

ELKHART-SOUTH BEND FISH COMMUNITY MONITORING



ANNUAL REPORT
2004

City of Elkhart 

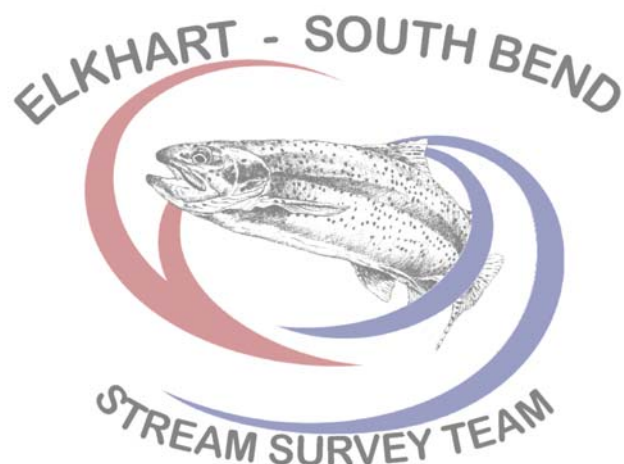
The city with a heart

David L. Miller, Mayor

Cover Photo: Dan explaining about the types of fish found in the St. Joseph River at Rhapsody in Green 2004

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FISH COMMUNITY MONITORING IN ELKHART AND ST. JOSEPH COUNTIES ON THE ST. JOSEPH RIVER AND SELECTED TRIBUTARIES,



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May, 2005

INTRODUCTION

The beautiful St. Joseph River flows through Elkhart and St. Joseph counties in northern Indiana as it winds its way across Indiana and Michigan on its 210 mile journey to Lake Michigan. On this journey from east to west, the St. Joseph River drains approximately 4,685 square miles of land through an intricate network of smaller tributary streams (SJRBC website). As this water flows towards Lake Michigan it courses through forests, wetlands, farm fields, and urban areas. All of these environments can have an effect on the quality of the water, and in turn, on the animals that reside within this water. The City of Elkhart is one of the urban areas this water flows through, and in 1998 the City decided it was time to take a more proactive role in monitoring and protecting this important natural resource. At that time a monitoring program focused on fish communities was initiated to supplement the existing chemical and microbial monitoring the City already had in place (Foy 2001).

The decision by the City to monitor a biological community in conjunction with the existing monitoring programs made a lot of sense for several reasons. First, ecologists and biologists have known for years

about the limitations of using only chemical monitoring to document the health of flowing waters and the biological communities that reside within them (Ohio EPA 1988). The City understood that the addition of biological monitoring was the next logical step in helping to protect and preserve our rivers and streams and the aquatic life within them. Second, in 1990 the state of Indiana began development of a sampling program aimed specifically at monitoring fish and macroinvertebrate (insect) communities in the rivers and streams of Indiana. This monitoring is done to provide biological community information on all waters of the state and their ability to support aquatic life (IDEM 1998). This type of statewide monitoring can also be seen as the first step in establishing regulations for municipalities and industries to conduct similar monitoring, so Elkhart felt it would be best to begin this type of monitoring voluntarily and work with the state on any regulatory developments in the future.

By the end of the summer of 2000, Elkhart had completed its first phase of monitoring at 17 sites on seven area streams (Foy 2001). The data gathered from this first phase was crucial to establishing a baseline of information on area streams. With this type of information in hand, Elkhart now had a better understanding of the health of these streams and also had information to compare to in future years.

In the fall of 2000, the City of South Bend expressed an interest in a cooperative fish community study on the St. Joseph River with the City of Elkhart. South Bend had observed how the initial fish community information was being put to use by Elkhart and determined that similar information from their area would be helpful. Elkhart quickly realized additional biological information from the St. Joseph River would prove useful on future projects dealing with the river's watershed. In the fall of 2000, Elkhart prepared and presented several possible monitoring programs to South Bend. South Bend then chose the monitoring program that best suited their needs. Since the spring of 2001, an interlocal agreement between Elkhart and South Bend has been in place. With this watershed approach, we have seen what the health of the fish communities are throughout the entire stretch of the St. Joseph River as it flows through Indiana.

The biological monitoring strategy developed by Elkhart has established core stations on the St. Joseph River and its major tributaries in Elkhart and St. Joseph counties. Results obtained from 1998-2003 at these stations have been used to create a baseline of information for all of the streams sampled. To date, this baseline of information has been used to reveal what impact Elkhart and South Bend's urban environments have on the receiving streams and will be used to

document any changes in the fish communities over time.

The Index of Biotic Integrity (IBI), as modified by Simon (1997) for use in the St. Joseph River basin, has been utilized to assess the fish community information. This index was developed by Karr (1981), and is most useful in translating complex fish community information into a more understandable format for non-biologists. In simplest terms, the IBI acts as a biological indicator much like the DOW Industrial Average acts as an economic indicator (Karr 1996) and it provides a method to track the trends in fish community condition over time. It is comprised of three broad categories (species composition, trophic composition, and fish condition) which are broken down into 12 smaller categories known as metrics (Appendix A) to assess fish communities. These metrics are each given a score based on their similarity to least impacted (reference) sites; 1 (not similar), 3 (somewhat similar), or 5 (very similar). The total score for a site will range from 12 to 60. These scores can then be graphed and placed into one of five 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. In 2003, Elkhart began 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 six broad categories which are broken down into 21 smaller categories or metrics (Appendix A). 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 will help determine to what extent the IBI scores are being affected by habitat and to begin cataloging the quality of available habitat in all the local rivers and streams.

In 2004, with assistance from the Midwest Biodiversity Institute (MBI, Columbus, Ohio), a pilot project involving macroinvertebrate (insect) community sampling was initiated to compliment the fish community and habitat data that was being collected. This sampling will be conducted at 20 of the fish index sites for the next three years and will include St. Joseph River and tributary sites in Elkhart and St. Joseph counties. This community assessment will be done using the Invertebrate Community Index (ICI) developed by Ohio EPA (Ohio EPA 1987). This index is broken down into 10 metrics (Appendix A). 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 graphed and classified the same as the IBI scores. This combination of fish, habitat, and macroinvertebrate monitoring will provide Elkhart and South Bend with the most comprehensive view of our stream resources' health.

In addition to monitoring the water quality in the St. Joseph River and some of its tributaries, sampling was also conducted to determine the overall diversity of the fish species in the Elkhart and South Bend areas. Elkhart's aquatics staff continued tagging smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*) and walleye (*Sander vitreus*) collected throughout the sampling year. Finally, tissue from eleven species of fish was again sampled and analyzed for mercury and PCB (polychlorinated biphenyl) content. This information was added to Elkhart and South Bend's existing tissue data from the St. Joseph and Elkhart Rivers. At present, several species are on the Indiana Fish Consumption Advisory (FCA)

(Table 1) for these streams and the cities want to contribute additional information to the state's fish tissue database so the most accurate and thorough advisory possible may be issued.

METHODS

To quickly identify the majority of fish species present and to determine water quality levels in the St. Joseph River and its tributaries, two sampling approaches have been consistently used over the last seven years. Investigative sites were sampled only once and all fish collected at these sites were identified to species, the largest and smallest of each species were measured to the nearest millimeter (mm), the fish were

Table 1: Fish consumption information taken from the 2004 Indiana Fish Consumption Advisory

Location	Species	Fish Size (inches)	Contaminant	Group
Elkhart River <i>Elkhart County</i>	Rock Bass	9+	☐	3
	Smallmouth Bass	17+	☐	3
	White Sucker	16+	☐	3
St. Joseph River <i>Elkhart County</i>	Carp	25-28	☐	3
		28+	☐	4
	Channel Catfish	29+	☐	3
	Golden Redhorse	17+	☐	3
	Northern Hogsucker	15+	☐	3
	Shorthead Redhorse	15-17	☐	3
		17+	☐	4
	Smallmouth Bass	11+	☐	3
Walleye	16+	☐	3	
St. Joseph River <i>St. Joseph County</i>	Black Redhorse	16-18	☐	3
		18+	☐	4
	Carp	20+	☐	5
	Channel Catfish	22+	○☐	4
	Golden Redhorse	13-22	☐	3
		22+	☐	4
	Largemouth Bass	14+	☐	3
	Quillback	18+	☐	3
	Rainbow Trout (also known as Steelhead)	25-31	☐	3
		31+	☐	4
	Rock Bass	8+	☐	3
	Shorthead Redhorse	15-19	☐	3
		19+	☐	4
	Smallmouth Bass	9+	☐	3
White Sucker	14-16	☐	3	
	16+	☐	4	
Juday Creek	White Sucker	17+	☐	3

○ = Mercury
☐ = PCBs

Group 2 = 1 meal/week

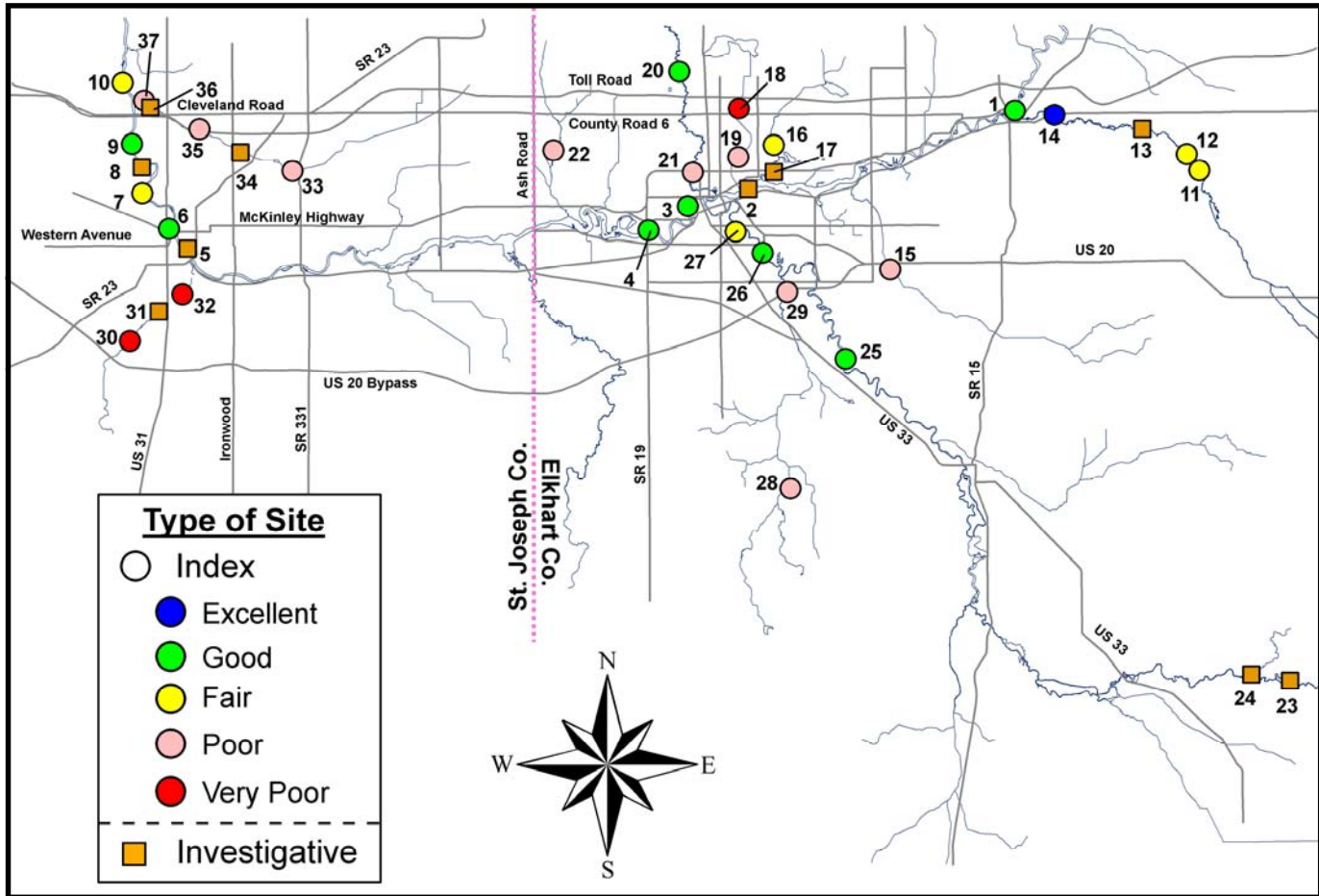
Group 4 = 1 meal/2 months

Group 3 = 1 meal/month

Group 5 = DO NOT EAT

counted, and then released. Index sites, on the other hand, were sampled twice during the summer with a five-week interval between samples, and the length of the sample area was dependent on the stream's width. The length of these sites was 15 times the stream's width with a minimum length of 50 meters and a maximum length of 500 meters. Differences in sampling and processing (Foy 2004) have allowed multiple investigative sites to be sampled in a day versus one to two index sites. Additionally, if a specimen of a species had not been previously retained from a site for the Public Works & Utilities specimen museum, then a single specimen of the smaller species was retained and larger

Figure 1: Fish sampling sites in Elkhart and St. Joseph Counties and associated fish community condition for 2004



specimens were photographed. This practice allows for the verification of the field and lab identifications if needed.

In 2004, 19 index and 5 investigative sites were sampled in Elkhart County and 8 index and 5 investigative sites were sampled in St. Joseph County (Figure 1 and Table 2). Index sites were sampled twice with at least a five week "rest" period between visits, and investigative sites were generally sampled only once. IBI scores were calculated for every index site visit, then the scores for the two visits at each site were averaged to calculate the annual score.

All sites were sampled utilizing either backpack, tote barge, or boat mounted electrofishing gear. The type of equipment used depended on the depth of the stream. For the smallest streams that would not accommodate the tote barge equipment, the battery powered backpack unit was used. If the stream was larger and wadeable for at least 80-90% of the area to be sampled, the tote barge equipment was used. All other areas were sampled utilizing the boat equipment. Power output of the three types of equipment varied.

The backpack output was 0.5-1.5 amperes, the tote barge was 4-6 amperes, and the boat was 8-16 amperes.

In 2003 and 2004, stream habitat information was systematically collected at all sites using the Qualitative Habitat Evaluation Index (QHEI) as developed by Ohio EPA (Rankin 1989). Multiple field personnel assessed the habitat at all fish sites every time the sites were sampled. These multiple assessments were then averaged for each site (Table 2).

In August of 2004, MBI personnel placed macroinvertebrate (insect) samplers at 20 of the fish index sites (Table 3 & Figure 2) following Ohio EPA macroinvertebrate sampling procedures (Ohio EPA 1987, 1989). All samplers were retrieved six weeks later and their contents were preserved in ethanol for later identification. Once the insects were identified, ICI scores were calculated for each site sampled (Table 2). Due to recent stream modifications in Yellow Creek, one sampler was placed upstream of its corresponding fish site. The County Road 45 site was substituted for the US 20 Bypass site. Michigan Street was also

Table 2: Fish sampling sites in Elkhart and St. Joseph Counties, 2004

Site Number	Site Description	Type of Site (Index/Investigative) County	Method	IBI Scores				2004 ICI Score	2004 QHEI Score
				2002	2003	2004	Average		
1	State Road 15 (Bristol) St. Joseph River	Index Elkhart	Boat			49		40	72
2	Mouth of Lily Creek St. Joseph River	Investigative Elkhart	Boat						57
3	Sherman Street St. Joseph River	Index Elkhart	Boat			49		44	81
4	Nappanee Street St. Joseph River	Index Elkhart	Boat			50			71
5	Jefferson Boulevard St. Joseph River	Investigative St. Joseph	Boat						66
6	LaSalle Street St. Joseph River	Index St. Joseph	Boat			47		44	78
7	Angela Boulevard St. Joseph River	Index St. Joseph	Boat			45			84
8	Sherman Avenue St. Joseph River	Investigative St. Joseph	Boat						82
9	Pinhook Park (B) St. Joseph River	Index St. Joseph	Boat			49			86
10	Brick Road St. Joseph River	Index St. Joseph	Boat			45		36	84
11*	County Road 10 Little Elkhart River	Index Elkhart	Tote Barge			40		36	83
12*	County Road 35 Little Elkhart River	Index Elkhart	Tote Barge	44	40	45	43		90
13*	Eby's Pines Campground Little Elkhart River	Investigative Elkhart	Tote Barge						75
14*	State Road 120 Little Elkhart River	Index Elkhart	Tote Barge	52	53	55	53		79
15*	US 20 Bypass Pine Creek	Index Elkhart	Tote Barge			26		44	74
16*	County Road 8 Puterbaugh Creek	Index Elkhart	Tote Barge			43		50	75
17*	Bristol Street Puterbaugh Creek	Investigative Elkhart	Tote Barge						72
18	Park Six Drive Lily Creek	Index Elkhart	Back Pack	15	16	15	15		41
19	Reckell Avenue Lily Creek	Index Elkhart	Tote Barge			31		28	56
20	County Road 4 Christiana Creek	Index Elkhart	Tote Barge			49		40	78
21	Willowdale Park Christiana Creek	Index Elkhart	Tote Barge			35		48	83
22*	County Road 8 Cobus Creek	Index Elkhart	Tote Barge			30		46	70
23	County Road 43 Elkhart River	Investigative Elkhart	Tote Barge						83
24	State Road 13 Elkhart River	Investigative Elkhart	Tote Barge						86
25	Oxbow Park Elkhart River	Index Elkhart	Boat			47		48	84
26	Indiana Avenue Elkhart River	Index Elkhart	Boat			50		52	86
27	Middlebury Street Elkhart River	Index Elkhart	Boat			44		50	86

* denotes a cool/cold water site

Table 2 (continued)

Site Number	Site Description	Type of Site (Index/Investigative) County	Method	IBI Scores				2004 ICI Score	2004 QHEI Score
				2002	2003	2004	Average		
28	County Road 32 Yellow Creek	Index Elkhart	Tote Barge	37	37	34		44	64
29	US 20 Bypass Yellow Creek	Index Elkhart	Tote Barge	38	31	37		38	70
30	Chippewa Avenue Phillips Ditch	Index St. Joseph	Back Pack			16		8	59
31	Main Street Bowman Creek	Investigative St. Joseph	Back Pack						44
32	Studebaker Golf Course Bowman Creek	Index St. Joseph	Back Pack			14			52
33*	Grape Road Juday Creek	Index St. Joseph	Tote Barge			28		36	52
34*	Ponader Park Juday Creek	Investigative St. Joseph	Tote Barge						62
35*	Kintz Avenue Juday Creek	Index St. Joseph	Tote Barge			27		36	59
36*	Brookwood Drive Juday Creek	Investigative St. Joseph	Tote Barge						66
37*	Izaak Walton League Juday Creek	Index St. Joseph	Tote Barge	26	27	29	27	32	79

* denotes a cool/cold water site

substituted for LaSalle Street on the St. Joseph River for logistical reasons relating to the placement of the sampler.

Tagging of smallmouth bass, walleye and largemouth bass continued following the same procedure as past years (Foy 2004). An orange anchor tag applied under the left anterior edge of the dorsal fin (Figure 3) contained Elkhart Public Works & Utilities' phone number and a unique tag number. It was hoped that angler curiosity would be sufficient motivation to call the phone number listed on the tag, and thus gain additional movement information.

Tissue in the form of fillets was collected from smallmouth bass, largemouth bass, rock bass (*Ambloplites rupestris*), walleye, channel catfish (*Ictalurus punctatus*), northern hog sucker (*Hypentelium nigricans*), golden redhorse (*Moxostoma erythrurum*), black redhorse (*M. dugesnei*), shorthead redhorse (*M. macrolepidotum*), quillback (*Carpionodes cyprinus*), and white sucker (*Catostomus commersoni*) from July through August. The tissue samples were collected from two sites on the Elkhart River and nine sites on the St. Joseph River (Table 4 & Figure 4). Each tissue sample sent in for analysis was a composite of tissue from three fish of the same species at the given site or area. The samples were collected following the procedures in Appendix B (this report) and Appendix III in "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory" (1993).

