty Crayfish are not native to the St. Joseph River Watershed and have been introduced outside of their native range by anglers using them for bait (Simon, 2001). Their dominant presence in the Elkhart and St. Joseph Rivers seem likely due to introductions from anglers given the flourishing smallmouth bass fisheries in both rivers.

Table 14: Crayfish species richness at sites sampled in 2021 and 2022

Species Richness	0	1	2	3	4	5+
# of Sites	20	30	14	4	2	0

It was apparent during sampling events that barge and backpack electrofishing methods are very effective for collecting crayfish, whereas, boat electrofishing was not. With boat electrofishing, it is difficult to sample small benthic fish that associate with rocky habitat. Crayfish, which occupy the same habitat were not easily sampled in the Elkhart and St. Joseph Rivers due to the limitations of boat electrofishing (only 32 of the 587 total crayfish were collected from both rivers). Thus, the abundance of crayfish from both streams is under-represented due to sampling methodology.

In the tributaries, Rusty Crayfish mostly occupied sections that are close the streams confluence with the St. Joseph River. Rusty Crayfish have a reputation for displacing native species (Taylor et al., 2015), however, they were found to be co-existing at 10 sites with Northern Clearwater Crayfish. They were only found to be co-occupying 3 sites with Virile Crayfish, indicating less tolerance of Virile Crayfish to their presence.

White River Crayfish were found at 8 sites in 5 different streams. However, the majority of White River Crayfish (46 of the 65 collected) were collected from Lily Creek, and they were the only species found in this stream. Only 16 total Calico Crayfish were collected over the 2 summers. Of the 16 collected, 15 of them were collected from Bowman Creek in South Bend. White River Crayfish and Calico Crayfish spend a certain portion of their life-cycles in streams, but are also known to occupy wet areas adjacent to waterbodies during periods of drought. Lily Creek and Bowman Creek, having intermittent qualities, appear to provide suitable habitat for these species.

Only one Big Water Crayfish was collected during both



A really big snapper from the St. Joseph River

Table 15: RTA metric scores and total score for 10 sites sampled in 2022

Stream	Site	Level of Trash	Total # of Trash	Threat to Aquatic Life	Threat to Human Life	Illegal Dumping	Illegal Littering	Accumulation of Trash	Total RTA Score
Bowman Creek	Ravina Park	13.5	1	1	1	0	0	5	21.5
Bowman Creek	Green Tech Dr.	1.5	1	1	5	0	1	1	10.5
Cobus Creek	CR8	18.5	15	8	10	4	5	9	69.5
Lily Creek	Reckell Ave	16	4	3	9	9	2	4	47
Elkhart River	Prairie St	14	3	1	7	1	1	5	32
St. Joseph River	Bristol SR15	16.5	3	1	6	10	1	5	42.5
St. Joseph River	Sample St	12.5	4	4	9	6	1	7	43.5
Juday Creek	Ponader Park	17	8	8	13	8	7	7	68
Elkhart River	Middlebury St.	13	4	2	8	0	1	7	35
Elkhart River	Indiana Ave	17	4	2	3	9	2	8	45

seasons. The single individual was collected from Puterbaugh Creek, in the presence of 3 other species: Northern Clearwater, Rusty Crayfish, and Virile Crayfish. It is unclear if Big Water Crayfish are rare in the St. Joseph River Watershed in Indiana, however, they are said to prefer large to medium size rivers and are often found under large slab rocks. It seems that the Elkhart and St. Joseph Rivers would provide good habitat for this species, but they may not have been collected due to sampling limitation as discussed previously.

In general, crayfish species richness was pretty limited at sites sampled in 2021 and 2022 (Table 14). In most instances, only 1 species was collected during a survey. At 20 sites, no crayfish were collected, although most of these were Elkhart River or St. Joseph River sites that were negatively influenced by sampling limitations. Of note, there did not appear to be a relationship between fish and macroinvertebrate community integrity and the number of crayfish species present. For example, Yellow Creek at CR 32 was 1 of the 2 sites, where 4 species were collected, however, this site had very low IBI and ICI scores. As indicated with Bowman Creek and Lily Creek, habitat characteristics appear to play a role in the species present, and may drive crayfish species richness more so than water quality.

Rapid Trash Assessments

In 2022, Rapid Trash Assessments (RTAs) were completed at 10 sites where biological community monitoring occurred (Table 15). The RTAs followed methods outlined by the San Francisco Surface Water Monitoring Program (Moore et al, 2007), with modifications (see Appendix A). The RTA is a monitoring index similar to the IBI, ICI and QHEI in that it is made up of several metrics that have a score. Each of the metrics are added together to provide a final RTA score out of 120 with high scores representing low levels of trash and low scores representing high levels of trash. The RTA metrics include: Level of Trash (20 points), Total # of Trash Items (20 points), Threat to Aquatic Life (20 points), Threat to Human Life (20 points), Illegal Dumping and Littering (20 points), and Accumulation of Trash (20 points).

RTA sites were divided into 4 transects. Two (2) stream transects were located from the center of the stream to the edge of the right or left bank. Bank transects were located on each stream bank from the edge (high water mark) and 20 feet into the riparian zone. Trash was sampled by picking up or observing (items too large to pick up) for 15 minutes in each transect for a total of 1 hour of

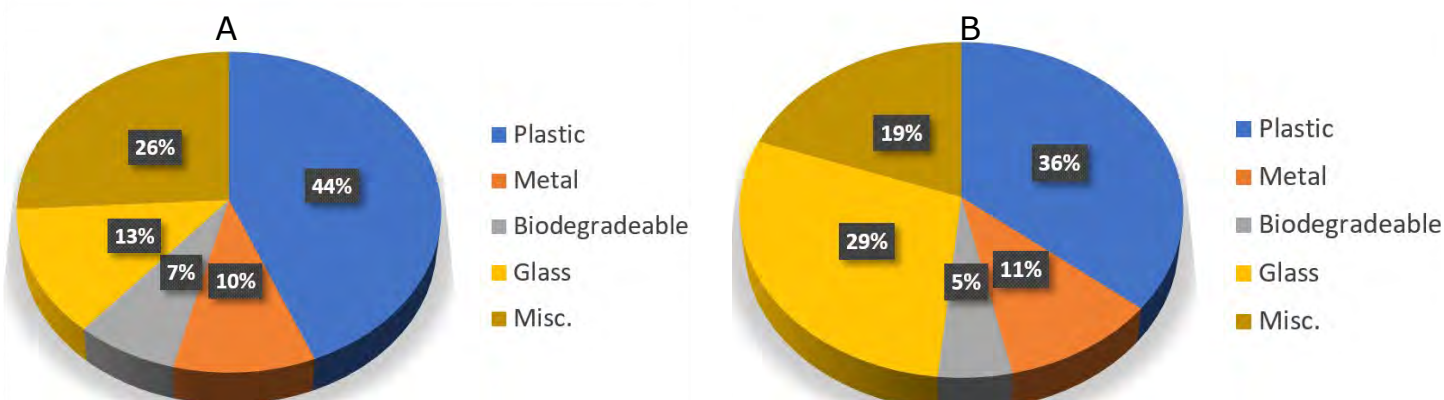


Figure 6: The proportion of trash items collected during Rapid Trash Assessments along the banks (A) and in the stream channel (B) at all sites sampled

Table 16: Sampling sites and Index Scores in Elkhart and St. Joseph Counties, 2022

Stream	Site	Site Number	Type of Site	County	Method	IBI Scores	ICI Scores	QHEI Scores
						2022	2022	2022
St. Joseph River	Trout Creek Mouth	1	Investigative	Elkhart	Boat			93
	SR 15 (Bristol)	2	Index	Elkhart	Boat	52	E*	85
	Homan Ave.	3	Index	Elkhart	Boat	50		59
	Sherman St.	4	Index	Elkhart	Boat	49	50	84
	Nappanee St.	5	Index	Elkhart	Boat	48		62
	Capital Ave.	6	Index	St. Joseph	Boat	47	50	60
	Ironwood (Above)	7	Macro Only	St. Joseph			52	
	Sample St.	8	Index	St. Joseph	Boat	45	46	59
	Michigan St.	9	Index	St. Joseph	Boat	49	46	90
	Sherman Ave.	10	Investigative	St. Joseph	Boat			90
	Pinhook	11	Investigative	St. Joseph	Boat			90
	Pinhook (Below)	12	Index	St. Joseph	Boat	48	42	84
Little Elkhart River	CR 10	13	Index	Elkhart	Tote Barge	46	G*	81
Puterbaugh Creek	CR 8	14	Index	Elkhart	Tote Barge	45	46	73
Lily Creek	Reckell Ave.	15	Index	Elkhart	Back Pack	36	<u>24</u>	42
Lily Creek	Modrell Ave.	16	Investigative	Elkhart	Back Pack			37
Christiana Creek	CR 4	17	Index	Elkhart	Tote Barge	45	48	80
Christiana Creek	Airport	18	Investigative	Elkhart	Tote Barge			76
Elkhart River	Rogers Park	19	Investigative	Elkhart	Boat			76
	Oxbow Park	20	Index	Elkhart	Boat	53	54	89
	Indiana Ave.	21	Index	Elkhart	Boat	55	54	94
	Middlebury St.	22	Index	Elkhart	Boat	54	48	85
	Prairie St.	23	Index	Elkhart	Boat	52		80
	Elkhart Ave.	24	Index	Elkhart	Boat	48		82
Yellow Creek	CR 32	25	Index	Elkhart	Tote Barge	<u>29</u>	<u>28</u>	58
Cobus Creek	CR 8	26	Index	Elkhart	Tote Barge	39 (34)	<u>34</u>	66
Baugo Creek	CR 1 (South)	27	Index	Elkhart	Tote Barge	<u>35</u>		66
	CR 3 (North)	28	Index	Elkhart	Tote Barge	40	<u>28</u>	84

Table 16: Fish sampling sites and Index Scores in Elkhart and St. Joseph Counties, 2022(continued)

Stream	Site	Site Number	Type of Site	County	Method	IBI Scores	ICI Scores	QHEI Scores
						2022	2022	2022
Bowman Creek	Gertrude Street	29	Index	St. Joseph	Back Pack	<u>14</u>	38	61
	Green Tech Drive	30	Index	St. Joseph	Back Pack	<u>12</u>	<u>16</u>	55
	Ravina Park	31	Index	St. Joseph	Back Pack	<u>14</u>		52
Juday Creek*	SR 23	32	Index	St. Joseph	Tote Barge	<u>32</u> (33)	44	68
	Ponader Park	33	Index	St. Joseph	Tote Barge	<u>28</u> (26)	36	63
	IWL Dam (Above)	34	Investigative	St. Joseph	Back Pack			50
	IWL Dam (Below)	35	Investigative	St. Joseph	Back Pack		MG*	86
Manion Drain	Below Dam	36	Investigative	St. Joseph	Back Pack			74

* denotes a cool/cold water stream

Underlined values are indicative of an impairment

Coolwater scores are in (parenthesis) Juday Creek and Cobus Creek were analyzed using coolwater methods

Narrative ratings where HD samplers were lost: E = Exceptional, G = Good, MG = Marginally Good

sampling. Following the 1 hour of sampling, trash items were separated by types and data were recorded based on trash type and its location (instream or along the banks).

In general, the amount of trash at most sites was staggering and RTA scores were fair to very poor. Of the 10 sites, the highest respective RTA scores of 69.5 and 68 were achieved at CR 8 on Cobus Creek and Ponader Park on Juday Creek. The two sites on Bowman Creek had the lowest scores (21.5 at Ravina Park and 10.5 at Green Tech Drive). The Ravina Park site is in a historic neighborhood close to downtown South Bend and much of the trash in the stream is old broken glass that is mixed with the substrate. There is some dumping and littering that occurs at this site also, but dumping appears to be a far greater occurrence at the Green Tech Drive site.

Plastic materials represented the highest proportion of trash materials at all sites sampled. Plastic items varied from bottles and bags, to small plastic chips and micro-plastic pieces. Plastics represented 44% of the items collected along stream banks and 36% of the items collected in the stream channel (Figure 16). In the 10 RTAs, a total of 2,842 trash items were collected/observed. Of those items a total of 1,136 were plastics. A breakdown of the trash items is presented in Appendix G.

Conclusion

Long-term biological monitoring by the cities of Elkhart and South Bend is starting to provide a more thorough understanding of the health of our rivers and streams. Along with our rivers and streams, the Elkhart-South Bend Aquatics Program also continues to evolve by sampling

more locations within the watershed, expanding our macroinvertebrate sampling program, sampling different aquatic communities and changing our techniques slightly to fill data gaps. Beginning in 2017, we started to apply more in-depth analyses of fish community data. In Juday Creek and other coolwater streams, more of an emphasis is now placed on macroinvertebrate monitoring.

When the Aquatics Program initiated monitoring in the St. Joseph River in 1998, IBI scores indicated that the river had good to excellent fish communities. IBI scores for the St. Joseph River have not shown much change in the past 20 years. However, a review of individual metrics, suggest that changes are occurring. In general, there has been a significant increase in the number of species collected during fish community surveys. A dramatic reduction in the biomass (weight) of tolerant fish has also occurred which is related to a significant reduction in the abundance of Common Carp in the St. Joseph River. Furthermore an in-depth analysis has revealed that the fish communities in the St. Joseph River have changed from ones that were heavily dominated by tolerant fish and sucker species to those that are more influenced by sunfish, insectivores and carnivores. Some of these changes are likely influenced by changes in the food web in the river.

Bowman Creek and Lily Creek continue to host impaired aquatic communities due to loss of flow and poor habitat. In 2022, Lily Creek did receive the highest IBI score since 2004, indicating a recovery in the fish community. Despite the impairment issues in Bowman Creek and Lily Creek, both streams are home to crayfish species that are found in very low abundance in other area streams.

While the fish communities in Juday Creek are rather limited, the macroinvertebrate communities indicate good water quality. Scores at Ponader Park were lower in 2022, where upstream land uses and the close proximity of Ju-

day Lake appear to contribute invasive species at this site.

In recent years we have reported that the total number of fish collected per survey is increasing to record levels in many of the streams in the area including the St. Joseph River. This general trend also continued into 2022 and is particularly evident in Christiana Creek where fish abundance has exploded in the last several years. An increase in total fish abundance can affect IBI scores (sometimes negatively) as it can influence IBI metrics that are based on proportions.

Fish community surveys, performed above and downstream of the former Elkhart River Dam between 2020 and 2022, indicate some very positive changes as a result of the dam removal. IBI scores, and other fish community metrics, increased significantly at several upstream sites as a direct result of the project. Furthermore, 12 new species of fish have been documented in the river upstream of the former dam with several species being found almost 20 miles upstream in Goshen.

Fish community metrics in the Little Elkhart River suggest some improvements in the stream at CR 10, although surveys in recent years close to Bristol appear to demonstrate declines in the fish community.

While Cobus Creek at CR 8 had good fish community scores in 2022, habitat at this site is being altered from an increase in fine sand from apparent upstream land use activities.

In an effort to document species distributions, turtles were collected during electrofishing surveys between 2020 and 2022. Seven (7) species were collected with Northern Map Turtle being the most common species (69% of the total catch).

In an effort to gain an understanding of crayfish species in the St. Joseph River Watershed, crayfish were also collected during electrofishing surveys in 2021 and 2022. Northern Clearwater Crayfish was the most abundant species in smaller tributaries, while Rusty Crayfish (a non-native) appear to dominate the Elkhart River and the St. Joseph River.

Rapid Trash Assessments were completed at 10 stream sites in 2022 revealing an overlooked and staggering issues with solid waste in local streams. Plastic trash from bottles and bags, to small microplastic pieces, represented the most commonly collected waste material found in streams. Bowman Creek at Green Tech Drive was a noteworthy site, containing a huge amount of windblown trash and evidence of dumping.

Acknowledgements

Thanks to the 2022 field crew of Leo Thurin, Mel Hendrickson, Noah Haas and Owen Slater. Nathan Schoenherr, a high school intern was very helpful in providing support in the field and the lab. Thanks also to the staff of Elkhart Public Works and Utilities and their counterparts at the City of South Bend for their continued support of the Aquatics Program. Lynn Brabec, the creator and manager of the Aquatics Program was in-

strumental in our continued success, as was Eric Horvath and Kieran Fahey with the City of South Bend. Special thanks to Jason Kauffman and Dustin Sailor with the City of Goshen for supporting educational activities in Goshen. We are very grateful to the Kitkowski Family (Brandon, Melissa and Samuel) who dedicated a lot of volunteer time to our program; Samuel provided 212 hours in volunteer time towards our sampling activities and community outreach events. Recognition is also extended to local groups such as the Michiana Walleye Association, the Elkhart River Restoration Association, Friends of the St. Joe River, the St. Joseph River Basin Commission and the many other groups, schools, volunteers, and people that support the work of the Aquatics Program and the improvement of the St. Joseph River Watershed.

References

- Aquatic Research Center of the Indiana Biological Survey. 2007. Development of Coolwater Indiana of Biotic Integrity Expectations for Use in Streams and Rivers of Indiana and Review of Existing Data. Technical Report 2007-01. Indiana Biological Survey, Aquatic Research Center, Bloomington IN.
- Deegan, 2019. Elkhart-South Bend aquatic community monitoring: annual report 2018. Loose-leaf pub. n.p.
- Foy, J. 2004. Elkhart—South Bend fish community monitoring: annual report 2003. Loose-leaf pub. n.p.
- Great Lakes Sport Fish Advisory Task Force. 1993. Appendix III, Species associated analysis and compositing of samples. in Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory.
- Indiana Department of Environmental Management (IDEM). 2015. Indiana's 2014 303 (d) List of Impaired Waterways: NOC Attachment 1 Consolidated Assessment and Listing Methodology (CALM). Watershed Planning and Restoration Section. Indianapolis, IN.
- Indiana State Department of Health. Fish Consumption Advisory. <http://www.in.gov/isdh/23650.htm>
- Karr, J.R. 1981. Assessment of biotic integrity using fish communities. Fisheries 6 (6): 21-27.
- Moore, S.M., Cover, M.R., and A. Senter. 2007. A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams. Region Water Quality Control Board, San Francisco Bay Region, Surface Water Ambient Program. San Francisco, California.

- Ohio Environmental Protection Agency. 1987. Biological criteria for the protection of aquatic life. Volumes I, II, III. Division of Water Quality Planning and Assessment, Surface Water Section. Columbus, Ohio.
- Ohio Environmental Protection Agency. 1989. Biological criteria for the protection of aquatic life. Volume III: Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Division of Water Quality Monitoring and Assessment. Columbus, Ohio.
- Rankin, E.T. 1989. The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application. Ohio Environmental Protection Agency, Division of Water Quality Planning and Assessment. Columbus, Ohio.
- Simon, T.P. 1997. Development of Index of Biotic Integrity expectations for the Ecoregions of Indiana. III. Northern Indiana Till Plain. U.S. Environmental Protection Agency, Region V, Water Division, Watershed and Non-Point Source Branch, Chicago, IL. EPA 905/R-96/002.
- Simon, T.P. 2001. Checklist of Crayfish and Freshwater Shrimp (Decapoda) of Indiana. Proceedings of the Indiana Academy of Science 110:104-110.
- Taylor C.A., G.A. Schuster, and D.B. Wylie. 2015. Field Guide to Crayfishes of the Midwest. Illinois Natural History Survey. Champaign. X + 149pp.

APPENDICES

Appendix A

Biological Assessment Introduction and Methodology

In 2022, the cities of Elkhart and South Bend, through the Aquatic Community Monitoring Program (Aquatics Program), continued to monitor local fish and macroinvertebrate communities in area rivers and streams. The information gathered was integrated into an overall water quality program for each City. While the cities measure the chemical and microbial composition of local stream water, the additional biological data provides a more accurate representation of the overall health of each stream. The way that biological communities are assembled can change as a result of a disturbance, such as a chemical spill or alteration of habitat. Chemical and microbial testing, which can play an important role in pinpointing contaminants, is simply a snapshot of current conditions. In many cases, having both sets of data can help determine the cause and effect of disturbances to our local streams.

During the first 6 years (1998-2003), the Aquatics Program established core fish sampling sites on the St. Joseph River and many of its primary tributaries in the Elkhart area. For 3 consecutive years, data were collected from these sites and a baseline was established for each stream. Baseline data are now used to compare with current monitoring results to determine if impairments or enhancements are taking place in Elkhart area streams.

In 2001, the City of South Bend combined forces with the Aquatics Program, establishing a unique biological monitoring partnership between municipalities. As with the Elkhart area, core sampling sites were determined and similar baselines were established for South Bend over a 6 year period (2001-2006).

Other sampling efforts have been conducted in both Elkhart and St. Joseph Counties, offering a comprehensive view of stream conditions for the entire section of the St. Joseph River in Indiana. From 2007 to 2009, baseline monitoring was completed in the Mishawaka section of the St. Joseph River. Baseline monitoring was also conducted in the Goshen area of the Elkhart River in a partnership with the Elkhart River Restoration Association in 2009 and 2010. Additionally, in 2016 baseline monitoring was conducted on numerous sites in the Cobus Creek Watershed to support a watershed study being conducted by the St. Joseph River Basin Commission (this study is available on the St. Joseph River Basin Commission's website: <http://www.sjrbc.com/>). While monitoring will not continue in these areas, the baseline data that were gathered will serve as an important reference for future biological comparisons.

In 2018, the Aquatics Program also collaborated with Indiana University—South Bend to conduct aquatic plant surveys on the St. Joseph River. These surveys were investigative in nature, but were conducted to obtain a better understanding of all aquatic life in the St. Joseph River.

Indices

The Index of Biotic Integrity (IBI) is the system that is used to assess local fish communities. The IBI was developed by Dr. James Karr in 1981 as a tool for assessing water/stream quality based on the fish communities that are present. The IBI was modified by Dr. Thomas Simon in 1997 for use in the St. Joseph River Watershed. The IBI is a great tool in that complex biological information can be analyzed to provide measurements of stream quality for non-biologists and members of the general public. The IBI is comprised of 3 broad categories (species composition, trophic composition, and fish condition) which are broken down into 12 smaller categories, known as metrics (Page A3). These metrics are given a score based on their similarity to least impacted (reference) sites. One of 3 scores can be given for each metric: 1 (not similar to reference conditions), 3 (somewhat similar to reference conditions), or 5 (very similar to reference conditions). In general, the total score for a site will range from 12 to 60, but in an instance where no fish are present at a site, a score of 0 is given. These scores can then be graphed and placed into 1 to 5 classifications (very poor, poor, fair, good, or excellent), which describes the overall condition of the fish community being monitored.

Biologists recognize that fish community condition is a product of the water quality and the habitat that is available in any given area. Since 2003, the Aquatics Program has been assessing available habitat at all sampling locations using the Qualitative Habitat Evaluation Index (QHEI) (Rankin 1989). This index is similar to the IBI in its structure. It has 6 broad categories which are broken down into 21 smaller categories or metrics (Page A4). This index will have a final score of 0 to 100 and the scores will be classified as excellent, good, fair-good, poor, and very poor. This assessment is used to determine to what extent the IBI scores are being affected by habitat. It may also show specific habitat degradation issues that need to be addressed.

Fish are not the only aquatic organisms that can be monitored to determine overall health of rivers and streams. Through a sub-contract with the Midwest Biodiversity Institute (MBI, Columbus, Ohio), the Aquatics Program is also monitoring benthic (bottom dwelling) macroinvertebrates (visible animals without backbones). Twenty-two (22) sites were sampled in 2020 and results were compared to their respective baseline values or the value from the previous sampling event. The macroinvertebrate communities are assessed with the Invertebrate Community Index (ICI) developed by the Ohio Environmental Protection Agency (EPA) (Ohio EPA 1987). This index is broken down into 10 metrics (Page A4). Like the IBI metrics, the ICI metrics are given a score based on their similarity to relatively undisturbed sites; 6 (comparable to exceptional community), 4 (comparable to typical community), 2 (slightly different from the typical community), or 1 (very

different from the typical community). The site scores range from 0 to 60 and are classified similar to IBI scores. This combination of fish, habitat, macroinvertebrate, and chemical monitoring provides the cities of Elkhart and South Bend with the most comprehensive view of stream health.

