

# ELKHART-SOUTH BEND FISH COMMUNITY MONITORING



**ANNUAL REPORT  
2003**

City of Elkhart   
*The city with a heart*

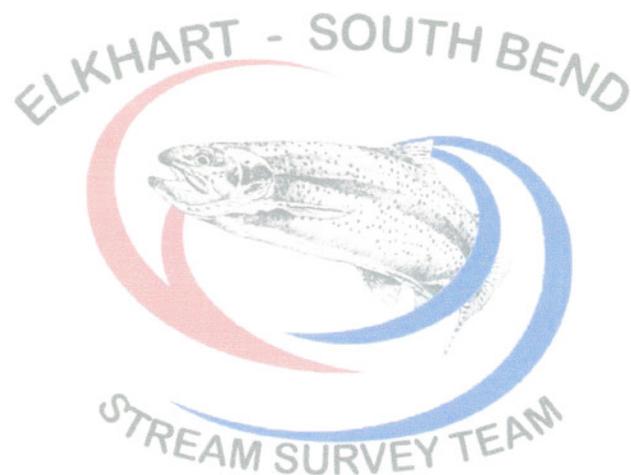
David L. Miller, Mayor

**Cover Photo: Public demonstration at Rhapsody in Green 2003**

# TABLE OF CONTENTS

INTRODUCTION .....	1
METHODS.....	4
RESULTS AND DISCUSSION.....	8
INDICIES.....	9
TAGGING AND MOVEMENT.....	14
FISH TISSUE.....	15
CONCLUSION.....	16
ACKNOWLEDGEMENTS.....	17
REFERENCES .....	18
SUMMER 2003 .....	19
APPENDICES	

- APPENDIX A (Index of Biotic Integrity metrics)
- APPENDIX B (Fish tissue preparation and results)
- APPENDIX C (Summary of fish collected by county, 2003)
- APPENDIX D (Summary of fish collected by site, 2003)



---

# FISH COMMUNITY MONITORING IN ELKHART AND ST. JOSEPH COUNTIES ON THE ST. JOSEPH RIVER AND SELECTED TRIBUTARIES, 2003



**Prepared by  
Joseph Foy  
Aquatic Biologist  
April, 2004**

## **INTRODUCTION**

The headwaters of the St. Joseph River originate at Baw Beese Lake in Hillsdale County, Michigan. As this river flows from Michigan into Indiana and then back into Michigan on its 210 mile journey to Lake Michigan, it has become a centerpiece for community development and recreation in most of the areas through which it flows. Over the years city and county parks have developed and prospered along its banks. A world-class trout and salmon fishery has evolved and walleye have become more abundant due to the tireless efforts of Michigan and Indiana natural resource professionals. Annual clean-up efforts by a multitude of local organizations along segments of the river are also slowly chipping away at the trash that has built up. After years of neglect, these organizations are working to keep the river an attractive place to visit. During this time, the cities of Elkhart and South Bend have also been monitoring the river's water in an effort to protect the public and the aquatic communities that inhabit this river (Foy 2002).

---

In 1972, the Clean Water Act was established to restore and maintain the physical, chemical and biological integrity of the nation's waters. At the time, there were acceptable methods to measure the physical and chemical components of water, but methods to measure the health of aquatic communities were not yet standardized. In an attempt to indirectly monitor the biological integrity of rivers and streams until an appropriate method could be designed, water chemistry results were used to determine if the water was safe for aquatic organisms.

For years now, ecologists and biologists have recognized the shortcomings of using chemical monitoring as a surrogate for monitoring the health and condition of aquatic species (Ohio EPA 1988). While chemical monitoring is important and useful in identifying contaminants in the water being tested, its results provide limited information about the biological integrity of the aquatic species that are present. In short, to have an accurate understanding of the true condition of any aquatic community, that community should be directly sampled and analyzed. In 1998, Elkhart initiated a biological monitoring program to supplement its existing chemical and microbial monitoring. The results from this multi-faceted monitoring strategy will finally provide a way for Elkhart to accurately assess the chemical, physical and biological integrity of the rivers and streams in this area as the Clean Water Act had intended.