RESULTS & DISCUSSION

During the summer of 2004 a total of 15,790 fish were collected in Elkhart County and 6,482 fish were collected in St. Joseph County (Appendix C). In Elkhart County these fish represented 61 species in 14 families and in St. Joseph County, the fish collected represented 49 species from 11 families. In all, 65 species were collected from the two counties. Creek chub (*Semotilus atromaculatus*), smallmouth bass and blacknose dace (*Rhinichthys atratulus*) were the top three species collected in St. Joseph County, while creek chub, blacknose dace, and striped shiner (*Luxilus chrysocephalus*) were the top three species found in Elkhart County.

INDICES

The IBI, ICI and QHEI scores for 2004 are summarized in Table 2. Throughout this report these scores will be graphed to show the longitudinal changes on the various streams. The ICI and IBI graphs will contain a new feature this year, an attainment line. Fish and aquatic insect communities that score below this line are considered impaired. A variety of factors (low quality habitat, chemical contaminants, thermal effects, etc.) could be responsible for causing an impairment.

The condition of the fish communities at the index sites ranged from very poor (14) at Studebaker Golf Course on Bowman Creek to excellent (55) at State Road 120 on the Little Elkhart River. The macroinvertebrate community condition at the 20

Table 3: Macroinvertebrate sites, 2004

Site Number	Stream	Station	Site Number	Stream	Station
1	St. Joseph River	State Road 15	11	Elkhart River	Oxbow Park
2	St. Joseph River	Sherman Street	12	Elkhart River	Indiana Avenue
3	St. Joseph River	Michigan Street	13	Elkhart River	Middlebury Street
4	St. Joseph River	Brick Road	14	Yellow Creek	County Road 32
5	Little Elkhart River	County Road 10	15	Yellow Creek	County Road 45
6	Pine Creek	US 20 Bypass	16	Cobus Creek	County Road 8
7	Puterbaugh Creek	County Road 8	17	Phillips Ditch	Chippewa Avenue
8	Lily Creek	Reckell Avenue	18	Juday Creek	Grape Road
9	Christiana Creek	County Road 4	19	Juday Creek	Kintz Avenue
10	Christiana Creek	Willowdale Park	20	Juday Creek	Izaak Walton League

Figure 2: Location of macroinvertebrate sampling sites for 2004

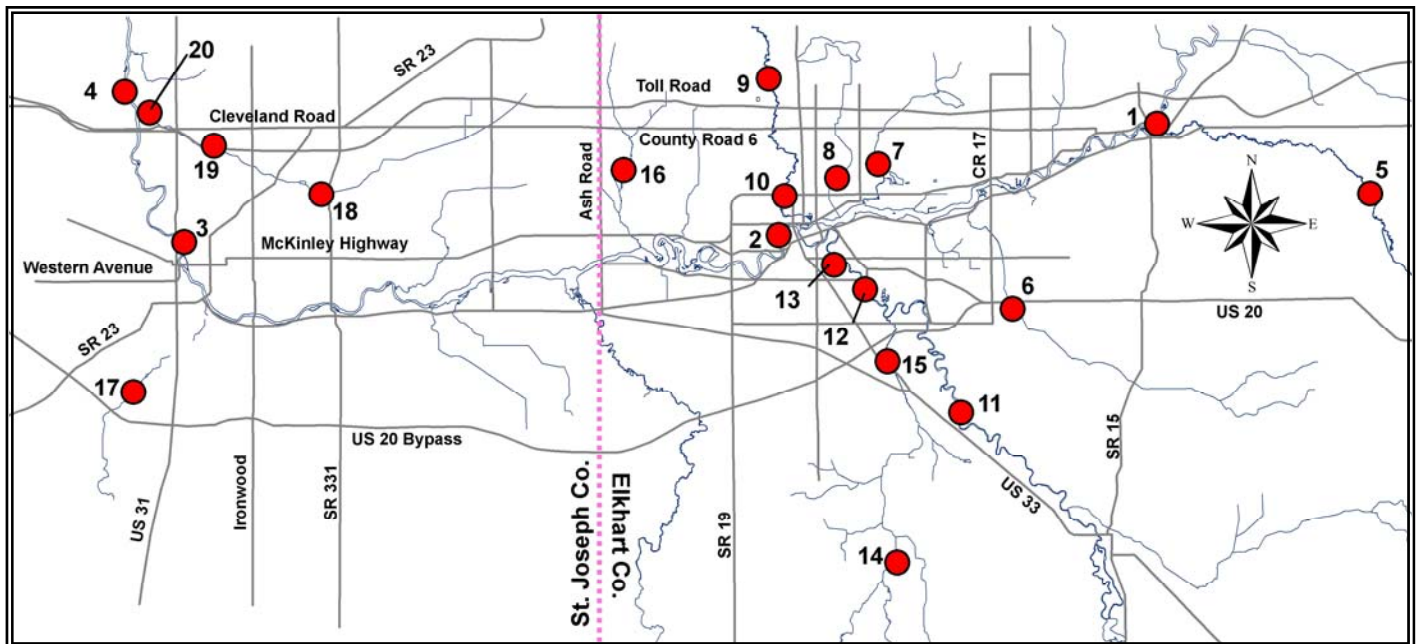


Figure 3: Location of tag on fish



Table 4: Fish tissue sites

Site Number	Stream	Station
1	St. Joseph River	Below Bristol
2	St. Joseph River	Sherman Street
3	St. Joseph River	Nappanee Street
4	St. Joseph River	Jefferson Boulevard
5	St. Joseph River	LaSalle Street
6	St. Joseph River	Angela Boulevard
7	St. Joseph River	Pinhook Park (B)
8	St. Joseph River	Darden Road
9	St. Joseph River	Brick Road
10	Elkhart River	Oxbow Park
11	Elkhart River	Indiana Avenue

pilot sites varied from poor (8) at Chippewa Avenue on Phillips Ditch to excellent (52) at Indiana Avenue on the Elkhart River. The habitat quality at the index and investigative sites ranged from poor (41) at Park Six Drive on Lily Creek to excellent (90) at County Road 35 on the Little Elkhart River.

The Indiana Department of Environmental Management (IDEM) has established guidelines to determine if a river or stream is being impaired or if

its condition is supportive of aquatic life (IDEM 2004) for the IBI and QHEI. The ICI is not an index used by IDEM, but similar guideline values have been established by Ohio EPA for a nearby region, and those values will be used with the Elkhart and South Bend data. The guidelines list IBI and ICI scores of 32 or greater as indicators of a healthy, unimpaired stream. QHEI values of 64 or greater indicate enough quality habitat is available to support aquatic communities.

The longitudinal trends in fish community condition for the entire St. Joseph River in Indiana can be seen in Figure 5. The Elkhart baseline was created with information collected from 1998 to 2003. The condition of the fish communities in the Elkhart area of the river continue to be good with only slight differences from the baseline. The greatest change occurred at the State Road 15 (Bristol) site, but even this was within the normal range of natural fluctuations (Foy 2001). The condition of the aquatic insect communities at the pilot sites on the St. Joseph River was also good (Figure 6) and closely followed the trend of the fish communities at those sites. Additional habitat information (Figure 7) continues to reflect poorer habitat in areas of low flow behind dams or in areas containing a lot of artificial shoreline. The lowest QHEI scores in the Elkhart area of the St. Joseph River occur immediately upstream of the hydroelectric dam or downstream of the city in the impoundment of the next dam. These lake-type environments have highly developed shorelines (sheet-driven or concrete seawalls) and little or no diversity in the type of habitat that is favored by stream-dwelling fish.

Figure 4: Location of fish tissue collection sites for 2004

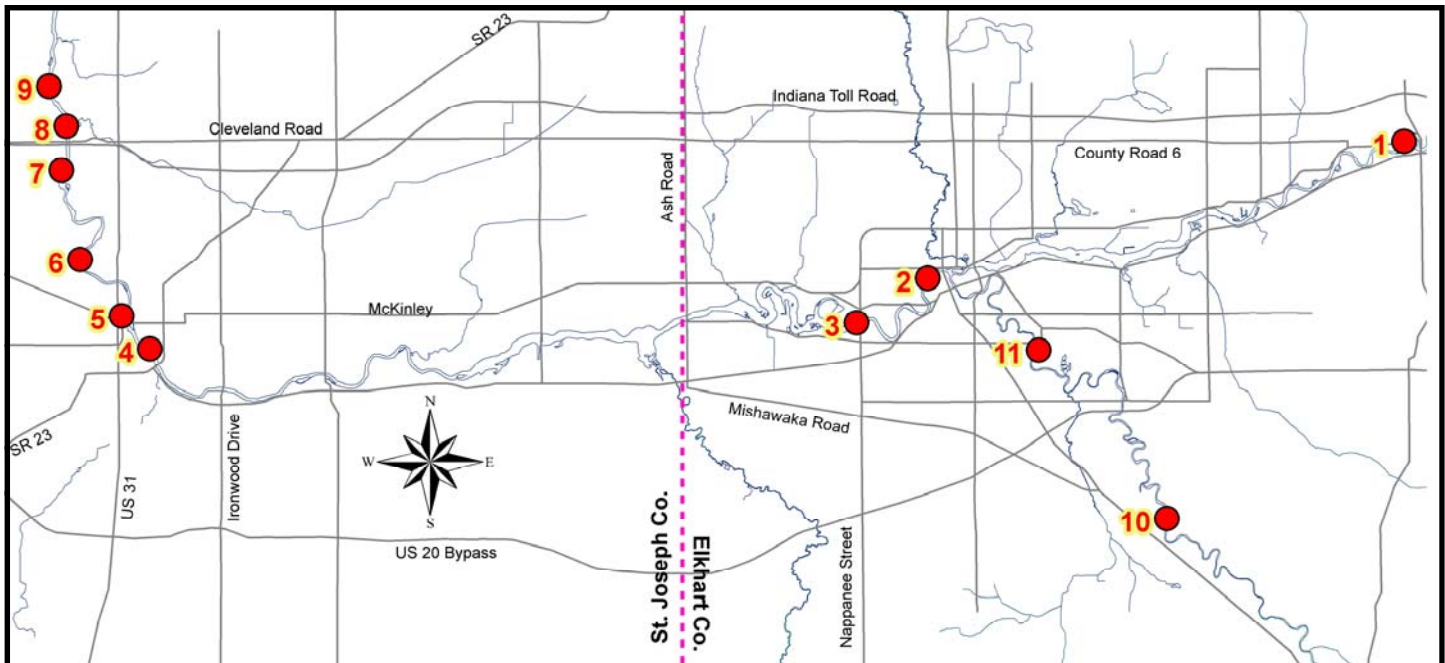
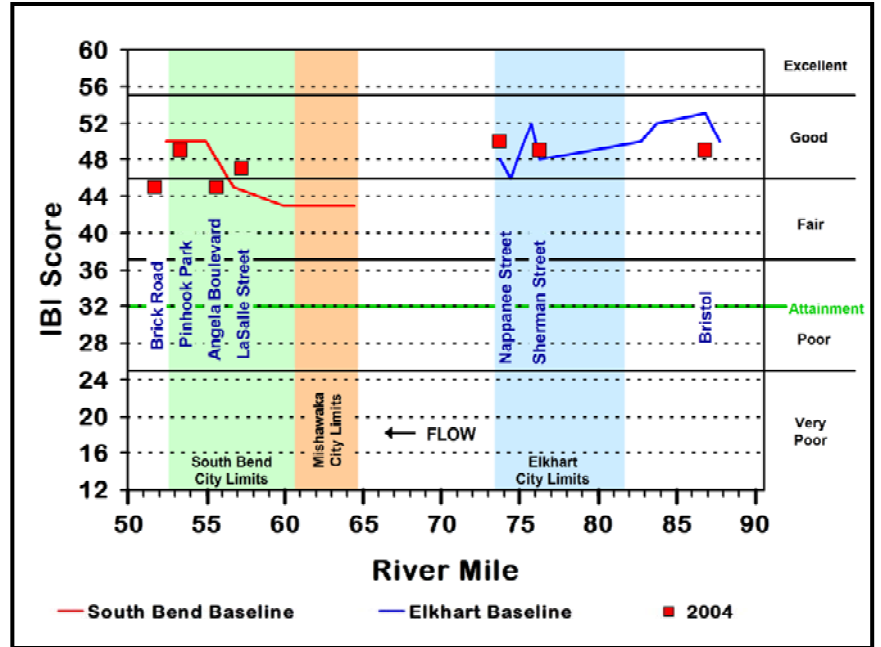


Figure 5: IBI scores for the St. Joseph River, Elkhart and St. Joseph Counties

The first stage of developing a long-term baseline for South Bend was completed in 2003 with information collected at index sites from 2001 to 2003. In 2004, the first year of sampling in a three year cycle was completed at four additional sites in the area (Figure 5). The information from these sites will help complete the South Bend IBI baseline on the St. Joseph River. The 2004 IBI scores here are similar to the existing baseline with a drop in fish community condition at Brick Road. No conclusions can be made about this decrease with only one year's worth of information. The aquatic insect community condition was also lower here (Figure 6) than in the city, so this site will be monitored closely over the next two years to determine if this is a pattern or just part of the natural variability at this site.



The IBI scores for the Elkhart River (Figure 7) are similar to the baseline, except for the Oxbow Park site. While there is a decrease here, and it is within the range of natural fluctuations, there is another possible cause. A major bridge construction project has been underway upstream of this site, and this activity could be affecting the fish and aquatic insect communities condition (Figure 8). This project should be completed by next summer, so we will watch for any changes in the condition of these communities then. QHEI scores for the sites sampled on the Elkhart River in 2004 all fell within the excellent classification (Figure 9). In general, this river has some of the best habitat in the Elkhart area.

Figure 6: ICI scores for the St. Joseph River, Elkhart and St. Joseph Counties

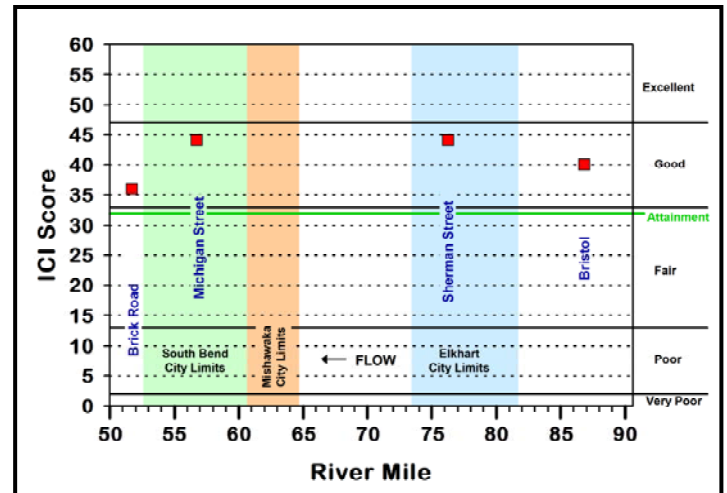
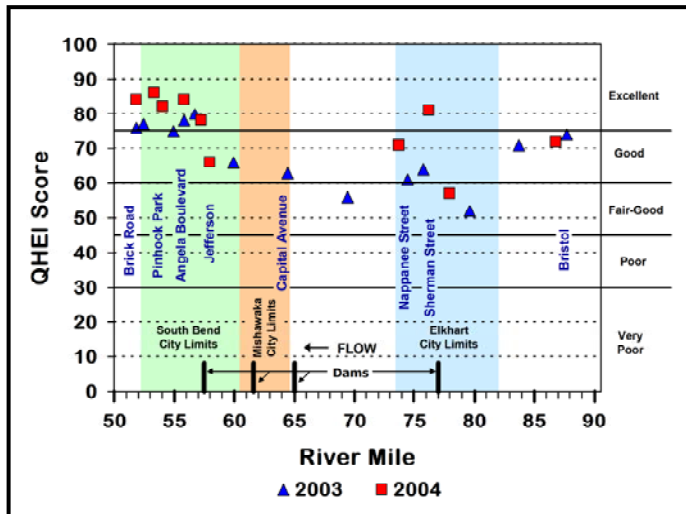


Figure 7: QHEI scores for the St. Joseph River, Elkhart and St. Joseph Counties



Multiple index sites have now been sampled on most of the area tributaries. Longitudinal views of IBI scores at these sites will compare the results from baseline stations (3 years of data) to the recently sampled sites.

Juday Creek and Bowman Creek (Phillips Ditch is an extension of this creek) in St. Joseph County are very different from one another. Juday Creek is a cool/cold water stream that supports trout, while Bowman Creek is much warmer and heavily impacted by the urban environment it flows through. Both drain agricultural and urban lands. The IBI scores on these creeks (Figure 10) continue to closely follow the same trend as the QHEI

scores (Figure 11). In Juday Creek, as the habitat quality increased in the area of the Izaak Walton League, so did the fish community condition (IBI). It was at this site, however, that the ICI scores dropped slightly from the other sites on this stream (Figure 12). The dominant substrate in this part of the stream is bedrock, which could explain the slight drop in ICI scores. A substrate like this does not provide much cover for aquatic insects. Juday Creek's water temperature also plays a big role in its fish community condition falling below its potential because the IBI modification used to assess these sites was developed for warm-water streams. Cool/cold water streams tend to have fewer fish and not as many species as warmwater streams and thus generally score lower when assessed with a warmwater IBI. Cool/cold water IBI's have been established for other areas, but are not appropriate for this region. For now, the currently used IBI modification will be used to document any drastic changes over time. Once an acceptable cool/cold water IBI is developed, the data collected from Juday Creek will be used to recalculate a more accurate IBI score.

Bowman Creek is smaller than Juday Creek and has been buried in concrete pipes or tunnels for much of its length within the city limits of South Bend. This serious habitat modification is reflected in the QHEI scores (Figure 11) and greatly limits the fish species found in areas like the Studabaker Golf Course where the stream is above ground. During the course of this monitoring we also discovered that areas of the stream periodically dry out (no flowing water). This, too, limits

Figure 9: QHEI scores for the Elkhart River, Elkhart County

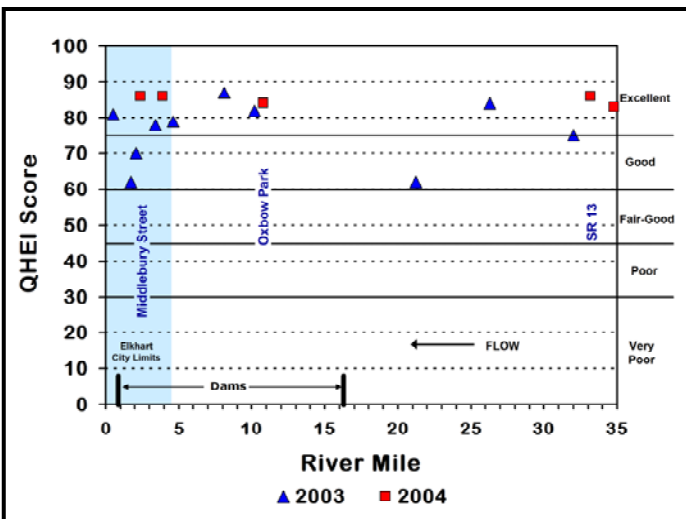


Figure 7: IBI scores for the Elkhart River, Elkhart County

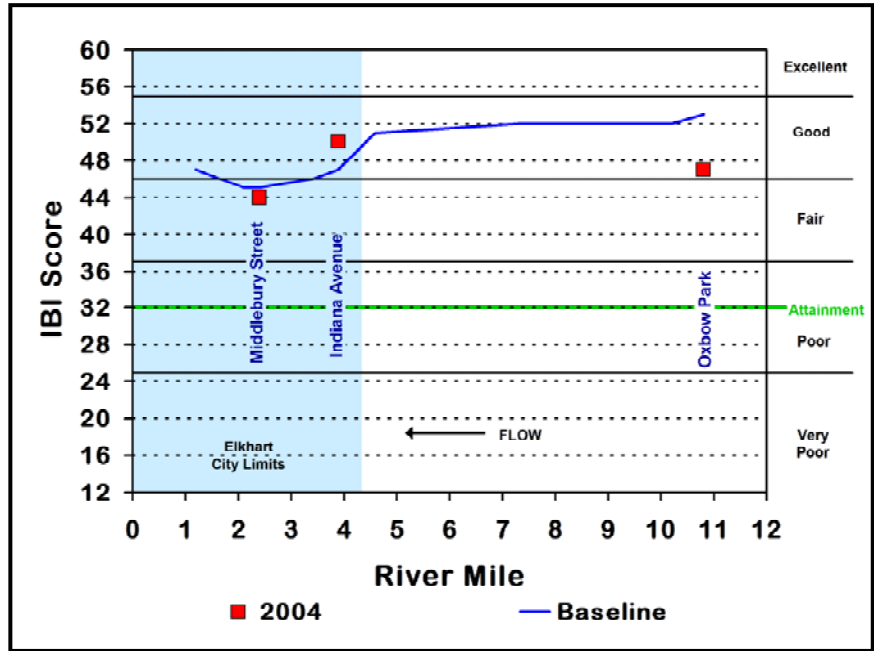
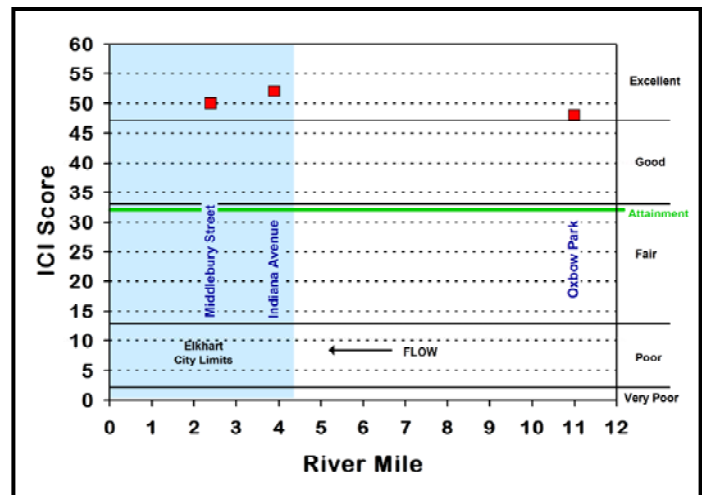


Figure 8: ICI scores for the Elkhart River, Elkhart County



the number and types of fish found in this stream regardless of the habitat quality. The Chippewa Avenue site, however, is upstream of the buried sections in a wooded area and also had a very low IBI score in 2001 (Foy 2004) and 2004. Historical and current disturbances may have eliminated many of the fish from this area of the stream and recolonization would be very limited to nonexistent from a downstream direction due to the urban modifications just described.