The Indiana Department of Environmental Management (IDEM) has established guidelines to determine if a body of water is impaired or if its condition is supportive of aquatic life for the IBI and QHEI (IDEM 2015). The ICI is not an index used by IDEM, however, similar guidelines have been established by OHIO EPA for a nearby region, and those values are being used with the Elkhart and St. Joseph County data. Values of 36 or higher for IBI and ICI scores are indicators of a stream with the ability to support aquatic life. IDEM refers to streams with a score of 36 or higher, as those that are "attaining" aquatic life standards. QHEI scores of 51 or greater indicate that enough quality habitat is available to support aquatic communities.

In addition to performing water quality monitoring in the St. Joseph River basin, fish collections are conducted to determine the overall species diversity throughout the watershed. Walleye (*Sander vitreus*) and smallmouth bass (*Micropterus dolomieu*) populations are monitored from previous tagging events in cooperation with the Indiana Department of Natural Resources (IDNR). Tissue from 10 fish species was collected and analyzed for mercury and polychlorinated biphenyl (PCB) content. Current Indiana Fish Consumption Advisory data for the State of Indiana (Tables 9-12) include many species from the Indiana portion of the St. Joseph River Watershed. The cities involved in the Program believe it is vital to continually provide local citizens with the most updated and comprehensive information on local fish consumption.

Methods

For the past 25 years, the Aquatics staff has used 2 collection protocols (investigative sampling and index sampling) to quickly catalog the major fish species and to quantify stream quality in the St. Joseph River Watershed. Investigative sites are sampled once during the season and the fish collected at these sites are identified to species, the largest and smallest specimens are measured to the nearest millimeter (mm), and all fish are counted and then released. Index sites are sampled twice during the season, with a minimum 5 week "rest" period between sampling events. Individual species maximum and minimum lengths are recorded, all fish are counted, and game fish and are weighed and measured individually, while most non-game fish are mass weighed. Individual length and weight data are also collected for some of the important species like greater redhorse.

The length of stream sampled at an index site is dependent on the wetted width of the stream. The length of sites is 15 times this width, with a minimum of 50 meters and a maximum of 500 meters. Differences in sampling and processing (Foy 2004) have allowed multiple investigative sites to be sampled in a day versus 1 or 2 index sites. Eve-

ry species collected at each site is verified either by retaining and preserving a small specimen for the Public Works & Utilities voucher museum or by photographing a large specimen. This practice allows for the verification of the field and lab identifications if needed.

In 2022, 9 Index and 5 Investigative sites were sampled in St. Joseph County and 16 Index and 4 Investigative sites were sampled in Elkhart County. Fish community parameters were calculated for Index sites and averaged to between the 2 surveys. Index sites are those that are part of the Aquatics Programs long-term monitoring network and are sampled every 3 years.

Fish were collected using either boat mounted, tote barge, or backpack electrofishing equipment. The type of gear used depended on the size of the stream. The St. Joseph and Elkhart Rivers were sampled with the boat. Smaller, wadeable streams were sampled with the tote barge, unless the stream was extremely small and shallow, in which case, the backpack was used. Power output from the 3 devices differed. The boat output was 8-16 amperes, the tote barge was 4-6 amperes, and the backpack was 0.5-1.5 amperes.

During each fish sampling event, stream habitat information was methodically collected using the QHEI as developed by Ohio EPA (Rankin 1989). Given that each index site was sampled twice, scores were averaged to give a final score.

In late June 2022, Aquatics personnel placed Hester-Dendy samplers (artificial substrates used to collect small aquatic organisms) at 22 sites following Ohio EPA macroinvertebrate sampling procedures (Ohio EPA 1987, 1989). The data gathered from the samplers is considered a quantitative sample where species are identified and specimens are counted. This information was then used to calculate ICI scores for each site. Qualitative sampling also took place at each site with the use of a kick net through all available habitat near the location of the sampler. This extra sampling is used to capture additional species as well as provide information to make an estimate of stream health in the case where an ICI score can not be calculated due to the loss or vandalism of a sampler.

Fish tissue in the form of fillets was collected from Channel Catfish (*Ictalurus punctatus*), White Sucker (*Catostomus commersonii*), Walleye (*Sander vitreus*), Quillback (*Carpiodes cyprinus*), and Bluegill (*Lepomis macrochirus*). Data and location information are presented in Appendix B of this report. Each tissue sample sent in for laboratory analysis (Pace Analytical, Green Bay, WI) was a composite of fillets from 3 fish of the same species from the sample reach. The shortest specimen was within 90% of the length of the longest specimen. The samples were collected following the procedures in Appendix B (this report) and in "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory", Appendix III (1993).

The Northern Indiana Till Plain Index of Biotic Integrity metrics used to evaluate headwater stream (<20 square miles drainage area) sites in the St. Joseph River drainage:

1. Total number of species
2. Number of darter/madtom/sculpin species
3. Percent headwater species
4. Number of minnow species
5. Number of sensitive species
6. Percent tolerant
7. Percent omnivores
8. Percent insectivores
9. Percent pioneer species (individuals)
10. Number of fish collected
11. Percent simple lithophils
12. Percent DELT anomalies

The Northern Indiana Till Plain Index of Biotic Integrity metrics used to evaluate wadeable stream (>20-<1,000 square miles drainage area) sites in the St. Joseph River drainage:

1. Total number of species
2. Number of darter species
3. Number of sunfish species
4. Number of sucker species
5. Number of sensitive species
6. Percent tolerant
7. Percent omnivores
8. Percent insectivores
9. Percent carnivores
10. Number of fish collected
11. Percent simple lithophils
12. Percent DELT anomalies

Invertebrate Community Index categories and metrics used to evaluate sites in the St. Joseph River drainage:

1. Total number of taxa
2. Total number of mayfly taxa
3. Total number of caddisfly taxa
4. Total number of dipteran taxa
5. Percent mayfly composition
6. Percent caddisfly composition
7. Percent tribe Tanytarsini midge composition
8. Percent other dipteran and non-insect composition
9. Percent tolerant organisms
10. Total number of qualitative EPT (mayflies, stoneflies and caddisflies) taxa

Qualitative Habitat Evaluation Index categories and metrics used to evaluate sites in the St. Joseph River drainage:

1. Substrate
 - type
 - number of types present
 - origin
 - silt cover
 - extent of embeddedness
2. Instream Cover
 - type
 - amount
3. Channel Morphology
 - sinuosity
 - development
 - channelization
 - stability
4. Riparian Zone and Bank Erosion
 - riparian width
 - floodplain quality
 - bank erosion
5. Pool/Glide and Riffle/Run Quality
 - maximum pool depth
 - pool/riffle morphology
 - pool/riffle/run current velocity
 - riffle/run depth
 - riffle/run substrate
 - riffle/run embeddedness
6. Gradient

The Coolwater Index of Biotic Integrity metrics used to evaluate sites in Indiana with less than or equal to 100 square miles drainage area:

1. Number of Native Species
2. Number of darter/madtom/sculpin species
3. Percent headwater species
4. Percent coolwater species
5. Percent sensitive and intolerant Species
6. Percent tolerant
7. Percent detritivore
8. Percent invertivore
9. Percent pioneer species
10. Number of fish collected (minus tolerant individuals)
11. Percent simple lithophils
12. Percent DELT anomalies

The Coolwater Index of Biotic Integrity metrics used to evaluate sites in Indiana with greater than 100 square miles drainage area:

1. Number of Native Species
2. Number of darter/madtom/sculpin species
3. Percent catostomidae (sucker family)
4. Percent coolwater species
5. Percent sensitive and intolerant Species
6. Percent tolerant
7. Percent detritivore
8. Percent invertivore
9. Percent carnivore
10. Number of fish collected (minus tolerant individuals)
11. Percent simple lithophils
12. Percent DELT anomalies

The following is a description of the Rapid Trash Assessment Methods:

The RTA is comprised of 6 metrics. Each of the metrics are added together to provide a final RTA score out of 120. The RTA metrics include: Level of Trash (20 points), Total # of Trash Items (20 points), Threat to Aquatic Life (20 points), Threat to Human Life (20 points), Illegal Dumping and Littering (20 points), and Accumulation of Trash (20 points).

RTA sites are divided into 4 transects. Two (2) stream transects are located from the center of the stream to the edge of the right or left bank. Bank transects were located on each stream bank from the edge (high water mark) and 20 feet into the riparian zone. Trash is sampled by picking up or observing (items too large to pick up) for 15 minutes in each transect for a total of 1 hour of sampling. Following the 1 hour of sampling, trash items are separated by types and data are recorded based on trash type and its location (instream or along the banks). Note that sampling can be conducted in teams to reduce the time at a site.

The first metric (Level of Trash) is a qualitative score out of 20 that is assigned at the beginning of the assessment and is "first glance" perception on the level of trash at a site. The remaining metrics are quantitative and based on the number of trash items observed.

The table below details each metric and the scoring matrix associated with each scoring matrix. Further details can be found in Moore et al., 2007.

Metric	# of items	Score Range	# of items	Score Range	# of items	Score Range	# of items	Score Range
Level of Trash	0	16 to 20	10 to 50	11 to 15	51 to 100	6 to 10	>100	1 to 5
Quantity of Trash	0 to 10	16 to 20	11 to 50	11 to 15	51 to 100	6 to 10	>100	1 to 5
Threat to Aquatic Life	0	16 to 20	<10	11 to 15	<50	6 to 10	>50	1 to 5
Threat to Human Life	0	16 to 20	<10	11 to 15	10 to 50	6 to 10	>50	1 to 5
Illegal Dumping*	None	9 to 10	Minor Evidence	6 to 8	A large item	3 to 5	Several items	0 to 2
Illegal Littering*	<5	9 to 10	<10	6 to 8	10 to 50	3 to 5	>50	0 to 2
Accumulation of Trash	0	16 to 20	<10	11 to 15	10 to 50	6 to 10	>50	1 to 5

**Illegal dumping and littering are scored separately but are considered to be the same metric for a total of 20 points*

Appendix B

Fish tissue preparation and results

Materials needed:

- Reynolds aluminum foil
- freezer wrap
- deionized (DI) water
- 1/2 gallon, 1 gallon, and jumbo size freezer bags w/write-on labels
- skinners
- stainless steel fillet knives
- knife sharpener
- scales
- ice
- cooler

A group of three fish per species was selected based on size. The smallest fish in each group was greater than or equal to 90% of the length of the largest fish in that group. The largest fish or fish that fell into a length range for species on the advisory were selected. The fish were kept as close in size as possible within a group because the tissue from the three fish in each group was composited (mixed together) before the analyses were completed.

All of the tissue was in the form of boneless fillets taken from the fish. All of the fish had skin-on fillets taken. Before the tissue was removed, the fillet knives, scalers and skinners were cleaned and rinsed with DI water, and freezer wrap was placed where the fish were to be processed. The knives, scalers and skinners were washed in river water and rinsed with DI water after each species was processed and new freezer wrap was placed before another species was processed. For skin-on samples, the

scales were removed before the fillet was taken. It was important to be consistent with where the cut of the fillet ended and to not include any of the body cavity or viscera. Once the fillets were removed, they were rinsed in river water and then rinsed with DI water before being placed on aluminum foil. The foil was large enough to hold the three fillets for each species at a site. When all three fillets were placed on the foil, it was then wrapped and placed in a labeled freezer bag and placed on ice in a cooler. The fish tissue was placed in a freezer upon returning to the lab, and kept frozen until sent to the contract lab for analyses.

Fish Tissue Results, Aquatics Program 2022

Station	Species	Length Range (in)	Hg Group General Population	Hg Group Sensitive Population	PCB Group General Population	PCB Group Sensitive Population
St. Joseph River SR 15 (Bristol)	Channel Catfish	19	1	2	2	2
Elkhart River Elkhart Avenue	Channel Catfish	< 19	1	1	3	3
		19 +			4	4
St. Joseph River Sherman Street	Channel Catfish	< 23	1	1	2	2
		23+	1	2	3	3
St. Joseph River Capital Avenue	Channel Catfish	29	2	2	3	3
St. Joseph River SR 15 (Bristol)	White Sucker	16.8	1	2	1	1
St. Joseph River Nappanee Street	White Sucker	< 16	1	1	1	1
		16 +			2	2
St. Joseph River Capital Avenue	Walleye	18	1	2	2	2
St. Joseph River Sample Street	Quillback	< 19	1	2	4	4
		19 +	2	2	5	5
St. Joseph River Pinhook (B)	Quillback	20	1	2	2	2
St. Joseph River Capital Avenue	Bluegill	7.5	1	1	1	1

Sensitive Population— Females under the age of 50 and males under the age of 18

1 Meal—8oz. For adults, 3oz. for children ages 3 to 6

Group 1—No restrictions

Group 2—1 Meal/week

Group 3—1 meal/month

Group 4—1 meal/2 months

Group 5—Do Not Eat

Appendix C

Summary of fish collected by county, 2022

Summary of species captured at index sites in Elkhart County, 2022

COMMON NAME	Total Number	% by Number	Total Weight (g)	Total Weight (lbs)	% by Weight
Bluegill	2,364	10.04	87,124	192.08	4.3040
Sand Shiner	1,864	7.92	4,006	8.83	0.1979
Mimic Shiner	1,811	7.69	3,456	7.62	0.1707
Rock Bass	1,770	7.52	110,981	244.67	5.4826
Spotfin Shiner	1,475	6.26	6,333	13.96	0.3129
Striped Shiner	1,474	6.26	12,918	28.48	0.6382
Smallmouth Bass	1,243	5.28	176,558	389.24	8.7222
White Sucker	1,210	5.14	137,669	303.51	6.8010
Bluntnose Minnow	1,088	4.62	4,539	10.01	0.2242
Creek Chub	951	4.04	17,307	38.16	0.8550
Longear Sunfish	776	3.30	18,644	41.10	0.9210
Golden Redhorse	753	3.20	448,271	988.27	22.1452
Logperch	660	2.80	5,569	12.28	0.2751
Shorthead Redhorse	633	2.69	369,860	815.40	18.2716
Mottled Sculpin	473	2.01	2,263	4.99	0.1118
Northern Hog Sucker	469	1.99	95,671	210.92	4.7263
Rainbow Darter	454	1.93	648	1.43	0.0320
Hornyhead Chub	442	1.88	6,779	14.95	0.3349
Common Shiner	427	1.81	5,867	12.93	0.2898
Silverjaw Minnow	366	1.55	1,137	2.51	0.0562
Largemouth Bass	329	1.40	79,345	174.93	3.9198
Rosyface Shiner	298	1.27	660	1.46	0.0326
Stoneroller, Central	221	0.94	2,387	5.26	0.1179
Johnny Darter	188	0.80	309	0.68	0.0153
Blacknose Dace	182	0.77	675	1.49	0.0333
Green Sunfish	148	0.63	3,861	8.51	0.1907
Bowfin	128	0.54	20,080	44.27	0.9920
Pumpkinseed	128	0.54	3,604	7.95	0.1780
Greenside Darter	109	0.46	1,590	3.51	0.0785
Spotted Sucker	101	0.43	19,371	42.71	0.9570
Blackside Darter	95	0.40	284	0.63	0.0140
Common Carp	85	0.36	203,113	447.79	10.0341
Yellow Bullhead	73	0.31	4,599	10.14	0.2272
Banded Killifish	73	0.31	265	0.58	0.0131
Longnose Dace	65	0.28	189	0.42	0.0093
YOY Suckers (Unid.)	62	0.26	97	0.21	0.0048
Walleye	57	0.24	30,369	66.95	1.5003
Grass Pickerel	51	0.22	743	1.64	0.0367
Chestnut Lamprey	50	0.21	288	0.63	0.0142
American Brook Lamprey	46	0.20	230	0.51	0.0114
Brown Trout	41	0.17	6,570	14.48	0.3246
Blackstripe Topminnow	40	0.17	80	0.18	0.0040

Summary of species captured at index sites in Elkhart County, 2022 (continued)

COMMON NAME	Total Number	% by Number	Total Weight (g)	Total Weight (lbs)	% by Weight
Silver Redhorse	37	0.16	46,500	102.52	2.2972
Redear Sunfish	29	0.12	2,021	4.46	0.0998
Silver Lamprey	25	0.11	93	0.21	0.0046
Fathead Minnow	21	0.09	59	0.13	0.0029
Hybrid Sunfish	17	0.07	648	1.43	0.0320
Central Mudminnow	17	0.07	101	0.22	0.0050
Channel Catfish	16	0.07	22,809	50.29	1.1268
Northern Pike	15	0.06	12,921	28.49	0.6383
Mosquitofish	12	0.05	13	0.03	0.0006
Quillback	10	0.04	15,300	33.73	0.7558
Northern Brook Lamprey	10	0.04	30	0.07	0.0015
Gizzard Shad	8	0.03	1,812	3.99	0.0895
River Redhorse	7	0.03	16,500	36.38	0.8151
Brook Silverside	7	0.03	24	0.05	0.0012
Rainbow Trout	6	0.03	1,217	2.68	0.0601
Tadpole Madtom	6	0.03	61	0.13	0.0030
Greater Redhorse	4	0.02	5,198	11.46	0.2568
Longnose Gar	4	0.02	1,800	3.97	0.0889
Black Redhorse	4	0.02	827	1.82	0.0409
Warmouth	4	0.02	129	0.28	0.0064
Black Crappie	3	0.01	548	1.21	0.0271
Pirate Perch	3	0.01	21	0.05	0.0010
Brown Bullhead	2	0.01	898	1.98	0.0444
Stonecat	2	0.01	70	0.15	0.0035
Spotted Gar	1	0.00	230	0.51	0.0114
Black Bullhead	1	0.00	80	0.18	0.0040
Golden Shiner	1	0.00	17	0.04	0.0008
Totals	23,545	100	2,024,236	4,462.68	100

Summary of species captured at investigative sites in Elkhart County, 2022

COMMON NAME	Total Number	% by the number
Spotfin Shiner	137	10.48
Rock Bass	132	10.10
Common Shiner	114	8.72
Bluegill	113	8.65
Golden Redhorse	102	7.80
Striped Shiner	95	7.27
Smallmouth Bass	83	6.35
Northern Hog Sucker	69	5.28
Bluntnose Minnow	45	3.44
Sand Shiner	42	3.21
Longear Sunfish	30	2.30
Johnny Darter	28	2.14
Largemouth Bass	25	1.91
Shorthead Redhorse	20	1.53
Stoneroller, Central	18	1.38
Rainbow Darter	18	1.38
Tadpole Madtom	17	1.30
Northern Pike	15	1.15
Silverjaw Minnow	15	1.15
Common Carp	14	1.07
White Sucker	14	1.07
Hornyhead Chub	14	1.07
Chestnut Lamprey	14	1.07
Bowfin	13	0.99
Spotted Sucker	13	0.99
Creek Chub	12	0.92
Rosyface Shiner	12	0.92
Northern Brook Lamprey	12	0.92
Mosquitofish	8	0.61
Yellow Bullhead	6	0.46
Quillback	6	0.46
Silver Redhorse	5	0.38
Walleye	5	0.38
Longnose Gar	5	0.38
Central Mudminnow	5	0.38
Blacknose Dace	4	0.31
Mimic Shiner	4	0.31
Blackstripe Topminnow	4	0.31
Channel Catfish	2	0.15
Spotted Gar	2	0.15

COMMON NAME	Total Number	% by the number
Redear Sunfish	2	0.15
Logperch	2	0.15
Pirate Perch	2	0.15
Grass Pickerel	2	0.15
Greater Redhorse	1	0.08
Black Redhorse	1	0.08
Pumpkinseed	1	0.08
Yellow Perch	1	0.08
Black Crappie	1	0.08
Green Sunfish	1	0.08
Banded Killifish	1	0.08
Totals	1307	100

Index Sites	23,545
Investigative Sites	1,307
Elkhart County Total	24,852

Summary of species captured at investigative sites in St. Joseph County, 2022

COMMON NAME	Total Number	% by the number
Smallmouth Bass	131	14.92
Mottled Sculpin	127	14.46
Rock Bass	121	13.78
Creek Chub	64	7.29
Longear Sunfish	57	6.49
Golden Redhorse	50	5.69
Bluegill	48	5.47
Northern Hog Sucker	39	4.44
Central Mudminnow	35	3.99
Rainbow Darter	28	3.19
White Sucker	22	2.51
Spotfin Shiner	22	2.51
Rainbow Trout	16	1.82
Shorthead Redhorse	12	1.37
Spotted Sucker	10	1.14
Largemouth Bass	9	1.03
Mimic Shiner	9	1.03
Black Redhorse	8	0.91
Logperch	8	0.91
Green Sunfish	8	0.91
Banded Killifish	8	0.91
Blacknose Dace	7	0.80
Common Carp	6	0.68
Johnny Darter	6	0.68
Northern Pike	5	0.57
Yellow Bullhead	3	0.34
Redear Sunfish	3	0.34
Striped Shiner	3	0.34
Sand Shiner	3	0.34
Spottail Shiner	3	0.34
Quillback	1	0.11
Spotted Gar	1	0.11
Walleye	1	0.11
Longnose Gar	1	0.11
Warmouth	1	0.11
Greenside Darter	1	0.11
Bluntnose Minnow	1	0.11
Totals	878	100

Summary of species captured at index sites in St. Joseph County, 2022

COMMON NAME	Total Number	% by Number	Total Weight (g)	Total Weight (lbs)	% by Weight
Bluegill	1,200	17.16	42,618	93.96	6.0433
Rock Bass	1,187	16.97	71,788	158.27	10.1797
Smallmouth Bass	981	14.03	79,461	175.18	11.2677
Longear Sunfish	867	12.40	26,861	59.22	3.8089
Creek Chub	577	8.25	6,074	13.39	0.8613
Mottled Sculpin	264	3.77	1,380	3.04	0.1957
White Sucker	247	3.53	19,174	42.27	2.7189
Spotfin Shiner	193	2.76	788	1.74	0.1117
Mimic Shiner	161	2.30	294	0.65	0.0417
Bluntnose Minnow	134	1.92	368	0.81	0.0522
Shorthead Redhorse	130	1.86	79,800	175.93	11.3158
Golden Redhorse	116	1.66	86,300	190.26	12.2375
Johnny Darter	106	1.52	156	0.34	0.0221
Northern Hog Sucker	98	1.40	29,000	63.93	4.1123
Largemouth Bass	94	1.34	17,810	39.26	2.5255
Green Sunfish	67	0.96	1,478	3.26	0.2096
Blacknose Dace	65	0.93	254	0.56	0.0360
Sand Shiner	64	0.92	123	0.27	0.0174
Logperch	61	0.87	721	1.59	0.1022
Pumpkinseed	48	0.69	1,107	2.44	0.1570
Rainbow Trout	33	0.47	2,925	6.45	0.4148
Walleye	30	0.43	22,725	50.10	3.2224
Redear Sunfish	28	0.40	1,547	3.41	0.2194
Greenside Darter	28	0.40	105	0.23	0.0149
Banded Killifish	27	0.39	129	0.28	0.0183
Spotted Sucker	25	0.36	7,027	15.49	0.9964
Common Carp	23	0.33	125,900	277.56	17.8528
Blackside Darter	22	0.31	56	0.12	0.0079
Black Redhorse	20	0.29	17,900	39.46	2.5383
Yellow Bullhead	15	0.21	1,837	4.05	0.2605
Rainbow Darter	14	0.20	31	0.07	0.0044
Spottail Shiner	14	0.20	16	0.04	0.0023
Quillback	11	0.16	17,159	37.83	2.4332
River Redhorse	7	0.10	23,500	51.81	3.3323
Chestnut Lamprey	7	0.10	84	0.19	0.0119
Warmouth	5	0.07	169	0.37	0.0240
Silver Redhorse	4	0.06	7,800	17.20	1.1061
YOY Suckers (Unid.)	3	0.04	4	0.01	0.0006
Brook Silverside	3	0.04	4	0.01	0.0006
Channel Catfish	2	0.03	9,550	21.05	1.3542
Longnose Gar	2	0.03	1,000	2.20	0.1418
Stonecat	2	0.03	66	0.15	0.0094

Summary of species captured at index sites in St. Joseph County, 2022 (continued)