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 1998-2000 fish community information was being put to use by Elkhart and determined that similar information from their area would be helpful. Likewise, Elkhart felt additional biological information from the St. Joseph River would prove useful on future projects dealing with the river's watershed. Biologists know rivers and streams are not confined to one political boundary or area, but flow across several. Even with this knowledge, governmental agencies tend to study and monitor these rivers and streams within the confines of those established boundaries. In February of 2001, an interlocal agreement was signed between Elkhart and South Bend that erased one political boundary and finally allowed these municipalities a glimpse at the health of the fish communities 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 will be used to create a baseline of information for all of the streams sampled. To date, this baseline information has been used to reveal what impact Elkhart's urban environment has 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, will be 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 (a score of zero indicates no fish were collected). 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 sampled.

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, available habitat at all sampling locations was assessed 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 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 (*Stizostedion vitreum*) collected throughout the year. This tagging effort will assist the Indiana Department of Natural Resources (IDNR) in determining the movement patterns of walleye and alert anglers to Elkhart and South Bend's monitoring activities. Scale samples were also taken from all walleye, smallmouth and largemouth bass over 75 mm in length for age and growth analysis. This information will be released in a report later this year. Finally, tissue from eleven species of fish was 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 and Juday Creek. 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.

**Table 1: Fish consumption information taken from the 2003 Indiana Fish Consumption Advisory**

Location	Species	Fish Size (inches)	Contaminant	Group
Elkhart River <i>Elkhart County</i>	Rock Bass	7-9	■	2
		9+	■	3
	Smallmouth Bass	11-17	■O	2
		17+	■O	3
	White Sucker	14-16	■O	2
		16+	■O	3
St. Joseph River <i>Elkhart County</i>	Black Redhorse	13-17	O	2
		17+	O	3
	Carp	25-28	■	3
		28+	■	4
	Channel Catfish	16-29	■	2
		29+	■	3
	Golden Redhorse	15-17	■	2
		17+	■	3
	Largemouth Bass	13-14	O	2
		14+	O	3
	Northern Hogsucker	13-15	■	2
		15+	■	3
	Rock Bass	7+	O	2
	Shorthead Redhorse Redhorse	15-17	■	3
		17+	■	4
	Smallmouth Bass	10-11	■	2
11+		■	3	
Walleye	15-16	■O	2	
	16+	■O	3	
St. Joseph River <i>St. Joseph County</i>	Black Redhorse	16-18	■	3
		18+	■	4
	Carp	20+	■	5
	Channel Catfish	22+	■O	4
	Golden Redhorse	13-22	■	3
		22+	■	4
	Largemouth Bass	11-14	■	2
		14+	■	3
	Quillback	18+	■	3
	Rock Bass	7-8	■	2
		8+	■	3
	Shorthead Redhorse	15-19	■O	3
		19+	■O	4
	Smallmouth Bass	7-9	■O	2
		9+	■O	3
	Steelhead	25-26	■	3
26+		■	4	
White Sucker	14-16	■	3	
	16+	■	4	
Juday Creek	White Sucker	12-17	■	2
		17+	■	3

O = Mercury

■ = PCBs

Group 2 = 1 meal/week

Group 3 = 1 meal/month

Group 4 = 1 meal/2 months

Group 5 = DO NOT EAT

(Special restrictions apply to women and children. See advisory.)