In Elkhart County, the fish community condition continues to be poor to very poor (Figure 13) at sites located on Lily Creek. The aquatic insect community also indicates this stream is undergoing some type of disturbance or impact (Figure

14). Lily Creek is a regulated drain and, as such, is periodically maintained (dredged) in an effort to decrease flooding impacts to neighboring landowners. This type of maintenance activity is a disturbance that does not allow for much instream cover for aquatic communities. This lack of cover, or habitat, is reflected in the QHEI scores (Figure 15). Streams of this type may never fully support biological communities, but that is to be expected due to the main function (agricultural drainage) of the stream. The Park Six Drive site on this stream is very uniform in depth (<12 inches) due to the recent dredging activities and is located in an area of the stream that periodically dries out (personal observation, 2002 and 2003). The Reckell Avenue site, on the other hand, is also modified, but is located in a groundwater recharge zone and still contains one moderately deep (about 2½ feet) pool that may provide temporary refuge for the local fish community when water levels are low. These factors appear to be the driving force behind the variation in IBI and QHEI scores between these two sites.

Yellow Creek is another regulated drain in Elkhart County. In the past, most of this stream, except for the area near the US 20 Bypass, had been regularly dredged and had little or no buffer zone (unmowed grass or uncut forest) along its banks. The US 20 Bypass site had been untouched and contained a lot of natural meanders (bends) and a wooded buffer zone. During the winter of 2002, however, this site was severely impacted by channel maintenance activities. The habitat destruction in the US 20 Bypass area was documented by drastically reduced QHEI scores for the site from

Figure 12: ICI scores for Bowman Creek and Juday Creek, St. Joseph County

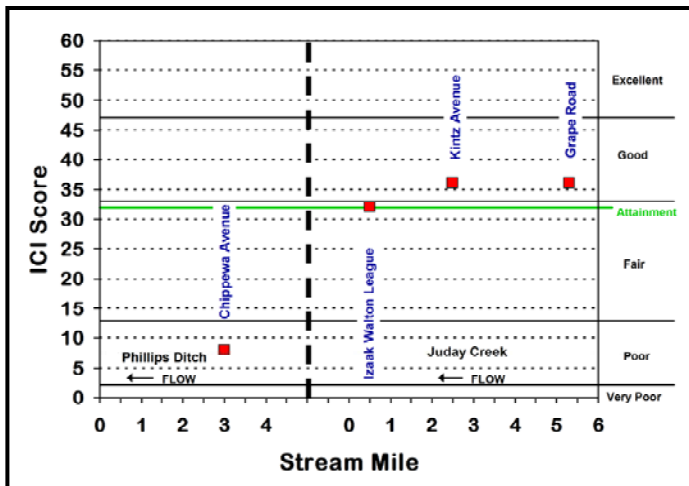


Figure 10: IBI scores for Bowman Creek and Juday Creek, St. Joseph County

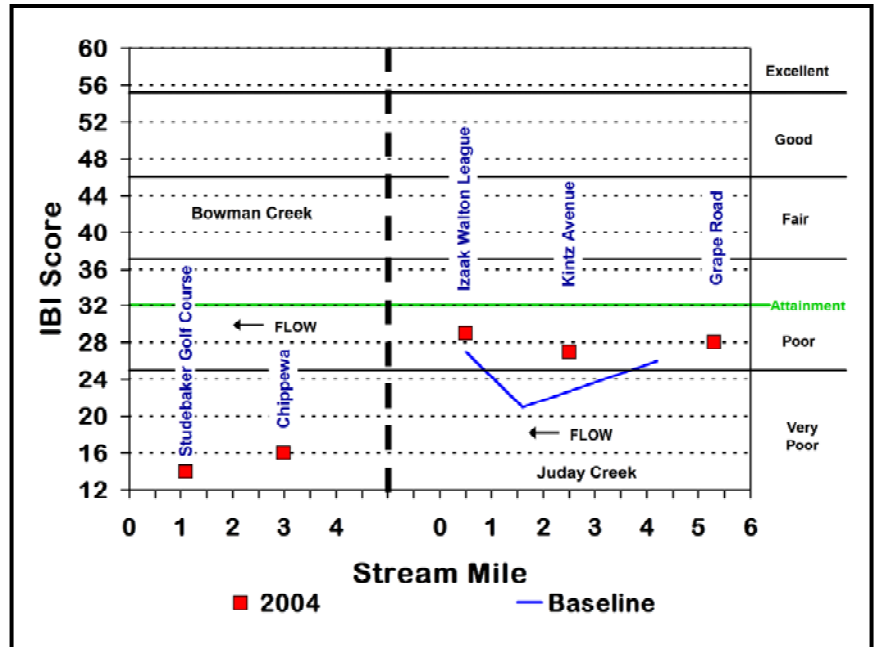
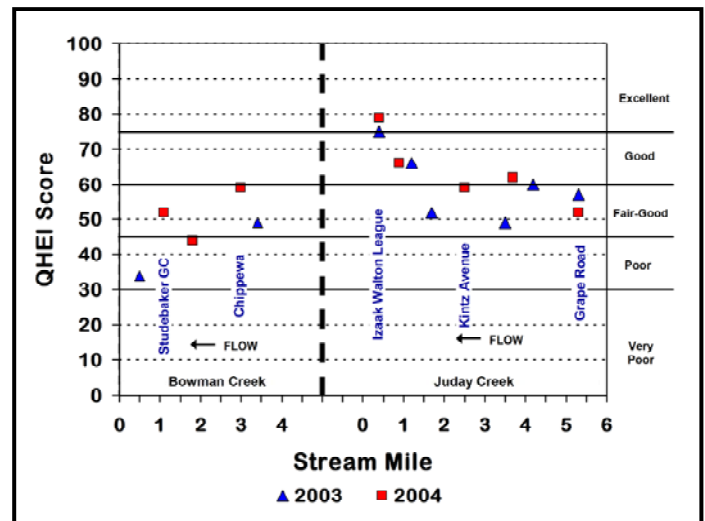


Figure 11: QHEI scores for Bowman Creek and Juday Creek, St. Joseph County



2002 to 2003 (Figure 15). This decrease in available habitat in turn lead to a decrease in the fish community condition (Table 2).

In August of 2004, a County project to restore some of the lost habitat in this section of Yellow Creek was completed. The fish community sampling and habitat evaluations occurred before the restoration project and are reflective of the creek's natural ability to recover from such an impact. While both the QHEI and IBI scores increased from 2003 (Figure 15 and Table 2), the fish community and habitat were not stable due to the dynamic fluctuations in this creek's flow. Ad-

Figure 13: IBI scores for Lily Creek and Yellow Creek, Elkhart County

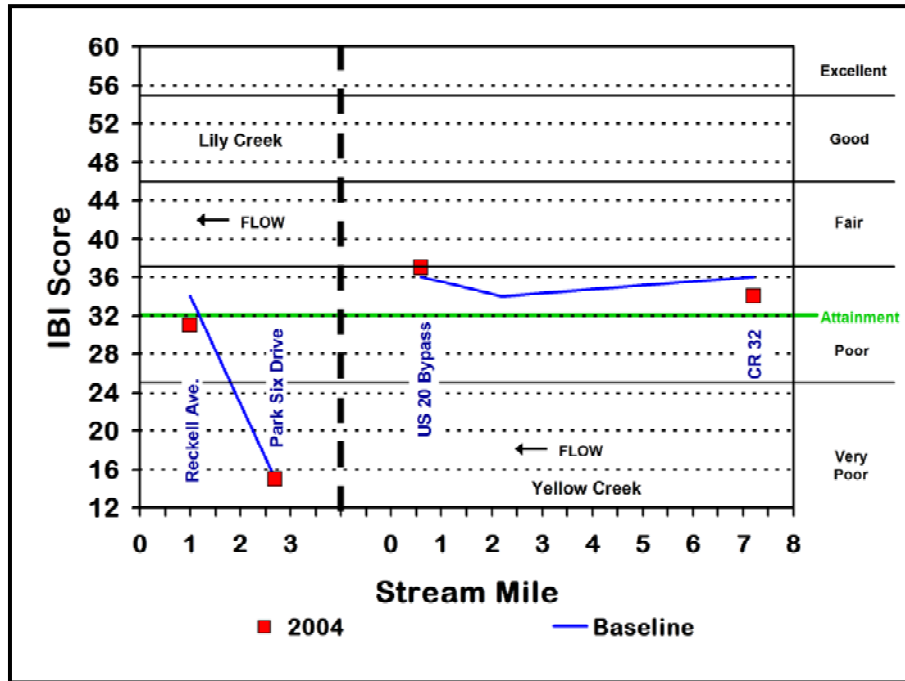
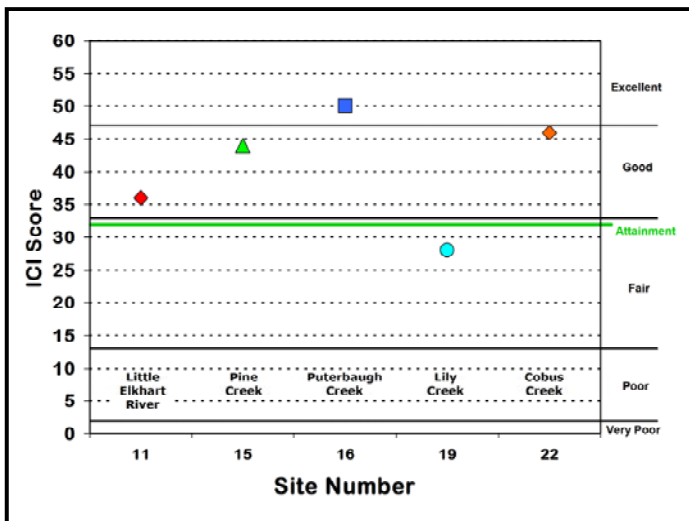


Figure 14: ICI scores for various streams in Elkhart County



ditional annual sampling would have been needed to determine if nature was truly healing itself of the impact that occurred in 2002. This additional sampling was not possible due to the timing of the restoration project. Sampling in 2005 should give some indications as to the impact of the restoration project, however, the data from 2005 alone should not be used to determine the success or failure of this project.

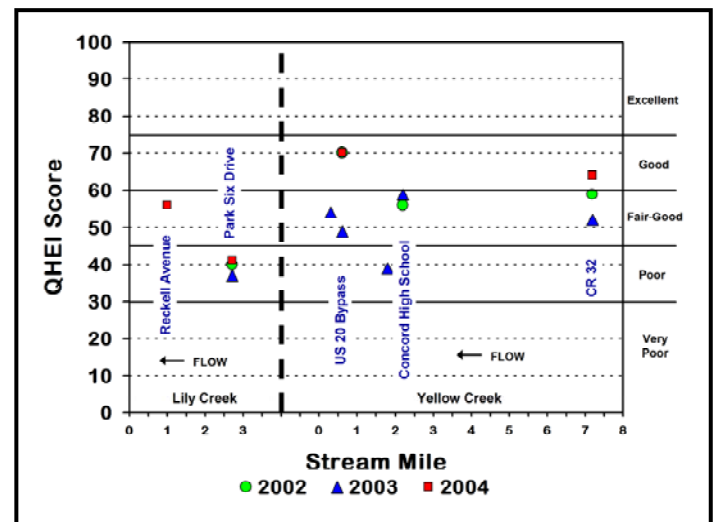
The fish community condition at two index sites in Christiana Creek did not drastically vary from the baseline (Figure 16). Habitat quality of sites in

this stream also continued to be excellent (Figure 17) which raised questions about the decreased IBI scores at the Willowdale Park site. While it is only one year of information, the aquatic insect community condition on Christiana Creek is just the opposite of the fish community (Figure 18). This would not occur if a chemical contaminant were involved. One possible cause for the drop in IBI scores at the Willowdale Park site could be the amount of human activity in the creek. Situated in the middle of a city park, this section of the creek is a favorite swimming and wading area. This much activity, may be enough to scare a lot of fish away even though the habitat is good. It is also important to note that low numbers of fish in the samples from this site greatly reduce the IBI score.

The Little Elkhart River, Cobus Creek, Puterbaugh Creek, and Pine Creek are cool/cold water streams like Juday Creek and, therefore, have the same limitation in scoring using the warmwater IBI that was developed for this area. As explained earlier, the current IBI scoring system will be used to document any drastic changes in these streams until an acceptable cool/cold water IBI is located or developed. At that time the data collected from these streams will be used to recalculate a more accurate score.

While the Little Elkhart River is a coldwater stream with scoring limitations, its IBI scores

Figure 15: QHEI scores for Lily Creek and Yellow Creek, Elkhart County



have remained in the fair to excellent range (Figure 16) and its aquatic insect community condition (ICI) was good (Figure 14). The increase in IBI scores from the upstream sites to the State Road 120 site does not appear to be affected by the available habitat (Figure 17), but could be due to the proximity of this site to the St. Joseph River. Some fish from larger rivers use the lower portion of small tributaries as a refuge for feeding or to just escape increased water temperatures during the summer. In areas like this, a mix of stream and river fish may artificially increase the IBI score due to an increase in the number and types of species present.

Puterbaugh Creek flows from a lake but maintains fairly cold water temperatures, especially in the lower, or downstream, seg-

Figure 16: IBI scores for Christiana Creek and the Little Elkhart River, Elkhart County

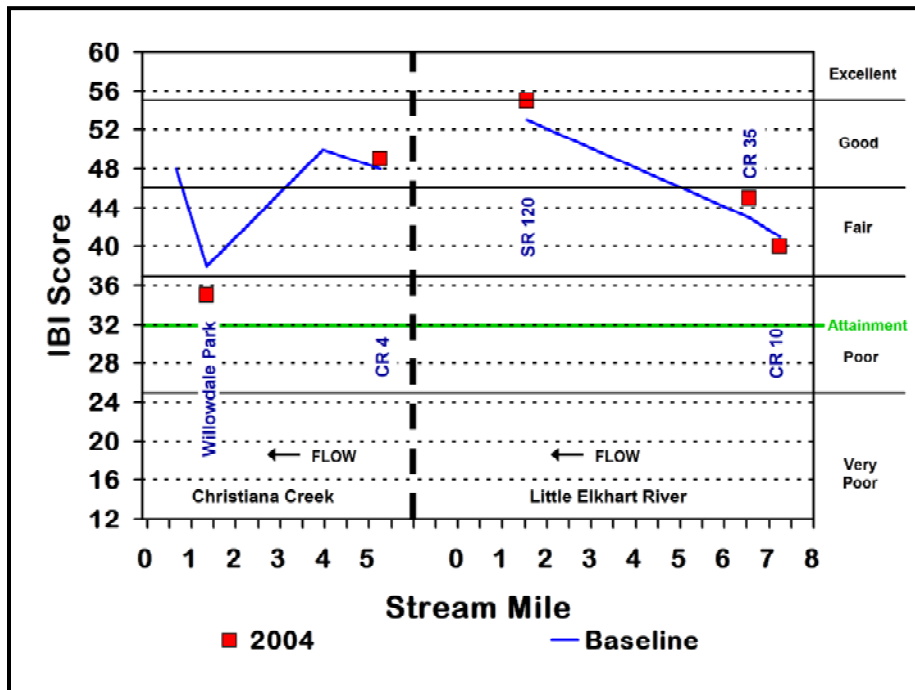
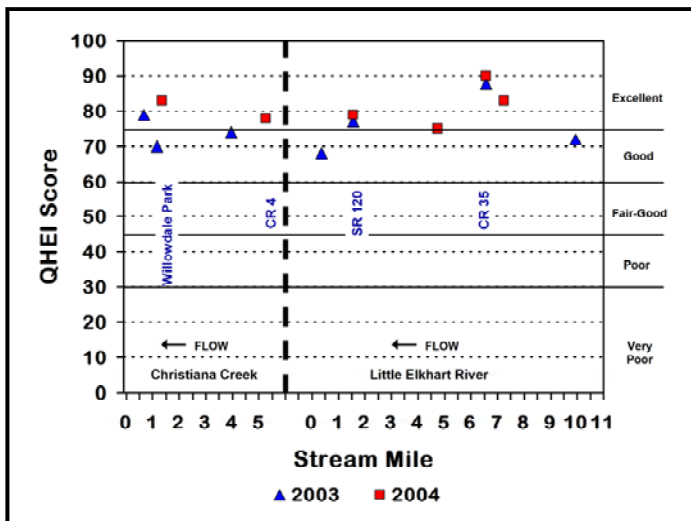


Figure 17: QHEI scores for Christiana Creek and the Little Elkhart River, Elkhart Co.



ments. Groundwater inflow through numerous seeps and springs, especially near the County Road 8 crossing, cause this shift in water temperatures. The small size of this stream and the changing water temperature limit the types of fish that will inhabit this stream. The good to excellent habitat (Figure 19) that is present at the downstream sites helps offset these limitations and allows the fish community condition in Puterbaugh Creek to be fair and basically stable from site to site (Figure 20). The aquatic insect community condition at the County Road 8 site (Figure 14) may be an indication that the fair IBI scores for this stream are underestimating the

stream's true overall quality.