COMMON NAME	Total Number	% by Number	Total Weight (g)	Total Weight (lbs)	% by Weight
Hybrid Sunfish	2	0.03	64	0.14	0.0091
Fathead Minnow	2	0.03	6	0.01	0.0009
Central Mudminnow	2	0.03	3	0.01	0.0004
Flathead Catfish	1	0.01	23	0.05	0.0033
Black Crappie	1	0.01	17	0.04	0.0024
Spotted Gar	1	0.01	8	0.02	0.0011
Totals	6,994	100	705,210	1,555	100

Index Sites	6,994
Investigative Sites	878
St. Joseph County Total	7,872

Appendix D

**Summary of fish collected by site, 2022
(Reference Table 16 for site numbers and locations)**

Stream	St. Joseph River, Elkhart County, 2022								
Site	Trout Creek Mouth	SR 15 (Bristol)		Homan Ave.		Sherman St.		Nappanee St.	
		1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass
~American Brook Lamprey				X	X		X		
#Banded Killifish	X			X	X	X	X	X	X
Black Crappie				X				X	
~Black Redhorse	X	X					X		
Blackside Darter			X		X	X	X		X
Bluegill	X	X	X	X	X	X	X	X	X
#Bluntnose Minnow	X	X	X	X	X	X	X	X	X
Bowfin	X	X	X						
~Brook Silverside					X	X	X		
#Brown Bullhead				X	X				
Brown Trout		X							
#Channel Catfish			X				X		
Chestnut Lamprey		X		X		X			X
#Common Carp	X				X	X	X	X	X
Common Shiner		X			X				
#Gizzard Shad		X				X			
~Golden Redhorse	X	X	X	X	X	X	X	X	X
Grass Pickerel	X	X	X		X				
~Greater Redhorse						X		X	
#Green Sunfish		X		X		X	X	X	X
~Greenside Darter			X		X		X		X
~Hornyhead Chub	X								X
Hybrid Sunfish				X			X		
Johnny Darter		X	X		X				
Largemouth Bass	X	X	X	X	X	X	X	X	X
~Logperch	X	X	X	X	X	X	X	X	X
~Longear Sunfish	X	X	X	X	X	X	X	X	X
#Longnose Gar	X	X				X			
~Mimic Shiner	X	X	X	X	X	X	X	X	X
Mottled Sculpin			X						
~Northern Hog Sucker	X	X	X		X	X	X	X	X
Northern Pike	X			X	X	X			X
Pumpkinseed	X	X	X	X	X	X	X	X	X
#Quillback								X	
~Rainbow Darter	X					X		X	X
Redear Sunfish	X	X		X		X	X	X	X
~River Redhorse						X		X	
~Rock Bass	X	X	X	X	X	X	X	X	X
~Rosyface Shiner					X		X	X	
~Sand Shiner	X	X	X	X	X	X	X	X	X

Stream	St. Joseph River, Elkhart County, 2022								
Site	Trout Creek Mouth	SR 15 (Bristol)		Homan Ave.		Sherman St.		Nappanee St.	
		1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass
~Shorthead Redhorse	X	X	X	X	X	X	X	X	X
~Silver Redhorse	X		X	X	X		X	X	
~Smallmouth Bass	X	X		X	X	X	X	X	X
Spotfin Shiner	X	X	X	X	X	X	X	X	X
Spotted Gar						X			
Spotted Sucker	X	X		X	X	X	X	X	X
Stoneroller, Central							X		
Striped Shiner	X	X	X	X	X		X	X	X
Walleye		X	X				X	X	X
Warmouth						X	X		
#White Sucker	X	X	X	X	X	X	X	X	X
#Yellow Bullhead			X	X	X		X	X	X
YOY Suckers (Unid.)					X				

~ - denotes a species that is SENSITIVE to environmental disturbances such as degraded water quality or habitat
- denotes a species that is TOLERANT of environmental disturbances such as degraded water quality or habitat

Stream	St. Joseph River, St. Joseph County, 2022									
Site	Capital Ave.		Sample St.		Michigan St.		Sherman Ave.	Pinhook	Pinhook (Below)	
	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass			1st Pass	2nd Pass
#Banded Killifish	X	X	X	X	X	X		X		
Black Crappie		X								
~Black Redhorse					X	X	X	X	X	X
Blackside Darter	X	X	X	X	X	X			X	
Bluegill	X	X	X	X	X	X	X	X	X	X
#Bluntnose Minnow	X	X	X	X	X	X	X			X
~Brook Silverside		X		X						
#Channel Catfish	X	X								
Chestnut Lamprey			X						X	X
#Common Carp	X	X	X	X				X		
Flathead Catfish						X	X			
~Golden Redhorse	X	X	X	X	X	X	X	X	X	X
#Green Sunfish		X	X	X		X	X		X	X
~Greenside Darter	X	X	X		X	X	X		X	
Hybrid Sunfish	X			X						
Johnny Darter		X	X							
Largemouth Bass	X	X		X	X			X	X	X
~Logperch	X	X			X	X	X		X	
~Longear Sunfish	X	X	X	X	X	X	X	X	X	X
#Longnose Gar		X								X
~Mimic Shiner	X	X	X	X	X				X	X
~Northern Hog Sucker					X	X	X	X	X	X
Northern Pike								X		
Pumpkinseed	X	X	X	X						
#Quillback	X		X		X					X
~Rainbow Darter	X	X	X	X	X	X	X		X	
Rainbow Trout	X		X							
Redear Sunfish	X	X						X	X	X
~River Redhorse	X		X		X					X
~Rock Bass	X	X	X	X	X	X	X	X	X	X
~Sand Shiner	X	X						X	X	
~Shorthead Redhorse			X	X	X	X	X	X	X	X
~Silver Redhorse	X		X						X	
~Smallmouth Bass	X	X	X	X	X	X	X	X	X	X
Spotfin Shiner	X	X		X	X	X	X	X	X	X
Spottail Shiner		X		X				X		
Spotted Gar										
Spotted Sucker	X	X	X	X				X	X	X
~Stonecat						X	X			
Walleye	X	X	X	X	X	X	X		X	X

Stream	St. Joseph River, St. Joseph County, 2022									
Site	Capital Ave.		Sample St.		Michigan St.		Sherman Ave.	Pinhook	Pinhook (Below)	
	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass			1st Pass	2nd Pass
Warmouth						X	X		X	X
#White Sucker		X	X	X				X	X	X
#Yellow Bullhead	X		X	X						X
YOY Suckers (Unid.)		X		X						

~ - denotes a species that is SENSITIVE to environmental disturbances such as degraded water quality or habitat
- denotes a species that is TOLERANT of environmental disturbances such as degraded water quality or habitat

Tributaries to the St. Joseph River, St. Joseph County, 2022							
Stream	Bowman Creek						Manion Drain
Site	Gertrude		Green Tech		Ravina Park		Below Dam
	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	
#Blacknose Dace							X
Bluegill		X	X	X	X	X	
#Central Mudminnow							X
#Creek Chub	X	X		X	X	X	
#Fathead Minnow					X		
#Green Sunfish			X	X			
Largemouth Bass				X			
Mottled Sculpin							X
~Rainbow Darter							X
Rainbow Trout							X

Tributaries to the St. Joseph River, St. Joseph County, 2022						
Stream	Juday Creek					
Site	SR 23		Ponader Park		IWL Dam (Above)	IWL Dam (Below)
	1st Pass	2nd Pass	1st Pass	2nd Pass		
#Blacknose Dace	X	X	X	X		X
#Central Mudminnow	X	X				
#Common Carp			X			
#Creek Chub	X	X	X	X	X	X
#Green Sunfish	X	X	X	X	X	X
~Greenside Darter						X
Johnny Darter	X	X	X	X	X	
Largemouth Bass		X	X	X		
Mottled Sculpin	X	X	X	X	X	X
~Rainbow Darter						X
Rainbow Trout	X			X		X
~Rock Bass	X	X	X	X		
~Smallmouth Bass		X		X		X
Striped Shiner						X
#White Sucker	X	X	X	X	X	X
#Yellow Bullhead						X

~ - denotes a species that is SENSITIVE to environmental disturbances such as degraded water quality or habitat
- denotes a species that is TOLERANT of environmental disturbances such as degraded water quality or habitat

Tributaries to the St. Joseph River, Elkhart County, 2022							
Stream	Lily Creek			Yellow Creek		Cobus Creek	
Site	Reckell Ave.		Modrell Ave	CR 32		CR8	
	1st Pass	2nd Pass		1st Pass	2nd Pass	1st Pass	2nd Pass
~American Brook Lamprey						X	X
#Black Bullhead					X		
#Blacknose Dace				X	X	X	X
Bluegill	X	X	X	X	X	X	X
#Bluntnose Minnow	X			X	X		
Bowfin		X	X				
Brown Trout						X	X
#Central Mudminnow		X	X	X	X		
#Common Carp		X					
Common Shiner					X		X
#Creek Chub	X	X	X	X	X	X	X
#Fathead Minnow				X			
~Golden Shiner					X		
Grass Pickerel					X	X	X
#Green Sunfish	X	X	X	X	X	X	X
Johnny Darter	X	X	X	X	X		
Largemouth Bass	X				X	X	X
Mottled Sculpin						X	X
~Northern Hog Sucker						X	
Northern Pike		X					
Pumpkinseed		X				X	X
Rainbow Trout						X	
Redear Sunfish		X				X	X
~Rock Bass						X	X
Silverjaw Minnow				X	X		
Spotfin Shiner	X						
Spotted Sucker					X		
Striped Shiner	X						
#White Sucker	X	X			X	X	X
#Yellow Bullhead		X					

~ - denotes a species that is SENSITIVE to environmental disturbances such as degraded water quality or habitat
- denotes a species that is TOLERANT of environmental disturbances such as degraded water quality or habitat

Tributaries to the St. Joseph River, Elkhart County, 2022											
Stream	Elkhart River										
Site	Rogers Park	Oxbow Park		Indiana Ave.		Middlebury St.		Prairie Ave.		Elkhart Ave.	
		1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass
~Black Redhorse											X
~American Brook Lamprey		X	X	X		X	X	X	X		
Black Crappie	X									X	
Blackside Darter		X	X	X	X	X	X		X	X	X
#Blackstripe Topminnow	X										
Bluegill	X	X	X	X	X	X	X	X	X	X	X
#Bluntnose Minnow	X	X	X	X	X	X	X	X	X	X	X
Bowfin	X				X						
~Brook Silverside				X						X	
Brown Trout											X
#Central Mudminnow		X	X								
#Channel Catfish	X						X	X	X	X	X
Chestnut Lamprey	X	X	X	X	X	X	X	X		X	
#Common Carp	X		X	X	X	X			X	X	X
Common Shiner	X	X	X	X	X					X	
#Gizzard Shad								X		X	X
~Golden Redhorse	X	X	X	X	X	X	X	X	X	X	X
Grass Pickerel					X				X	X	
~Greater Redhorse	X	X	X								
#Green Sunfish		X	X	X	X	X	X	X	X	X	X
~Greenside Darter									X		X
~Hornyhead Chub	X	X	X	X	X	X	X	X	X		
Hybrid Sunfish					X			X	X	X	
Johnny Darter		X	X	X	X		X		X		
Largemouth Bass	X	X	X	X	X	X	X	X	X	X	X
~Logperch		X	X	X	X	X	X	X	X		X
~Longear Sunfish	X	X	X	X	X	X	X	X	X	X	X
~Longnose Dace							X				
#Longnose Gar	X										
~Mimic Shiner		X	X	X	X	X	X	X	X	X	X
~Northern Brook Lamprey						X					
~Northern Hog Sucker	X	X	X	X	X	X	X	X	X	X	X
Northern Pike	X		X							X	
Pirate Perch	X										
Pumpkinseed		X	X		X		X	X	X	X	X
#Quillback										X	
~Rainbow Darter			X		X	X	X	X	X	X	X
Redear Sunfish			X	X	X		X	X	X	X	X
~River Redhorse		X					X	X			
~Rock Bass	X	X	X	X	X	X	X	X	X	X	X

Tributaries to the St. Joseph River, Elkhart County, 2022											
Stream	Elkhart River										
Site	Rogers Park	Oxbow Park		Indiana Ave.		Middlebury St.		Prairie Ave.		Elkhart Ave.	
		1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass
~Rosyface Shiner	X	X	X	X	X	X	X	X	X	X	X
~Sand Shiner		X	X	X	X	X	X	X	X	X	X
~Shorthead Redhorse	X	X	X	X	X	X	X	X	X	X	X
Silver Lamprey				X				X			
~Silver Redhorse		X	X	X	X	X	X	X	X		X
Silverjaw Minnow					X						
~Smallmouth Bass	X	X	X	X	X	X	X	X	X	X	X
Spotfin Shiner	X	X	X	X	X	X	X	X	X	X	X
Spotted Gar	X										
Spotted Sucker	X	X	X	X	X	X	X		X	X	X
~Stonecat									X		
Stoneroller, Central		X									
Striped Shiner	X	X	X	X	X	X	X	X	X	X	
Tadpole Madtom				X							
Walleye	X	X	X	X	X	X	X	X	X	X	X
Warmouth											X
#White Sucker	X	X	X	X	X	X	X	X	X		X
#Yellow Bullhead	X	X	X	X		X	X		X		
Yellow Perch	X										

~ - denotes a species that is SENSITIVE to environmental disturbances such as degraded water quality or habitat
- denotes a species that is TOLERANT of environmental disturbances such as degraded water quality or habitat

Tributaries to the St. Joseph River, Elkhart County, 2022											
Stream	Little Elkhart		Puterbaugh Creek		Christiana Creek			Baugo Creek			
Site	CR 10		CR 8		CR 4		Airport	CR 1 (S)		CR 3 (N)	
	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass		1st Pass	2nd Pass	1st Pass	2nd Pass
~American Brook Lamprey	X	X	X	X							
#Banded Killifish								X	X	X	X
#Blacknose Dace	X	X						X	X	X	X
Blackside Darter		X	X	X							
Blackstripe Topminnow					X	X	X				
Bluegill	X	X	X	X	X	X	X	X	X	X	X
#Bluntnose Minnow	X	X			X	X	X	X	X	X	X
Bowfin					X	X					
Brown Trout	X	X									
#Central Mudminnow	X							X			
#Channel Catfish						X					
Chestnut Lamprey		X			X	X	X				
#Common Carp					X	X					
Common Shiner	X	X			X			X	X	X	X
#Creek Chub	X	X	X	X	X			X	X	X	X
~Golden Redhorse		X			X	X	X				X
Grass Pickerel	X	X	X	X			X				
#Green Sunfish	X	X	X	X				X	X		
~Greenside Darter										X	X
~Hornyhead Chub	X				X	X	X				
Hybrid Sunfish										X	
Johnny Darter	X	X	X	X				X	X	X	X
Largemouth Bass	X	X	X	X	X	X	X				X
~Logperch	X	X	X	X						X	X
~Longnose Dace										X	X
~Mimic Shiner								X	X		X
#Mosquitofish					X	X	X				
Mottled Sculpin	X	X	X	X							
~Northern Brook Lamprey					X		X				
~Northern Hog Sucker	X	X			X	X	X				
Pirate Perch				X					X		
Pumpkinseed										X	
~Rainbow Darter	X	X	X	X	X	X	X			X	X
Rainbow Trout	X										
Redear Sunfish				X							
~Rock Bass	X	X			X	X	X	X	X	X	X
~Sand Shiner								X	X	X	X
~Shorthead Redhorse	X										
Silver Lamprey	X	X			X	X					

Tributaries to the St. Joseph River, Elkhart County, 2022											
Stream	Little Elkhart		Puterbaugh Creek		Christiana Creek			Baugo Creek			
Site	CR 10		CR 8		CR 4		Airport	CR 1 (S)		CR 3 (N)	
	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass		1st Pass	2nd Pass	1st Pass	2nd Pass
~Silver Redhorse						X	X				
Silverjaw Minnow										X	X
~Smallmouth Bass	X	X			X	X	X			X	X
Spotfin Shiner	X	X			X	X	X				
Spotted Sucker			X	X							
~Stonecat					X						
Stoneroller, Central	X	X						X	X	X	X
Striped Shiner	X	X			X	X	X	X	X	X	X
Tadpole Madtom					X		X	X	X		
Warmouth						X					
#White Sucker	X	X	X	X	X	X	X	X	X	X	X
#Yellow Bullhead					X	X	X	X	X	X	X

~ - denotes a species that is SENSITIVE to environmental disturbances such as degraded water quality or habitat
- denotes a species that is TOLERANT of environmental disturbances such as degraded water quality or habitat

Appendix E

Summary of macroinvertebrates (insects) collected by site, 2022

Macroinvertebrates were collected in two ways to calculate the Invertebrate Community Index (ICI). The first method employed a sampling device known as a Hester-Dendy multi-plate sampler (HD sampler). Macroinvertebrates collected using this method were identified and counted (Quantitative column in the following tables). The second method was a sweep with a net of all the available habitat types in the area of the Hester-Dendy in an effort to identify other macroinvertebrates in the stream that may not colonize the HD samplers. Macroinvertebrates collected in this way were identified and simply counted as being present (Qualitative column). The following table displays the varioy sites sampled in 2022.

<u>Site Number</u>	<u>Stream</u>	<u>Location</u>	<u>Site Number</u>	<u>Stream</u>	<u>Location</u>
2	St. Joseph River	SR 15 (Bristol)	20	Elkhart River	Oxbow Park
4	St. Joseph River	Sherman Street	21	Elkhart River	Indiana Avenue
6	St. Joseph River	Capital Avenue	22	Elkhart River	Middlebury Street
7	St. Joseph River	Ironwood (A)	25	Yellow Creek	CR 32
8	St. Joseph River	Sample Street	26	Cobus Creek	CR 8
9	St. Joseph River	Michigan Street	28	Baugo Creek	CR 3 (N)
12	St. Joseph River	Pinhook (B)	29	Bowman Creek	Gertrude Street
13	Little Elkhart River	CR 10	30	Bowman Creek	Green Tech Drive
14	Puterbaugh Creek	CR 8	32	Juday Creek	SR 23
15	Lily Creek	Reckell Avenue	33	Juday Creek	Ponader Park
18	Christiana Creek	CR 4	35	Juday Creek	Juday Creek IWL Dam (B)

St. Joseph River—SR 15 (Bristol)

Date Collected: 08/16/22

Site #2

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	4	+	<i>Dineutus sp</i>	F	0	+
<i>Oligochaeta</i>	T	2	+	<i>Psephenus herricki</i>	MI	0	+
<i>Helobdella stagnalis</i>	T	0	+	<i>Macronychus glabratus</i>	F	14	+
<i>Helobdella papillata</i>	MT	0	+	<i>Optioservus trivittatus</i>	MI	0	+
<i>Caecidotea sp</i>	T	0	+	<i>Stenelmis sp</i>	F	5	+
<i>Hyaella azteca</i>	F	0	+	<i>Dixella sp</i>	F	0	+
<i>Gammarus fasciatus</i>	F	0	+	<i>Anopheles sp</i>	F	0	+
<i>Hydrachnidia</i>	F	0	+	<i>Simulium sp</i>	F	0	+
<i>Plauditus sp</i>	MI	0	+	<i>Conchapelopia sp</i>	F	1	
<i>Baetis intercalaris</i>	F	17	+	<i>Nilotanytus fimbriatus</i>	F	5	
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Pentaneura inconspicua</i>	F	4	
<i>Callibaetis sp</i>	MT	0	+	<i>Corynoneura lobata</i>	F	16	
<i>Isonychia sp</i>	MI	2	+	<i>Cricotopus (C.) sp</i>	F	1	
<i>Leucrocota sp</i>	MI	0	+	<i>Nanocladius (N.) spinipennis</i>	F	1	
<i>Stenacron sp</i>	F	69	+	<i>Thienemanniella sp</i>		1	
<i>Maccaffertium exiguum</i>	MI	3	+	<i>Thienemanniella similis</i>	MI	3	
<i>M. mediopunctatum</i>	MI	12	+	<i>Cryptochironomus sp</i>	F	0	+
<i>Maccaffertium pulchellum</i>	MI	3	+	<i>Microtendipes "caelum"</i>	MI	4	
<i>Maccaffertium terminatum</i>	MI	0	+	<i>Phaenopsectra obediens group</i>	F	1	
<i>Teloganopsis deficiens</i>	I	0	+	<i>Polypedilum flavum</i>	F	3	+
<i>Tricorythodes sp</i>	MI	2	+	<i>Polypedilum (P.) fallax group</i>	F	1	
<i>Caenis sp</i>	F	1	+	<i>Polypedilum (P.) illinoense</i>	T	7	+
<i>Anthopotamus sp</i>	MI	1	+	<i>Polypedilum scalaenum group</i>	F	8	
<i>Hetaerina sp</i>	F	0	+	<i>Stenochironomus sp</i>	F	11	
<i>Coenagrionidae</i>	T	0	+	<i>Rheotanytarsus sp</i>	F	1	
<i>Argia sp</i>	F	3	+	<i>Hemerodromia sp</i>	F	1	
<i>Pteronarcys sp</i>	MI	3	+	<i>Hydrobiidae</i>	F	7	
<i>Acrotonia internata</i>	MI	8	+	<i>Elimia sp</i>	MI	7	+
<i>Neoperla clymene complex</i>	I	0	+	<i>Physella sp</i>	T	0	+
<i>Corydalus cornutus</i>	MI	3	+	<i>Planorbella (Pierosoma) pilsbryi</i>	T	7	+
<i>Chimarra obscura</i>	MI	0	+	<i>Ferrissia sp</i>	F	0	+
<i>Neureclipsis sp</i>	MI	0	+	<i>Corbicula fluminea</i>	F	0	+
<i>Cheumatopsyche sp</i>	F	1	+	<i>Dreissena polymorpha</i>	F	0	+
<i>Macrostemum zebratum</i>	I	0	+	<i>Sphaerium sp</i>	F	0	+
<i>Hydroptila sp</i>	F	3					
<i>Brachycentrus numerosus</i>	MI	5	+				
<i>Neophylax sp</i>	MI	0	+	No. of Quantitative Taxa	42		
<i>Pycnopsyche sp</i>	MI	0	+	No. of Qualitative Taxa	59		
<i>Lepidostoma sp</i>	MI	2	+	Total Taxa	76		
<i>Helicopsyche borealis</i>	MI	3	+	No. Organisms	256		
<i>Nectopsyche exquisita</i>	MI	0	+	Qualitative EPT	29		
<i>Oecetis avara</i>	I	0	+	ICI	E		

St. Joseph River—Sherman St

Date Collected: 08/22/22 Site #4

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	107		<i>Ablabesmyia rhamphe group</i>	MT	3	
<i>Caecidotea sp</i>	T	0	+	<i>H. senata or T. norena</i>	F	3	
<i>Hyalella azteca</i>	F	28	+	<i>Cricotopus (C.) bicinctus</i>	T	8	+
<i>Gammarus fasciatus</i>	F	3	+	<i>Rheocricotopus robacki</i>	F	3	
<i>Hydrachnidia</i>	F	0	+	<i>Tvetenia discoloripes group</i>	MI	3	
<i>Plauditus dubius or P. virilis</i>	I	13	+	<i>Chironomini</i>		8	
<i>Baetis flavistriga</i>	F	0	+	<i>Cryptochironomus eminentia</i>	F	0	+
<i>Baetis intercalaris</i>	F	22	+	<i>Dicrotendipes neomodestus</i>	F	106	+
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Microtendipes "caelum"</i>	MI	3	
<i>Iswaeon anoka</i>	MI	0	+	<i>Polypedilum flavum</i>	F	55	+
<i>Callibaetis sp</i>	MT	0	+	<i>Polypedilum (P.) fallax group</i>	F	0	+
<i>Paracloeodes minutus</i>	MI	0	+	<i>Tanytarsini</i>		3	
<i>Isonychia sp</i>	MI	75		<i>Hemerodromia sp</i>	F	5	
<i>Nixe sp</i>	MI	2	+	<i>Elimia sp</i>	MI	68	+
<i>Stenacron sp</i>	F	165	+	<i>Ferrissia sp</i>	F	0	+
<i>Maccaffertium exiguum</i>	MI	191	+	<i>Corbicula fluminea</i>	F	0	+
<i>M. mediopunctatum</i>	MI	73					
<i>Maccaffertium pulchellum</i>	MI	16		No. of Quantitative Taxa	42		
<i>Maccaffertium terminatum</i>	MI	18		No. of Qualitative Taxa	30		
<i>Teloganopsis deficiens</i>	I	18		Total Taxa	56		
<i>Tricorythodes sp</i>	MI	448	+	No. Organisms	1864		
<i>Argia sp</i>	F	1		Qualitative EPT	15		
<i>Perlidae</i>		1		ICI	50		
<i>Chimarra obscura</i>	MI	1					
<i>Cernotina sp</i>	MI	8					
<i>Cheumatopsyche sp</i>	F	312	+				
<i>Ceratopsyche sparna</i>	F	5					
<i>Hydropsyche aerata</i>	MI	6					
<i>Hydropsyche phalerata</i>	MI	10					
<i>Hydropsyche venularis</i>	MI	5					
<i>Hydroptila sp</i>	F	38					
<i>Ochrotrichia sp</i>	MI	4					
<i>Brachycentrus numerosus</i>	MI	3	+				
<i>Mystacides sepulchralis</i>	MI	0	+				
<i>Nectopsyche diarina</i>	MI	0	+				
<i>Oecetis persimilis</i>	MI	1					
<i>Petrophila sp</i>	MI	1					
<i>Macronychus glabratus</i>	F	20	+				
<i>Stenelmis sp</i>	F	1	+				
<i>Simulium sp</i>	F	0	+				