**Table 2: Fish sampling sites in Elkhart and St. Joseph Counties, 2003**

Site Number	Site Description	Type of Site (Index/Investigative) County	Method	IBI Scores				2003 QHEI Score
				2001	2002	2003	Average	
1	Toll Road (Bristol) St. Joseph River	Index Elkhart	Boat	47	50	54	50	74
2	Bristol (B) St. Joseph River	Investigative Elkhart	Boat					NOT ASSESSED
3	Nibbyville (A) St. Joseph River	Index Elkhart	Boat	51	54	52	52	71
4	County Road 13 St. Joseph River	Investigative Elkhart	Boat					52
5	Lexington Avenue St. Joseph River	Index Elkhart	Boat	51	50	55	52	64
6	McNaughton Park St. Joseph River	Index Elkhart	Boat	44	51	44	46	61
7	Treasure Island County Park St. Joseph River	Investigative Elkhart	Boat					NOT ASSESSED
8	Mouth of Cobus Creek St. Joseph River	Investigative Elkhart	Boat					56
9	Capital Avenue St. Joseph River	Index St. Joseph	Boat	43	45	42	43	63
10	Ironwood Drive St. Joseph River	Index St. Joseph	Boat	45	41	43	43	66
11	Sample Street St. Joseph River	Investigative St. Joseph	Boat					NOT ASSESSED
12	Michigan Street St. Joseph River	Index St. Joseph	Boat	44	50	41	45	80
13	Angela Boulevard St. Joseph River	Investigative St. Joseph	Boat					78
14	Keller Park St. Joseph River	Index St. Joseph	Boat	51	50	49	50	75
15	Darden Road St. Joseph River	Index St. Joseph	Boat	50	51	48	50	77
16	Brick Road St. Joseph River	Investigative St. Joseph	Boat					76
17*	County Road 16 Little Elkhart River	Investigative Elkhart	Tote Barge					72
18*	County Road 35 Little Elkhart River	Index Elkhart	Tote Barge		44	40		88
19*	State Road 120 Little Elkhart River	Index Elkhart	Tote Barge		52	53		77
20*	State Road 15 Little Elkhart River	Investigative Elkhart	Tote Barge					68
21	County Road 43 Rowe-Eden Ditch	Investigative Elkhart	Tote Barge					67
22*	County Road 27 Pine Creek	Investigative Elkhart	Back Pack					40
23*	County Road 20 Pine Creek	Investigative Elkhart	Back Pack					60
24*	County Road 19 Pine Creek	Investigative Elkhart	Tote Barge					60
25*	SR 120 Pine Creek	Index Elkhart	Tote Barge	38	48	35	40	71
26*	County Road 4 Puterbaugh Creek	Investigative Elkhart	Back Pack					27
27*	Reedy Drive Puterbaugh Creek	Index Elkhart	Tote Barge	33	41	36	37	63

**Table 2 (continued)**

Site Number	Site Description	Type of Site (Index/Investigative) County	Method	IBI Scores				2003 QHEI Score
				2001	2002	2003	Average	
28	Park Six Drive Lily Creek	Index Elkhart	Back Pack		15	16		37
29	County Road 6 Christiana Creek	Index Elkhart	Tote Barge	47	51	53	50	74
30	Simonton Street Christiana Creek	Investigative Elkhart	Tote Barge					70
31	N. Main Well Field Christiana Creek	Index Elkhart	Tote Barge	44	47	52	48	79
32*	Cross Creek Drive Cobus Creek	Investigative Elkhart	Tote Barge					57
33	County Road 37 Elkhart River	Investigative Elkhart	Tote Barge					75
34	County Road 127 Elkhart River	Investigative Elkhart	Tote Barge					84
35	County Road 40 Elkhart River	Investigative Elkhart	Boat					62
36	Oxbow Park (B) Elkhart River	Index Elkhart	Boat	51	52	54	52	82
37	Ironwood Drive Elkhart River	Investigative Elkhart	Boat					87
38	Elkhart Environmental Center Elkhart River	Index Elkhart	Boat	51	52	50	51	79
39	Studebaker Park (A) Elkhart River	Index Elkhart	Boat	46	46	46	46	78
40	Central High School Elkhart River	Index Elkhart	Boat	44	43	47	45	70
41	Rice Field Elkhart River	Investigative Elkhart	Boat					62
42	Elkhart Avenue Elkhart River	Investigative Elkhart	Boat					81
43	County Road 42 Stoney Creek	Investigative Elkhart	Tote Barge					60
44*	County Road 43 Solomon Creek	Investigative Elkhart	Tote Barge					36
45*	County Road 52 Solomon Creek	Investigative Elkhart	Tote Barge					60
46	County Road 146 Turkey Creek	Investigative Elkhart	Tote Barge					53
47	County Road 142 Turkey Creek	Investigative Elkhart	Tote Barge					55
48	State Road 4 Rock Run Creek	Investigative Elkhart	Tote Barge					48
49	1st Street Rock Run Creek	Investigative Elkhart	Tote Barge					58
50	County Road 40 Yellow Creek	Investigative Elkhart	Back Pack					24
51	County Road 32 Yellow Creek	Index Elkhart	Tote Barge	36	37	37	37	52
52	Concord High School Yellow Creek	Index Elkhart	Tote Barge	32	36	35	34	59
53	Concord Mall Yellow Creek	Investigative Elkhart	Tote Barge					39
54	US 20 Bypass Yellow Creek	Index Elkhart	Tote Barge	28	38	31	32	50
55	Hively Avenue Yellow Creek	Investigative Elkhart	Tote Barge					54