The fish community condition decreased at the US 20 Bypass site on Pine Creek in 2004 (Figure 20). While the habitat for this site scored in the good category (Figure 19), the stream banks continue to erode at a faster than normal pace. This increasing influx of sediments may be part of the cause of the declining fish community condition here. The initial aquatic insect sample for Pine Creek revealed a community in good condition (Figure 14). The condition of the fish community in Cobus

Figure 18: ICI scores for Christiana Creek and Yellow Creek, Elkhart County

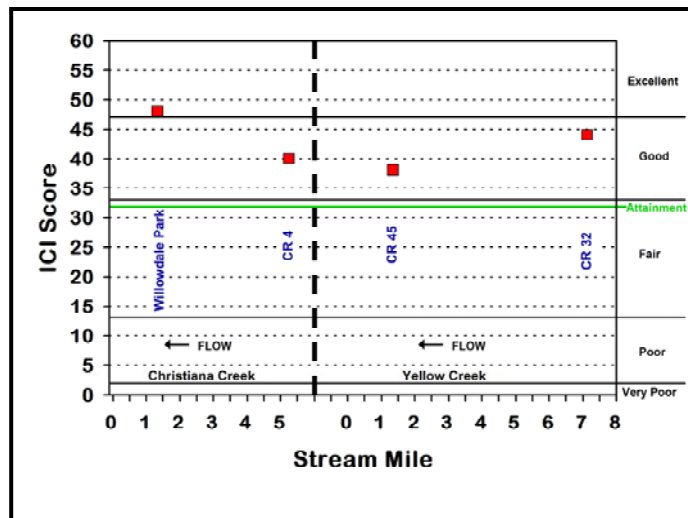
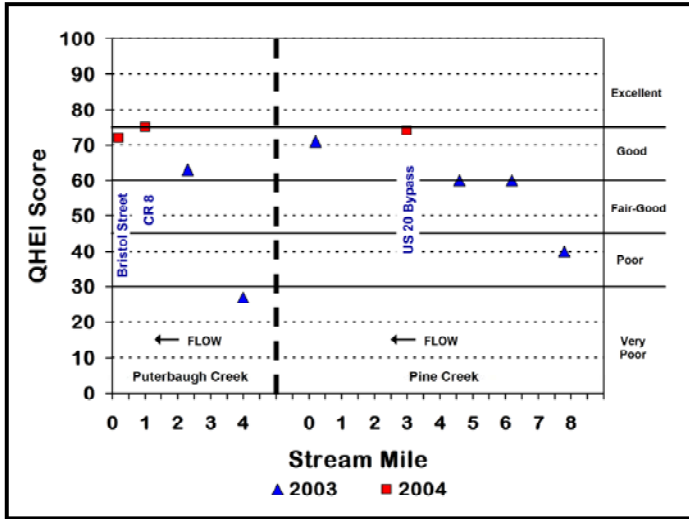


Figure 19: QHEI scores for Puterbaugh Creek and Pine Creek, Elkhart County



Creek remained fair and was unchanged from the baseline information collected from 1998 to 2000. Initial habitat and aquatic insect sampling revealed both were in the good category for their respective indices.

TAGGING & MOVEMENT

In 2004 a total of 510 fish were tagged (Table 5) and 58 recapture events were recorded. Since 1998, a total of 370 fish have been recaptured in 395 events. Thanks to the continued support by many anglers who reported catching tagged fish (Table 5), 12.8% of the tagged fish have supplied movement information. This rate of recapture is very acceptable and is up slightly from 2003 (Foy 2004). The number of fish that were recaptured in 2004 decreased from the previous year and the number of fish tagged during the year also decreased.

Beginning in 2002 and annually since then, Elkhart Public Works' aquatics staff have assisted the Indiana Department of Natural Resources (IDNR) with spring walleye sampling below the Johnson Street Dam and in the Island Park area of the St. Joseph River. This sampling allowed for age and growth information to be collected from a large number of adult walleye in a short period of time. Due to their annual spawning migration, many adult walleye congregate in this area and were easily captured. After collecting

scales from these fish, tags were also placed in the larger individuals. This has led to a dramatic increase in the number of walleye tagged annually.

Three of the 24 fish that moved in 2004 traveled downstream in the river or stream they were in and then upstream into another stream. The number of movements, however, do not equal the number of fish that moved. So, of the 58 recapture events, 24 revealed fish movements (14 downstream, 13 upstream) and the majority of these were walleye (Table 6).

Walleye movement was evenly split in the direction they moved and only one-third were recaptured where they were originally tagged. Five of the upstream moving walleye moved less than one mile. The rest of the upstream movements were four miles or more with the longest travel distance being 10.25 miles. One of these walleye moved from the Bristol area downstream over, or through, the Elkhart hydroelectric dam and then upstream in the Elkhart River. Another walleye was tagged near Pinhook Park in South Bend and recaptured near Mishawaka Avenue. It appears this fish effectively used the fish ladders to swim upstream around two dams. The upstream moving walleye averaged 3.3 miles, while the fish moving downstream averaged 9.4 miles. Unlike the upstream moving walleye, the majority of downstream moving fish moved more than 6 miles. This was mostly due to the fact that many of the tagged walleye were released below the Johnson Street dam and could not move any far-

Figure 20: IBI scores for Puterbaugh Creek and Pine Creek, Elkhart County

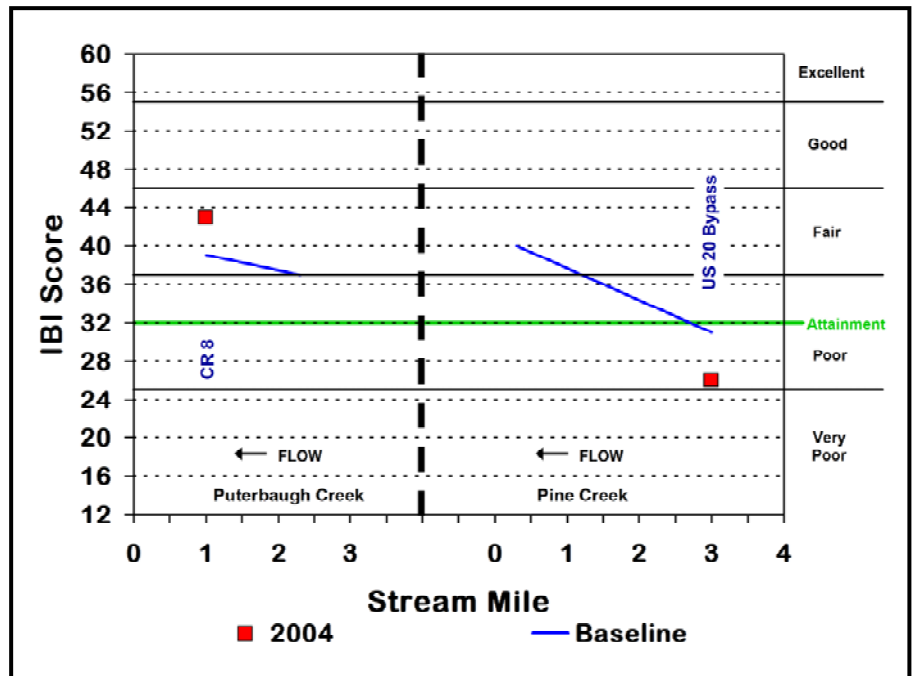


Table 5: Summary of tagged and recaptured fish

Species	Number Tagged		Recaptures (anglers)		Recaptures (PW&U)	
	Previous	2004	Previous	2004	Previous	2004
Smallmouth Bass	2,219	352	95	14	147	13
Walleye	512	144	70	26	12	4
Largemouth Bass	101	14	9	0	4	1

ther upstream, so they merely redistributed themselves downstream of the dam once their spawning activities were complete. One of the walleye, however, moved an unprecedented 45 miles downstream! This fish was tagged near Michigan Avenue in South Bend in July of 2003 and was recaptured by an angler near Interstate 94 outside of St. Joseph, Michigan in July of 2004.

As in the past, there was very little movement by the smallmouth bass and most were recaptured near their release point. These fish tend to remain in the areas where they are captured and released. The smallmouth bass that did move averaged 0.8 miles upstream and 3.7 miles downstream. One of these smallmouth bass moved 2.4 miles downstream in the Elkhart River to the St. Joseph River and then went 0.4 miles upstream to the Johnson Street dam where it was recaptured by an angler.

FISH TISSUE

The Indiana fish consumption advisory (FCA) was modified again in 2004. In this latest update all Group 2 fish were removed from the tables to allow for the booklet to be condensed. For the St. Joseph and Elkhart Rivers and Juday Creek this modification removed a few fish from the advisory and eliminated mercury as a contaminant from all previously listed species except channel catfish in St. Joseph County.

In 2004 golden redhorse tissue was collected again from the Elkhart River to expand the information on this species. Smallmouth bass and white sucker tissue was also collected as a monitoring check to see if any changes had occurred since 2000. The golden redhorse samples had group 2 and 3 PCB levels. This suggests an advisory for this species is warranted on the Elkhart River. The PCB and mercury level in the small-

mouth bass and white sucker tissue was similar to past samples.

On the St. Joseph River in Elkhart County, tissue sampling again focused on collecting larger walleye (16+ inches) from the Bristol area and getting additional tissue samples from black redhorse and largemouth bass. In addition, northern hog sucker were collected for the first time and golden redhorse and smallmouth bass tissue was collected as a monitoring check. Black redhorse were not successfully collected. The walleye sample contained group 2 mercury and PCB levels. These findings varied little from previous results (Appendix B). The largemouth bass and smallmouth bass samples also contained group 2 mercury levels, but only group 1 PCB levels. These results indicate all three of these species could be removed from the advisory in its current format of not listing Group 2 species. The golden redhorse samples had group 3 PCB levels which were higher than samples collected in 1998-2000, but consistent with the current advisory. The northern hog sucker tissue had group 1 and 2 mercury levels and group 2 and 3 PCB levels. Additional samples need to be collected and analyzed to better

Table 6: Summary of movement of recaptured fish

Direction Moved	Smallmouth Bass	Walleye	Largemouth Bass
No Movement	22	11	1
Upstream	3	10	0
Downstream	3	11	0

understand the contaminant levels in these fish.

In the South Bend area of the St. Joseph River tissue samples were collected for black redhorse, channel catfish, golden redhorse, quillback and shorthead

redhorse to expand the information on these species. Rock bass tissue was also collected for the first time to document the current contaminant levels. These tissue samples contained a variety of PCB levels (group 2-5) and lower (group 1 or 2) mercury levels (Appendix B). Attempts were again made to collect largemouth bass tissue, but were unsuccessful. Black redhorse, quillback and shorthead redhorse contained the highest PCB levels while channel catfish, golden redhorse, quillback and shorthead redhorse had the highest

mercury levels. These tissue results reveal several modifications are needed for the FCA in St. Joseph county (see Appendix B). Black redhorse and shorthead redhorse consistently have higher PCB levels than are indicated on the current FCA and should be considered for a more restrictive consumption group. Golden redhorse and quillback tissue results are usually in agreement with the advisory, but greatly vary and should also be considered for a change to a higher advisory group. Updating the FCA with these current results will greatly benefit the anglers who use this information. Channel catfish and rock bass tissue have also revealed higher PCB levels than listed in the advisory, but more information is needed for these species before considering any changes.

CONCLUSION

Long-term biological monitoring on the St. Joseph River in Elkhart and St. Joseph counties provides useful baseline information and current conditions of the biological communities for this watershed. Index of Biotic Integrity (IBI) scores on the St. Joseph River as it flows through Elkhart and South Bend continue to reveal fair to good fish community health. Initial Invertebrate Community Index (ICI) scores also reveal good aquatic insect community health. Habitat evaluations show variable habitat conditions in Elkhart County and increasing habitat quality in the South Bend area as the river flows through and past the urbanized areas.

The IBI scores on the Elkhart River follow the established baseline for this river, except for the Oxbow Park site. This may be our first glimpse of how a major disturbance, like bridge construction, can temporarily affect downstream aquatic communities. Excellent aquatic insect community condition and predominantly excellent habitat coupled with the fish community information reveal the overall good quality of this river.

Bowman Creek's fish community condition continues to be very poor, and the poor condition of the aquatic insect community confirms this stream is being seriously impacted. Poor to fair available habitat where the stream is above ground, coupled with the fact that this stream is piped underground and occasionally dries up are the main reasons biological communities do not do well here. Juday Creek's IBI scores, while artificially low due to its cooler water temperatures, continue to be lower than similar streams in the area (Puterbaugh Creek, Pine Creek and the Little Elkhart River). Fair to excellent habitat and ICI scores that show good aquatic insect community condition in Juday Creek indicate the limitations of the current IBI for use in cool/cold water streams.

While the pattern of IBI scores for Christiana Creek appear to show an impact occurring to the stream somewhere between County Road 6 and

Willowdale Park, the ICI and QHEI values show no impact. The lower IBI scores at Willowdale Park could simply be the result of increased swimming and wading activities throughout this site. These activities could be scaring the fish away, which leads to fewer fish in the sample and lower IBI scores.

The IBI, ICI and QHEI scores of Lily Creek are indicative of a stream that is categorized as a regulated drain and is dredged on a regular basis. Streams of this type may never have diverse fish or aquatic insect communities or high habitat quality due to how frequently they are disturbed. The fish community and habitat of Yellow Creek at the US 20 Bypass site appeared to be recovering from the channel maintenance activities that occurred in 2002. Fish community and habitat assessments revealed that both fish community condition and the quality of the available habitat had returned to pre-disturbance levels.

The increased IBI scores at the most downstream site on the Little Elkhart River may be due to the mix of warmwater river fish and cool/cold water stream fish that occurs in these confluence areas. This increase in IBI scores as a stream approaches a larger river has also been observed in Pine Creek in the past.

The US 20 Bypass site on Pine Creek has experienced a decrease in fish community condition as compared to the 1998-2000 baseline information. This decrease could possibly be due to the effects of heavy stream bank erosion in the area.

Puterbaugh Creek IBI scores at County Road 8 were slightly higher than the baseline. Habitat and aquatic insect community condition were excellent and could be an indication the IBI scores for this site are underestimated by the current warmwater IBI being used.

In 2004, 510 fish were tagged and 58 fish were recaptured. Walleye continued to exhibit a lot of movement while smallmouth bass pretty much stayed where they were. Three of the recaptured fish moved downstream and then upstream into another river or stream before being recaptured, and one walleye moved a record 45 miles downstream.

The Fish Consumption Advisory (FCA) for the entire state was modified in 2004 and excluded all Group 2 fish from the tables to allow for the booklet to be condensed. This removed several fish from the advisory for our area and eliminated mercury as a contaminant from all of the previously listed species except channel catfish in St. Joseph County. Golden redhorse samples from the Elkhart River had group 2 and 3 PCB levels for the third year. This suggests an advisory is war-

ranted for this species. PCB and mercury levels for other fish in the Elkhart River were similar to past samples. Tissue samples collected from walleye, largemouth bass, and smallmouth bass from the St. Joseph River in Elkhart County consistently contain group 2 or 1 levels of PCB and mercury indicating these species could be removed from the FCA in its current format. In the South Bend area of the St. Joseph River, black redhorse and shorthead redhorse tissue samples continue to have higher PCB levels than those listed in the FCA. Likewise, most of the golden redhorse and quillback tissue results are in agreement with the FCA, but a few of these samples have also contained higher PCB levels. The 2002-2004 results for these four species indicate a change to a higher advisory group should be considered. The fish tissue results for the St. Joseph River continue to show a pattern of increasing PCB levels as the river flows through Indiana.

The cities of South Bend and Elkhart have taken the first big step in helping to protect and preserve their natural aquatic resources. Through their joint effort to annually document the condition and integrity of the biological communities in the St. Joseph River watershed, they are demonstrating how local governments can work together for the betterment of a shared resource. That's what it is all about!

ACKNOWLEDGEMENTS

A special thanks is extended to the 2004 summer staff: Dan Rosauer, Steve Hooley, Ruchin Patel, and Lucas Wymore. It was a smaller group than the past couple of years, but they got the job done even with a shortened sampling season due to high water early in the summer.

Thanks are also extended to the Michiana Walleye Association for financial assistance with the purchase of the anchor tags used on the walleye and bass, and to the administration and support staff of Elkhart Public Works and Utilities for their continued assistance and support of this program and their true dedication to the environment.

Last, I would like to thank the cities of Elkhart and South Bend for their leadership in the area of aquatic resource protection. Through the establishment of an interlocal agreement between these two cities, information is now being collected to help preserve and protect a shared aquatic resource, the St. Joseph River.

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SUMMER 2004



Lucas with a big river redhorse



Summer Crew:
(L-R) Lucas, Ruchin, Joe, Steve, Dan



Steve with a 4.5 lb. walleye near Bristol



Ruchin, Steve, and Dan with six very nice bass found in one of the smaller streams!



Ruchin with a very large longnose gar in South Bend



Dan with a 13 pound St. Joseph River channel catfish



A blackside darter.



A net full of chestnut lampreys!

APPENDICES

Appendix A

Index of Biotic Integrity metrics

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

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

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
- scalars
- 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, except the channel catfish, had skin-on fillets taken. Before the tissue was removed, the fillet knives, scalars and skinners were cleaned and rinsed with DI water, and freezer wrap was placed where the fish were to be processed. The knives, scalars 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. For skin-off samples, the skin was scored around the edge of the fillet and then 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

Stream	Species ----- Year	Station	Length Range (inches, PW&U)	Advisory Length Range (State)	Mercury Group (PW&U)	Advisory Mercury Group (State)	PCB Group (PW&U)	Advisory PCB Group (State)
Elkhart River, Elkhart County								
Golden Redhorse								
2004		Oxbow Park	16.6-17.0	NONE	1	2	2	2
2002		Oxbow Park (Below)	15.2-15.8	NONE	1	1	2	1
2003		Oxbow Park (Below)	15.7-15.8	NONE	1	1	2	1
2002		EEC (Above)	15.2-16.1	NONE	1	1	2	1
2003		EEC (Above)	15.2-15.4	NONE	1	1	3	1
2004		Indiana Avenue	15.4-15.8	NONE	1	2	3	2
Smallmouth Bass								
2004		Oxbow Park	12.0-13.0	<17	1	2	2	2
2004		Indiana Avenue	12.5-13.2	<17	2	2	2	2
White Sucker								
2004		Oxbow Park	13.8-14.8	<16	1	2	2	2
2004		Indiana Avenue	14.1-15.1	<16	1	2	1	2
St. Joseph River, Elkhart County								
Golden Redhorse								
2004		Sherman Street	17.1-17.7	17+	2	2	3	3
2004		Nappanee Street	17.8-18.1	17+	2	2	3	3
Largemouth Bass								
2002		Nappanee Street	12.5-13.6	12+	2	3	1	1
2003		Toll Road (Bristol)	13.5-15.0	13-14	2	2	1	1
2004		Below Bristol	13.2-14.5	NONE	2	2	1	2
Northern Hogsucker								
2004		Below Bristol	13.9-14.6	<15	1	2	2	2
2004		Nappanee Street	13.9-15.4	<15	2	2	3	2
Smallmouth Bass								
2004		Sherman Street	12.4-13.8	11+	2	2	1	3
2004		Nappanee Street	11.7-12.1	11+	2	2	1	3
Walleye								
2000		Elkhart Area	17.4-18.7	17+	2	4	2	1
2002		Bristol Area	17.2-17.9	17+	2	4	1	1
2003		Bristol Area	16.1-16.4	16+	2	3	1	3
2003		Bristol Area	19.3-19.9	16+	2	3	1	3
2004		Below Bristol	19.8-20.4	16+	2	2	2	3