St. Joseph River—Capital Ave

Date Collected: 08/04/22 Site #6

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Porifera</i>		0	+	<i>Polypedilum flavum</i>	F	151	+
<i>Turbellaria</i>	F	189	+	<i>Polypedilum fallax group</i>	F	2	+
<i>Urnatella gracilis</i>	MI	1		<i>Polypedilum (P.) illinoense</i>	T	0	+
<i>Oligochaeta</i>	T	0	+	<i>Stenochironomus sp</i>	F	2	
<i>Caecidotea sp</i>	T	0	+	<i>Tribelos fuscicorne</i>	F	0	+
<i>Hyaella azteca</i>	F	5	+	<i>Rheotanytarsus sp</i>	F	5	
<i>Crangonyx sp</i>	MT	0	+	<i>Hemerodromia sp</i>	F	13	
<i>Baetis intercalaris</i>	F	26	+	<i>Elimia sp</i>	MI	9	+
<i>Isonychia sp</i>	MI	92	+	<i>Helisoma anceps anceps</i>	F	0	+
<i>Stenacron sp</i>	F	102	+	<i>Planorbella pilsbryi</i>	T	0	+
<i>Maccaffertium exiguum</i>	MI	163	+	<i>Ancylidae</i>	F	4	
<i>M. mediopunctatum</i>	MI	76		<i>Corbicula fluminea</i>	F	0	+
<i>Maccaffertium pulchellum</i>	MI	44		<i>Dreissena polymorpha</i>	F	1	+
<i>Maccaffertium terminatum</i>	MI	43					
<i>Tricorythodes sp</i>	MI	661	+				
<i>Hetaerina sp</i>	F	0	+	No. of Quantitative Taxa	35		
<i>Coenagrionidae</i>	T	0	+	No. of Qualitative Taxa	35		
<i>Argia sp</i>	F	4	+	Total Taxa	53		
<i>Cyrnellus fraternus</i>	F	1		No. Organisms	2771		
<i>Cheumatopsyche sp</i>	F	1029	+	Qualitative EPT	9		
<i>Hydropsyche aerata</i>	MI	1		ICI	50		
<i>Hydropsyche depravata gp.</i>	F	0	+				
<i>Hydropsyche orris</i>	MI	10					
<i>Hydropsyche phalerata</i>	MI	30	+				
<i>Hydropsyche venularis</i>	MI	6					
<i>Hydroptila sp</i>	F	60					
<i>Helicopsyche borealis</i>	MI	1					
<i>Oecetis persimilis</i>	MI	5	+				
<i>Petrophila sp</i>	MI	1					
<i>Psephenus herricki</i>	MI	0	+				
<i>Macronychus glabratus</i>	F	0	+				
<i>Stenelmis sp</i>	F	0	+				
<i>Simulium sp</i>	F	0	+				
<i>Ablabesmyia mallochi</i>	F	7					
<i>Ablabesmyia peleensis</i>		0	+				
<i>Pentaneura inconspicua</i>	F	2	+				
<i>Corynoneura sp</i>		2					
<i>Cricotopus (C.) bicinctus</i>	T	9					
<i>Cricotopus sylvestris group</i>	T	0	+				
<i>Dicrotendipes neomodestus</i>	F	14	+				

St. Joseph River—Ironwood (Above)

Date Collected: 08/24/22 Site #7

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	137	+	<i>Nilotanypus fimbriatus</i>	F	1	
<i>Nemertea</i>	F	4		<i>Telopelopia okoboji</i>	MI	1	
<i>A. inequiannulata</i>	MT	0	+	<i>Cricotopus (C.) bicinctus</i>	T	6	+
<i>Helobdella sp</i>	MT	0	+	<i>Tvetenia discoloripes group</i>	MI	4	
<i>Helobdella papillata</i>	MT	0	+	<i>Phaenopsectra obediens gp.</i>	F	0	+
<i>Caecidotea sp</i>	T	0	+	<i>Polypedilum flavum</i>	F	48	
<i>Hyalella azteca</i>	F	0	+	<i>Polypedilum (P.) illinoense</i>	T	0	+
<i>Gammarus fasciatus</i>	F	1	+	<i>Stenochironomus sp</i>	F	8	
<i>Hydrachnidia</i>	F	0	+	<i>Rheotanytarsus sp</i>	F	22	+
<i>Baetis intercalaris</i>	F	33	+	<i>Hemerodromia sp</i>	F	2	
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Elimia sp</i>	MI	21	+
<i>Isonychia sp</i>	MI	18		<i>Physella sp</i>	T	0	+
<i>Stenacron sp</i>	F	142	+	<i>Planorbella pilsbryi</i>	T	0	+
<i>Maccaffertium exiguum</i>	MI	32		<i>Corbicula fluminea</i>	F	0	+
<i>Maccaffertium mediopunctatum</i>	MI	3					
<i>Maccaffertium terminatum</i>	MI	2	+	No. of Quantitative Taxa	33		
<i>Teloganopsis deficiens</i>	I	283	+	No. of Qualitative Taxa	38		
<i>Tricorythodes sp</i>	MI	206	+	Total Taxa	54		
<i>Hetaerina sp</i>	F	0	+	No. Organisms	1891		
<i>Coenagrionidae</i>	T	0	+	Qualitative EPT	13		
<i>Argia sp</i>	F	5	+	ICI	52		
<i>Chimarra obscura</i>	MI	1					
<i>Ceratomyia sp</i>	MI	0	+				
<i>Cheumatopsyche sp</i>	F	472	+				
<i>Hydropsyche aerata</i>	MI	1					
<i>Hydropsyche bidens</i>	MI	1					
<i>Hydropsyche orris</i>	MI	1					
<i>Hydropsyche phalerata</i>	MI	80	+				
<i>Macrostemum zebratum</i>	I	277	+				
<i>Hydroptila sp</i>	F	0	+				
<i>Brachycentrus numerosus</i>	MI	11	+				
<i>Mystacides sepulchralis</i>	MI	0	+				
<i>Oecetis persimilis</i>	MI	5					
<i>Peltodytes sp</i>	MT	0	+				
<i>Berosus sp</i>	MT	0	+				
<i>Psephenus herricki</i>	MI	0	+				
<i>Macronychus glabratus</i>	F	1	+				
<i>Stenelmis sp</i>	F	0	+				
<i>Simulium sp</i>	F	61	+				
<i>Ablabesmyia mallochi</i>	F	1					

St. Joseph River—Sample St
Date Collected: 08/24/22 Site #8

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Spongillidae</i>	F	2		<i>Ablabesmyia peleensis</i>		0	+
<i>Cordylophora caspia</i>	MT	1		<i>Nilotanypus fimbriatus</i>	F	8	
<i>Turbellaria</i>	F	240	+	<i>Pentaneura inconspicua</i>	F	2	
<i>Oligochaeta</i>	T	0	+	<i>Cricotopus (C.) bicinctus</i>	T	0	+
<i>Helobdella elongata</i>	MT	0	+	<i>Cricotopus sylvestris group</i>	T	0	+
<i>Helobdella papillata</i>	MT	0	+	<i>Tvetenia discoloripes group</i>	MI	25	
<i>Hyaella azteca</i>	F	0	+	<i>Cryptochironomus sp</i>	F	0	+
<i>Gammarus fasciatus</i>	F	11	+	<i>Cryptotendipes pseudotener</i>	F	0	+
<i>Orconectes rusticus</i>	F	0	+	<i>Dicrotendipes neomodestus</i>	F	0	+
<i>Hydrachnidia</i>	F	0	+	<i>Parachironomus sp</i>	MT	0	+
<i>Baetis intercalaris</i>	F	52	+	<i>Polypedilum flavum</i>	F	44	
<i>Labiobaetis propinquus</i>	MI	3	+	<i>Polypedilum (P.) illinoense</i>	T	0	+
<i>Neocloeon sp.</i>	MI	0	+	<i>Stenochironomus sp</i>	F	8	
<i>Isonychia sp</i>	MI	556		<i>Rheotanytarsus sp</i>	F	3	
<i>Stenacron sp</i>	F	166	+	<i>Tanytarsus sp</i>	F	0	+
<i>Maccaffertium exiguum</i>	MI	18		<i>Hemerodromia sp</i>	F	2	
<i>Maccaffertium pulchellum</i>	MI	201	+	<i>Cipangopaludina c. malleata</i>	MT	0	+
<i>Teloganopsis deficiens</i>	I	147		<i>Hydrobiidae</i>	F	0	+
<i>Tricorythodes sp</i>	MI	538	+	<i>Elimia sp</i>	MI	9	+
<i>Coenagrionidae</i>	T	0	+	<i>Physella sp</i>	T	0	+
<i>Argia sp</i>	F	0	+	<i>Gyraulus sp</i>	MT	0	+
<i>Anax sp</i>	MT	0	+	<i>Corbicula fluminea</i>	F	0	+
<i>Epithea sp</i>	MT	0	+	<i>Dreissena polymorpha</i>	F	0	+
<i>Libellula sp</i>	MT	0	+	<i>Pyganodon grandis</i>	F	0	+
<i>Paragnetina sp</i>	MI	1					
<i>Chimarra obscura</i>	MI	13					
<i>Cheumatopsyche sp</i>	F	382		No. of Quantitative Taxa	32		
<i>Hydropsyche orris</i>	MI	1		No. of Qualitative Taxa	41		
<i>Hydropsyche phalerata</i>	MI	40		Total Taxa	64		
<i>Hydropsyche simulans</i>	MI	1		No. Organisms	3282		
<i>Macrostemum zebratum</i>	I	772		Qualitative EPT	6		
<i>Hydroptila sp</i>	F	27		ICI	46		
<i>Brachycentrus numerosus</i>	MI	1					
<i>Oecetis persimilis</i>	MI	2					
<i>Peltodytes sp</i>	MT	0	+				
<i>Dubiraphia bivittata</i>	F	0	+				
<i>Macronychus glabratus</i>	F	5					
<i>Stenelmis sp</i>	F	1	+				
<i>Anopheles sp</i>	F	0	+				
<i>Ablabesmyia mallochi</i>	F	0	+				

St. Joseph River—Michigan St

Date Collected: 08/23/22 Site #9

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	368	+	<i>Tvetenia discoloripes group</i>	MI	72	
<i>Oligochaeta</i>	T	0	+	<i>Polypedilum flavum</i>	F	23	
<i>Helobdella papillata</i>	MT	0	+	<i>Polypedilum illinoense</i>	T	0	+
<i>Gammarus fasciatus</i>	F	0	+	<i>Stenochironomus sp</i>	F	1	+
<i>Hydrachnidia</i>	F	0	+	<i>Rheotanytarsus sp</i>	F	4	
<i>Plauditus dubius or P. virilis</i>	I	0	+	<i>Hemerodromia sp</i>	F	2	
<i>Baetis intercalaris</i>	F	47	+	<i>Elimia sp</i>	MI	1	+
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Corbicula fluminea</i>	F	0	+
<i>Heterocloeon (H.) sp</i>	I	1					
<i>Isonychia sp</i>	MI	7	+				
<i>Stenacron sp</i>	F	5	+	No. of Quantitative Taxa	30		
<i>Maccaffertium exiguum</i>	MI	10	+	No. of Qualitative Taxa	29		
<i>M. mediopunctatum</i>	MI	2		Total Taxa	48		
<i>Maccaffertium pulchellum</i>	MI	15		No. Organisms	840		
<i>Maccaffertium terminatum</i>	MI	2		Qualitative EPT	15		
<i>Teloganopsis deficiens</i>	I	0	+	ICI	46		
<i>Teloganopsis deficiens</i>	I	21					
<i>Tricorythodes sp</i>	MI	39	+				
<i>Argia sp</i>	F	0	+				
<i>Chimarra obscura</i>	MI	15					
<i>Cheumatopsyche sp</i>	F	60					
<i>Hydropsyche phalerata</i>	MI	0	+				
<i>Hydropsyche phalerata</i>	MI	5					
<i>Macrostemum zebratum</i>	I	98	+				
<i>Hydroptilidae</i>	F	0	+				
<i>Hydroptila sp</i>	F	5					
<i>Ochrotrichia sp</i>	MI	16					
<i>Brachycentrus numerosus</i>	MI	3	+				
<i>Neophylax sp</i>	MI	0	+				
<i>Lepidostoma sp</i>	MI	2					
<i>Nectopsyche exquisita</i>	MI	0	+				
<i>Oecetis persimilis</i>	MI	0	+				
<i>Peltodytes sp</i>	MT	0	+				
<i>Macronychus glabratus</i>	F	2					
<i>Stenelmis sp</i>	F	0	+				
<i>Simulium sp</i>	F	9	+				
<i>Cardiocladius obscurus</i>	MI	3					
<i>Corynoneura sp</i>		0	+				
<i>Cricotopus sp</i>		1					
<i>Thienemanniella sp</i>		1					

St. Joseph River—Pinhook (Below)

Date Collected: 09/01/22 Site #12

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Cordylophora caspia</i>	MT	15		<i>Simulium sp</i>	F	0	+
<i>Hydra sp</i>	F	284		<i>H. senata</i> or <i>T. norena</i>	F	6	
<i>Turbellaria</i>	F	79	+	<i>Cricotopus (C.) bicinctus</i>	T	0	+
<i>Oligochaeta</i>	T	2	+	<i>Nanocladius (N.) distinctus</i>	MT	18	
<i>Helobdella elongata</i>	MT	0	+	<i>Tvetenia discoloripes</i> group	MI	15	
<i>Gammarus fasciatus</i>	F	9	+	<i>Polypedilum flavum</i>	F	212	+
<i>Orconectes rusticus</i>	F	0	+	<i>Polypedilum (P.) illinoense</i>	T	6	+
<i>Baetis intercalaris</i>	F	116	+	<i>Stenochironomus sp</i>	F	6	
<i>Isonychia sp</i>	MI	37	+	<i>Tribelos fuscicorne</i>	F	0	+
<i>Stenacron sp</i>	F	65	+	<i>Rheotanytarsus sp</i>	F	3	
<i>Maccaffertium exiguum</i>	MI	27	+	<i>Elimia sp</i>	MI	2	+
<i>Stenonema femoratum</i>	F	6		<i>Physella sp</i>	T	0	+
<i>Maccaffertium pulchellum</i>	MI	99	+	<i>Corbicula fluminea</i>	F	0	+
<i>Maccaffertium terminatum</i>	MI	13		<i>Sphaerium sp</i>	F	1	
<i>Teloganopsis deficiens</i>	I	18					
<i>Tricorythodes sp</i>	MI	144	+	No. of Quantitative Taxa			38
<i>Coenagrionidae</i>	T	0	+	No. of Qualitative Taxa			34
<i>Argia sp</i>	F	12	+	Total Taxa			54
<i>Corduliidae</i> or <i>Libellulidae</i>		0	+	No. Organisms			2063
<i>Paragnetina sp</i>	MI	1		Qualitative EPT			11
<i>Agnetina capitata</i> complex	MI	5		ICI			42
<i>Belostoma sp</i>	T	0	+				
<i>Pelocoris sp</i>	MT	0	+				
<i>Corydalus cornutus</i>	MI	1					
<i>Chimarra obscura</i>	MI	28					
<i>Neureclipsis sp</i>	MI	14					
<i>Cheumatopsyche sp</i>	F	381	+				
<i>Hydropsyche phalerata</i>	MI	233	+				
<i>Macrostemum zebratum</i>	I	146	+				
<i>Hydroptila sp</i>	F	2					
<i>Ochrotrichia sp</i>	MI	24					
<i>Orthotrichia sp</i>	F	4					
<i>Brachycentrus numerosus</i>	MI	4	+				
<i>Pycnopsyche sp</i>	MI	0	+				
<i>Oecetis persimilis</i>	MI	4					
<i>Psephenus herricki</i>	MI	0	+				
<i>Scirtidae</i>	F	0	+				
<i>Dubiraphia vittata</i> group	F	0	+				
<i>Macronychus glabratus</i>	F	21	+				
<i>Stenelmis sp</i>	F	0	+				

Little Elkhart River—CR 10

Date Collected: 08/16/22 Site #13

Taxa Name	Tolerance	Quantitative	Qualitative		
<i>Turbellaria</i>	F	0	+		
<i>Oligochaeta</i>	T	0	+	No. of Quantitative Taxa	0
<i>Caecidotea sp</i>	T	0	+	No. of Qualitative Taxa	36
<i>Gammarus sp</i>	F	0	+	Total Taxa	36
<i>Hydrachnidia</i>	F	0	+	No. Organisms	0
<i>Baetis tricaudatus</i>	MI	0	+	Qualitative EPT	14
<i>Baetis flavistriga</i>	F	0	+	ICI	G
<i>Baetis intercalaris</i>	F	0	+		
<i>Iswaeon anoka</i>	MI	0	+		
<i>Stenacron sp</i>	F	0	+		
<i>Maccaffertium exiguum</i>	MI	0	+		
<i>Maccaffertium vicarium</i>	MI	0	+		
<i>Pteronarcys sp</i>	MI	0	+		
<i>Cheumatopsyche sp</i>	F	0	+		
<i>Ceratopsyche morosa gp.</i>	MI	0	+		
<i>Ceratopsyche sparna</i>	F	0	+		
<i>Brachycentrus numerosus</i>	MI	0	+		
<i>Neophylax sp</i>	MI	0	+		
<i>Pycnopsyche sp</i>	MI	0	+		
<i>Ancyronyx variegata</i>	F	0	+		
<i>Macronychus glabratus</i>	F	0	+		
<i>Optioservus sp</i>	MI	0	+		
<i>Stenelmis sp</i>	F	0	+		
<i>Simulium sp</i>	F	0	+		
<i>Conchapelopia sp</i>	F	0	+		
<i>Diamesa sp</i>	F	0	+		
<i>Pagastia sp</i>	F	0	+		
<i>Microtendipes pedellus gp.</i>	F	0	+		
<i>P. albimanus</i> or <i>P. duplicatus</i>	F	0	+		
<i>Polypedilum (P.) fallax group</i>	F	0	+		
<i>Polypedilum (P.) illinoense</i>	T	0	+		
<i>Stictochironomus sp</i>	F	0	+		
<i>Cladotanytarsus sp grp A</i>	F	0	+		
<i>Rheotanytarsus sp</i>	F	0	+		
<i>Elimia sp</i>	MI	0	+		
<i>Corbicula fluminea</i>	F	0	+		

Puterbaugh Creek—(CR 8)

Date Collected: 09/06/22 Site #14

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	0	+	<i>C. vanderwulpi</i> group sp 5	MI	0	+
<i>Oligochaeta</i>	T	0	+	<i>Rheotanytarsus</i> sp	F	11	+
<i>Helobdella stagnalis</i>	T	1		<i>Tanytarsus</i> sp	F	5	
<i>Crangonyx</i> sp	MT	0	+	<i>Tanytarsus glabrescens</i> grp 7	F	4	
<i>Gammarus</i> sp	F	7		<i>Hemerodromia</i> sp	F	12	
<i>Orconectes</i> sp	F	0	+	<i>Elimia</i> sp	MI	12	+
<i>Hydrachnidia</i>	F	0	+	<i>Ferrissia</i> sp	F	21	
<i>Baetis flavistriga</i>	F	0	+	<i>Corbicula fluminea</i>	F	0	+
<i>Baetis intercalaris</i>	F	45	+				
<i>Stenacron</i> sp	F	147	+				
<i>Maccaffertium exiguum</i>	MI	46		No. of Quantitative Taxa	31		
<i>Maccaffertium terminatum</i>	MI	163		No. of Qualitative Taxa	26		
<i>Calopterygidae</i>	F	2		Total Taxa	48		
<i>Calopteryx</i> sp	F	0	+	No. Organisms	932		
<i>Hetaerina</i> sp	F	0	+	Qualitative EPT	8		
<i>Boyeria vinosa</i>	F	0	+	ICI	46		
<i>Corydalus cornutus</i>	MI	1					
<i>Cheumatopsyche</i> sp	F	172	+				
<i>Hydropsyche depr. grp</i>	F	83	+				
<i>Brachycentrus numerosus</i>	MI	22	+				
<i>Pycnopsyche</i> sp	MI	1					
<i>Lepidostoma</i> sp	MI	1					
<i>Helicopsyche borealis</i>	MI	4	+				
<i>Triaenodes injustus</i>	MI	0	+				
<i>Ancyronyx variegata</i>	F	0	+				
<i>Macronychus glabratus</i>	F	38					
<i>Optioservus</i> sp	MI	0	+				
<i>Simulium</i> sp	F	0	+				
<i>Conchapelopia</i> sp	F	7					
<i>H. senata</i> or <i>T. norena</i>	F	16	+				
<i>Parametriocnemus</i> sp	F	4					
<i>Thienemanniella xena</i>	F	11					
<i>Cryptochironomus</i> sp	F	0	+				
<i>Microtendipes pedellus</i> group	F	5					
<i>Microtendipes rydalensis</i>	MI	51					
<i>P. albimanus</i> or <i>P. duplicatus</i>	F	0	+				
<i>Polypedilum flavum</i>	F	21					
<i>Polypedilum</i> (<i>P.</i>) <i>fallax</i> group	F	12					
<i>Polypedilum</i> (<i>Tripodura</i>)							
<i>scalaenum</i> group	F	5					
<i>Cladotanytarsus</i> sp		2					

Taxa Name	Tolerance	Quantitative	Qualitative		
<i>Turbellaria</i>	F	100	+		
<i>Oligochaeta</i>	T	57			
<i>Helobdella stagnalis</i>	T	20	+	No. of Quantitative Taxa	24
<i>Crangonyx sp</i>	MT	0	+	No. of Qualitative Taxa	19
<i>Gammarus sp</i>	F	596		Total Taxa	33
<i>Hydrachnidia</i>	F	0	+	No. Organisms	1597
<i>Hetaerina sp</i>	F	0	+	Qualitative EPT	0
<i>Coenagrionidae</i>	T	0	+	ICI	24
<i>Cheumatopsyche sp</i>	F	31			
<i>Hydropsyche depravata group</i>	F	5			
<i>Hydroptilidae</i>	F	4			
<i>Leptoceridae</i>		2			
<i>Simulium sp</i>	F	0	+		
<i>Conchapelopia sp</i>	F	167	+		
<i>H. senata or T. norena</i>	F	16			
<i>Cricotopus (C.) sp</i>	F	10			
<i>Cricotopus (C.) bicinctus</i>	T	83	+		
<i>Chironomus (C.) decorus group</i>	T	0	+		
<i>Cryptochironomus sp</i>	F	31			
<i>Microtendipes "caelum"</i>	MI	21			
<i>P. albimanus or P. duplicatus</i>	F	104	+		
<i>Polypedilum aviceps</i>	MI	0	+		
<i>Polypedilum flavum</i>	F	188	+		
<i>Polypedilum (P.) illinoense</i>	T	10	+		
<i>Polypedilum (Tripodura)</i>					
<i>scalaenum group</i>	F	10			
<i>Paratanytarsus sp</i>	F	42	+		
<i>Tanytarsus sp</i>	F	42	+		
<i>Tanytarsus glabrescens group sp 7</i>	F	31			
<i>Tanytarsus sepp</i>	F	21	+		
<i>Chrysops sp</i>	F	0	+		
<i>Fossaria sp</i>	MT	0	+		
<i>Physella sp</i>	T	4			
<i>Pisidium sp</i>	MT	2			