**Table 2 (continued)**

Site Number	Site Description	Type of Site (Index/Investigative) County	Method	IBI Scores				2003 QHEI Score
				2001	2002	2003	Average	
56	County Road 1 (Wakarusa) Baugo Creek	Investigative Elkhart	Tote Barge					40
57	County Road 130 Baugo Creek	Investigative Elkhart	Tote Barge					62
58	Gertrude Phillips Ditch	Investigative St. Joseph	Back Pack					49
59	Ravina Park Bowman Creek	Index St. Joseph	Back Pack	12	6	0	6	34
60*	Grape Road Juday Creek	Investigative St. Joseph	Tote Barge					57
61*	State Road 23 Juday Creek	Index St. Joseph	Tote Barge	23	34	20	26	60
62*	Ironwood Road Juday Creek	Investigative St. Joseph	Back Pack					49
63*	Myrtle Street Juday Creek	Index St. Joseph	Tote Barge	19	23	21	21	52
64*	Kenilworth Road Juday Creek	Investigative St. Joseph	Back Pack					66
65*	Izaak Walton League Juday Creek	Index St. Joseph	Tote Barge		26	27		75

\* denotes a cool/cold water site

In 2003, 18 index and 31 investigative sites were sampled in Elkhart County and 9 index and 7 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.

Beginning in 2003, stream habitat information was systematically collected from both index and investigative sites using the Qualitative Habitat Evaluation Index (QHEI) as developed by Ohio

EPA (Rankin 1989). In 1999 and 2002, Elkhart attempted to collect this information, but due to inconsistencies in data collection, the information was never reported. In 2003, however, multiple field personnel assessed the habitat at each fish sampling site after the fish were processed and released. These multiple assessments were then averaged for each site (Table 2).

Smallmouth bass greater than 10 inches, walleye greater than 12 inches and largemouth bass greater than 14 inches in length also had an anchor tag applied under the left anterior edge of the dorsal fin (Figure 2). This tag contained Elk-

**Figure 2: Location of tag on fish**



**Table 3: Fish tissue sites**

Site Number	Stream	Station
1	St. Joseph River	Toll Road (Bristol)
2	St. Joseph River	Bristol
3	St. Joseph River	Middleton Run Road (CR 13)
4	St. Joseph River	Lexington Avenue
5	St. Joseph River	McNaughton Park
6	St. Joseph River	Nappanee Street
7	St. Joseph River	Ironwood Drive
8	St. Joseph River	Michigan Street
9	St. Joseph River	Keller Park
10	St. Joseph River	Darden Road
11	St. Joseph River	Brick Road
12	Elkhart River	Oxbow Park (B)
13	Elkhart River	EEC (A)
14	Juday Creek	State Road 23

hart Public Works & Utilities' phone number and a unique tag number. The biggest advantage of this tagging study is its ability to reveal important movement patterns of these fish and help the IDNR in its walleye stocking efforts on the St. Joseph River.

Tissue in the form of fillets was collected from common carp (*Cyprinus carpio*), smallmouth bass,

largemouth bass, rock bass (*Ambloplites rupestris*), walleye, steelhead (*Oncorhynchus mykiss*), channel catfish (*Ictalurus punctatus*), golden redbreast (*Moxostoma erythrurum*), black redbreast (*M. duquesnei*), shorthead redbreast (*M. macrolepidotum*), quillback (*Carpionoxys cyprinus*), and white sucker (*Catostomus commersoni*) from July through August. The tissue samples were collected from two sites on the Elkhart River, one site on Juday Creek, and eleven sites on the St. Joseph River (Table 3 & Figure 3). 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 2003 a total of 24,170 fish were collected in Elkhart County and 6,347 fish were collected in St. Joseph County (Appendix C). In Elkhart County these fish represented 68 species in 17 families of fish and in St. Joseph County, the fish collected represented 51 species from 13 families. In all, 70 species were collected from the two counties. Smallmouth bass, creek chub (*Semotilus atromaculatus*), and longear sunfish (*Lepomis megalotis*) were the top three species collected in St. Joseph County, while white sucker, creek chub, and mimic shiner (*Notropis volucellus*) were the top three species found in Elkhart County.

**Figure 3: Location of fish tissue collection sites for 2003**