Fish Tissue Results

Stream	Species ----- Year	Station	Length Range (inches, PW&U)	Advisory Length Range (State)	Mercury Group (PW&U)	Advisory Mercury Group (State)	PCB Group (PW&U)	Advisory PCB Group (State)
St. Joseph River, St. Joseph County								
Black Redhorse								
	2001	Keller Park	15.9-16.6	14-17	1	2	1	3
	2003	Keller Park	17.2-18.1	16-18	1	1	4	3
	2003	Darden Road	16.1-16.6	16-18	1	1	4	3
	2004	LaSalle Street	17.1-17.4	16-18	1	2	5	3
	2004	Angela Boulevard	16.5-17.1	16-18	2	2	5	3
	2004	Pinhook Park (B)	17.0-17.5	16-18	1	2	5	3
Channel Catfish								
	2003	Darden Road	26.1-28.7	22+	2	2	4	4
	2004	Darden Road	25.5-26.7	22+	2	4	5	4
Golden Redhorse								
	2003	Ironwood Drive	17.8-18.2	13-22	1	1	3	3
	2004	LaSalle Street	17.8-18.4	13-22	2	2	5	3
	2002	Michigan Street	17.6-17.8	13-22	2	1	3	3
	2003	Michigan Street	15.9-17.3	13-22	2	1	4	3
	2002	Darden Road	17.0-17.9	13-22	2	1	3	3
	2003	Darden Road	16.7-17.0	13-22	2	1	3	3
	2004	Brick Road	16.7-17.5	13-22	2	2	3	3
Quillback								
	2002	Ironwood Drive	18.6-19.4	18+	2	1	4	3
	2003	Ironwood Drive	19.3-19.5	18+	2	1	3	3
	2004	Jefferson Boulevard	19.7-20.1	18+	2	2	3	3
	2004	LaSalle Street	18.7-19.1	18+	2	2	5	3
	2003	Michigan Street	18.5-20.3	18+	2	1	4	3
	2002	Keller Park	19.0-20.2	18+	1	1	3	3
	2003	Keller Park	19.7-20.5	18+	1	1	3	3
	2002	Darden Road	18.3-19.1	18+	2	1	3	3
	2003	Darden Road	18.8-19.6	18+	1	1	3	3
	2004	Darden Road	18.3-19.5	18+	2	2	4	3
Rock Bass								
	2004	LaSalle Street	7.5-8.0	<8	1	2	3	2
	2004	Brick Road	7.6-8.0	<8	1	2	2	2
Shorthead Redhorse								
	2002	Ironwood Drive	17.5-18.0	15-19	2	2	4	3
	2003	Ironwood Drive	17.9-19.3	15-19	1	2	4	3
	2004	LaSalle Street	16.7-17.4	15-19	2	2	5	3
	2002	Michigan Street	16.5-17.6	15-19	2	2	3	3
	2003	Michigan Street	17.6-18.4	15-19	2	2	5	3
	2002	Darden Road	17.6-18.2	15-19	2	2	3	3
	2003	Darden Road	17.9-18.1	15-19	2	2	4	3
	2004	Darden Road	17.1-17.5	15-19	2	2	5	3

Appendix C

Summary of fish collected by county, 2004

Summary of species captured at index sites in Elkhart County, 2004

Common Name	Total Number	% by Number	Total Weight (g)	Total Weight (lbs)	% by Weight
Creek Chub	1,488	10.51	26,390	58.13	1.99
Blacknose Dace	1,387	9.80	4,500	9.91	0.34
Striped Shiner	1,319	9.32	27,801	61.24	2.10
Mimic Shiner	1,188	8.39	1,571	3.46	0.12
White Sucker	1,111	7.85	97,422	214.59	7.36
Rock Bass	798	5.64	64,006	140.98	4.84
Smallmouth Bass	778	5.50	105,550	232.49	7.98
Common Shiner	714	5.04	11,459	25.24	0.87
Hornyhead Chub	595	4.20	15,582	34.32	1.18
Bluegill	519	3.67	16,282	35.86	1.23
Mottled Sculpin	496	3.50	3,048	6.71	0.23
Spotfin Shiner	385	2.72	2,018	4.44	0.15
Golden Redhorse	378	2.67	222,298	489.64	16.80
Northern Hog Sucker	323	2.28	75,101	165.42	5.68
Bluntnose Minnow	297	2.10	1,149	2.53	0.09
Loggerhead	211	1.49	1,497	3.30	0.11
Green Sunfish	209	1.48	2,590	5.70	0.20
Johnny Darter	197	1.39	377	0.83	0.03
Rosyface Shiner	190	1.34	436	0.96	0.03
Longear Sunfish	156	1.10	5,822	12.82	0.44
Shorthead Redhorse	152	1.07	107,920	237.71	8.16
Stoneroller	144	1.02	1,438	3.17	0.11
Chestnut Lamprey	116	0.82	1,318	2.90	0.10
Silverjaw Minnow	113	0.80	277	0.61	0.02
Rainbow Darter	93	0.66	122	0.27	0.01
Largemouth Bass	75	0.53	12,349	27.20	0.93
Sand Shiner	66	0.47	133	0.29	0.01
Brown Trout	60	0.42	6,409	14.12	0.48
Silver Redhorse	56	0.40	95,667	210.72	7.23
Fathead Minnow	47	0.33	83	0.18	0.01
Steelcolor Shiner	44	0.31	242	0.53	0.02
Common Carp	40	0.28	160,350	353.19	12.12
Yellow Bullhead	38	0.27	5,129	11.30	0.39
River Redhorse	36	0.25	90,600	199.56	6.85
Walleye	35	0.25	13,902	30.62	1.05
Central Mudminnow	32	0.23	207	0.46	0.02
Quillback	29	0.20	44,750	98.57	3.38
Hybrid Sunfish	28	0.20	1,513	3.33	0.11
Grass Pickerel	28	0.20	601	1.32	0.05
Longnose Gar	25	0.18	16,150	35.57	1.22
Channel Catfish	24	0.17	18,453	40.65	1.39
Blackside Darter	21	0.15	65	0.14	0.00
Warmouth	15	0.11	272	0.60	0.02
Bowfin	13	0.09	25,548	56.27	1.93
Greater Redhorse	11	0.08	21,950	48.35	1.66
Pumpkinseed	11	0.08	199	0.44	0.02
Spotted Sucker	10	0.07	2,814	6.20	0.21
Orangethroat Darter	10	0.07	11	0.02	0.00
Rainbow Trout	9	0.06	2,554	5.63	0.19
Black Crappie	9	0.06	922	2.03	0.07
American Brook Lamprey	7	0.05	39	0.09	0.00
Redear Sunfish	6	0.04	653	1.44	0.05
Golden Shiner	4	0.03	16	0.04	0.00
Black Redhorse	3	0.02	1,544	3.40	0.12
Northern Pike	2	0.01	4,000	8.81	0.30
Yellow Perch	2	0.01	56	0.12	0.00
Tadpole Madtom	1	0.01	6	0.01	0.00
Longnose Dace	1	0.01	4	0.01	0.00
Emerald Shiner	1	0.01	4	0.01	0.00
Sub-Total	14,156	100.00	1,323,169	2,914.47	100.00

Summary of species captured at investigative sites in Elkhart County, 2004

Common Name	Total Number	% by Number
Hornyhead Chub	262	16.03
Bluegill	241	14.75
Common Shiner	105	6.43
Smallmouth Bass	91	5.57
Golden Redhorse	86	5.26
Mottled Sculpin	84	5.14
Creek Chub	67	4.10
Striped Shiner	65	3.98
Rosyface Shiner	60	3.67
Rock Bass	53	3.24
Northern Hog Sucker	46	2.82
Bluntnose Minnow	41	2.51
Green Sunfish	41	2.51
White Sucker	35	2.14
Longear Sunfish	35	2.14
Rainbow Darter	33	2.02
Johnny Darter	27	1.65
Pumpkinseed	24	1.47
Sand Shiner	24	1.47
Orangethroat Darter	22	1.35
Warmouth	20	1.22
Blackside Darter	17	1.04
Spotfin Shiner	17	1.04
Loggerperch	12	0.73
Largemouth Bass	12	0.73
Yellow Perch	11	0.67
Pirate Perch	10	0.61
Chestnut Lamprey	10	0.61
Silver Redhorse	10	0.61
Central Mudminnow	10	0.61
Stoneroller	8	0.49
Mimic Shiner	7	0.43
Grass Pickerel	7	0.43
Common Carp	6	0.37
Hybrid Sunfish	6	0.37
American Brook Lamprey	6	0.37
Northern Pike	4	0.24
Spotted Sucker	4	0.24
Brown Trout	3	0.18
Redear Sunfish	2	0.12
Shorthead Redhorse	2	0.12
Yellow Bullhead	2	0.12
Fathead Minnow	1	0.06
Brown Bullhead	1	0.06
Black Crappie	1	0.06
Channel Catfish	1	0.06
Blackstripe Topminnow	1	0.06
Walleye	1	0.06
Sub-total	1,634	100.00

Index Sites	14,156
Investigative Sites	<u>1,634</u>
Elkhart County Total	15,790

Summary of species captured at index sites in St. Joseph County, 2004

Common Name	Total Number	% by Number	Total Weight (g)	Total Weight (lbs)	% by Weight
Creek Chub	1,218	26.42	13,760	30.31	1.36
Smallmouth Bass	545	11.82	84,994	187.21	8.40
Golden Redhorse	394	8.55	278,442	613.31	27.51
Blacknose Dace	324	7.03	1,230	2.71	0.12
Longear Sunfish	260	5.64	9,813	21.61	0.97
Rock Bass	229	4.97	20,733	45.67	2.05
Mottled Sculpin	204	4.43	1,414	3.11	0.14
Shorthead Redhorse	200	4.34	138,395	304.83	13.68
White Sucker	192	4.16	12,931	28.48	1.28
Bluegill	191	4.14	4,383	9.65	0.43
Spotfin Shiner	160	3.47	724	1.59	0.07
Mimic Shiner	140	3.04	250	0.55	0.02
Black Redhorse	81	1.76	58,835	129.59	5.81
Walleye	66	1.43	31,333	69.02	3.10
Northern Hog Sucker	62	1.34	17,011	37.47	1.68
Johnny Darter	51	1.11	107	0.24	0.01
Common Carp	43	0.93	215,261	474.14	21.27
Logperch	33	0.72	394	0.87	0.04
Green Sunfish	31	0.67	529	1.17	0.05
Quillback	29	0.63	39,091	86.10	3.86
Bluntnose Minnow	18	0.39	60	0.13	0.01
Brown Trout	16	0.35	706	1.56	0.07
Rainbow Trout	15	0.33	9,559	21.06	0.94
Largemouth Bass	14	0.30	1,762	3.88	0.17
Silver Redhorse	13	0.28	25,000	55.07	2.47
Longnose Gar	9	0.20	4,950	10.90	0.49
Yellow Bullhead	9	0.20	2,144	4.72	0.21
Steelcolor Shiner	9	0.20	50	0.11	0.00
Chestnut Lamprey	8	0.17	124	0.27	0.01
Spotted Sucker	5	0.11	3,150	6.94	0.31
Hybrid Sunfish	5	0.11	357	0.79	0.04
Pumpkinseed	5	0.11	187	0.41	0.02
Rainbow Darter	5	0.11	11	0.02	0.00
River Redhorse	4	0.09	15,550	34.25	1.54
Blackside Darter	4	0.09	16	0.04	0.00
Greater Redhorse	3	0.07	7,450	16.41	0.74
Warmouth	3	0.07	51	0.11	0.01
Channel Catfish	2	0.04	3,451	7.60	0.34
Sand Shiner	2	0.04	2	0.00	0.00
Muskellunge	1	0.02	6,800	14.98	0.67
Brown Bullhead	1	0.02	308	0.68	0.03
Black Crappie	1	0.02	204	0.45	0.02
Black Bullhead	1	0.02	174	0.38	0.02
Northern Pike	1	0.02	157	0.35	0.02
Redear Sunfish	1	0.02	80	0.18	0.01
Stonecat	1	0.02	55	0.12	0.01
Grass Pickerel	1	0.02	27	0.06	0.00
Sub-Total	4,610	100.00	1,012,015	2,229.11	100.00

Summary of species captured at investigative sites in St. Joseph County, 2004

Common Name	Total Number	% by Number
Creek Chub	695	37.13
Blacknose Dace	280	14.96
White Sucker	245	13.09
Smallmouth Bass	118	6.30
Longear Sunfish	107	5.72
Rock Bass	77	4.11
Golden Redhorse	73	3.90
Shorthead Redhorse	42	2.24
Bluegill	34	1.82
Mottled Sculpin	25	1.34
Spotfin Shiner	21	1.12
Black Redhorse	18	0.96
Northern Hog Sucker	16	0.85
Rainbow Trout	16	0.85
Johnny Darter	15	0.80
Common Carp	13	0.69
Quillback	11	0.59
Pumpkinseed	10	0.53
Largemouth Bass	10	0.53
Yellow Bullhead	10	0.53
Rainbow Darter	6	0.32
Brown Bullhead	4	0.21
Walleye	4	0.21
Spotted Sucker	3	0.16
Green Sunfish	3	0.16
Bluntnose Minnow	2	0.11
Logperch	2	0.11
Hybrid Sunfish	2	0.11
Orangethroat Darter	2	0.11
Blackside Darter	1	0.05
Warmouth	1	0.05
Chestnut Lamprey	1	0.05
Golden Shiner	1	0.05
River Redhorse	1	0.05
Silver Redhorse	1	0.05
Brook Silverside	1	0.05
Stonecat	1	0.05
Sub-total	1,872	100.00

Index Sites	4,610
Investigative Sites	1,872
St. Joseph County Total	6,482

Appendix D

Summary of fish collected by site, 2004

Stream	St. Joseph River, Elkhart County						
	1		2	3		4	
	1st Pass	2nd Pass		1st Pass	2nd Pass	1st Pass	2nd Pass
Black Crappie	X		X	X		X	
▲Black Redhorse				X	X		
Blackside Darter	X			X	X	X	X
Bluegill	X	X	X	X	X	X	X
●Bluntnose Minnow	X	X		X			X
Bowfin	X	X					
Brown Bullhead			X				
●Channel Catfish	X		X		X	X	
Chestnut Lamprey	X	X	X	X	X	X	
●Common Carp	X	X	X	X	X	X	X
Common Shiner				X			
Emerald Shiner						X	
Golden Redhorse	X	X	X	X	X	X	X
Grass Pickerel				X			
●Green Sunfish				X			
▲Hornyhead Chub	X			X			
Hybrid Sunfish			X	X			X
Largemouth Bass	X	X	X			X	X
Logperch	X	X	X	X	X	X	X
Longear Sunfish	X	X	X	X	X	X	X
●Longnose Gar	X	X		X	X	X	
▲Mimic Shiner	X	X	X	X	X	X	X
Northern Hog Sucker	X	X		X	X	X	X
Northern Pike	X		X				X
Pumpkinseed			X		X	X	X
●Quillback				X		X	X
Rainbow Trout						X	
Redear Sunfish			X				X
▲River Redhorse	X			X	X	X	X
Rock Bass	X	X	X	X	X	X	X
▲Rosyface Shiner	X			X		X	
Sand Shiner		X	X	X			
Shorthead Redhorse	X	X	X	X	X		X
Silver Redhorse	X	X	X	X	X	X	X
Smallmouth Bass	X	X	X	X	X	X	X
Spotfin Shiner	X	X		X		X	X
Spotted Sucker			X				
Steelcolor Shiner		X		X		X	X
Striped Shiner			X	X		X	X
Walleye	X	X	X	X	X	X	X
Warmouth						X	
●White Sucker	X	X	X	X	X	X	X
Yellow Bullhead	X	X	X		X		X
Yellow Perch		X	X				X

▲ - denotes a species that is INTOLERANT of 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									
	5	6		7		8	9		10	
		1st Pass	2nd Pass	1st Pass	2nd Pass		1st Pass	2nd Pass	1st Pass	2nd Pass
Black Crappie				X						
▲Black Redhorse		X	X	X	X	X	X	X	X	X
Blackside Darter		X		X		X			X	
Bluegill	X	X	X	X	X	X	X	X	X	X
●Bluntnose Minnow	X	X	X	X		X	X	X		
Brook Silverside						X				
Brown Bullhead	X		X							
●Channel Catfish								X		X
Chestnut Lamprey		X		X		X		X	X	X
●Common Carp	X	X	X	X	X	X	X	X	X	X
Golden Redhorse	X	X	X	X	X	X	X	X	X	X
Golden Shiner	X									
▲Greater Redhorse		X	X							
●Green Sunfish		X	X		X	X	X	X	X	X
Hybrid Sunfish			X		X	X				
Johnny Darter						X				
Largemouth Bass	X					X	X		X	X
Logperch	X	X	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	X
Muskellunge							X			
Northern Hog Sucker		X	X	X	X	X	X	X	X	X
Northern Pike										X
Pumpkinseed	X	X				X		X		
●Quillback	X	X	X	X	X	X	X		X	
Rainbow Trout		X	X	X						
Redear Sunfish								X		
▲River Redhorse	X	X			X		X	X		
Rock Bass	X	X	X	X	X	X	X	X	X	X
Sand Shiner									X	
Shorthead Redhorse	X	X	X	X	X	X	X	X	X	X
Silver Redhorse	X	X	X	X	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
Spotted Sucker	X								X	X
Steelcolor Shiner							X		X	
▲Stonecat		X				X				
Walleye	X	X	X	X	X	X	X	X	X	X
Warmouth			X			X	X		X	
●White Sucker	X	X	X	X		X	X	X	X	X
Yellow Bullhead	X				X		X	X	X	X

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Stream	Little Elkhart River							Pine Creek	
	11		12		13	14		15	
	1st Pass	2nd Pass	1st Pass	2nd Pass		1st Pass	2nd Pass	1st Pass	2nd Pass
▲ American Brook Lamprey				X					
● Blacknose Dace	X	X	X	X				X	X
Blackside Darter					X	X	X		
Bluegill	X	X	X	X	X	X	X	X	
● Bluntnose Minnow	X	X	X	X			X		
Brown Trout	X	X	X	X	X		X		
● Central Mudminnow				X	X	X		X	X
Chestnut Lamprey	X	X	X	X	X	X	X		
Common Shiner	X	X	X	X					
● Creek Chub	X	X	X	X	X	X	X	X	X
● Fathead Minnow				X	X				
Golden Redhorse	X		X		X				
Grass Pickerel	X		X	X	X				X
● Green Sunfish			X			X	X		X
▲ Hornyhead Chub	X	X	X	X					
Hybrid Sunfish		X	X						
Johnny Darter	X	X	X	X	X	X	X	X	X
Largemouth Bass	X	X	X		X	X			X
Logperch		X	X	X	X	X	X		
Mimic Shiner						X			
Mottled Sculpin	X	X	X	X	X	X	X	X	X
Northern Hog Sucker	X	X	X	X	X	X	X		
Rainbow Darter				X			X		
Rainbow Trout	X		X			X	X		
Rock Bass		X				X	X		
Shorthead Redhorse	X		X			X	X		
Silver Redhorse				X		X	X		
Smallmouth Bass						X	X		
Spotfin Shiner						X	X		
Stoneroller				X				X	X
Striped Shiner	X	X	X			X			
Warmouth	X				X				
● White Sucker	X	X	X	X	X	X	X	X	X

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Stream	Puterbaugh Creek			Lily Creek				Christiana Creek			
	16		17	18		19		20		21	
	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								
● Blacknose Dace						X	X				
Blackside Darter			X								
Bluegill	X	X	X	X	X	X	X	X	X	X	X
● Bluntnose Minnow	X	X				X		X	X		
Bowfin						X		X	X		
● Central Mudminnow	X		X		X						
Chestnut Lamprey								X	X		X
● Common Carp				X			X			X	X
● Creek Chub	X	X			X	X	X				
Golden Redhorse			X					X	X	X	
Grass Pickerel	X	X	X			X	X				X
● Green Sunfish	X	X	X		X	X	X				X
▲ Hornyhead Chub								X	X	X	
Hybrid Sunfish	X	X	X			X					X
Johnny Darter	X	X	X			X	X				
Largemouth Bass		X	X			X			X		
Logperch	X	X	X							X	X
Longear Sunfish			X								
Mottled Sculpin	X	X	X								
Northern Hog Sucker								X	X	X	X
Orangethroat Darter								X	X	X	X
Pirate Perch			X								
Pumpkinseed			X				X			X	
Rainbow Darter	X	X	X					X	X	X	X
▲ River Redhorse										X	
Rock Bass			X					X	X	X	X
Sand Shiner								X			
Shorthead Redhorse									X	X	X
Silver Redhorse			X					X		X	
Smallmouth Bass		X	X					X	X	X	X
Spotfin Shiner										X	
Stoneroller	X	X				X	X				
Striped Shiner								X	X		
Tadpole Madtom									X		
Warmouth	X	X	X								
● White Sucker	X	X			X	X	X	X	X	X	X
Yellow Bullhead								X	X	X	