Christiana—CR 4

Date Collected: 08/31/22 Site #17

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	1		<i>Dineutus sp</i>	F	0	+
<i>Helobdella stagnalis</i>	T	0	+	<i>Psephenus herricki</i>	MI	0	+
<i>Placobdella ornata</i>	MT	0	+	<i>Macronychus glabratus</i>	F	3	
<i>Erpobdellidae</i>	MT	0	+	<i>Stenelmis sp</i>	F	0	+
<i>Gammarus sp</i>	F	4		<i>Simulium sp</i>	F	36	+
<i>Gammarus fasciatus</i>	F	0	+	<i>Ablabesmyia mallochi</i>	F	0	+
<i>Orconectes sp</i>	F	0	+	<i>H. senata or T. norena</i>	F	3	
<i>Hydrachnidia</i>	F	0	+	<i>Cricotopus (C.) bicinctus</i>	T	0	+
<i>P. dubius or P. virilis</i>	I	0	+	<i>Parametriocnemus sp</i>	F	1	
<i>Baetis intercalaris</i>	F	79	+	<i>Rheocricotopus (robacki</i>	F	3	
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Thienemanniella xena</i>	F	0	+
<i>Iswaeon anoka</i>	MI	0	+	<i>Tvetenia sp</i>	MI	12	
<i>Leucrocuta sp</i>	MI	0	+	<i>Microtendipes "caelum"</i>	MI	1	
<i>Nixe sp</i>	MI	0	+	<i>Polypedilum flavum</i>	F	16	
<i>Stenacron sp</i>	F	0	+	<i>Polypedilum (P.) fallax grp</i>	F	1	
<i>Maccaffertium exiguum</i>	MI	11	+	<i>Paratanytarsus sp</i>	F	1	
<i>M. mediopunctatum</i>	MI	7	+	<i>Rheotanytarsus sp</i>	F	8	+
<i>Maccaffertium pulchellum</i>	MI	7	+	<i>Chrysops sp</i>	F	2	
<i>Maccaffertium terminatum</i>	MI	418	+	<i>Elimia sp</i>	MI	0	+
<i>Teloganopsis deficiens</i>	I	331	+	<i>Planorbella trivolvis</i>	MT	0	+
<i>Tricorythodes sp</i>	MI	6	+	<i>Ferrissia sp</i>	F	1	
<i>Calopterygidae</i>	F	0	+				
<i>Hetaerina sp</i>	F	0	+	No. of Quantitative Taxa	32		
<i>Coenagrionidae</i>	T	0	+	No. of Qualitative Taxa	42		
<i>Argia sp</i>	F	0	+	Total Taxa	61		
<i>Boyeria vinosa</i>	F	0	+	No. Organisms	1201		
<i>Acroneuria internata</i>	MI	4	+	Qualitative EPT	19		
<i>Corydalus cornutus</i>	MI	4	+	ICI	48		
<i>Chimarra obscura</i>	MI	7					
<i>Neureclipsis sp</i>	MI	4					
<i>Cheumatopsyche sp</i>	F	56	+				
<i>Ceratopsyche morosa grp</i>	MI	1					
<i>Ceratopsyche sparna</i>	F	1					
<i>Hydropsyche depra. group</i>	F	40					
<i>Hydropsyche phalerata</i>	MI	128	+				
<i>Pycnopsyche sp</i>	MI	0	+				
<i>Helicopsyche borealis</i>	MI	0	+				
<i>Nectopsyche diarina</i>	MI	0	+				
<i>Oecetis persimilis</i>	MI	4					
<i>Petrophila sp</i>	MI	0	+				

Elkhart River—Oxbow Park

Date Collected: 08/23/22 Site #20

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	20	+	<i>Cricotopus (C.) sp</i>	F	3	
<i>Oligochaeta</i>	T	0	+	<i>Cricotopus (C.) bicinctus</i>	T	0	+
<i>Placobdella papillifera</i>	MT	0	+	<i>Rheocricotopus robacki</i>	F	3	
<i>Caecidotea sp</i>	T	0	+	<i>Thienemanniella xena</i>	F	5	
<i>Gammarus fasciatus</i>	F	0	+	<i>Tvetenia discoloripes group</i>	MI	57	
<i>Hydrachnidia</i>	F	0	+	<i>Cryptochironomus sp</i>	F	0	+
<i>P. dubius or P. virilis</i>	I	0	+	<i>P. albimanus or P. duplicatus</i>	F	0	+
<i>Baetis flavistriga</i>	F	5	+	<i>Phaenopsectra obediens grp.</i>	F	0	+
<i>Baetis intercalaris</i>	F	144	+	<i>Polypedilum flavum</i>	F	57	
<i>Iswaeon anoka</i>	MI	0	+	<i>Polypedilum (P.) fallax group</i>	F	3	+
<i>Stenacron sp</i>	F	12	+	<i>Polypedilum (P.) illinoense</i>	T	3	
<i>Maccaffertium exiguum</i>	MI	28	+	<i>Polypedilum scalaenum grp</i>	F	0	+
<i>M. mediopunctatum</i>	MI	3	+	<i>Rheotanytarsus sp</i>	F	131	
<i>Maccaffertium pulchellum</i>	MI	6	+	<i>Chrysops sp</i>	F	2	+
<i>Maccaffertium terminatum</i>	MI	170	+	<i>Hydrobiidae</i>	F	0	+
<i>Teloganopsis deficiens</i>	I	33		<i>Elimia sp</i>	MI	1	+
<i>Tricorythodes sp</i>	MI	21	+	<i>Ferrissia sp</i>	F	2	
<i>Calopteryx sp</i>	F	0	+	<i>Dreissena polymorpha</i>	F	0	+
<i>Hetaerina sp</i>	F	0	+	<i>Sphaerium sp</i>	F	0	+
<i>Argia sp</i>	F	0	+				
<i>Pteronarcys sp</i>	MI	1					
<i>Agnetina capitata</i>	MI	2					
<i>Corydalus cornutus</i>	MI	5	+				
<i>Cheumatopsyche sp</i>	F	316	+				
<i>Ceratopsyche morosa grp</i>	MI	168	+				
<i>Ceratopsyche sparna</i>	F	38	+				
<i>Hydropsyche phalerata</i>	MI	11	+				
<i>Hydroptila sp</i>	F	4					
<i>Brachycentrus numerosus</i>	MI	2	+				
<i>Neophylax sp</i>	MI	0	+				
<i>Pycnopsyche sp</i>	MI	0	+				
<i>Nectopsyche diarina</i>	MI	0	+				
<i>Psephenus herricki</i>	MI	0	+				
<i>Macronychus glabratus</i>	F	4	+				
<i>Stenelmis sp</i>	F	0	+				
<i>Anopheles sp</i>	F	0	+				
<i>Simulium sp</i>	F	1	+				
<i>Meropelopia sp</i>	F	3					
<i>Nilotanypus fimbriatus</i>	F	8					
<i>Pentaneura inconspicua</i>	F	5					

No. of Quantitative Taxa	35
No. of Qualitative Taxa	44
Total Taxa	59
No. Organisms	1277
Qualitative EPT	18
ICI	54

Elkhart River—Indiana Ave

Date Collected: 08/22/22 Site #21

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	43	+	<i>Parapoynx sp</i>	MI	0	+
<i>Erpobdella p. punctata</i>	MT	0	+	<i>Ancyronyx variegata</i>	F	0	+
<i>Caecidotea sp</i>	T	0	+	<i>Macronychus glabratus</i>	F	11	+
<i>Crangonyx sp</i>	MT	0	+	<i>Optioservus trivittatus</i>	MI	0	+
<i>Gammarus fasciatus</i>	F	2	+	<i>Stenelmis sp</i>	F	2	+
<i>Hydrachnidia</i>	F	0	+	<i>Antocha sp</i>	MI	8	
<i>Baetis flavistriga</i>	F	7	+	<i>Simulium sp</i>	F	1	+
<i>Baetis intercalaris</i>	F	52	+	<i>H. senata or T. norena</i>	F	0	+
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Meropelopia sp</i>	F	2	
<i>Iswaeon anoka</i>	MI	1	+	<i>Nilotanypus fimbriatus</i>	F	4	
<i>Isonychia sp</i>	MI	12	+	<i>Orthocladinae</i>		1	
<i>Nixe sp</i>	MI	2	+	<i>Corynoneura sp</i>		2	
<i>Stenacron sp</i>	F	27	+	<i>Rheocricotopus robacki</i>	F	11	
<i>Maccaffertium exiguum</i>	MI	36	+	<i>Thienemanniella xena</i>	F	2	
<i>M. mediopunctatum</i>	MI	19	+	<i>Tvetenia discoloripes group</i>	MI	5	+
<i>Maccaffertium pulchellum</i>	MI	59		<i>Chironomini</i>		1	
<i>M. terminatum</i>	MI	1	+	<i>Dicrotendipes neomodestus</i>	F	1	
<i>Teloganopsis deficiens</i>	I	46		<i>P. albimanus or P. duplicatus</i>	F	0	+
<i>Tricorythodes sp</i>	MI	25	+	<i>Polypedilum flavum</i>	F	11	
<i>Calopteryx sp</i>	F	0	+	<i>Polypedilum (P.) fallax group</i>	F	5	
<i>Hetaerina sp</i>	F	0	+	<i>Polypedilum (P.) illinoense</i>	T	0	+
<i>Coenagrionidae</i>	T	0	+	<i>Polypedilum scalaenum grp</i>	F	1	+
<i>Boyeria vinosa</i>	F	0	+	<i>Rheotanytarsus pellucidus</i>	MI	7	
<i>Pteronarcys sp</i>	MI	4		<i>Rheotanytarsus sp</i>	F	65	+
<i>Acroneuria sp</i>	MI	1		<i>Tanytarsus sp</i>	F	1	
<i>Acroneuria carolinensis</i>	MI	2		<i>Chrysops sp</i>	F	0	+
<i>Acroneuria lycorias</i>	I	1		<i>Hemerodromia sp</i>	F	6	
<i>Agnetina capitata complex</i>	MI	2		<i>Hydrobiidae</i>	F	2	
<i>Corydalus cornutus</i>	MI	2	+	<i>Elimia sp</i>	MI	31	+
<i>Polycentropus sp</i>	MI	3		<i>Physella sp</i>	T	0	+
<i>Cheumatopsyche sp</i>	F	176	+	<i>Ferrissia sp</i>	F	4	
<i>Ceratopsyche morosa grp</i>	MI	42		<i>Corbicula fluminea</i>	F	0	+
<i>Ceratopsyche sparna</i>	F	36		<i>Pisidium sp</i>	MT	0	+
<i>Hydropsyche phalerata</i>	MI	20		<i>Sphaerium sp</i>	F	1	+
<i>Hydropsyche simulans</i>	MI	1		No. of Quantitative Taxa			53
<i>Hydroptila sp</i>	F	5		No. of Qualitative Taxa			44
<i>Brachycentrus numerosus</i>	MI	11	+	Total Taxa			74
<i>Pycnopsyche sp</i>	MI	0	+	No. Organisms			832
<i>Lepidostoma sp</i>	MI	0	+	Qualitative EPT			15
<i>Lepidostoma sp</i>	MI	9		ICI			54

Elkhart River –Middlebury Street

Date Collected: 08/15/22 Site #22

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	38		<i>Trienodes injustus</i>	MI	0	+
<i>Oligochaeta</i>	T	1	+	<i>Ancyronyx variegata</i>	F	1	
<i>Caecidotea sp</i>	T	1	+	<i>Macronychus glabratus</i>	F	32	+
<i>Gammarus sp</i>	F	59		<i>Stenelmis sp</i>	F	12	+
<i>Gammarus fasciatus</i>	F	0	+	<i>Simulium sp</i>	F	0	+
<i>Orconectes sp</i>	F	1	+	<i>Nilotanytus fimbriatus</i>	F	3	
<i>Hydrachnidia</i>	F	0	+	<i>Cricotopus (C.) trifascia</i>	F	0	+
<i>Plauditus dubius</i> or <i>P. virilis</i>	I	0	+	<i>Thienemanniella taurocapita</i>	MI	1	
<i>Baetis flavistriga</i>	F	0	+	<i>Thienemanniella similis</i>	MI	1	
<i>Baetis intercalaris</i>	F	27	+	<i>Thienemanniella xena</i>	F	1	
<i>Iswaeon anoka</i>	MI	0	+	<i>Microtendipes "caelum"</i>	MI	7	
<i>Isonychia sp</i>	MI	32	+	<i>Microtendipes pedellus group</i>	F	0	+
<i>Leucrocuta sp</i>	MI	0	+	<i>P. albimanus</i> or <i>P. duplicatus</i>	F	1	
<i>Stenacron sp</i>	F	35	+	<i>Polypedilum flavum</i>	F	11	
<i>Maccaffertium exiguum</i>	MI	15	+	<i>Polypedilum (P.) fallax group</i>	F	2	
<i>Stenonema femoratum</i>	F	0	+	<i>Stenochironomus sp</i>	F	0	+
<i>M. mediopunctatum</i>	MI	2		<i>Cladotanytarsus vand. grp 5</i>	MI	2	
<i>Maccaffertium pulchellum</i>	MI	5		<i>Rheotanytarsus pellucidus</i>	MI	2	
<i>Maccaffertium terminatum</i>	MI	137	+	<i>Rheotanytarsus sp</i>	F	25	
<i>Teloganopsis deficiens</i>	I	22	+	<i>Tanytarsus sp</i>	F	1	
<i>Tricorythodes sp</i>	MI	10	+	<i>Hydrobiidae</i>	F	1	
<i>Calopterygidae</i>	F	0	+	<i>Elimia sp</i>	MI	32	+
<i>Argia sp</i>	F	0	+	<i>Stagnicola sp</i>	T	4	+
<i>Acroneuria abnormis</i>	MI	0	+	<i>Ferrissia sp</i>	F	8	+
<i>Acroneuria carolinensis</i>	MI	1		<i>Corbicula fluminea</i>	F	1	
<i>Agnetina capitata complex</i>	MI	0	+	<i>Pisidium sp</i>	MT	5	
<i>Corydalus cornutus</i>	MI	3	+	<i>Sphaerium sp</i>	F	1	
<i>Cheumatopsyche sp</i>	F	51	+				
<i>Ceratopsyche morosa grp</i>	MI	3	+	No. of Quantitative Taxa	45		
<i>Ceratopsyche sparna</i>	F	4		No. of Qualitative Taxa	41		
<i>Hydropsyche phalerata</i>	MI	0	+	Total Taxa	67		
<i>Hydropsyche venularis</i>	MI	5		No. Organisms	632		
<i>Glossosomatidae</i>	MI	0	+	Qualitative EPT	24		
<i>Protophila sp</i>	I	4		ICI	48		
<i>Brachycentrus numerosus</i>	MI	21	+				
<i>Pycnopsyche sp</i>	MI	0	+				
<i>Lepidostoma sp</i>	MI	0	+				
<i>Helicopsyche borealis</i>	MI	1					
<i>Nectopsyche candida</i>	MI	0	+				
<i>Nectopsyche diarina</i>	MI	0	+				

Yellow Creek—CR 32

Date Collected: 08/23/22 Site #25

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Hydra sp</i>	F	0	+	<i>Phaenopsectra flavipes</i>	MT	29	
<i>Turbellaria</i>	F	418	+	<i>Polypedilum flavum</i>	F	29	+
<i>Oligochaeta</i>	T	37	+	<i>Polypedilum (P.) fallax group</i>	F	187	
<i>Helobdella papillata</i>	MT	1		<i>Polypedilum (P.) illinoense</i>	T	0	+
<i>Placobdella sp</i>	MT	0	+	<i>Polypedilum scalaenum grp</i>	F	345	+
<i>Placobdella sp</i>	MT	2		<i>Paratanytarsus sp</i>	F	86	
<i>Erpobdella p.punctata</i>	MT	2	+	<i>Rheotanytarsus sp</i>	F	201	
<i>Hyaella azteca</i>	F	5	+	<i>Tanytarsus sp</i>	F	29	
<i>Hydrachnidia</i>	F	0	+	<i>Chrysops sp</i>	F	0	+
<i>Baetis tricaudatus</i>	MI	0	+	<i>Cipangopaludina sp</i>	MT	0	+
<i>Baetis flavistriga</i>	F	0	+	<i>Physella sp</i>	T	14	+
<i>Calopterygidae</i>	F	2	+	<i>Planorbella trivolvis</i>	MT	0	+
<i>Hetaerina sp</i>	F	0	+	<i>Ferrissia sp</i>	F	4	
<i>Coenagrionidae</i>	T	4	+	<i>Pisidium sp</i>	MT	2	+
<i>Argia sp</i>	F	0	+	<i>Sphaerium sp</i>	F	0	+
<i>Boyeria vinosa</i>	F	0	+				
<i>Belostomatidae</i>		0	+				
<i>Cheumatopsyche sp</i>	F	6	+	No. of Quantitative Taxa	37		
<i>Hydropsyche depr. grp</i>	F	13		No. of Qualitative Taxa	38		
<i>Oecetis inconspicua comp. sp A</i>	F	15		Total Taxa	55		
<i>Peltodytes sp</i>	MT	0	+	No. Organisms	1974		
<i>Hydrophilidae</i>	F	4		Qualitative EPT	3		
<i>Berosus sp</i>	MT	4		ICI	28		
<i>Ancyronyx variegata</i>	F	6	+				
<i>Dubiraphia sp</i>	F	5	+				
<i>Macronychus glabratus</i>	F	4					
<i>Stenelmis sp</i>	F	4	+				
<i>Simulium sp</i>	F	0	+				
<i>Ablabesmyia rhamphe group</i>	MT	14	+				
<i>Conchapelopia sp</i>	F	29					
<i>Hayesomyia senata or Thiene-</i> <i>mannimyia norena</i>	F	14					
<i>Procladius (Holotanypus) sp</i>	MT	43	+				
<i>Cricotopus (C.) bicinctus</i>	T	0	+				
<i>Chironomus (C.) decorus grp</i>	T	14	+				
<i>Cryptochironomus sp</i>	F	14					
<i>Cryptotendipes sp</i>	F	0	+				
<i>Dicrotendipes neomodestus</i>	F	86	+				
<i>Microtendipes "caelum"</i>	MI	14					
<i>P. albimanus or P. duplicatus</i>	F	245	+				
<i>Phaenopsectra obediens group</i>	F	43	+				

Cobus Creek—CR 8

Date Collected: 08/30/22 Site #26

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Hydra sp</i>	F	2		<i>Microtendipes "caelum"</i>	MI	3	
<i>Turbellaria</i>	F	0	+	<i>Microtendipes pedellus group</i>	F	10	+
<i>Oligochaeta</i>	T	6	+	<i>Microtendipes rydalensis</i>	MI	18	
<i>Helobdella stagnalis</i>	T	0	+	<i>P. albimanus or P. duplicatus</i>	F	8	+
<i>Erpobdella p. punctata</i>	MT	0	+	<i>Phaenopsectra obediens grp</i>	F	2	
<i>Caecidotea sp</i>	T	2	+	<i>Polypedilum flavum</i>	F	3	
<i>Crangonyx sp</i>	MT	0	+	<i>Polypedilum scalaenum grp</i>	F	5	
<i>Gammarus sp</i>	F	283		<i>Paratanytarsus sp</i>	F	13	
<i>Orconectes sp</i>	F	1	+	<i>Tanytarsus sp</i>	F	35	
<i>Hydrachnidia</i>	F	0	+	<i>Tanytarsus glabrescens grp sp 7</i>	F	2	
<i>Baetis tricaudatus</i>	MI	0	+	<i>Tanytarsus sepp</i>	F	21	
<i>Baetis intercalaris</i>	F	0	+	<i>Chrysops sp</i>	F	0	+
<i>Labiobaetis propinquus</i>	MI	0	+	<i>Hemerodromia sp</i>	F	1	
<i>Stenacron sp</i>	F	102	+	<i>Hydrobiidae</i>	F	0	+
<i>Maccaffertium terminatum</i>	MI	0	+	<i>Physella sp</i>	T	0	+
<i>Calopterygidae</i>	F	0	+	<i>Planorbella (Pierosoma) pilsbryi</i>	T	0	+
<i>Calopteryx sp</i>	F	0	+	<i>Ferrissia sp</i>	F	48	
<i>Boyeria vinosa</i>	F	0	+	<i>Corbicula fluminea</i>	F	0	+
<i>Lype diversa</i>	MI	1		<i>Pisidium sp</i>	MT	0	+
<i>Nyctiophylax sp</i>	MI	2					
<i>Polycentropus sp</i>	MI	15					
<i>Cheumatopsyche sp</i>	F	0	+	No. of Quantitative Taxa	35		
<i>Hydropsyche aerata</i>	MI	1		No. of Qualitative Taxa	33		
<i>Hydropsyche depr. grp</i>	F	0	+	Total Taxa	59		
<i>Hydroptilidae</i>	F	1		No. Organisms	629		
<i>Brachycentrus numerosus</i>	MI	0	+	Qualitative EPT	10		
<i>Pycnopsyche sp</i>	MI	8		ICI	34		
<i>Helicopsyche borealis</i>	MI	2	+				
<i>Nectopsyche diarina</i>	MI	0	+				
<i>Ancyronyx variegata</i>	F	0	+				
<i>Macronychus glabratus</i>	F	4	+				
<i>Optioservus sp</i>	MI	0	+				
<i>Ablabesmyia mallochi</i>	F	10					
<i>Ablabesmyia rhamphe grp</i>	MT	3					
<i>Conchapelopia sp</i>	F	5					
<i>H. senata or T. norena</i>	F	3	+				
<i>Nilotanytus fimbriatus</i>	F	2					
<i>Thienemanniella sp</i>		2					
<i>Dicrotendipes neomodestus</i>	F	3					
<i>Endochironomus nigricans</i>	MT	2					

Baugo Creek—CR 3(North)