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Stream	Cobus Creek		Elkhart River							
	22		23	24	25		26		27	
	1st Pass	2nd Pass			1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass
▲ American Brook Lamprey		X					X			
Black Crappie						X			X	
● Blacknose Dace	X	X								
Blackside Darter			X	X		X	X		X	X
Blackstripe Topminnow			X							
Bluegill		X	X	X	X	X	X	X	X	X
● Bluntnose Minnow			X	X	X		X	X		
Brown Trout	X	X								
● Central Mudminnow	X	X	X					X		
Chestnut Lamprey					X	X	X	X	X	
● Common Carp				X		X				
Common Shiner			X	X	X	X	X			X
● Creek Chub	X	X	X	X			X	X		X
Golden Redhorse			X	X	X	X	X	X	X	X
Golden Shiner	X									
Grass Pickerel	X	X	X	X		X				
▲ Greater Redhorse					X	X	X	X		X
● Green Sunfish		X	X	X			X	X	X	X
▲ Hornyhead Chub			X	X	X	X	X	X	X	X
Hybrid Sunfish				X		X	X	X		
Johnny Darter			X	X						
Largemouth Bass	X				X	X	X	X		
Longear Sunfish			X	X	X	X	X	X		X
Mottled Sculpin	X	X								
Northern Hog Sucker			X	X	X	X	X	X	X	X
Northern Pike			X							
Orangethroat Darter			X	X						
Pirate Perch			X	X						
Rainbow Darter			X	X						
Redear Sunfish							X	X		
River Redhorse					X		X		X	
Rock Bass			X	X	X	X	X	X	X	X
▲ Rosyface Shiner			X	X	X	X	X	X	X	X
Sand Shiner			X	X			X	X	X	
Smallmouth Bass			X	X	X	X	X	X	X	X
Spotfin Shiner			X	X	X		X	X	X	X
Spotted Sucker			X		X	X				
Steelcolor Shiner									X	
Stoneroller			X	X						
Striped Shiner			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

▲ - denotes a species that is INTOLERANT of 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	Yellow Creek				Phillips Ditch		Bowman Creek		
	28		29		30		31	32	
	1st Pass	2nd Pass	1st Pass	2nd Pass	1st Pass	2nd Pass		1st Pass	2nd Pass
●Black Bullhead									X
Black Crappie				X					
●Blacknose Dace	X	X	X	X					
Bluegill	X	X	X	X	X	X			X
●Bluntnose Minnow	X	X	X	X					
●Central Mudminnow	X	X							
Chestnut Lamprey			X						
Common Shiner	X	X	X	X					
●Creek Chub	X	X	X	X	X		X	X	X
●Fathead Minnow	X		X	X					
Golden Shiner			X						
Grass Pickerel					X				
●Green Sunfish	X	X	X	X					
▲Hornyhead Chub	X	X	X	X					
Johnny Darter	X	X	X	X					
Largemouth Bass		X	X	X	X				X
▲Longnose Dace			X						
Rock Bass				X					
▲Rosyface Shiner				X					
Silverjaw Minnow	X	X	X	X					
Smallmouth Bass			X	X					
Stoneroller	X	X	X	X					
Striped Shiner		X	X	X					
●White Sucker	X	X	X	X					
Yellow Bullhead								X	

Stream	Juday Creek							
	33		34	35		36	37	
	1st Pass	2nd Pass		1st Pass	2nd Pass		1st Pass	2nd Pass
●Blacknose Dace	X	X	X	X	X	X	X	X
Bluegill	X	X		X				
Brown Trout	X	X		X	X		X	X
●Creek Chub	X	X	X	X	X	X	X	X
●Green Sunfish	X	X	X		X	X		
Hybrid Sunfish			X					
Johnny Darter	X	X	X	X	X	X		X
Largemouth Bass			X					
Mottled Sculpin	X	X	X	X	X	X	X	X
Orangethroat Darter						X		
Rainbow Darter						X	X	X
Rainbow Trout			X			X	X	
Rock Bass				X	X			X
●White Sucker	X	X	X	X	X	X	X	X

▲ - denotes a species that is INTOLERANT of 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, 2004

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. 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 Hester-Dendy samplers. Macroinvertebrates collected in this way were identified and simply counted as being present (Qualitative column).

Site: St. Joseph River, State Road 15 (Bristol)

Collection Date: 9/27/2004

Site Number: 1

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	48		<i>Helopelopia sp</i>	4	
<i>Turbellaria</i>	13	+	<i>Labrundinia pilosella</i>	4	
<i>Hyaella azteca</i>	0	+	<i>Corynoneura lobata</i>	166	+
<i>Gammarus sp</i>	25	+	<i>Cricotopus (C.) sp</i>	0	+
<i>Orconectes (Procericambarus) rusticus</i>	0	+	<i>Cricotopus (C.) trifascia</i>	0	+
<i>Plauditus dubius</i> or <i>P. virilis</i>	8	+	<i>Nanocladius (N.) crassicornus</i> or <i>N. (N.)</i>	4	
<i>Baetis intercalaris</i>	0	+	<i>Tvetenia discoloripes group</i>	4	+
<i>Pseudocloeon propinquum</i>	0	+	<i>Microtendipes rydalensis</i>	4	
<i>Plauditus punctiventris</i>	0	+	<i>Polypedilum (P.) fallax group</i>	4	
<i>Isonychia sp</i>	120	+	<i>Polypedilum (P.) illinoense</i>	4	+
<i>Stenacron sp</i>	116	+	<i>Rheotanytarsus sp</i>	9	+
<i>Stenonema pulchellum</i>	278	+	<i>Atherix lantha</i>	0	+
<i>Stenonema terminatum</i>	0	+	<i>Hemerodromia sp</i>	2	
<i>Ephemerella sp</i>	8		<i>Campeloma sp</i>	0	+
<i>Tricorythodes sp</i>	13	+	<i>Elimia sp</i>	31	+
<i>Anthopotamus sp</i>	0	+	<i>Physella sp</i>	0	+
<i>Calopteryx sp</i>	0	+	<i>Ferrissia sp</i>	24	+
<i>Hetaerina sp</i>	8		<i>Corbicula fluminea</i>	0	+
<i>Coenagrionidae</i>	0	+	<i>Dreissena polymorpha</i>	0	+
<i>Argia sp</i>	0	+	<i>Sphaerium sp</i>	0	+
<i>Boyeria vinosa</i>	0	+	<i>Fusconaia flava</i>	0	+
<i>Gomphus sp</i>	0	+	<i>Elliptio dilatata</i>	0	+
<i>Pteronarcys sp</i>	1	+	<i>Actinonaias ligamentina carinata</i>	0	+
<i>Acroneuria abnormis</i>	4	+	<i>Lampsilis radiata luteola</i>	0	+
<i>Paragnetina sp</i>	0	+			
<i>Corydalus cornutus</i>	0	+			
<i>Chimarra obscura</i>	8		No. Quantitative Taxa:	33	
<i>Neureclipsis sp</i>	3	+	No. Qualitative Taxa:	42	
<i>Polycentropus sp</i>	7		Total No. Taxa:	62	
<i>Cheumatopsyche sp</i>	49	+	Number of Organisms:	603	
<i>Ceratopsyche sparna</i>	0	+			
<i>Hydropsyche simulans</i>	38	+			
<i>Hydropsyche venularis</i>	11	+			
<i>Macrostemum zebratum</i>	3	+			
<i>Protophila sp</i>	0	+			
<i>Brachycentrus numerosus</i>	11	+			
<i>Neophylax sp</i>	0	+			
<i>Helicopsyche borealis</i>	2	+			
<i>Ceraclea sp</i>	4				
<i>Oecetis persimilis</i>	8	+			
<i>Parapoynx sp</i>	1				
<i>Petrophila sp</i>	0	+			
<i>Dineutus sp</i>	0	+			
<i>Psephenus herricki</i>	0	+			
<i>Macronychus glabratus</i>	20	+			
<i>Stenelmis sp</i>	0	+			
<i>Tipula sp</i>	2				
<i>Simulium sp</i>	0	+			

Site: St. Joseph River, Sherman Street

Collection Date: 9/29/2004

Site Number: 2

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	8		<i>Hemerodromia sp</i>	24	
<i>Turbellaria</i>	97	+	<i>Elimia sp</i>	17	+
<i>Nemertea</i>	0	+	<i>Ferrissia sp</i>	33	+
<i>Caecidotea sp</i>	0	+	<i>Corbicula fluminea</i>	0	+
<i>Gammarus sp</i>	0	+	<i>Dreissena polymorpha</i>	0	+
<i>Plauditus dubius</i> or <i>P. virilis</i>	33				
<i>Baetis intercalaris</i>	64	+	No. Quantitative Taxa:	38	
<i>Pseudocloeon propinquum</i>	0	+	No. Qualitative Taxa:	28	
<i>Isonychia sp</i>	48	+	Total No. Taxa:	54	
<i>Stenacron sp</i>	2	+	Number of Organisms:	1,846	
<i>Stenonema mediopunctatum</i>	130				
<i>Stenonema pulchellum</i>	56				
<i>Stenonema terminatum</i>	130	+			
<i>Ephemerella sp</i>	97				
<i>Tricorythodes sp</i>	273	+			
<i>Caenis sp</i>	8				
<i>Coenagrionidae</i>	1				
<i>Argia sp</i>	0	+			
<i>Pteronarcys sp</i>	0	+			
<i>Corydalus cornutus</i>	0	+			
<i>Chimarra obscura</i>	10				
<i>Neureclipsis sp</i>	8				
<i>Cheumatopsyche sp</i>	204	+			
<i>Ceratopsyche morosa group</i>	14				
<i>Ceratopsyche sparna</i>	12				
<i>Hydropsyche aerata</i>	51				
<i>Hydropsyche depravata group</i>	0	+			
<i>Hydropsyche simulans</i>	114	+			
<i>Hydropsyche venularis</i>	12				
<i>Macrostemum zebratum</i>	6	+			
<i>Brachycentrus numerosus</i>	2				
<i>Micrasema sp.</i>	2				
<i>Neophylax sp</i>	0	+			
<i>Oecetis sp</i>	16				
<i>Petrophila sp</i>	25				
<i>Psephenus herricki</i>	0	+			
<i>Stenelmis sp</i>	0	+			
<i>Antocha sp</i>	16				
<i>Corynoneura lobata</i>	16				
<i>Cricotopus (C.) bicinctus</i>	60	+			
<i>Cricotopus (C.) trifascia</i>	15				
<i>Rheocricotopus (Psilocricotopus) robacki</i>	15				
<i>Thienemanniella xena</i>	2				
<i>Tvetenia discoloripes group</i>	60				
<i>Chironomus (C.) sp</i>	0	+			
<i>Cryptochironomus sp</i>	0	+			
<i>Phaenopsectra flavipes</i>	15				
<i>Rheotanytarsus sp</i>	150				
<i>Tanytarsus sp</i>	0	+			

Site: St. Joseph River, Michigan Street

Collection Date: 9/28/2004

Site Number: 3

Taxa Name	Quantitative	Qualitative
<i>Turbellaria</i>	94	
<i>Caecidotea sp</i>	0	+
<i>Gammarus sp</i>	12	+
<i>Orconectes sp</i>	0	+
<i>Hydracarina</i>	8	
<i>Plauditus dubius or P. virilis</i>	0	+
<i>Baetis intercalaris</i>	326	+
<i>Pseudocloeon propinquum</i>	0	+
<i>Plauditus punctiventris</i>	0	+
<i>Isonychia sp</i>	24	+
<i>Heptagenia sp</i>	4	
<i>Stenacron sp</i>	42	+
<i>Stenonema pulchellum</i>	33	+
<i>Ephemerella sp</i>	4	
<i>Tricorythodes sp</i>	20	+
<i>Baetisca sp</i>	0	+
<i>Hetaerina sp</i>	0	+
<i>Coenagrionidae</i>	0	+
<i>Argia sp</i>	0	+
<i>Chimarra obscura</i>	4	
<i>Cheumatopsyche sp</i>	469	+
<i>Hydropsyche aerata</i>	12	+
<i>Hydropsyche bidens</i>	0	+
<i>Hydropsyche orris</i>	8	
<i>Hydropsyche simulans</i>	161	+
<i>Macrostemum zebratum</i>	2	+
<i>Protophila sp</i>	0	+
<i>Brachycentrus numerosus</i>	0	+
<i>Petrophila sp</i>	5	+
<i>Peltodytes sp</i>	0	+
<i>Dubiraphia bivittata</i>	0	+
<i>Labrundinia pilosella</i>	1	
<i>Cricotopus (C.) bicinctus</i>	20	+
<i>Thienemanniella xena</i>	95	
<i>Tvetenia discoloripes group</i>	77	
<i>Chironomus (C.) sp</i>	0	+
<i>Polypedilum (P.) illinoense</i>	0	+
<i>Stictochironomus sp</i>	0	+
<i>Rheotanytarsus sp</i>	41	
<i>Tanytarsus sp</i>	0	+
<i>Hemerodromia sp</i>	4	
<i>Elimia sp</i>	0	+
<i>Physella sp</i>	0	+
<i>Gyraulus (Torquis) parvus</i>	0	+
<i>Ferrissia sp</i>	8	
<i>Corbicula fluminea</i>	0	+
<i>Dreissena polymorpha</i>	0	+

No. Quantitative Taxa: 24
 No. Qualitative Taxa: 35
 Total No. Taxa: 47
 Number of Organisms: 1,474

Site: St. Joseph River, Brick Road

Collection Date: 9/28/2004

Site Number: 4

Taxa Name	Quantitative	Qualitative		
<i>Turbellaria</i>	376	+	No. Quantitative Taxa:	20
<i>Oligochaeta</i>	8	+	No. Qualitative Taxa:	31
<i>Gammarus sp</i>	0	+	Total No. Taxa:	39
<i>Plauditus dubius</i> or <i>P. virilis</i>	0	+	Number of Organisms:	3,222
<i>Baetis intercalaris</i>	450	+		
<i>Plauditus punctiventris</i>	17	+		
<i>Isonychia sp</i>	289	+		
<i>Stenacron sp</i>	0	+		
<i>Stenonema sp</i>	172			
<i>Ephemerella sp</i>	33	+		
<i>Tricorythodes sp</i>	0	+		
<i>Hetaerina sp</i>	0	+		
<i>Coenagrionidae</i>	0	+		
<i>Argia sp</i>	0	+		
<i>Boyeria vinosa</i>	0	+		
<i>Agnatina capitata complex</i>	8			
<i>Neureclipsis sp</i>	1			
<i>Cheumatopsyche sp</i>	941	+		
<i>Hydropsyche simulans</i>	404	+		
<i>Macrostemum zebratum</i>	0	+		
<i>Brachycentrus numerosus</i>	0	+		
<i>Psephenus herricki</i>	0	+		
<i>Macronychus glabratus</i>	0	+		
<i>Stenelmis sp</i>	0	+		
<i>Antocha sp</i>	8			
<i>Simulium sp</i>	0	+		
<i>Cricotopus (C.) bicinctus</i>	0	+		
<i>Cricotopus (C.) trifascia</i>	0	+		
<i>Thienemanniella lobapodema</i>	0	+		
<i>Thienemanniella xena</i>	14	+		
<i>Tvetenia discoloripes group</i>	109			
<i>Polypedilum (Uresipedilum) flavum</i>	54			
<i>Polypedilum (P.) illinoense</i>	91	+		
<i>Rheotanytarsus sp</i>	218			
<i>Hemerodromia sp</i>	24			
<i>Hydrobiidae</i>	1	+		
<i>Elimia sp</i>	4	+		
<i>Corbicula fluminea</i>	0	+		
<i>Pisidium sp</i>	0	+		

Site: Little Elkhart River, County Road 10

Collection Date: 9/27/2004

Site Number: 5

Taxa Name	Quantitative	Qualitative		
<i>Turbellaria</i>	0	+	No. Quantitative Taxa:	34
<i>Nemertea</i>	4		No. Qualitative Taxa:	30
<i>Oligochaeta</i>	48	+	Total No. Taxa:	48
<i>Caecidotea sp</i>	8	+	Number of Organisms:	1,929
<i>Gammarus sp</i>	1	+		
<i>Orconectes (Procericambarus) rusticus</i>	0	+		
<i>Baetis tricaudatus</i>	10	+		
<i>Baetis flavistriga</i>	21	+		
<i>Baetis intercalaris</i>	12	+		
<i>Pseudocloeon propinquum</i>	2	+		
<i>Stenacron sp</i>	4	+		
<i>Stenonema exiguum</i>	4	+		
<i>Stenonema vicarium</i>	66	+		
<i>Calopteryx sp</i>	0	+		
<i>Boyeria vinosa</i>	0	+		
<i>Pteronarcys sp</i>	0	+		
<i>Perlidae</i>	20			
<i>Belostoma sp</i>	0	+		
<i>Notonecta sp</i>	0	+		
<i>Sialis sp</i>	0	+		
<i>Lype diversa</i>	20			
<i>Neureclipsis sp</i>	0	+		
<i>Cheumatopsyche sp</i>	153	+		
<i>Ceratopsyche morosa group</i>	18			
<i>Hydropsyche depravata group</i>	112	+		
<i>Brachycentrus numerosus</i>	2	+		
<i>Neophylax sp</i>	0	+		
<i>Macronychus glabratus</i>	1	+		
<i>Stenelmis sp</i>	8	+		
<i>Tipula sp</i>	0	+		
<i>Dixella sp</i>	0	+		
<i>Simulium sp</i>	0	+		
<i>Brillia flavifrons group</i>	54			
<i>Corynoneura lobata</i>	10			
<i>Cricotopus (C.) sp</i>	18			
<i>Parametriocnemus sp</i>	161			
<i>Rheocricotopus (Psilocricotopus) robacki</i>	303			
<i>Thienemanniella xena</i>	10			
<i>Tvetenia bavarica group</i>	232			
<i>Microtendipes pedellus group</i>	72			
<i>Polypedilum (Uresipedilum) aviceps</i>	18			
<i>Polypedilum (P.) fallax group</i>	161			
<i>Rheotanytarsus pellucidus</i>	107			
<i>Rheotanytarsus sp</i>	250			
<i>Hemerodromia sp</i>	8			
<i>Elimia sp</i>	1	+		
<i>Physella sp</i>	0	+		
<i>Ferrissia sp</i>	10			

Site: Pine Creek, US 20 Bypass

Collection Date: 9/27/2004

Site Number: 6

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	4		<i>Ferrissia sp</i>	0	+
<i>Oligochaeta</i>	20		<i>Corbicula fluminea</i>	0	+
<i>Caecidotea sp</i>	0	+	<i>Pisidium sp</i>	0	+
<i>Gammarus sp</i>	16	+			
<i>Orconectes sp</i>	0	+			
<i>Baetis tricaudatus</i>	119	+	No. Quantitative Taxa:	29	
<i>Baetis flavistriga</i>	29	+	No. Qualitative Taxa:	34	
<i>Stenacron sp</i>	4	+	Total No. Taxa:	51	
<i>Stenonema vicarium</i>	39	+	Number of Organisms:	2,124	
<i>Ephemerella sp</i>	4				
<i>Tricorythodes sp</i>	0	+			
<i>Calopteryx sp</i>	0	+			
<i>Coenagrionidae</i>	0	+			
<i>Boyeria vinosa</i>	0	+			
<i>Gomphus sp</i>	0	+			
<i>Progomphus obscurus</i>	0	+			
<i>Notonecta sp</i>	0	+			
<i>Cheumatopsyche sp</i>	263	+			
<i>Ceratopsyche morosa group</i>	153	+			
<i>Ceratopsyche slossonae</i>	171	+			
<i>Ceratopsyche sparna</i>	214				
<i>Hydropsyche depravata group</i>	342	+			
<i>Pycnopsyche sp</i>	0	+			
<i>Enochrus sp</i>	0	+			
<i>Sperchopsis tessellatus</i>	0	+			
<i>Helichus sp</i>	0	+			
<i>Optioservus sp</i>	4				
<i>Antocha sp</i>	79				
<i>Tipula sp</i>	0	+			
<i>Simulium sp</i>	25	+			
<i>Ceratopogonidae</i>	0	+			
<i>Brillia flavifrons group</i>	8				
<i>Corynoneura lobata</i>	85				
<i>Cricotopus (C.) sp</i>	76				
<i>Cricotopus (C.) bicinctus</i>	8	+			
<i>Thienemanniella taurocapita</i>	1				
<i>Thienemanniella xena</i>	5				
<i>Tvetenia bavarica group</i>	102				
<i>Tvetenia discoloripes group</i>	17				
<i>Chironomus (C.) sp</i>	0	+			
<i>Polypedilum (Uresipedilum) aviceps</i>	68				
<i>Stictochironomus sp</i>	0	+			
<i>Rheotanytarsus pellucidus</i>	85				
<i>Rheotanytarsus sp</i>	135				
<i>Tanytarsus sp</i>	8	+			
<i>Chrysops sp</i>	0	+			
<i>Hemerodromia sp</i>	40				
<i>Physella sp</i>	0	+			