Date Collected: 08/23/22 Site #28

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	3	+	<i>Polypedilum (P.) fallax group</i>	F	31	
<i>Ectoprocta</i>	F	1		<i>Polypedilum (P.) illinoense</i>	T	15	+
<i>Oligochaeta</i>	T	8	+	<i>Polypedilum halterale grp</i>	MT	0	+
<i>Hydrachnidia</i>	F	0	+	<i>Polypedilum scalaenum grp</i>	F	108	+
<i>Acerpenna macdunnoughi</i>	MI	0	+	<i>Paratanytarsus sp</i>	F	15	
<i>Acerpenna pygmaea</i>	MI	0	+	<i>Rheotanytarsus sp</i>	F	170	+
<i>Baetis flavistriga</i>	F	0	+	<i>Tanytarsus sp</i>	F	123	+
<i>Calopteryx sp</i>	F	0	+	<i>Tanytarsus glabrescens grp sp 7</i>	F	154	+
<i>Argia sp</i>	F	0	+	<i>Fossaria sp</i>	MT	0	+
<i>Belostomatidae</i>		0	+	<i>Physella sp</i>	T	11	+
<i>Cheumatopsyche sp</i>	F	18	+	<i>Planorbella trivolvis</i>	MT	0	+
<i>Ceratopsyche morosa group</i>	MI	10	+	<i>Ferrissia sp</i>	F	87	+
<i>Hydroptilidae</i>	F	2		<i>Corbicula fluminea</i>	F	0	+
<i>Hydroptila sp</i>	F	0	+				
<i>Ochrotrichia sp</i>	MI	5	+				
<i>Leptoceridae</i>		1		No. of Quantitative Taxa	33		
<i>Oecetis persimilis</i>	MI	1		No. of Qualitative Taxa	37		
<i>Berosus sp</i>	MT	1	+	Total Taxa	53		
<i>Ancyronyx variegata</i>	F	23	+	No. Organisms	1495		
<i>Dubiraphia sp</i>	F	0	+	Qualitative EPT	7		
<i>Macronychus glabratus</i>	F	0	+	ICI	28		
<i>Stenelmis sp</i>	F	0	+				
<i>Tipula sp</i>	F	2					
<i>Simulium sp</i>	F	0	+				
<i>Ablabesmyia mallochi</i>	F	108	+				
<i>Conchapelopia sp</i>	F	154					
<i>Hayesomyia senata or</i>							
<i>Thienemannimyia norena</i>	F	139					
<i>Pentaneura inconspicua</i>	F	15					
<i>Procladius (Holotanypus) sp</i>	MT	0	+				
<i>Cricotopus (C.) bicinctus</i>	T	0	+				
<i>Cricotopus (C.) trifascia</i>	F	0	+				
<i>Cryptochironomus sp</i>	F	13					
<i>Cryptotendipes sp</i>	F	0	+				
<i>Dicrotendipes neomodestus</i>	F	62					
<i>Dicrotendipes simpsoni</i>	T	15					
<i>Endochironomus nigricans</i>	MT	15					
<i>Microtendipes "caelum"</i>	MI	46					
<i>P.albimanus or P. duplicatus</i>	F	46	+				
<i>Phaenopsectra obediens grp</i>	F	62	+				
<i>Polypedilum flavum</i>	F	31					

Bowman Creek—Gertude St

Date Collected: 08/11/22 Site #29

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	0	+	<i>Paratanytarsus sp</i>	F	2	
<i>Oligochaeta</i>	T	1	+	<i>Rheotanytarsus sp</i>	F	45	
<i>Helobdella stagnalis</i>	T	0	+	<i>T. glabrescens grp sp 7</i>	F	1	
<i>Erpobdellidae</i>	MT	0	+	<i>Chrysops sp</i>	F	0	+
<i>Erpobdella p. punctata</i>	MT	0	+	<i>Hydrobiidae</i>	F	1	+
<i>Caecidotea sp</i>	T	0	+	<i>Physella sp</i>	T	0	+
<i>Crangonyx sp</i>	MT	0	+	<i>Planorbidae</i>	MT	1	
<i>Gammarus fasciatus</i>	F	48		<i>Ferrissia sp</i>	F	2	+
<i>Orconectes sp</i>	F	0	+	<i>Sphaerium sp</i>	F	0	+
<i>Baetis tricaudatus</i>	MI	11	+				
<i>Baetis flavistriga</i>	F	4	+	No. of Quantitative Taxa	27		
<i>Heptageniidae</i>		0	+	No. of Qualitative Taxa	33		
<i>Hetaerina sp</i>	F	0	+	Total Taxa	49		
<i>Boyeria vinosa</i>	F	0	+	No. Organisms	200		
<i>Lype diversa</i>	MI	1		Qualitative EPT	5		
<i>Cheumatopsyche sp</i>	F	1	+	ICI	38		
<i>Hydropsyche depr. group</i>	F	1	+				
<i>Sperchopsis tessellata</i>	F	0	+				
<i>Helichus sp</i>	F	0	+				
<i>Macronychus glabratus</i>	F	6	+				
<i>Optioservus sp</i>	MI	0	+				
<i>Stenelmis sp</i>	F	9	+				
<i>Conchapelopia sp</i>	F	1					
<i>Larsia sp</i>	MT	0	+				
<i>Natarsia species A</i>	T	0	+				
<i>Diamesa sp</i>	F	0	+				
<i>Brillia flavifrons group</i>	F	0	+				
<i>Corynoneura lobata</i>	F	10					
<i>Cricotopus sp</i>	F	1					
<i>Cricotopus (C.) bicinctus</i>	T	1					
<i>Nanocladius (N.) distinctus</i>	MT	6					
<i>Parametriocnemus sp</i>	F	2	+				
<i>Tvetenia discoloripes group</i>	MI	2					
<i>Microtendipes pedellus group</i>	F	4					
<i>P. albimanus or P. duplicatus</i>	F	0	+				
<i>Phaenopsectra flavipes</i>	MT	0	+				
<i>Polypedilum aviceps</i>	MI	8					
<i>Polypedilum flavum</i>	F	23	+				
<i>Polypedilum (P.) fallax group</i>	F	7					
<i>Xenochironomus xenolabis</i>	F	1					

Bowman Creek—Green Tech

Date Collected: 08/23/22

Site #30

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Hydra sp</i>	F	4		<i>Pisidiidae</i>		0	+
<i>Turbellaria</i>	F	55	+	<i>Pisidium sp</i>	MT	4	
<i>Oligochaeta</i>	T	254	+	<i>Sphaerium sp</i>	F	13	
<i>Helobdella stagnalis</i>	T	13	+				
<i>Helobdella papillata</i>	MT	37		No. of Quantitative Taxa	34		
<i>Erpobdellidae</i>	MT	1	+	No. of Qualitative Taxa	18		
<i>Hyaella azteca</i>	F	2	+	Total Taxa	43		
<i>Hydrachnidia</i>	F	0	+	No. Organisms	488		
<i>Callibaetis sp</i>	MT	0	+	Qualitative EPT	2		
<i>Tricorythodes sp</i>	MI	0	+	ICI	16		
<i>Coenagrionidae</i>	T	32	+				
<i>Epitheca (Tetragoneuria) sp</i>	MT	0	+				
<i>Libellulidae</i>	MT	0	+				
<i>Libellula sp</i>	MT	2					
<i>Oecetis inconspicua complex sp A</i>	F	1					
<i>Petrophila sp</i>	MI	1					
<i>Peltodytes sp</i>	MT	0	+				
<i>Berosus sp</i>	MT	1					
<i>Paracymus sp</i>	MT	0	+				
<i>Stenelmis sp</i>	F	1					
<i>Anopheles sp</i>	F	0	+				
<i>Ablabesmyia mallochi</i>	F	1					
<i>Conchapelopia sp</i>	F	1					
<i>Labrundinia neopilosella</i>		1					
<i>Larsia sp</i>	MT	7	+				
<i>Nilotanytus fimbriatus</i>	F	1					
<i>Chironomus (C.) decorus group</i>	T	3					
<i>Dicrotendipes sp</i>	F	1					
<i>Dicrotendipes lucifer</i>	MT	5					
<i>Dicrotendipes simpsoni</i>	T	3					
<i>Endochironomus nigricans</i>	MT	1					
<i>Glyptotendipes (G.) sp</i>	MT	1					
<i>Phaenopsectra flavipes</i>	MT	6					
<i>Polypedilum (P.) illinoense</i>	T	1					
<i>Stenochironomus sp</i>	F	1					
<i>Zavreliella marmorata</i>		1					
<i>Tanytarsus glabrescens grp sp 7</i>	F	1					
<i>Valvata sp</i>		27					
<i>Physella sp</i>	T	2	+				
<i>Planorbella (Pierosoma) trivolvis</i>	MT	3	+				

Juday Creek—SR 23

Date Collected: 08/30/22 Site #32

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	8	+	<i>Phaenopsectra obediens grp</i>	F	0	+
<i>Oligochaeta</i>	T	0	+	<i>Polypedilum flavum</i>	F	101	
<i>Erpobdellidae</i>	MT	0	+	<i>Polypedilum (P.) fallax group</i>	F	25	
<i>Hyalella azteca</i>	F	8	+	<i>Polypedilum scalaenum group</i>	F	0	+
<i>Gammarus sp</i>	F	1	+	<i>Paratanytarsus sp</i>	F	76	
<i>Orconectes sp</i>	F	0	+	<i>Rheotanytarsus sp</i>	F	1611	+
<i>Hydrachnidia</i>	F	0	+	<i>Tanytarsus sp</i>	F	0	+
<i>Baetis intercalaris</i>	F	17	+	<i>Neoplasta sp</i>	MI	32	
<i>Stenacron sp</i>	F	67	+	<i>Physella sp</i>	T	0	+
<i>Maccaffertium terminatum</i>	MI	3		<i>Corbicula fluminea</i>	F	0	+
<i>Tricorythodes sp</i>	MI	0	+				
<i>Calopteryx sp</i>	F	0	+	No. of Quantitative Taxa	27		
<i>Boyeria vinosa</i>	F	0	+	No. of Qualitative Taxa	37		
<i>Polycentropus sp</i>	MI	1		Total Taxa	50		
<i>Cheumatopsyche sp</i>	F	729	+	No. Organisms	4748		
<i>Ceratopsyche morosa grp</i>	MI	312	+	Qualitative EPT	8		
<i>Ceratopsyche sparna</i>	F	23		ICI	44		
<i>Hydropsyche depr. group</i>	F	564	+				
<i>Hydroptila sp</i>	F	65					
<i>Brachycentrus numerosus</i>	MI	1					
<i>Mystacides sp</i>	MI	0	+				
<i>Nectopsyche diarina</i>	MI	0	+				
<i>Helichus sp</i>	F	1					
<i>Dubiraphia vittata group</i>	F	0	+				
<i>Macronychus glabratus</i>	F	21	+				
<i>Anopheles sp</i>	F	0	+				
<i>Ablabesmyia mallochi</i>	F	25	+				
<i>Conchapelopia sp</i>	F	227	+				
<i>H. senata or T norena</i>	F	25					
<i>Helopelopia sp</i>	F	0	+				
<i>Procladius (Holotanypus) sp</i>	MT	0	+				
<i>Cricotopus (C.) bicinctus</i>	T	25	+				
<i>Parametriocnemus sp</i>	F	25					
<i>Rheocricotopus robacki</i>	F	705					
<i>Chironomus (C.) decorus grp</i>	T	0	+				
<i>Cryptotendipes sp</i>	F	0	+				
<i>Dicrotendipes neomodestus</i>	F	0	+				
<i>Dicrotendipes simpsoni</i>	T	0	+				
<i>Microtendipes pedellus grp</i>	F	50	+				
<i>P. albimanus or P. duplicatus</i>	F	0	+				

Juday Creek—Ponader Park

Date Collected: 08/31/22 Site #33

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	0	+	<i>Microtendipes pedellus</i> grp	F	362	
<i>Oligochaeta</i>	T	18	+	<i>Microtendipes rydalensis</i>	MI	0	+
<i>Crangonyx</i> sp	MT	18		<i>P. albimanus</i> or <i>P. duplicatus</i>	F	95	+
<i>Gammarus</i> sp	F	0	+	<i>Phaenopsectra obediens</i> grp	F	19	+
<i>Orconectes</i> sp	F	1	+	<i>Polypedilum</i> (P.) <i>fallax</i> group	F	38	
<i>Hydrachnidia</i>	F	0	+	<i>Polypedilum</i> (P.) <i>illinoense</i>	T	0	+
<i>Baetis intercalaris</i>	F	0	+	<i>Polypedilum scalaenum</i> grp	F	0	+
<i>Stenacron</i> sp	F	77	+	<i>Paratanytarsus</i> sp	F	114	+
<i>Tricorythodes</i> sp	MI	3	+	<i>Rheotanytarsus pellucidus</i>	MI	38	
<i>Caenis</i> sp	F	3	+	<i>Rheotanytarsus</i> sp	F	153	+
<i>Argia</i> sp	F	0	+	<i>Tanytarsus</i> sp	F	57	+
<i>Boyeria vinosa</i>	F	0	+	<i>Tanytarsus glabr.</i> grp sp 7	F	19	
<i>Sialis</i> sp	MT	4		<i>Physella</i> sp	T	0	+
<i>Polycentropus</i> sp	MI	12		<i>Planorbella trivolvis</i>	MT	0	+
<i>Cheumatopsyche</i> sp	F	50	+	<i>Ferrissia</i> sp	F	4	
<i>Ceratopsyche morosa</i> group	MI	25	+	<i>Corbicula fluminea</i>	F	2	
<i>Ceratopsyche sparna</i>	F	2					
<i>Hydropsyche depravata</i> group	F	0	+	No. of Quantitative Taxa	35		
<i>Hydroptila</i> sp	F	6		No. of Qualitative Taxa	36		
<i>Pycnopsyche</i> sp	MI	0	+	Total Taxa	56		
<i>Nectopsyche diarina</i>	MI	0	+	No. Organisms	1618		
<i>Oecetis persimilis</i>	MI	2		Qualitative EPT	9		
<i>Dubiraphia</i> sp	F	0	+	ICI	36		
<i>Macronychus glabratus</i>	F	2	+				
<i>Simulium</i> sp	F	0	+				
<i>Ablabesmyia mallochi</i>	F	19					
<i>Conchapelopia</i> sp	F	57					
<i>Hayesomyia senata</i> or							
<i>Thienemannimyia norena</i>	F	95					
<i>Helopelopia</i> sp	F	57					
<i>Pentaneura inconspicua</i>	F	19					
<i>Tanypus neopunctipennis</i>	T	0	+				
<i>Cricotopus</i> (C.) <i>bicinctus</i>	T	19	+				
<i>Eukiefferiella claripennis</i> grp	MT	0	+				
<i>Nanocladius</i> sp	F	19					
<i>Parametriocnemus</i> sp	F	114					
<i>Rheocricotopus robacki</i>	F	76	+				
<i>Chironomus</i> (C.) <i>decorus</i> grp	T	0	+				
<i>Cryptotendipes pseudotener</i>	F	0	+				
<i>Dicrotendipes neomodestus</i>	F	0	+				
<i>Microtendipes "caelum"</i>	MI	19					

Juday Creek—IWL Dam (Below)

Date Collected: 08/30/22 Site #35

Taxa Name	Tolerance	Quantitative	Qualitative	Taxa Name	Tolerance	Quantitative	Qualitative
<i>Turbellaria</i>	F	88	+	<i>Microtendipes "caelum"</i>	MI	6	
<i>Oligochaeta</i>	T	59	+	<i>Phaenopsectra obediens gp</i>	F	6	
<i>Helobdella sp</i>	MT	0	+	<i>Polypedilum (P.) fallax group</i>	F	11	
<i>Caecidotea sp</i>	T	271	+	<i>Polypedilum scalaenum grp</i>	F	28	
<i>Gammarus sp</i>	F	10		<i>Stenochironomus sp</i>	F	6	
<i>Gammarus fasciatus</i>	F	0	+	<i>Rheotanytarsus pellucidus</i>	MI	6	
<i>Baetis tricaudatus</i>	MI	0	+	<i>Rheotanytarsus sp</i>	F	22	+
<i>Baetis flavistriga</i>	F	0	+	<i>Tanytarsus sp</i>	F	6	
<i>Baetis intercalaris</i>	F	0	+	<i>Neoplasta sp</i>	MI	4	
<i>Stenacron sp</i>	F	2	+	<i>Stagnicola sp</i>	T	0	+
<i>Maccaffertium vicarium</i>	MI	7	+	<i>Physella sp</i>	T	1	+
<i>Hetaerina sp</i>	F	0	+	<i>Corbicula fluminea</i>	F	5	+
<i>Boyeria vinosa</i>	F	5	+				
<i>Lype diversa</i>	MI	1		No. of Quantitative Taxa	36		
<i>Ceratopsyche morosa group</i>	MI	1	+	No. of Qualitative Taxa	31		
<i>Ceratopsyche sparna</i>	F	0	+	Total Taxa	52		
<i>Hydropsyche depr. group</i>	F	6	+	No. Organisms	976		
<i>Protophila sp</i>	I	0	+	Qualitative EPT	12		
<i>Hydroptila sp</i>	F	4		ICI	MG		
<i>Ochrotrichia sp</i>	MI	5					
<i>Brachycentrus numerosus</i>	MI	14	+				
<i>Pycnopsyche sp</i>	MI	0	+				
<i>Lepidostoma sp</i>	MI	1					
<i>Nectopsyche diarina</i>	MI	0	+				
<i>Oecetis persimilis</i>	MI	7					
<i>Macronychus glabratus</i>	F	5					
<i>Optioservus sp</i>	MI	0	+				
<i>Stenelmis sp</i>	F	0	+				
<i>Tipula sp</i>	F	1					
<i>Simulium sp</i>	F	0	+				
<i>Conchapelopia sp</i>	F	50					
<i>Hayesomyia senata or</i>							
<i>Thienemannimyia norena</i>	F	55					
<i>Pagastia sp</i>	F	6	+				
<i>Cardiocladius obscurus</i>	MI	6					
<i>Cricotopus (C.) sp</i>	F	11	+				
<i>Cricotopus (C.) bicinctus</i>	T	0	+				
<i>Cricotopus (C.) trifascia</i>	F	6					
<i>Parametriocnemus sp</i>	F	248	+				
<i>Thienemanniella xena</i>	F	6					
<i>Tvetenia sp</i>	MI	0	+				

Appendix F

Aerial Site Location Maps



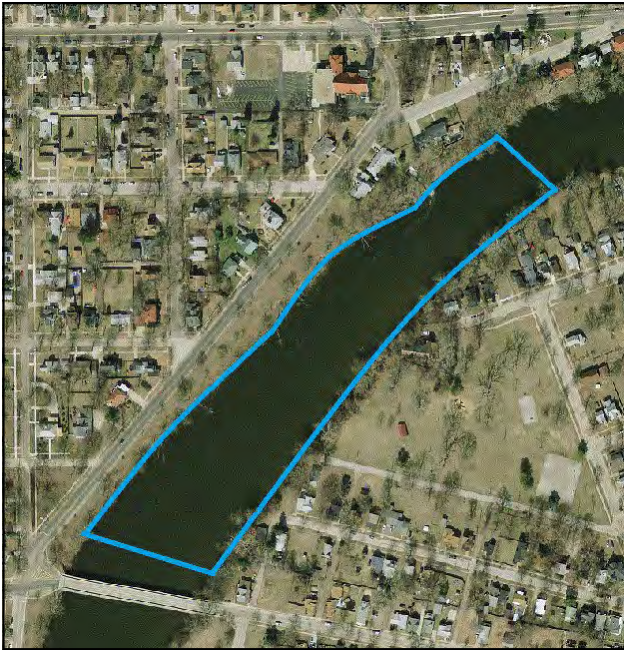
Site #1: St Joseph River Trout Creek Mouth



Site #2: St Joseph River SR 15 Bristol



Site #3 St. Joseph River Homan Avenue

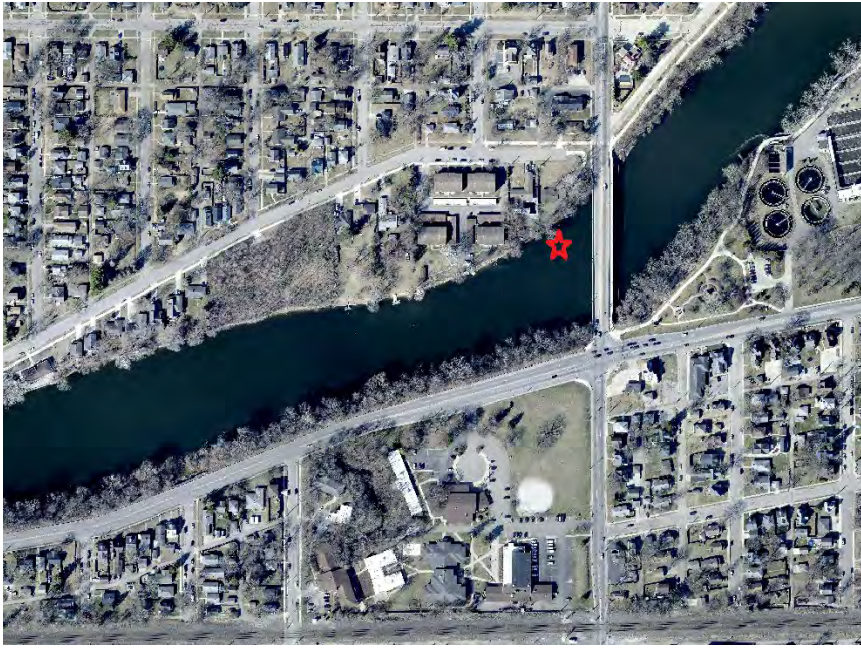


Site #4: St. Joseph River Sherman Street

Site #5: St. Joseph River Nappanee Street



Site #6: St. Joseph River Capital Avenue



Site #7: St. Joseph River Ironwood (A)
(Macroinvertebrate Sample only)

Site #8: St. Joseph River Sample
Street



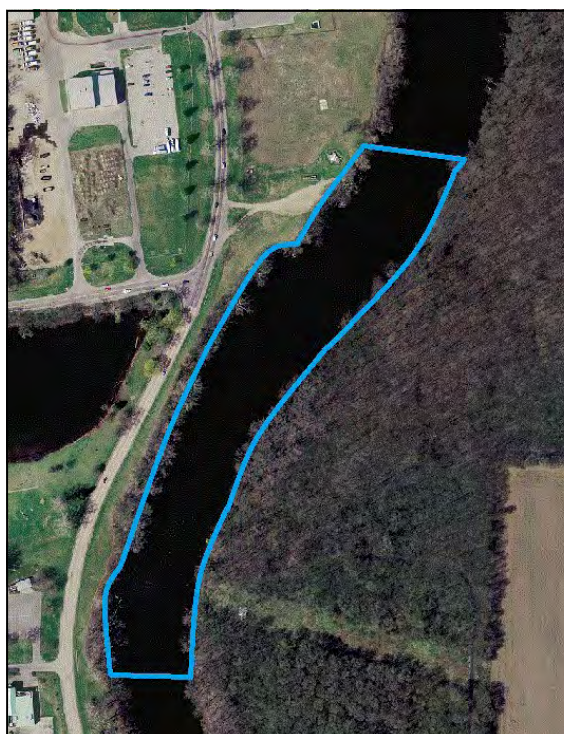
Site #9: St. Joseph River Michigan Street



Site #10: St. Joseph River
Sherman Ave



Site #11: St. Joseph River Pinhook



Site #12: St. Joseph River Pinhook (B)