Site: Puterbaugh Creek, County Road 8

Collection Date: 9/30/2004

Site Number: 7

Taxa Name	Quantitative	Qualitative		
<i>Turbellaria</i>	0	+	No. Quantitative Taxa:	32
<i>Gammarus sp</i>	8	+	No. Qualitative Taxa:	34
<i>Hydracarina</i>	8	+	Total No. Taxa:	49
<i>Baetis flavistriga</i>	1	+	Number of Organisms:	1,697
<i>Baetis intercalaris</i>	9	+		
<i>Pseudocloeon propinquum</i>	0	+		
<i>Stenacron sp</i>	87	+		
<i>Stenonema exiguum</i>	25			
<i>Stenonema vicarium</i>	108	+		
<i>Paraleptophlebia sp</i>	0	+		
<i>Caenis sp</i>	0	+		
<i>Calopteryx sp</i>	0	+		
<i>Coenagrionidae</i>	0	+		
<i>Boyeria vinosa</i>	1	+		
<i>Belostoma sp</i>	0	+		
<i>Ranatra sp</i>	0	+		
<i>Cheumatopsyche sp</i>	297	+		
<i>Ceratopsyche sparna</i>	46	+		
<i>Hydropsyche depravata group</i>	53	+		
<i>Ptilostomis sp</i>	0	+		
<i>Brachycentrus numerosus</i>	21	+		
<i>Micrasema sp.</i>	8			
<i>Helicopsyche borealis</i>	12	+		
<i>Hydroporus sp</i>	0	+		
<i>Macronychus glabratus</i>	17	+		
<i>Antocha sp</i>	8			
<i>Anopheles sp</i>	0	+		
<i>Simulium sp</i>	17	+		
<i>Ceratopogonidae</i>	8			
<i>Clinotanypus pinguis</i>	0	+		
<i>Nilotanypus fimbriatus</i>	1			
<i>Brillia flavifrons group</i>	0	+		
<i>Corynoneura lobata</i>	42			
<i>Cricotopus (C.) bicinctus</i>	18			
<i>Parametrioctenemus sp</i>	18			
<i>Thienemanniella xena</i>	15			
<i>Tvetenia bavarica group</i>	233	+		
<i>Microtendipes pedellus group</i>	36			
<i>Phaenopsectra obediens group</i>	0	+		
<i>Polypedilum (Uresipedilum) aviceps</i>	36	+		
<i>Polypedilum (P.) fallax group</i>	18			
<i>Rheotanytarsus pellucidus</i>	125			
<i>Rheotanytarsus sp</i>	340			
<i>Chrysops sp</i>	0	+		
<i>Hemerodromia sp</i>	24			
<i>Elimia sp</i>	10	+		
<i>Gyraulus (Torquis) parvus</i>	0	+		
<i>Ferrissia sp</i>	47			
<i>Corbicula fluminea</i>	0	+		

Site: Lily Creek, Reckell Avenue

Collection Date: 9/30/2004

Site Number: 8

Taxa Name	Quantitative	Qualitative		
<i>Turbellaria</i>	50	+	No. Quantitative Taxa:	21
<i>Oligochaeta</i>	32	+	No. Qualitative Taxa:	24
<i>Helobdella stagnalis</i>	0	+	Total No. Taxa:	37
<i>Hydracarina</i>	4		Number of Organisms:	689
<i>Baetis tricaudatus</i>	0	+		
<i>Baetis intercalaris</i>	1	+		
<i>Pseudocloeon propinquum</i>	0	+		
<i>Stenacron sp</i>	0	+		
<i>Calopteryx sp</i>	0	+		
<i>Coenagrionidae</i>	0	+		
<i>Basiaeschna janata</i>	0	+		
<i>Belostoma sp</i>	0	+		
<i>Sigara sp</i>	0	+		
<i>Notonecta sp</i>	0	+		
<i>Cheumatopsyche sp</i>	20	+		
<i>Hydroptila sp</i>	4			
<i>Peltodytes sp</i>	0	+		
<i>Agabus sp</i>	4	+		
<i>Dubiraphia vittata group</i>	0	+		
<i>Stenelmis sp</i>	0	+		
<i>Ceratopogonidae</i>	26			
<i>Clinotanytus pinguis</i>	0	+		
<i>Helopelopia sp</i>	128			
<i>Parametrioctenemus sp</i>	64			
<i>Polypedilum (Uresipedilum) flavum</i>	38			
<i>Polypedilum (P.) fallax group</i>	38			
<i>Stictochironomus sp</i>	38	+		
<i>Paratanytarsus sp</i>	13			
<i>Rheotanytarsus sp</i>	51			
<i>Tanytarsus sp</i>	89	+		
<i>Tanytarsus glabrescens group sp 7</i>	13			
<i>Hemerodromia sp</i>	66			
<i>Physella sp</i>	1	+		
<i>Gyraulus (Torquis) parvus</i>	0	+		
<i>Menetus (Micromenetus) dilatatus</i>	5			
<i>Ferrissia sp</i>	4			
<i>Pisidium sp</i>	0	+		

Site: Christiana Creek, County Road 4

Collection Date: 9/30/2004

Site Number: 9

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Dineutus sp</i>	0	+	<i>Micrasema sp.</i>	0	+
<i>Dixella sp</i>	0	+	<i>Cheumatopsyche sp</i>	27	+
<i>Simulium sp</i>	0	+	<i>Protophila sp</i>	4	+
<i>Laccophilus sp</i>	0	+	<i>Molanna sp</i>	0	+
<i>Gyrinus sp</i>	0	+	<i>Coenagrionidae</i>	0	+
<i>Clinotanytus pinguis</i>	0	+	<i>Nectopsyche diarina</i>	0	+
<i>Tropisternus sp</i>	0	+	<i>Hetaerina sp</i>	0	+
<i>Psephenus herricki</i>	0	+	<i>Hydropsyche simulans</i>	7	+
<i>Stenelmis sp</i>	0	+	<i>Helicopsyche borealis</i>	64	+
<i>Macronychus glabratus</i>	0	+	<i>Trichocorixa sp</i>	0	+
<i>Paraponyx sp</i>	0	+	<i>Notonecta sp</i>	0	+
<i>Oecetis avara</i>	29		<i>Stenonema mediopunctatum</i>	14	+
<i>Microtendipes pedellus group</i>	6		<i>Ceratopsyche morosa group</i>	2	
<i>Oecetis persimilis</i>	6		<i>Trienodes ignitus</i>	0	+
<i>Corynoneura lobata</i>	44		<i>Hyaella azteca</i>	4	
<i>Ferrissia sp</i>	33				
<i>Ranatra sp</i>	0	+			
<i>Planorbella (Pterosoma) pilsbryi</i>	0	+	No. Quantitative Taxa:	33	
<i>Lepidostoma sp</i>	4		No. Qualitative Taxa:	42	
<i>Elimia sp</i>	84	+	Total No. Taxa:	62	
<i>Corbicula fluminea</i>	0	+	Number of organisms:	603	
<i>Thienemanniella xena</i>	6				
<i>Tvetenia discoloripes group</i>	7				
<i>Rheotanytarsus sp</i>	3				
<i>Helopelopia sp</i>	3				
<i>Nanocladius (N.) spiniplenus</i>	1				
<i>Paratendipes albimanus or P. duplicatus</i>	1				
<i>Tanytarsus glabrescens group sp 7</i>	1				
<i>Polypedilum (Uresipedilum) flavum</i>	1				
<i>Dreissena polymorpha</i>	0	+			
<i>Acroneuria abnormis</i>	3	+			
<i>Turbellaria</i>	6	+			
<i>Gammarus sp</i>	90	+			
<i>Orconectes (Procericambarus) rusticus</i>	0	+			
<i>Tricorythodes sp</i>	4	+			
<i>Baetis intercalaris</i>	6	+			
<i>Stenacron sp</i>	51	+			
<i>Stenonema terminatum</i>	0	+			
<i>Pseudocloeon propinquum</i>	0	+			
<i>Plauditus punctiventris</i>	2	+			
<i>Ephemerella sp</i>	30				
<i>Caenis sp</i>	2				
<i>Stenonema pulchellum</i>	57				
<i>Boyeria vinosa</i>	0	+			
<i>Belostoma sp</i>	0	+			
<i>Neophylax sp</i>	0	+			
<i>Neureclipsis sp</i>	1				

Site: Christiana Creek, Willowdale Park

Collection Date: 9/30/2004

Site Number: 10

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Turbellaria</i>	12	+	<i>Rheocricotopus (Psilocricotopus) robacki</i>	12	
<i>Oligochaeta</i>	0	+	<i>Thienemanniella taurocapita</i>	1	
<i>Helobdella stagnalis</i>	0	+	<i>Thienemanniella xena</i>	12	
<i>Gammarus sp</i>	48	+	<i>Tvetenia discoloripes group</i>	30	+
<i>Baetis intercalaris</i>	66	+	<i>Cryptochironomus sp</i>	0	+
<i>Pseudocloeon propinquum</i>	0	+	<i>Phaenopsectra obediens group</i>	0	+
<i>Stenacron sp</i>	14	+	<i>Polypedilum (P.) illinoense</i>	0	+
<i>Stenonema sp</i>	252		<i>Rheotanytarsus pellucidus</i>	9	
<i>Stenonema mediopunctatum</i>	23	+	<i>Rheotanytarsus sp</i>	36	
<i>Stenonema terminatum</i>	0	+	<i>Tanytarsus sp</i>	2	+
<i>Ephemerella sp</i>	36	+	<i>Hemerodromia sp</i>	26	
<i>Tricorythodes sp</i>	0	+	<i>Elimia sp</i>	17	+
<i>Hexagenia sp</i>	0	+	<i>Ferrissia sp</i>	41	+
<i>Hetaerina sp</i>	0	+	<i>Corbicula fluminea</i>	0	+
<i>Coenagrionidae</i>	0	+			
<i>Argia sp</i>	0	+			
<i>Boyeria vinosa</i>	0	+	No. Quantitative Taxa:	34	
<i>Acroneuria frisoni</i>	0	+	No. Qualitative Taxa:	47	
<i>Sialis sp</i>	0	+	Total No. Taxa:	63	
<i>Corydalus cornutus</i>	4	+	Number of organisms:	1,109	
<i>Chimarra obscura</i>	4	+			
<i>Neureclipsis sp</i>	4	+			
<i>Cheumatopsyche sp</i>	63	+			
<i>Ceratopsyche morosa group</i>	0	+			
<i>Ceratopsyche sparna</i>	101	+			
<i>Hydropsyche depravata group</i>	11				
<i>Hydropsyche simulans</i>	174	+			
<i>Protophila sp</i>	2				
<i>Micrasema sp.</i>	2				
<i>Neophylax sp</i>	0	+			
<i>Nectopsyche diarina</i>	0	+			
<i>Nectopsyche exquisita</i>	0	+			
<i>Oecetis avara</i>	4				
<i>Triaenodes ignitus</i>	0	+			
<i>Dineutus sp</i>	0	+			
<i>Hydroporus sp</i>	0	+			
<i>Psephenus herricki</i>	0	+			
<i>Macronychus glabratus</i>	4	+			
<i>Optioservus trivittatus</i>	0	+			
<i>Stenelmis sp</i>	0	+			
<i>Tipula sp</i>	1				
<i>Simulium sp</i>	68	+			
<i>Clinotanypus pinguis</i>	0	+			
<i>Hayesomyia senata or Thienemannimyia norena</i>	2				
<i>Helopelopia sp</i>	2				
<i>Procladius (Holotanypus) sp</i>	0	+			
<i>Corynoneura lobata</i>	19				
<i>Cricotopus (C.) trifascia</i>	0	+			
<i>Parametriocnemus sp</i>	7				

Site: Elkhart River, Oxbow Park

Collection Date: 9/29/2004

Site Number: 11

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Turbellaria</i>	16	+	<i>Atherix lantha</i>	1	
<i>Caecidotea sp</i>	0	+	<i>Hemerodromia sp</i>	4	
<i>Gammarus sp</i>	0	+	<i>Hydrobiidae</i>	0	+
<i>Orconectes (Procericambarus) rusticus</i>	0	+	<i>Elimia sp</i>	0	+
<i>Plauditus dubius or P. virilis</i>	0	+	<i>Ferrissia sp</i>	0	+
<i>Baetis flavistriga</i>	9	+	<i>Corbicula fluminea</i>	0	+
<i>Baetis intercalaris</i>	277		<i>Pisidium sp</i>	0	+
<i>Pseudocloeon propinquum</i>	0	+	<i>Sphaerium sp</i>	0	+
<i>Isonychia sp</i>	22	+			
<i>Nixe sp</i>	0	+			
<i>Stenacron sp</i>	4	+	No. Quantitative Taxa:	23	
<i>Stenonema exiguum</i>	0	+	No. Qualitative Taxa:	47	
<i>Stenonema pulchellum</i>	37	+	Total No. Taxa:	56	
<i>Ephemerella sp</i>	36	+	Number of organisms:	789	
<i>Tricorythodes sp</i>	0	+			
<i>Calopteryx sp</i>	0	+			
<i>Hetaerina sp</i>	0	+			
<i>Coenagrionidae</i>	0	+			
<i>Argia sp</i>	0	+			
<i>Boyeria vinosa</i>	0	+			
<i>Pteronarcys sp</i>	0	+			
<i>Acroneuria abnormis</i>	0	+			
<i>Paragnetina sp</i>	5	+			
<i>Belostoma sp</i>	0	+			
<i>Corydalus cornutus</i>	1				
<i>Chimarra obscura</i>	4	+			
<i>Cheumatopsyche sp</i>	69	+			
<i>Ceratopsyche morosa group</i>	53	+			
<i>Ceratopsyche sparna</i>	119	+			
<i>Hydropsyche depravata group</i>	2				
<i>Hydropsyche simulans</i>	31				
<i>Brachycentrus numerosus</i>	0	+			
<i>Micrasema sp.</i>	0	+			
<i>Oecetis persimilis</i>	0	+			
<i>Petrophila sp</i>	0	+			
<i>Psephenus herricki</i>	0	+			
<i>Dubiraphia vittata group</i>	0	+			
<i>Macronychus glabratus</i>	0	+			
<i>Stenelmis sp</i>	0	+			
<i>Antocha sp</i>	0	+			
<i>Corynoneura lobata</i>	17	+			
<i>Cricotopus (C.) bicinctus</i>	0	+			
<i>Cricotopus (C.) trifascia</i>	0	+			
<i>Rheocricotopus (Psilocricotopus) robacki</i>	4				
<i>Thienemanniella xena</i>	58				
<i>Tvetenia discoloripes group</i>	8				
<i>Polypedilum (Uresipedilum) flavum</i>	4	+			
<i>Rheotanytarsus sp</i>	8	+			

Site: Elkhart River, Indiana Avenue

Collection Date: 9/29/2004

Site Number: 12

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	6		<i>Polypedilum (Uresipedilum) flavum</i>	5	
<i>Turbellaria</i>	8	+	<i>Polypedilum (P.) fallax group</i>	5	
<i>Oligochaeta</i>	0	+	<i>Rheotanytarsus sp</i>	15	
<i>Helobdella stagnalis</i>	0	+	<i>Hemerodromia sp</i>	10	
<i>Caecidotea sp</i>	0	+	<i>Cipangopaludina chinensis malleata</i>	0	+
<i>Gammarus sp</i>	0	+	<i>Elimia sp</i>	0	+
<i>Orconectes (Procericambarus) rusticus</i>	0	+	<i>Planorbella (Pierosoma) pilsbryi</i>	0	+
<i>Orconectes (Gremicambarus) virilis</i>	0	+	<i>Ferrissia sp</i>	0	+
<i>Baetis tricaudatus</i>	26		<i>Corbicula fluminea</i>	0	+
<i>Baetis flavistriga</i>	66	+	<i>Pisidium sp</i>	0	+
<i>Baetis intercalaris</i>	393		<i>Sphaerium sp</i>	8	+
<i>Pseudocloeon propinquum</i>	0	+	<i>Alasmidonta marginata</i>	0	+
<i>Plauditus punctiventris</i>	8		<i>Fusconaia flava</i>	0	+
<i>Isonychia sp</i>	69	+	<i>Actinonaias ligamentina carinata</i>	0	+
<i>Nixe sp</i>	0	+	<i>Villosa iris iris</i>	0	+
<i>Stenacron sp</i>	8	+	<i>Lampsilis radiata luteola</i>	0	+
<i>Stenonema exiguum</i>	206				
<i>Stenonema pulchellum</i>	52	+	No. Quantitative Taxa:	33	
<i>Stenonema terminatum</i>	0	+	No. Qualitative Taxa:	46	
<i>Ephemerella sp</i>	107	+	Total No. Taxa:	64	
<i>Tricorythodes sp</i>	0	+	Number of organisms:	2,598	
<i>Ephemera sp</i>	0	+			
<i>Calopteryx sp</i>	0	+			
<i>Coenagrionidae</i>	0	+			
<i>Argia sp</i>	0	+			
<i>Boyeria vinosa</i>	0	+			
<i>Stylurus sp</i>	0	+			
<i>Pteronarcys sp</i>	4	+			
<i>Acroneuria lycorias</i>	0	+			
<i>Corydalus cornutus</i>	1				
<i>Neureclipsis sp</i>	8				
<i>Cheumatopsyche sp</i>	334	+			
<i>Ceratopsyche morosa group</i>	511	+			
<i>Ceratopsyche sparna</i>	331	+			
<i>Hydropsyche depravata group</i>	70	+			
<i>Hydropsyche simulans</i>	137	+			
<i>Proptila sp</i>	122	+			
<i>Brachycentrus numeros</i>	3	+			
<i>Micrasema sp.</i>	0	+			
<i>Psephenus herricki</i>	0	+			
<i>Macronychus glabratus</i>	1				
<i>Stenelmis sp</i>	0	+			
<i>Antocha sp</i>	2				
<i>Corynoneura lobata</i>	6				
<i>Cricotopus (C.) trifascia</i>	5				
<i>Rheocricotopus (Psilocricotopus) robacki</i>	20				
<i>Thienemanniella xena</i>	11				
<i>Tvetenia discoloripes group</i>	40				

Site: Elkhart River, Middlebury Street
 Collection Date: 9/29/2004 Site Number: 13

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	8		<i>Rheocricotopus (Psilocricotopus) robacki</i>	27	
<i>Turbellaria</i>	38		<i>Thienemanniella xena</i>	32	+
<i>Erpobdella punctata punctata</i>	0	+	<i>Tvetenia discoloripes group</i>	59	
<i>Caecidotea sp</i>	27	+	<i>Phaenopsectra obediens group</i>	0	+
<i>Gammarus sp</i>	7	+	<i>Polypedilum (Uresipedilum) flavum</i>	6	
<i>Hydracarina</i>	2		<i>Polypedilum (P.) fallax group</i>	6	
<i>Plauditus dubius or P. virilis</i>	1		<i>Polypedilum (Tripodura) scalaenum group</i>	6	
<i>Baetis flavistriga</i>	27	+	<i>Stenochironomus sp</i>	6	
<i>Baetis intercalaris</i>	217	+	<i>Rheotanytarsus pellucidus</i>	6	
<i>Plauditus punctiventris</i>	17	+	<i>Rheotanytarsus sp</i>	91	
<i>Proclleon irrubrum</i>	0	+	<i>Hemerodromia sp</i>	36	
<i>Isonychia sp</i>	45	+	<i>Hydrobiidae</i>	0	+
<i>Leucrocota sp</i>	1		<i>Elimia sp</i>	6	+
<i>Nixe sp</i>	0	+	<i>Ferrissia sp</i>	14	+
<i>Stenacron sp</i>	22	+	<i>Corbicula fluminea</i>	0	+
<i>Stenonema exiguum</i>	23		<i>Sphaerium sp</i>	0	+
<i>Stenonema pulchellum group</i>	184	+	<i>Fusconaia flava</i>	0	+
<i>Ephemerella sp</i>	24		<i>Actinonaias ligamentina carinata</i>	0	+
<i>Tricorythodes sp</i>	14	+			
<i>Calopteryx sp</i>	0	+			
<i>Coenagrionidae</i>	0	+	No. Quantitative Taxa:	46	
<i>Argia sp</i>	0	+	No. Qualitative Taxa:	40	
<i>Boyeria vinosa</i>	0	+	Total No. Taxa:	65	
<i>Stylurus sp</i>	0	+	Number of organisms:	1,371	
<i>Pteronarcys sp</i>	0	+			
<i>Agnetina capitata complex</i>	7				
<i>Corydalus cornutus</i>	1	+			
<i>Chimarra obscura</i>	5				
<i>Cheumatopsyche sp</i>	24	+			
<i>Ceratopsyche morosa group</i>	28	+			
<i>Ceratopsyche sparna</i>	34	+			
<i>Hydropsyche simulans</i>	29	+			
<i>Proptoptila sp</i>	201	+			
<i>Hydroptila sp</i>	24				
<i>Brachycentrus numerosus</i>	0	+			
<i>Micrasema sp.</i>	5				
<i>Lepidostoma sp</i>	0	+			
<i>Lepidostoma sp</i>	1				
<i>Laccophilus sp</i>	0	+			
<i>Psephenus herricki</i>	0	+			
<i>Dubiraphia bivittata</i>	0	+			
<i>Macronychus glabratus</i>	4	+			
<i>Stenelmis sp</i>	5	+			
<i>Simulium sp</i>	2				
<i>Corynoneura lobata</i>	31				
<i>Cricotopus (C.) bicinctus</i>	6	+			
<i>Cricotopus (C.) trifascia</i>	6				
<i>Nanocladius sp</i>	6				

Site: Yellow Creek, County Road 32

Collection Date: 9/29/2004

Site Number: 14

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	8		<i>Odontomyia (Odontomyiina) sp</i>	0	+
<i>Turbellaria</i>	8		<i>Hemerodromia sp</i>	250	+
<i>Erpobdella punctata punctata</i>	0	+	<i>Physella sp</i>	71	+
<i>Gammarus sp</i>	13	+	<i>Planorbidae</i>	1	
<i>Hydracarina</i>	8		<i>Helisoma anceps anceps</i>	0	+
<i>Baetis tricaudatus</i>	294	+	<i>Planorbella (Pierosoma) trivolvis</i>	0	+
<i>Baetis flavistriga</i>	82		<i>Ferrissia sp</i>	119	+
<i>Baetis intercalaris</i>	72		<i>Pisidium sp</i>	0	+
<i>Stenacron sp</i>	1	+	<i>Sphaerium sp</i>	1	+
<i>Caenis sp</i>	0	+			
<i>Calopteryx sp</i>	8	+			
<i>Coenagrionidae</i>	8	+			
<i>Aeshna sp</i>	0	+			
<i>Boyeria vinosa</i>	0	+			
<i>Belostoma sp</i>	0	+			
<i>Cheumatopsyche sp</i>	693	+			
<i>Hydropsyche depravata group</i>	48	+			
<i>Hydroptila sp</i>	8				
<i>Ancyronyx variegata</i>	0	+			
<i>Dubiraphia vittata group</i>	16	+			
<i>Stenelmis sp</i>	16	+			
<i>Anopheles sp</i>	0	+			
<i>Ablabesmyia mallochi</i>	13				
<i>Helopelopia sp</i>	13				
<i>Labrundinia pilosella</i>	1				
<i>Natarsia species A (sensu Roback, 1978)</i>	26				
<i>Corynoneura n.sp 1</i>	1				
<i>Corynoneura lobata</i>	42				
<i>Cricotopus (C.) sp</i>	13	+			
<i>Cricotopus (C.) bicinctus</i>	13				
<i>Nanocladius (N.) crassicornus or N. (N.) "rectinervis"</i>	51				
<i>Nanocladius (N.) spiniplenus</i>	38				
<i>Rheocricotopus (Psilocricotopus) robacki</i>	13				
<i>Thienemanniella xena</i>	6				
<i>Tvetenia sp</i>	13				
<i>Chironomus (C.) sp</i>	0	+			
<i>Cryptochironomus sp</i>	0	+			
<i>Dicrotendipes neomodestus</i>	76	+			
<i>Microtendipes pedellus group</i>	114				
<i>Phaenopsectra flavipes</i>	0	+			
<i>Polypedilum (P.) fallax group</i>	102				
<i>Stictochironomus sp</i>	0	+			
<i>Paratanytarsus sp</i>	64	+			
<i>Rheotanytarsus pellucidus</i>	13				
<i>Rheotanytarsus sp</i>	165				
<i>Tanytarsus sp</i>	63	+			
<i>Tanytarsus glabrescens group sp 7</i>	13				
<i>Tanytarsus sepp</i>	13				

No. Quantitative Taxa: 42
 No. Qualitative Taxa: 32
 Total No. Taxa: 57
 Number of organisms: 2,591

Site: Yellow Creek, County Road 45

Collection Date: 9/29/2004

Site Number: 15

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Hydra sp</i>	24		<i>Stictochironomus sp</i>	0	+
<i>Hydra sp</i>	24		<i>Stictochironomus sp</i>	18	
<i>Turbellaria</i>	0	+	<i>Paratanytarsus sp</i>	111	+
<i>Oligochaeta</i>	0	+	<i>Rheotanytarsus sp</i>	166	
<i>Erpobdella punctata punctata</i>	1		<i>Tanytarsus sp</i>	18	+
<i>Caecidotea sp</i>	26	+	<i>Tanytarsus glabrescens group sp 7</i>	92	
<i>Gammarus sp</i>	1	+	<i>Tanytarsus sepp</i>	55	+
<i>Orconectes (Crockerinus) propinquus</i>	0	+	<i>Hemerodromia sp</i>	48	
<i>Hydracarina</i>	8		<i>Physella sp</i>	16	+
<i>Baetis tricaudatus</i>	284	+	<i>Ferrissia sp</i>	24	
<i>Plauditus dubius or P. virilis</i>	32	+	<i>Sphaerium sp</i>	0	+
<i>Baetis flavistriga</i>	0	+			
<i>Baetis intercalaris</i>	70	+			
<i>Heptageniidae</i>	40		No. Quantitative Taxa:	38	
<i>Stenacron sp</i>	0	+	No. Qualitative Taxa:	35	
<i>Calopteryx sp</i>	0	+	Total No. Taxa:	58	
<i>Coenagrionidae</i>	0	+	Number of organisms:	3,631	
<i>Boyeria vinosa</i>	0	+			
<i>Belostoma sp</i>	0	+			
<i>Ranatra sp</i>	0	+			
<i>Cheumatopsyche sp</i>	200	+			
<i>Ceratopsyche morosa group</i>	1410	+			
<i>Hydropsyche depravata group</i>	0	+			
<i>Hydropsyche simulans</i>	30				
<i>Peltodytes sp</i>	0	+			
<i>Dubiraphia sp</i>	0	+			
<i>Macronychus glabratus</i>	8				
<i>Stenelmis sp</i>	0	+			
<i>Tipula sp</i>	10	+			
<i>Anopheles sp</i>	0	+			
<i>Simulium sp</i>	134	+			
<i>Helopelopia sp</i>	37				
<i>Cardiocladius obscurus</i>	18				
<i>Corynoneura lobata</i>	8				
<i>Cricotopus (C.) sp</i>	222	+			
<i>Cricotopus (C.) bicinctus</i>	240	+			
<i>Cricotopus (C.) trifascia</i>	55				
<i>Parametriocnemus sp</i>	18				
<i>Psectrocladius (P.) psilopterus group</i>	0	+			
<i>Rheocricotopus (Psilocricotopus) robacki</i>	38				
<i>Thienemanniella xena</i>	3				
<i>Chironomus (C.) sp</i>	0	+			
<i>Cryptochironomus sp</i>	18				
<i>Dicrotendipes neomodestus</i>	18				
<i>Paratendipes albimanus or P. duplicatus</i>	18				
<i>Phaenopsectra obediens group</i>	0	+			
<i>Polypedilum (Uresipedilum) flavum</i>	74				
<i>Polypedilum (P.) illinoense</i>	38				

Site: Cobus Creek, County Road 8

Collection Date: 9/30/2004

Site Number: 16

Taxa Name	Quantitative	Qualitative		
<i>Turbellaria</i>	8		No. Quantitative Taxa:	31
<i>Oligochaeta</i>	24	+	No. Qualitative Taxa:	28
<i>Caecidotea sp</i>	0	+	Total No. Taxa:	45
<i>Gammarus sp</i>	19	+	Number of organisms:	2,930
<i>Orconectes sp</i>	0	+		
<i>Hydracarina</i>	16			
<i>Baetis tricaudatus</i>	110	+		
<i>Plauditus dubius or P. virilis</i>	0	+		
<i>Baetis intercalaris</i>	93			
<i>Stenacron sp</i>	126	+		
<i>Stenonema pulchellum</i>	17			
<i>Stenonema vicarium</i>	124	+		
<i>Calopteryx sp</i>	8	+		
<i>Boyeria vinosa</i>	0	+		
<i>Ranatra sp</i>	0	+		
<i>Lype diversa</i>	8			
<i>Cheumatopsyche sp</i>	418	+		
<i>Ceratopsyche morosa group</i>	35	+		
<i>Ceratopsyche slossonae</i>	137	+		
<i>Ceratopsyche sparna</i>	47			
<i>Hydropsyche depravata group</i>	106	+		
<i>Ptilostomis sp</i>	0	+		
<i>Brachycentrus numerosus</i>	2	+		
<i>Micrasema sp.</i>	8			
<i>Pycnopsyche sp</i>	0	+		
<i>Molanna sp</i>	0	+		
<i>Helicopsyche borealis</i>	14	+		
<i>Dubiraphia vittata group</i>	0	+		
<i>Macronychus glabratus</i>	0	+		
<i>Antocha sp</i>	74			
<i>Tipula sp</i>	1			
<i>Anopheles sp</i>	0	+		
<i>Simulium sp</i>	24			
<i>Cricotopus (C.) bicinctus</i>	20			
<i>Parametrioctenemus sp</i>	143			
<i>Tvetenia bavarica group</i>	897			
<i>Polypedilum (P.) fallax group</i>	20			
<i>Rheotanytarsus pellucidus</i>	388			
<i>Tanytarsus sepp</i>	20			
<i>Chrysops sp</i>	0	+		
<i>Hemerodromia sp</i>	8			
<i>Hydrobiidae</i>	0	+		
<i>Physella sp</i>	1	+		
<i>Ferrissia sp</i>	14	+		
<i>Corbicula fluminea</i>	0	+		

Site: Phillips Ditch, Chippewa Avenue

Collection Date: 9/28/2004

Site Number: 17

Taxa Name	Quantitative	Qualitative	
<i>Turbellaria</i>	2		No. Quantitative Taxa: 9
<i>Oligochaeta</i>	0	+	No. Qualitative Taxa: 20
<i>Gammarus sp</i>	304	+	Total No. Taxa: 25
<i>Orconectes sp</i>	0	+	Number of organisms: 541
<i>Baetis tricaudatus</i>	0	+	
<i>Baetis intercalaris</i>	2	+	
<i>Calopteryx sp</i>	0	+	
<i>Basiaeschna janata</i>	0	+	
<i>Boyeria vinosa</i>	0	+	
<i>Notonecta sp</i>	0	+	
<i>Ptilostomis sp</i>	0	+	
<i>Hydroporus sp</i>	0	+	
<i>Helichus sp</i>	0	+	
<i>Macronychus glabratus</i>	2	+	
<i>Optioservus ovalis</i>	0	+	
<i>Stenelmis sp</i>	0	+	
<i>Anopheles sp</i>	0	+	
<i>Paramerina fragilis</i>	1		
<i>Corynoneura lobata</i>	199		
<i>Nanocladius (N.) crassicornus</i> or <i>N. (N.) "rectinervis"</i>	3		
<i>Microtendipes pedellus group</i>	26	+	
<i>Phaenopsectra flavipes</i>	0	+	
<i>Stictochironomus sp</i>	0	+	
<i>Chrysops sp</i>	0	+	
<i>Physella sp</i>	2		

Site: Juday Creek, Grape Road

Collection Date: 9/28/2004

Site Number: 18

Taxa Name	Quantitative	Qualitative		
<i>Oligochaeta</i>	4	+	No. Quantitative Taxa:	25
<i>Gammarus sp</i>	54	+	No. Qualitative Taxa:	21
<i>Baetis tricaudatus</i>	1		Total No. Taxa:	36
<i>Baetis intercalaris</i>	0	+	Number of organisms:	1,409
<i>Pseudocloeon propinquum</i>	0	+		
<i>Stenacron sp</i>	31	+		
<i>Stenonema vicarium</i>	7	+		
<i>Calopteryx sp</i>	0	+		
Coenagrionidae	0	+		
<i>Boyeria vinosa</i>	2	+		
<i>Cheumatopsyche sp</i>	35			
<i>Ceratopsyche slossonae</i>	4	+		
<i>Ceratopsyche sparna</i>	4			
<i>Hydropsyche depravata group</i>	0	+		
<i>Pycnopsyche sp</i>	0	+		
<i>Tipula sp</i>	2	+		
<i>Simulium sp</i>	0	+		
<i>Helopelopia sp</i>	29			
<i>Procladius (Holotanypus) sp</i>	0	+		
<i>Tanypus sp</i>	14			
<i>Prodiamesa olivacea</i>	0	+		
<i>Corynoneura lobata</i>	32			
<i>Parametriocnemus sp</i>	173			
<i>Rheocricotopus (Psilocricotopus) robacki</i>	87	+		
<i>Thienemanniella xena</i>	1			
<i>Tvetenia bavarica group</i>	158			
<i>Tvetenia discoloripes group</i>	58	+		
<i>Phaenopsectra obediens group</i>	0	+		
<i>Polypedilum (Uresipedilum) aviceps</i>	29			
<i>Polypedilum (Uresipedilum) flavum</i>	130	+		
<i>Stictochironomus sp</i>	0	+		
<i>Rheotanytarsus pellucidus</i>	217			
<i>Rheotanytarsus sp</i>	87			
<i>Tanytarsus sp</i>	217			
<i>Tanytarsus glabrescens group sp 7</i>	29			
<i>Hemerodromia sp</i>	4			

Site: Juday Creek, Kintz Avenue

Collection Date: 9/28/2004

Site Number: 19

Taxa Name	Quantitative	Qualitative	Taxa Name	Quantitative	Qualitative
<i>Gammarus sp</i>	8	+	<i>Physella sp</i>	2	+
<i>Orconectes sp</i>	0	+	<i>Planorbella sp</i>	0	+
<i>Hydracarina</i>	8		<i>Ferrissia sp</i>	10	
<i>Baetis flavistriga</i>	8	+	<i>Corbicula fluminea</i>	0	+
<i>Pseudocloeon propinquum</i>	0	+	<i>Pisidium sp</i>	0	+
<i>Plauditus punctiventris</i>	0	+			
<i>Stenacron sp</i>	32	+			
<i>Stenonema pulchellum</i>	112	+	No. Quantitative Taxa:	32	
<i>Caenis sp</i>	8	+	No. Qualitative Taxa:	34	
<i>Ephemera sp</i>	0	+	Total No. Taxa:	53	
<i>Calopteryx sp</i>	0	+	Number of organisms:	2,015	
<i>Coenagrionidae</i>	8				
<i>Boyeria vinosa</i>	0	+			
<i>Belostoma sp</i>	0	+			
<i>Ranatra sp</i>	0	+			
<i>Sigara sp</i>	0	+			
<i>Sialis sp</i>	0	+			
<i>Cheumatopsyche sp</i>	96	+			
<i>Ceratopsyche morosa group</i>	277	+			
<i>Ceratopsyche slossonae</i>	0	+			
<i>Ceratopsyche sparna</i>	24	+			
<i>Triaenodes ignitus</i>	0	+			
<i>Tropisternus sp</i>	0	+			
<i>Optioservus ovalis</i>	8	+			
<i>Stenelmis sp</i>	8	+			
<i>Antocha sp</i>	104				
<i>Anopheles sp</i>	0	+			
<i>Simulium sp</i>	0	+			
<i>Helopelopia sp</i>	41				
<i>Brillia flavifrons group</i>	41				
<i>Corynoneura lobata</i>	12				
<i>Cricotopus (C.) sp</i>	103				
<i>Cricotopus (C.) bicinctus</i>	82				
<i>Eukiefferiella brevicealcar group</i>	20				
<i>Parametriocnemus sp</i>	269	+			
<i>Psectrocladius (P.) psilopterus group</i>	20				
<i>Rheocricotopus (Psilocricotopus) robacki</i>	0	+			
<i>Thienemanniella xena</i>	1				
<i>Tvetenia bavarica group</i>	0	+			
<i>Tvetenia discoloripes group</i>	144				
<i>Microtendipes pedellus group</i>	82	+			
<i>Phaenopsectra obediens group</i>	62				
<i>Polypedilum (P.) fallax group</i>	82				
<i>Rheotanytarsus pellucidus</i>	20				
<i>Rheotanytarsus sp</i>	287				
<i>Tanytarsus sp</i>	20				
<i>Tanytarsus sepp</i>	0	+			
<i>Hemerodromia sp</i>	16				

Site: Juday Creek, Izaak Walton League

Collection Date: 9/28/2004

Site Number: 20

Taxa Name	Quantitative	Qualitative		
<i>Turbellaria</i>	0	+	No. Quantitative Taxa:	26
<i>Oligochaeta</i>	80	+	No. Qualitative Taxa:	17
<i>Orconectes sp</i>	0	+	Total No. Taxa:	31
<i>Hydracarina</i>	32		Number of organisms:	3,584
<i>Baetis intercalaris</i>	1			
<i>Stenacron sp</i>	15	+		
<i>Stenonema pulchellum</i>	48	+		
<i>Stenonema vicarium</i>	3	+		
<i>Calopteryx sp</i>	1	+		
<i>Cheumatopsyche sp</i>	368	+		
<i>Ceratopsyche morosa group</i>	13	+		
<i>Ceratopsyche sparna</i>	316	+		
<i>Hydropsyche depravata group</i>	32	+		
<i>Macronychus glabratus</i>	2			
<i>Optioservus sp</i>	8			
<i>Optioservus ovalis</i>	0	+		
<i>Stenelmis sp</i>	5	+		
<i>Tipula sp</i>	1	+		
<i>Simulium sp</i>	25			
<i>Helopelopia sp</i>	26			
<i>Brillia flavifrons group</i>	0	+		
<i>Corynoneura lobata</i>	24			
<i>Cricotopus (C.) sp</i>	27			
<i>Parametriocnemus sp</i>	1917	+		
<i>Thienemanniella xena</i>	1			
<i>Tvetenia bavarica group</i>	153			
<i>Phaenopsectra obediens group</i>	0	+		
<i>Polypedilum (P.) fallax group</i>	26			
<i>Rheotanytarsus pellucidus</i>	51			
<i>Rheotanytarsus sp</i>	383			
<i>Tanytarsus glabrescens group sp 7</i>	26			