Site #13: Little Elkhart River CR 10



Site #14: Puterbaugh Creek CR 8



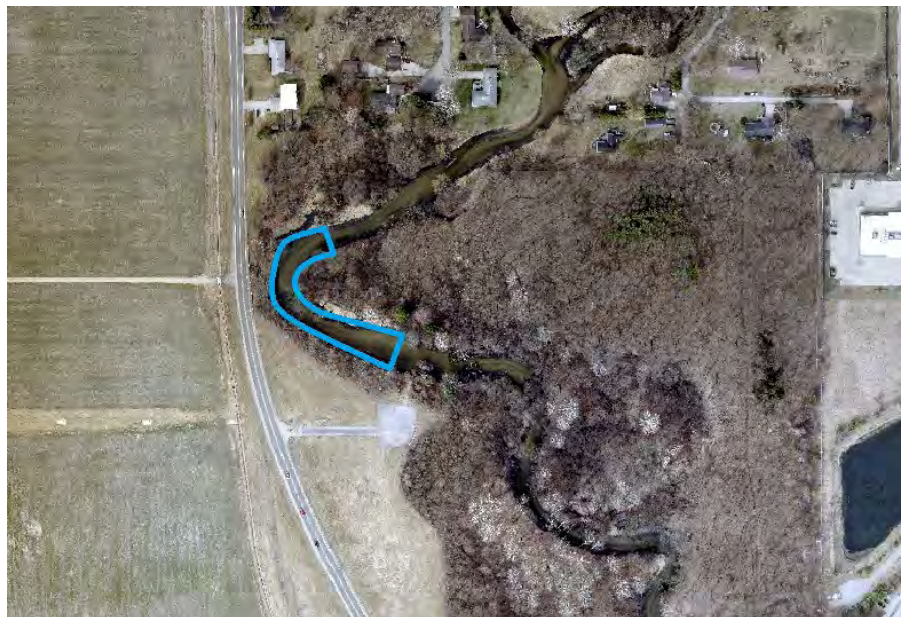
Site #15: Lily Creek Reckell Ave

Site #16: Lily Creek Modell Avenue



Site #17: Christiana Creek CR 4

Site #18: Christiana Creek Airport





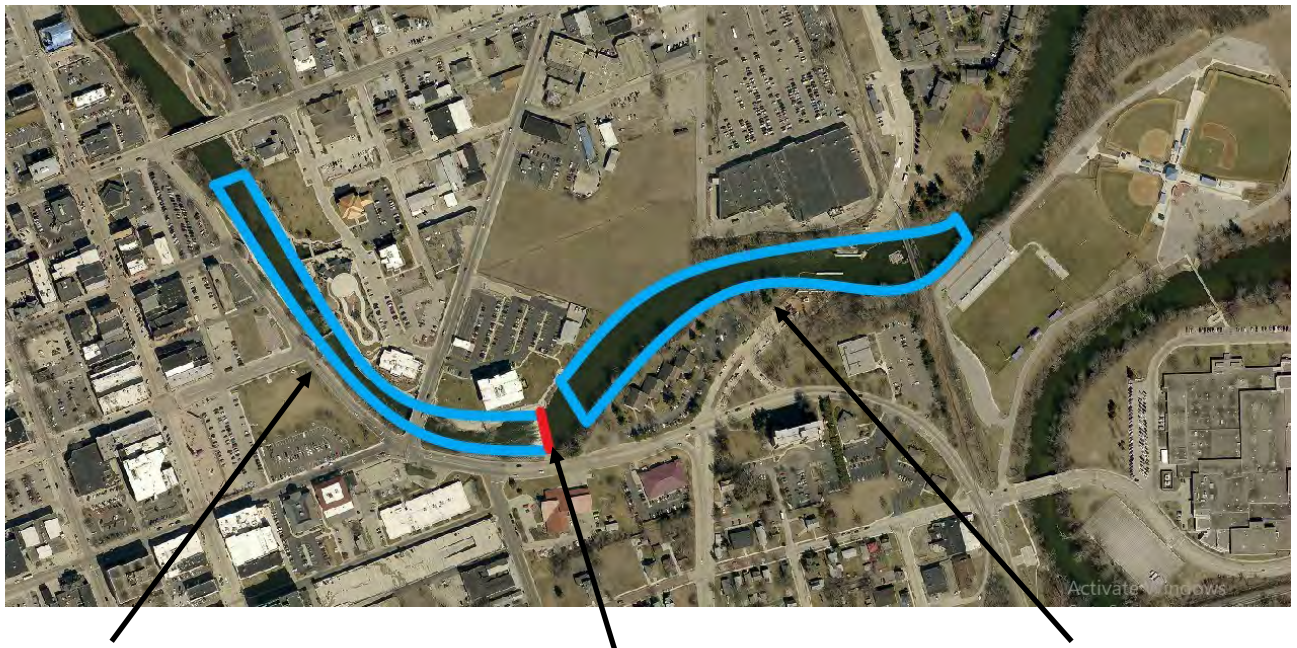
Site #19: Elkhart River Rogers Park

Site #20: Elkhart River Oxbow Park



Site #21: Elkhart River Indiana Ave

Site #22: Elkhart River Middlebury Street



Site #24: Elkhart River Elkhart Avenue

Elkhart River Dam

Site #23: Elkhart River Prairie Street



Site #25: Yellow Creek CR 32



Site #26: Cobus Creek CR 8



Site #27: Baugo Creek CR 1 (South)

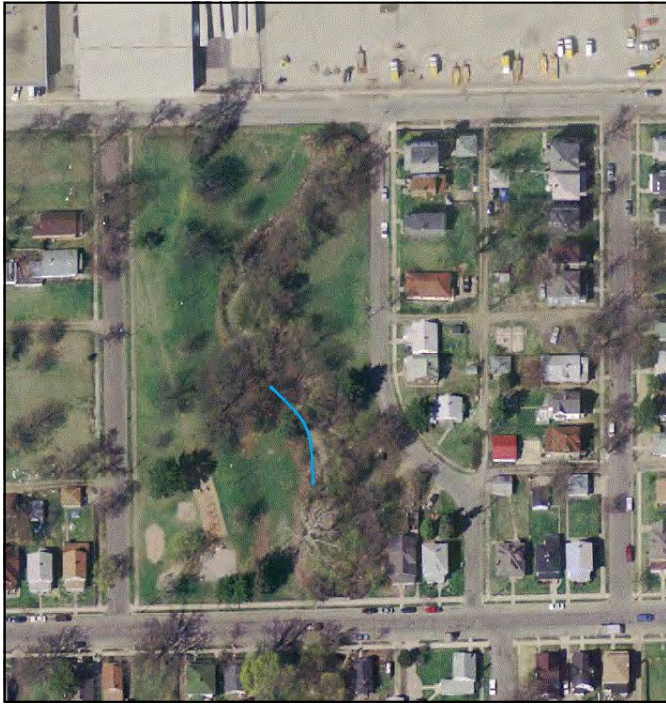
Site #28: Baugo Creek CR 3 (North)



Site #29: Bowman Creek Gertude Street

Site #30: Bowman Creek Green Tech





Site #31: Bowman Creek Ravina Park



Site #32 Juday Creek Ponader Park



Site #33: Juday Creek SR 23



Site # 34: Izaak Walton League Dam (A)

Dam

Site #35: Izaak Walton League Dam (B)

Site #36: Manion Drain Below Dam



Dam

Appendix G

Rapid Trash Assessment Results

The following are results from Rapid Trash Assessments that were completed at 10 sites in the St. Joseph River Watershed in 2022

RTA metrics and scores for sites sampled in 2022

Stream	Site	Level of Trash	Total # of Trash	Threat to Aquatic Life	Threat to Human Life	Illegal Dumping	Illegal Littering	Accumulation of Trash	RTA Score
Bowman Creek	Ravina Park	13.5	1	1	1	0	0	5	21.5
Bowman Creek	Green Tech Drive	1.5	1	1	5	0	1	1	10.5
Cobus Creek	CR8	18.5	15	8	10	4	5	9	69.5
Lily Creek	Reckell Ave	16	4	3	9	9	2	4	47
Elkhart River	Prairie St	14	3	1	7	1	1	5	32
St. Joseph River	Bristol SR15	16.5	3	1	6	10	1	5	42.5
St. Joseph River	Sample St	12.5	4	4	9	6	1	7	43.5
Juday Creek	Ponader Park	17	8	8	13	8	7	7	68
Elkhart River	Middlebury Street	13	4	2	8	0	1	7	35
Elkhart River	Indiana Ave	17	4	2	3	9	2	8	45

The # of trash items per category collected at each site in 2022

Stream	Site	Plastic		Metal		Biodegradable		Glass		Mis.		Total
		Bank	Stream	Bank	Stream	Bank	Stream	Bank	Stream	Bank	Stream	
Bowman Creek	Ravina Park	125	46	8	29	10	5	6	305	36	17	587
Bowman Creek	Green Tech Drive	107	229	22	4	20	4	34	26	54	101	601
Cobus Creek	CR8	7	19	2	2	4	0	11	2	4	1	52
Lily Creek	Reckell Ave	53	57	4	1	17	2	7	9	13	33	196
Elkhart River	Prairie St	72	31	9	59	13	1	2	8	113	27	335
St. Joseph River	Bristol SR15	75	33	16	12	29	10	42	7	83	25	332
St. Joseph River	Sample St	52	26	34	9	5	26	1	9	20	23	205
Juday Creek	Ponader Park	23	13	3	3	1	20	0	2	8	9	82
Elkhart River	Middlebury Street	72	37	43	24	4	2	5	22	23	14	246
Elkhart River	Indiana Ave	49	10	5	5	2	0	79	14	21	21	206

The # of trash items per metric collected at each site in 2022

Stream	Site	Total # of Trash	Threat to Aquatic Life	Threat to Human Life	Illegal Dumping	Illegal Littering	Accumulation of Trash
Bowman Creek	Ravina Park	587	435	321	14	171	55
Bowman Creek	Green Tech Drive	601	419	61	36	191	269
Cobus Creek	CR8	52	31	14	2	15	20
Lily Creek	Reckell Ave	196	119	25	5	86	87
Elkhart River	Prairie St	335	207	40	10	206	50
St. Joseph River	Bristol SR15	332	223	49	0	197	64
St. Joseph River	Sample St	205	87	24	17	110	41
Juday Creek	Ponader Park	82	32	5	2	35	39
Elkhart River	Middlebury Street	246	123	23	3	143	41
Elkhart River	Indiana Ave	206	158	87	2	78	30

Stream: Bowman Creek				Nearest Bridge (m): 0		
Station: Ravina Park				Recreational uses: None		
Date: 06/30/22				Recent Rain Event: No		
Recorder: DJD				Recent Flood Event: No		
Crew: OLS, MJH, NAH, LJT, SAM				Stream Clarity: Clear		
Landuse (L): Park				Other Notes:		
Landuse (Ri): Residential/Urban						
	Stream	Riparian			Stream	Riparian
<u>Biodegradeable</u>				<u>Metal</u>		
Cardboard				Cans		2
Paper		9		Aluminum Foil		4
Wood	1	1		Sharp Objects	4	
Grass Clippings				Misc	25	2
Leaves						
Feces				<u>Glass</u>		
Food				Bottles/jars	2	
Bones	4			shattered pieces	303	6
<u>Aquatic Life Threat</u>						
Styrofoam	4	24				
Small/Microplastics (<4cm)	2	40		<u>Plastics</u>		
Plastic Straws				Bottles		6
Cig Butts		2		Plastic Bags		
Tagle Hazards				Misc Large Plastics	8	6
				Plastic Wrappers (>4cm)	36	73
	Stream	Riparian			Stream	Riparian
<u>Misc</u>				Other Misc.		
Brick						
clothing	6	3		Tent		1
dryer sheets				Plastic Sheet		1
Masks	1			Cone	2	
Tires				Pencil	1	
Tires with rim				Coal	1	
chem/haz container				Air Pods	1	
Batteries	1			Pepper Spray		1
Foam				Roof Shingles		2
Shopping Karts				Misc Electrical		1
Diapers						
Medical/biohaz						
Mosquito Sources		1				
Furniture						
Appliances						
Evidence of dumping						

Stream: Bowman Creek			Nearest Bridge (m): 0		
Station: Green Tech			Recreational uses: None		
Date: 6/30/2022			Recent Rain Event: No		
Recorder: DJD			Recent Flood Event: No		
Crew: SMK,LJT,NAH,MJH,OLS.DJD			Stream Clarity: Clear		
Landuse (L): Oldfield,Urban,Brownfield,Homeless Camp			Other Notes: Waste management facility upstream likely source of blowable waste: bags + paper. Homeless Camp likely the source of dumped items		
Landuse (Ri): Oldfield, Urban Brownfield					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard			Cans	2	5
Paper	3	20	Aluminum Foil		
Wood	1		Sharp Objects		
Grass Clippings			Misc	2	17
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars		2
Bones			shattered pieces	26	32
<u>Aquatic Life Threat</u>					
Styrofoam	72	33	<u>Plastics</u>		
Small/Microplastics (<4cm)		16	Bottles	7	15
Plastic Straws		3	Plastic Bags	168	39
Cig Butts			Misc Large Plastics	29	18
Tagle Hazards	1		Plastic Wrappers (>4cm)	25	16
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	12	12	Trash Barrel		1
dryer sheets			Shutters	1	
Masks			Rug	1	
Tires			Blanket	1	
Tires with rim			Picket Fence	1	
chem/haz container			Drum	1	
Batteries		2	Hose		1
Foam			Misc Electrical	1	
Shopping Karts			Potato Sack	1	
Diapers					
Medical/biohaz		3			
Mosquito Sources	7				
Furniture	1	2			
Appliances					
Evidence of dumping	1				

Stream: Cobus Creek			Nearest Bridge (m): 0		
Station: CR 8			Recreational uses: None		
Date: 06/30/222			Recent Rain Event: No		
Recorder: DJD			Recent Flood Event: No		
Crew: OLS,MJH,NAH,LJT,DJD			Stream Clarity: Clear		
Landuse (L): Forest, Ag Field, Trailer Park			Other Notes:		
Landuse (Ri): Forest					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard			Cans		1
Paper			Aluminum Foil		
Wood		1	Sharp Objects	1	1
Grass Clippings			Misc	1	
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars	2	3
Bones		3	shattered pieces		8
<u>Aquatic Life Threat</u>					
Styrofoam		1	<u>Plastics</u>		
Small/Microplastics (<4cm)			Bottles	1	2
Plastic Straws			Plastic Bags		
Cig Butts			Misc Large Plastics	17	5
Tagle Hazards			Plastic Wrappers (>4cm)	1	
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing			Lighter		1
dryer sheets			Small Swimming Pool	1	
Masks					
Tires					
Tires with rim		1			
chem/haz container					
Batteries					
Foam					
Shopping Karts					
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances		1			
Evidence of dumping					

Stream: Lily Creek			Nearest Bridge (m): 0		
Station: Reckell Ave			Recreational uses: None		
Date: 7/4/2022			Recent Rain Event: No		
Recorder: DJD			Recent Flood Event: No		
Crew: SMK,OLS,NAH,MJH,DJD			Stream Clarity: Clear		
Landuse (L): Industrial			Other Notes:		
Landuse (Ri): Industrial					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard			Cans	1	
Paper	1	5	Aluminum Foil		2
Wood	1	1	Sharp Objects		
Grass Clippings			Misc		2
Leaves					
Feces		11	<u>Glass</u>		
Food			Bottles/jars	9	
Bones			shattered pieces		7
<u>Aquatic Life Threat</u>					
Styrofoam	27	4	<u>Plastics</u>		
Small/Microplastics (<4cm)	5	14	Bottles		2
Plastic Straws	2		Plastic Bags	27	3
Cig Butts			Misc Large Plastics	13	11
Tagle Hazards		1	Plastic Wrappers (>4cm)	10	23
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	4	1	Fireworks Trash		6
dryer sheets			Balloon		1
Masks			Lighter	1	
Tires			Softball	1	
Tires with rim					
chem/haz container					
Batteries					
Foam					
Shopping Karts					
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Stream: Elkhart River			Nearest Bridge (m): 100 M		
Station: Prairie St.			Recreational uses: Fishing and Kayaking		
Date: 8/16/2022			Recent Rain Event:		
Recorder: DJD			Recent Flood Event:		
Crew: OLS,LIT,MJH,DJD			Stream Clarity:		
Landuse (L): Residential, Urban			Other Notes:		
Landuse (Ri): Commercial, Office, Urban					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard		1	Cans		1
Paper	1	10	Aluminum Foil		4
Wood			Sharp Objects	26	
Grass Clippings			Misc	33	4
Leaves					
Feces			<u>Glass</u>		
Food		2	Bottles/jars	1	
Bones			shattered pieces	7	2
<u>Aquatic Life Threat</u>					
Styrofoam	11		<u>Plastics</u>		
Small/Microplastics (<4cm)	5	11	Bottles	1	2
Plastic Straws	1		Plastic Bags	12	14
Cig Butts	1	109	Misc Large Plastics	4	17
Tagle Hazards		2	Plastic Wrappers (>4cm)	8	28
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	1	1	Bike	1	
dryer sheets			Plastic Kart	1	
Masks			Patio Umbrella	1	
Tires			Bed Sheet	1	
Tires with rim			Hose	1	
chem/haz container			Baby Wipe	1	
Batteries			Cell Phone	1	
Foam			Misc. Rubber	1	
Shopping Karts	2		Thermometer	1	
Diapers			Tampon Wrapper	1	
Medical/biohaz	1	1	Foundry Moulds	1	
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Stream: Elkhart River			Nearest Bridge (m): 300' upstream		
Station: Middlebury			Recreational uses: Fishing and Boating		
Date: 8/17/2022			Recent Rain Event: No		
Recorder: DJD			Recent Flood Event: No		
Crew: OLS,LJT,DJD			Stream Clarity: Clear		
Landuse (L): residential/urban			Other Notes: Evidence of chronic dumping of cans and other trash		
Landuse (Ri): forest/swamp					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard	1		Cans	13	19
Paper	1	4	Aluminum Foil	1	6
Wood			Sharp Objects	6	
Grass Clippings			Misc	4	18
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars	9	1
Bones			shattered pieces	13	4
<u>Aquatic Life Threat</u>					
Styrofoam	1	17	<u>Plastics</u>		
Small/Microplastics (<4cm)		33	Bottles	1	11
Plastic Straws		2	Plastic Bags	10	6
Cig Butts		2	Misc Large Plastics	7	11
Tagle Hazards		1	Plastic Wrappers (>4cm)	19	9
	Stream	Riparian		Stream	Riparian
Misc			other		
Brick					
clothing	1		Cigarette Lighter		2
dryer sheets			Misc Glass	1	
Masks			Tile	7	
Tires			Q-Tip		1
Tires with rim			Fishing Pole	1	
chem/haz container			Wood w/ Screw	1	
Batteries			Bowling Ball	1	
Foam					
Shopping Karts	1				
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Stream: Elkhart River			Nearest Bridge (m): 0		
Station: Indiana			Recreational uses: Fishing and Boating		
Date: 8/17/2022			Recent Rain Event:		
Recorder: DJD			Recent Flood Event:		
Crew: OLS,LJT,DJD			Stream Clarity:		
Landuse (L): Park			Other Notes:		
Landuse (Ri): Forest/Old Landfill					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard			Cans	2	1
Paper		2	Aluminum Foil		
Wood			Sharp Objects		1
Grass Clippings			Misc	3	3
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars	7	2
Bones			shattered pieces	7	77
<u>Aquatic Life Threat</u>					
Styrofoam	9		<u>Plastics</u>		
Small/Microplastics (<4cm)		30	Bottles		
Plastic Straws			Plastic Bags	1	1
Cig Butts		17	Misc Large Plastics	5	15
Tagle Hazards	3	1	Plastic Wrappers (>4cm)	4	3
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	1	1	Misc. Rubber	1	1
dryer sheets			Motherboard		1
Masks			Meth Lab Bottle	1	
Tires	4		Lighter	1	
Tires with rim			Plastic Inflatable Inner Tube	1	
chem/haz container					
Batteries					
Foam					
Shopping Karts					
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Stream: St. Joseph River			Nearest Bridge (m): 0		
Station: SR 15 (Bristol)			Recreational uses: Fishing and Boating		
Date: 8/16/2022			Recent Rain Event:		
Recorder: DJD			Recent Flood Event:		
Crew: OLD,DJD,MJH,LJT			Stream Clarity:		
Landuse (L): Park			Other Notes:		
Landuse (Ri): Park					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard		29	Cans	3	1
Paper	9		Aluminum Foil	4	
Wood			Sharp Objects		
Grass Clippings			Misc	5	15
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars	2	
Bones	1		shattered pieces	5	42
<u>Aquatic Life Threat</u>					
Styrofoam	1	4	<u>Plastics</u>		
Small/Microplastics (<4cm)	6	29	Bottles		2
Plastic Straws			Plastic Bags		5
Cig Butts	3	67	Misc Large Plastics	8	7
Tagle Hazards	11	6	Plastic Wrappers (>4cm)	19	32
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	1		Misc. Rubber	3	3
dryer sheets			Hook	1	
Masks			Rope	2	
Tires			Laptop	1	
Tires with rim			Glow Stick	1	
chem/haz container					
Batteries	1	3			
Foam					
Shopping Karts					
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Stream: St. Joe River			Nearest Bridge (m): 300'		
Station: Sample St.			Recreational uses: Boat Ramp at Site		
Date: 8/17/2022			Recent Rain Event: No		
Recorder: DJD			Recent Flood Event: No		
Crew: OLS,LIT,DJD			Stream Clarity: Clear		
Landuse (L): Park			Other Notes:		
Landuse (Ri): Urban					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard	9	5	Cans	5	34
Paper			Aluminum Foil		
Wood			Sharp Objects	2	
Grass Clippings			Misc	2	
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars	4	1
Bones	17		shattered pieces	5	
<u>Aquatic Life Threat</u>					
Styrofoam			<u>Plastics</u>		
Small/Microplastics (<4cm)	4	16	Bottles	2	1
Plastic Straws		3	Plastic Bags	8	
Cig Butts	2	19	Misc Large Plastics	11	18
Tagle Hazards			Plastic Wrappers (>4cm)	1	14
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	16		Insulin test	1	
dryer sheets			Fishing Line w/ Hook	1	
Masks			Baby Wipe		1
Tires			Metal Road Sign	1	
Tires with rim			Rubber Gloves	2	
chem/haz container					
Batteries					
Foam					
Shopping Karts					
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Stream: Juday Creek			Nearest Bridge (m): 0		
Station: Ponader Park			Recreational uses: None		
Date: 8/17/2022			Recent Rain Event: No		
Recorder: DJD			Recent Flood Event: No		
Crew: OLS,LJT,DJD			Stream Clarity: Clear		
Landuse (L): Residential			Other Notes:		
Landuse (Ri): Park					
	Stream	Riparian		Stream	Riparian
<u>Biodegradeable</u>			<u>Metal</u>		
Cardboard			Cans	2	2
Paper		1	Aluminum Foil		
Wood	19		Sharp Objects		
Grass Clippings			Misc	1	1
Leaves					
Feces			<u>Glass</u>		
Food			Bottles/jars	1	
Bones	1		shattered pieces	1	
<u>Aquatic Life Threat</u>					
Styrofoam		8	<u>Plastics</u>		
Small/Microplastics (<4cm)	1	6	Bottles	3	3
Plastic Straws			Plastic Bags	4	3
Cig Butts			Misc Large Plastics	5	5
Tagle Hazards			Plastic Wrappers (>4cm)		6
	Stream	Riparian		Stream	Riparian
<u>Misc</u>			other		
Brick					
clothing	1		Big Ceramic Pot	1	
dryer sheets			Plastic Kiddy Pool	1	
Masks			Big Plastic Tarp	1	
Tires	1		Wood w/ Screw	2	
Tires with rim			Tile	1	
chem/haz container			Tampon Applicator	1	
Batteries					
Foam					
Shopping Karts					
Diapers					
Medical/biohaz					
Mosquito Sources					
Furniture					
Appliances					
Evidence of dumping					

Appendix H

IBI Calculations

Site #2**St. Joseph River SR 15 (B)****Drainage Area: 2444****Year 2022**

ICHTY #	1613			ICHTY #	1647		
Metric	calc	score		Metric	calc	score	
Total # of Species	29	5		Total # of Species	26	5	
# of Darters	2	3		# of Darters	4	5	
# of Sunfish	6	5		# of Sunfish	4	3	
# of Suckers	6	5		# of Suckers	5	5	
# of Sensitive	10	5		# of Sensitive	11	5	
% Tolerant	1.79	5		% Tolerant	1.9	5	
% Omnivores	1.32	5		% Omnivores	1.65	5	
% Insectivores	66.39	5		% Insectivores	71.74	5	
% Carnivores	32.06	5		% Carnivores	26.49	5	
CPUE	836	3		CPUE	789	3	
% Simple Lithophil	19.5	3		% Simple Lithophil	35.36	3	
% DELT anomalies	1.08	3		% DELT anomalies	0.51	3	
Total		52		Total		52	

Average	52
----------------	----

Site #3**St. Joseph River Homan Ave****Drainage Area: 2511****Year 2022**

ICHTY #	1618			ICHTY #	1658		
Metric	calc	score		Metric	calc	score	
Total # of Species	26	5		Total # of Species	31	5	
# of Darters	1	1		# of Darters	4	5	
# of Sunfish	7	5		# of Sunfish	4	3	
# of Suckers	5	5		# of Suckers	6	5	
# of Sensitive	10	5		# of Sensitive	14	5	
% Tolerant	15.69	5		% Tolerant	22.12	5	
% Omnivores	14.08	5		% Omnivores	20.18	5	
% Insectivores	44.39	3		% Insectivores	48.85	3	
% Carnivores	40.29	5		% Carnivores	29.73	5	
CPUE	561	5		CPUE	565	5	
% Simple Lithophil	8.38	1		% Simple Lithophil	25.49	3	
% DELT anomalies	0.89	3		% DELT anomalies	0.71	3	
Total		48		Total		52	

Average	50
----------------	----

Site #4**St. Joseph River Sherman St****Drainage Area: 3371****Year 2022**

ICHTY # 1622			ICHTY # 1656		
Metric	calc	score	Metric	calc	score
Total # of Species	30	5	Total # of Species	33	5
# of Darters	3	5	# of Darters	3	5
# of Sunfish	7	5	# of Sunfish	7	5
# of Suckers	6	5	# of Suckers	7	5
# of Sensitive	13	5	# of Sensitive	15	5
% Tolerant	2.6	5	% Tolerant	5.37	5
% Omnivores	1.76	5	% Omnivores	2.76	5
% Insectivores	84.66	5	% Insectivores	82.52	5
% Carnivores	13.33	3	% Carnivores	14.14	3
CPUE	1193	1	CPUE	1379	1
% Simple Lithophil	13.75	1	% Simple Lithophil	15.23	3
% DELT anomalies	0.34	3	% DELT anomalies	0.15	3
Total		48	Total		50

Average	49
----------------	----

Site #5**St. Joseph River Nappanee St.****Drainage Area: 3375****Year 2022**

ICHTY # 1610			ICHTY # 1649		
Metric	calc	score	Metric	calc	score
Total # of Species	30	5	Total # of Species	29	5
# of Darters	2	3	# of Darters	4	5
# of Sunfish	7	5	# of Sunfish	6	5
# of Suckers	9	5	# of Suckers	5	3
# of Sensitive	14	5	# of Sensitive	12	5
% Tolerant	4.21	5	% Tolerant	6.86	5
% Omnivores	3.47	5	% Omnivores	6.03	5
% Insectivores	79.05	5	% Insectivores	74.58	5
% Carnivores	17.37	5	% Carnivores	19.29	5
CPUE	950	3	CPUE	1078	1
% Simple Lithophil	14.74	1	% Simple Lithophil	14.75	1
% DELT anomalies	1.68	1	% DELT anomalies	1.02	3
Total		48	Total		48

Average	48
----------------	----

Site #6
St. Joseph River Capital Ave
Drainage Area: 3527
Year 2022

ICHTY #	1615			ICHTY #	1645		
Metric	calc	score		Metric	calc	score	
Total # of Species	26	5		Total # of Species	29	5	
# of Darters	4	5		# of Darters	5	5	
# of Sunfish	5	3		# of Sunfish	7	5	
# of Suckers	5	3		# of Suckers	3	3	
# of Sensitive	11	5		# of Sensitive	10	5	
% Tolerant	6.05	5		% Tolerant	5.7	5	
% Omnivores	5.15	5		% Omnivores	4.93	5	
% Insectivores	72.45	5		% Insectivores	72.56	5	
% Carnivores	22.2	5		% Carnivores	22.22	5	
CPUE	1009	1		CPUE	1035	1	
% Simple Lithophil	3.47	1		% Simple Lithophil	7.54	1	
% DELT anomalies	0.4	3		% DELT anomalies	0.68	3	
Total		46		Total		48	

Average	47
----------------	----

Site #8
St. Joseph River Sample Street
Drainage Area: 3567
Year 2022

ICHTY #	1617			ICHTY #	1651		
Metric	calc	score		Metric	calc	score	
Total # of Species	25	5		Total # of Species	22	3	
# of Darters	4	5		# of Darters	2	3	
# of Sunfish	5	3		# of Sunfish	5	3	
# of Suckers	7	5		# of Suckers	4	3	
# of Sensitive	10	5		# of Sensitive	8	3	
% Tolerant	5.31	5		% Tolerant	6.41	5	
% Omnivores	3.34	5		% Omnivores	4.21	5	
% Insectivores	35.99	3		% Insectivores	32.97	3	
% Carnivores	60.55	5		% Carnivores	62.27	5	
CPUE	867	3		CPUE	546	5	
% Simple Lithophil	2.54	1		% Simple Lithophil	2.93	1	
% DELT anomalies	0.46	3		% DELT anomalies	0.73	3	
Total		48		Total		42	

Average	45
----------------	----

Site #9**St. Joseph River Michigan Street****Drainage Area: 3583****Year 2022**

1620			1653		
ICHTY #			ICHTY #		
Metric	calc	score	Metric	calc	score
Total # of Species	20	3	Total # of Species	20	3
# of Darters	4	5	# of Darters	4	5
# of Sunfish	3	3	# of Sunfish	5	3
# of Suckers	6	5	# of Suckers	4	3
# of Sensitive	12	5	# of Sensitive	11	5
% Tolerant	1.49	5	% Tolerant	1.01	5
% Omnivores	0.99	5	% Omnivores	0.4	5
% Insectivores	45.79	3	% Insectivores	39.19	3
% Carnivores	53.22	5	% Carnivores	60.4	5
CPUE	605	5	CPUE	495	5
% Simple Lithophil	28.6	3	% Simple Lithophil	21.62	3
% DELT anomalies	0.66	3	% DELT anomalies	0.61	3
Total		50	Total		48

Average	49
----------------	----

Site #11**St. Joseph River Pinhook (B)****Drainage Area: 3608****Year 2022**

1623			1655		
ICHTY #			ICHTY #		
Metric	calc	score	Metric	calc	score
Total # of Species	24	5	Total # of Species	23	3
# of Darters	4	5	# of Darters	0	1
# of Sunfish	6	5	# of Sunfish	6	5
# of Suckers	7	5	# of Suckers	8	5
# of Sensitive	13	5	# of Sensitive	9	3
% Tolerant	1.23	5	% Tolerant	3.61	5
% Omnivores	0.18	5	% Omnivores	1.14	5
% Insectivores	65.08	5	% Insectivores	66.54	5
% Carnivores	34.04	5	% Carnivores	31.94	5
CPUE	567	5	CPUE	526	5
% Simple Lithophil	13.23	1	% Simple Lithophil	6.08	1
% DELT anomalies	2.29	1	% DELT anomalies	1.52	1
Total		52	Total		44

Average	48
----------------	----

Site #13
Little Elkhart River CR 10
Drainage Area: 114
Year 2022

1626			1659		
ICHTY #			ICHTY #		
Metric	calc	score	Metric	calc	score
Total # of Species	26	5	Total # of Species	25	5
# of Darters	3	5	# of Darters	4	5
# of Sunfish	3	3	# of Sunfish	3	3
# of Suckers	3	3	# of Suckers	3	3
# of Sensitive	8	5	# of Sensitive	7	5
% Tolerant	30.99	5	% Tolerant	32.62	5
% Omnivores	12.43	5	% Omnivores	13.37	5
% Insectivores	65.57	5	% Insectivores	59.36	3
% Carnivores	4.04	1	% Carnivores	6.77	1
CPUE	668	1	CPUE	561	3
% Simple Lithophil	39.82	3	% Simple Lithophil	36.36	3
% DELT anomalies	0	5	% DELT anomalies	0	5
Total		46	Total		46

Average	46
----------------	----

Site #14
Puterbaugh CR 8
Drainage Area: 15.3
Year 2022

1609			1634		
ICHTY #			ICHTY #		
Metric	calc	score	Metric	calc	score
Total # of Species	13	5	Total # of Species	15	5
# of Darters	5	5	# of Darters	5	5
% Headwater	15.9	1	% Headwater	20.12	1
# of Minnows	1	1	# of Minnows	1	1
# of Sensitive	3	3	# of Sensitive	3	3
% Tolerant	39.49	3	% Tolerant	36.59	3
% Omnivores	25.64	5	% Omnivores	12.2	5
% Insectivores	56.92	3	% Insectivores	60.37	5
% Pioneering	23.08	5	% Pioneering	30.49	5
CPUE	195	5	CPUE	164	3
% Simple Lithophil	57.44	5	% Simple Lithophil	37.8	3
% DELT anomalies	0	5	% DELT anomalies	0	5
Total		46	Total		44

Average	45
----------------	----

Site #15**Lily Creek - Reckell****Drainage Area: 8****Year 2022****Ichty #**

1603

1632

Metric	calc	score		Metric	calc	score
Total # of Species	9	3		Total # of Species	12	5
# Darter/Madtom/Sculpins	1	1		# Darter/Madtom/Sculpins	1	1
% Headwater	0	1		% Headwater	0	1
# of Minnows	4	5		# of Minnows	2	3
# of Sensitive	0	1		# of Sensitive	0	1
% Tolerant	43.55	3		% Tolerant	7.89	5
% Omnivores	17.74	5		% Omnivores	4.61	5
% Insectivores	56.45	3		% Insectivores	17.11	1
% Pioneering	35.48	3		% Pioneering	3.95	5
CPUE	62	1		CPUE	152	5
% Simple Lithophil	22.58	3		% Simple Lithophil	1.32	1
% DELT anomalies	0	5		% DELT anomalies	0	5
Total		34		Total		38

Average	36
----------------	----

Site #17**Christiana CR4****Drainage Area: 124****Year 2022****ICHTY #**

1614

ICHTY #

1661

Metric	calc	score		Metric	calc	score
Total # of Species	24	5		Total # of Species	22	5
# of Darters	1	1		# of Darters	1	1
# of Sunfish	2	3		# of Sunfish	3	3
# of Suckers	3	3		# of Suckers	4	5
# of Sensitive	8	5		# of Sensitive	7	5
% Tolerant	17.63	5		% Tolerant	16.44	5
% Omnivores	16.33	5		% Omnivores	15.06	5
% Insectivores	72.62	5		% Insectivores	71.69	5
% Carnivores	7.64	1		% Carnivores	7.57	1
CPUE	1231	1		CPUE	1162	1
% Simple Lithophil	54.1	5		% Simple Lithophil	58.78	5
% DELT anomalies	0	5		% DELT anomalies	0.09	5
Total		44		Total		46

Average	45
----------------	----

Site #20**Elkhart River Oxbow Park****Drainage Area: 651****Year 2022**

ICHTY #	1606			ICHTY #	1636	
Metric	calc	score		Metric	calc	score
Total # of Species	32	5		Total # of Species	34	5
# of Darters	3	5		# of Darters	4	5
# of Sunfish	5	5		# of Sunfish	6	5
# of Suckers	8	5		# of Suckers	7	5
# of Sensitive	15	5		# of Sensitive	15	5
% Tolerant	7.99	5		% Tolerant	8.13	5
% Omnivores	6.71	5		% Omnivores	5.13	5
% Insectivores	66.29	5		% Insectivores	68.34	5
% Carnivores	26.52	5		% Carnivores	26.31	5
CPUE	626	3		CPUE	935	1
% Simple Lithophil	37.54	3		% Simple Lithophil	45.24	5
% DELT anomalies	1.12	3		% DELT anomalies	2.14	1
Total		54		Total		52

Average	53
----------------	----

Site #21**Elkhart River Indiana****Drainage Area: 695****Year 2022**

ICHTY #	1607			ICHTY #	1639	
Metric	calc	score		Metric	calc	score
Total # of Species	32	5		Total # of Species	32	5
# of Darters	3	5		# of Darters	4	5
# of Sunfish	5	5		# of Sunfish	6	5
# of Suckers	6	5		# of Suckers	6	5
# of Sensitive	14	5		# of Sensitive	13	5
% Tolerant	4.92	5		% Tolerant	4.94	5
% Omnivores	4.33	5		% Omnivores	4.42	5
% Insectivores	75	5		% Insectivores	80.52	5
% Carnivores	18.31	5		% Carnivores	14.81	3
CPUE	508	5		CPUE	770	3
% Simple Lithophil	28.94	3		% Simple Lithophil	29.74	3
% DELT anomalies	0	5		% DELT anomalies	0.65	3
Total		58		Total		52

Average	55
----------------	----

Site #22**Elkhart River Middlebury****Drainage Area: 696****Year 2022**

ICHTY #	1602			ICHTY #	1631	
Metric	calc	score		Metric	calc	score
Total # of Species	28	5		Total # of Species	32	5
# of Darters	3	5		# of Darters	4	5
# of Sunfish	4	3		# of Sunfish	6	5
# of Suckers	6	5		# of Suckers	7	5
# of Sensitive	15	5		# of Sensitive	16	5
% Tolerant	6.99	5		% Tolerant	5.17	5
% Omnivores	5.51	5		% Omnivores	2.41	5
% Insectivores	73.53	5		% Insectivores	67.41	5
% Carnivores	20.4	5		% Carnivores	29.48	5
CPUE	544	5		CPUE	580	5
% Simple Lithophil	30.33	3		% Simple Lithophil	29.83	3
% DELT anomalies	0.55	3		% DELT anomalies	1.38	1
Total		54		Total		54

Average	54
----------------	----

Site #23**Elkhart River Prairie Street****Drainage Area: 699****Year 2022**

ICHTY #	1608			ICHTY #	1644	
Metric	calc	score		Metric	calc	score
Total # of Species	29	5		Total # of Species	33	5
# of Darters	2	3		# of Darters	5	5
# of Sunfish	6	5		# of Sunfish	6	5
# of Suckers	6	5		# of Suckers	6	5
# of Sensitive	15	5		# of Sensitive	16	5
% Tolerant	1.56	5		% Tolerant	2.98	5
% Omnivores	1.04	5		% Omnivores	1.82	5
% Insectivores	86.22	5		% Insectivores	80.29	5
% Carnivores	11.18	3		% Carnivores	17.25	5
CPUE	769	3		CPUE	771	3
% Simple Lithophil	28.09	3		% Simple Lithophil	34.11	3
% DELT anomalies	1.3	3		% DELT anomalies	0.91	3
Total		50		Total		54

Average	52
----------------	----

Site #24
Elkhart River Elkhart Avenue
Drainage Area: 700
Year 2022

ICHTY #	1611			ICHTY #	1643		
Metric	calc	score		Metric	calc	score	
Total # of Species	31	5		Total # of Species	30	5	
# of Darters	2	3		# of Darters	4	5	
# of Sunfish	7	5		# of Sunfish	7	5	
# of Suckers	5	5		# of Suckers	7	5	
# of Sensitive	11	5		# of Sensitive	14	5	
% Tolerant	1.88	5		% Tolerant	2.21	5	
% Omnivores	2.35	5		% Omnivores	1.68	5	
% Insectivores	79.91	5		% Insectivores	82.21	5	
% Carnivores	16.81	5		% Carnivores	15.75	3	
CPUE	1065	1		CPUE	1130	1	
% Simple Lithophil	12.68	1		% Simple Lithophil	14.69	1	
% DELT anomalies	0.56	3		% DELT anomalies	0.71	3	
Total		48		Total		48	

Average	48
----------------	----

Site #25
Yellow Creek - CR 32
Drainage Area: 10.5
Year 2022

ICHTY #	1616			ICHTY #	1650		
Metric	calc	score		Metric	calc	score	
Total # of Species	9	3		Total # of Species	15	5	
# Darter/Madtom/Sculpins	1	1		# Darter/Madtom/Sculpins	1	1	
% Headwater	11.86	1		% Headwater	8.29	1	
# of Minnows	5	5		# of Minnows	6	5	
# of Sensitive	0	1		# of Sensitive	0	1	
% Tolerant	76.27	1		% Tolerant	86.74	1	
% Omnivores	12.99	5		% Omnivores	2.21	5	
% Insectivores	25.42	1		% Insectivores	13.81	1	
% Pioneering	85.59	1		% Pioneering	79.01	1	
CPUE	354	1		CPUE	181	5	
% Simple Lithophil	11.86	1		% Simple Lithophil	14.36	1	
% DELT anomalies	0	5		% DELT anomalies	0	5	
Total		26		Total		32	

Average	29
----------------	----

Site #26**Cobus Creek CR 8****Drainage Area: 22****Year 2022**

1604			1627		
ICTHY #			ICTHY #		
Metric	calc	score	Metric	calc	score
Total # of Species	15	5	Total # of Species	14	5
# of Darters	0	1	# of Darters	0	1
# of Sunfish	5	5	# of Sunfish	5	5
# of Suckers	2	3	# of Suckers	1	1
# of Sensitive	3	3	# of Sensitive	2	1
% Tolerant	55.76	3	% Tolerant	51.58	3
% Omnivores	3.64	5	% Omnivores	3.62	5
% Insectivores	26.67	1	% Insectivores	38.01	3
% Carnivores	13.33	3	% Carnivores	10.86	3
CPUE	165	3	CPUE	221	5
% Simple Lithophil	15.76	3	% Simple Lithophil	13.12	1
% DELT anomalies	0	5	% DELT anomalies	0	5
Total		40	Total		38

Average	39
----------------	----

Site #27**Baugo CR 1 (S)****Drainage Area: 22****Year 2022**

1621			1654		
ICTHY #			ICTHY #		
Metric	calc	score	Metric	calc	score
Total # of Species	17	5	Total # of Species	17	5
# of Darters	1	1	# of Darters	1	1
# of Sunfish	3	5	# of Sunfish	3	5
# of Suckers	1	1	# of Suckers	1	1
# of Sensitive	3	3	# of Sensitive	3	3
% Tolerant	68.96	1	% Tolerant	54.3	3
% Omnivores	48.13	3	% Omnivores	31.45	5
% Insectivores	32.71	3	% Insectivores	48.12	3
% Carnivores	2.5	1	% Carnivores	0.81	1
CPUE	480	1	CPUE	372	3
% Simple Lithophil	39.17	3	% Simple Lithophil	30.38	3
% DELT anomalies	0	5	% DELT anomalies	0	5
Total		32	Total		38

Average	35
----------------	----

Site #28
 Baugo CR 3 (N)
 Drainage Area: 73
 Year 2022

ICHTY #	1625			ICHTY #	1657		
Metric	calc	score		Metric	calc	score	
Total # of Species	20	5		Total # of Species	22	5	
# of Darters	4	5		# of Darters	4	5	
# of Sunfish	3	3		# of Sunfish	2	3	
# of Suckers	1	1		# of Suckers	2	3	
# of Sensitive	7	5		# of Sensitive	9	5	
% Tolerant	34.76	3		% Tolerant	39.34	3	
% Omnivores	29.34	5		% Omnivores	32.33	5	
% Insectivores	52.53	3		% Insectivores	47.25	3	
% Carnivores	5.28	1		% Carnivores	5.33	1	
CPUE	1401	1		CPUE	1126	1	
% Simple Lithophil	37.33	3		% Simple Lithophil	45.74	5	
% DELT anomalies	0.14	3		% DELT anomalies	0.18	3	
Total		38		Total		42	

Average	40
----------------	----

Site #29
 Bowman Creek - Gertrude
 Drainage Area: 7
 Year 2022

ICHTY#	1605			ICHTY#	1630		
Metric	calc	score	MOD	Metric	calc	score	mod
Total # of Species	1	1	1	Total # of Species	2	1	1
# Darter/Madtom/Sculpins	0	1	1	# Darter/Madtom/Sculpins	0	1	1
% Headwater	0	1	1	% Headwater	0	1	1
# of Minnows	1	1	1	# of Minnows	1	1	1
# of Sensitive	0	1	1	# of Sensitive	0	1	1
% Tolerant	100	1	1	% Tolerant	50	3	3
% Omnivores	0	5	1 ¹	% Omnivores	0	5	1 ¹
% Insectivores	0	1	1	% Insectivores	50	3	3
% Pioneering	100	1	1	% Pioneering	50	3	1 ²
CPUE	4	1	1	CPUE	2	1	1
% Simple Lithophil	0	1	1	% Simple Lithophil	0	1	1
% DELT anomalies	0	5	1 ¹	% DELT anomalies	0	5	1 ¹
Total		20		Total		26	
SCORING MOD TOTAL			12	SCORING MOD TOTAL			16
				Average			23

1¹ scoring mod based on <50 individuals in sample

1² scoring mod based on <25 individuals in sample with drainage area <8 sq. miles

Site #30
Drainage Area: 12
Bowman Creek - Green Tech
Year 2022
ICHTY#
1601
ICHTY#
1629

Metric	calc	score	mod	Metric	calc	score	Mod
Total # of Species	2	1	1	Total # of Species	4	1	1
# Darter/Madtom/Sculpins	0	1	1	# Darter/Madtom/Sculpins	0	1	1
% Headwater	0	1	1	% Headwater	0	1	1
# of Minnows	0	1	1	# of Minnows	1	1	1
# of Sensitive	0	1	1	# of Sensitive	0	1	1
% Tolerant	30.8	5	1	% Tolerant	94.9	1	1
% Omnivores	0	5	1 ⁴	% Omnivores	0	5	1 ⁴
% Insectivores	100	5	1 ³	% Insectivores	7.22	1	1
% Pioneering	30.8	5	1 ²	% Pioneering	94.9	1	1
CPUE	13	1	1	CPUE	97	3	1
% Simple Lithophil	0	1	1	% Simple Lithophil	0	1	1
% DELT anomalies	0	5	1 ¹	% DELT anomalies	0	5	1 ¹
Total		32		Total		22	

SCORING MOD TOTAL
12
SCORING MOD TOTAL
12

Average	27
----------------	-----------

SCORING MOD AVG
12
¹ scoring mod based on <50 individuals in sample

¹ scoring mod based on <50 individuals in sample with drainage area >8 sq. miles

¹ scoring mod based on <50 individuals in sample dominated by insectivores

¹ scoring mod based on <50 individuals in sample dominated by generalists (Creek Chub)

Site #31
Drainage Area: 15
Bowman Creek - Ravina Park
Year 2022
ICHTY# 1600
ICHTY# 1628

Metric	calc	score	mod	Metric	calc	score	mod
Total # of Species	3	1	1	Total # of Species	2	1	1
# Darter/Madtom/Sculpins	0	1	1	# Darter/Madtom/Sculpins	0	1	1
% Headwater	0	1	1	% Headwater	0	1	1
# of Minnows	2	1	1	# of Minnows	1	1	1
# of Sensitive	0	1	1	# of Sensitive	0	1	1
% Tolerant	85.71	1	1	% Tolerant	50	3	3
% Omnivores	28.57	5	1	% Omnivores	0	5	1
% Insectivores	14.29	1	1	% Insectivores	50	3	3
% Pioneering	85.71	1	1	% Pioneering	50	3	1
CPUE	7	1	1	CPUE	2	1	1
% Simple Lithophil	0	1	1	% Simple Lithophil	0	1	1
% DELT anomalies	0	5	1	% DELT anomalies	0	5	1
Total		20		Total		26	

SCORING MOD TOTAL
12
SCORING MOD TOTAL
16

Average	23
----------------	-----------

SCORING MOD AVG
14
¹ scoring mod based on <50 individuals in sample

Site #32
Juday Creek SR 23
Drainage Area: 29
Year 2022

1619			1660		
ICHTY #			ICHTY #		
Metric	calc	score	Metric	calc	score
Total # of Species	9	3	Total # of Species	10	3
# of Darters	1	1	# of Darters	1	1
# of Sunfish	2	3	# of Sunfish	2	3
# of Suckers	1	1	# of Suckers	1	1
# of Sensitive	1	1	# of Sensitive	2	1
% Tolerant	60.37	3	% Tolerant	53.5	3
% Omnivores	7.78	5	% Omnivores	11.2	5
% Insectivores	40.37	3	% Insectivores	46.78	3
% Carnivores	1.48	1	% Carnivores	3.64	1
CPUE	270	5	CPUE	357	3
% Simple Lithophil	12.96	1	% Simple Lithophil	17.93	3
% DELT anomalies	0	5	% DELT anomalies	0	5
Total		32	Total		32

Average	32
----------------	----

Site #33
Juday Creek Ponader Park
Drainage Area: 30
Year 2022

1612			1648		
ICHTY #			ICHTY #		
Metric	calc	score	Metric	calc	score
Total # of Species	9	3	Total # of Species	10	3
# of Darters	1	1	# of Darters	1	1
# of Sunfish	2	3	# of Sunfish	2	3
# of Suckers	1	1	# of Suckers	1	1
# of Sensitive	1	1	# of Sensitive	2	1
% Tolerant	75.49	1	% Tolerant	82.99	1
% Omnivores	28.02	5	% Omnivores	34.03	3
% Insectivores	24.51	1	% Insectivores	17.31	1
% Carnivores	2.33	1	% Carnivores	2.69	1
CPUE	257	5	CPUE	335	3
% Simple Lithophil	28.4	3	% Simple Lithophil	38.51	3
% DELT anomalies	0	5	% DELT anomalies	0	5
Total		30	Total		26

Average	28
----------------	----

