

Elkhart Area Rivers Macroinvertebrate Assemblage Summary 2012

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2012

Project Summary and Data Presentation

Submitted by:

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Submitted to:

City of Elkhart
Public Works & Utilities Department
1201 S. Nappanee St.
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Project Summary

The Midwest Biodiversity Institute, Inc. (MBI) has conducted macroinvertebrate sampling of streams and rivers in the Elkhart, Indiana area on behalf of the City of Elkhart, Public Works and Utilities Department since 2004. This includes sampling during a summer – fall index period and reporting the results annually in a final report. The 2012 survey is the ninth in this series. Samples were collected from 14 sites in 2012 with 13 repeat locations and 1 new site. Sampling was conducted using modified Hester-Dendy artificial substrate samplers and a qualitative dip net/hand pick method in accordance with Ohio EPA macroinvertebrate assessment procedures (Ohio EPA 1987, 1989a). These methods and the attendant biocriteria have been used since 2004 primarily because Indiana then lacked a comparable assessment framework for macroinvertebrates. Indiana DEM has since developed a new macroinvertebrate method and preliminary assessment thresholds based on a calibrated macroinvertebrate IBI (IDEM 2010). However, given the 9-year long tenure of the Ohio EPA methodology and the fundamentally different methodology adopted by IDEM, Elkhart continues to utilize the Ohio EPA methods and assessment protocols.

In 2012, all of the artificial substrate retrievals were deemed valid and an Invertebrate Community Index (ICI; Ohio EPA 1987; DeShon 1995) value was calculated for each. All data was recorded, managed, and reported in accordance with Ohio EPA data management and analytical methods (Ohio EPA 1987, 1989b) which includes the computation of the Invertebrate Community Index (ICI; Ohio EPA 1987; DeShon 1995). This data is intended to compliment the

fish assemblage, habitat, and water quality data collected annually by the City of Elkhart and taken together the monitoring design follows the principles of adequate monitoring and assessment (Yoder 1998; Yoder and Barbour 2009) by employing two biological assemblages and with supporting chemical/physical data. The macroinvertebrate results are presented herein following the format of Ohio EPA use attainment status reporting (Table 1), the Ohio ICI metric values and scores (Appendix Table A-1), and taxa summaries by sampling location (Appendix Table A-2).

The ICI results were screened using the Ohio EPA numeric biological criteria for the Eastern Corn Belt Plains (ECBP) ecoregion as the nearest and most relevant thresholds. For the Warmwater Habitat (WWH) use designation, the ICI biocriterion is 36; for the Exceptional Warmwater Habitat (EWH) use designation, the ICI biocriterion is 46. In accordance with the Ohio Water Quality Standards (WQS), these are the principal benchmarks for assessing attainment of Clean Water Act goals for aquatic life. While the rivers and streams in the Elkhart study area lie within the Northern Indiana/Southern Michigan Till Plains (NISMTTP) ecoregion, the criteria from the neighboring ECBP ecoregion should be sufficiently indicative of the relative quality of each river and stream at least for the baseline assessment purposes of the Elkhart program. Of the 14 sites sampled in 2012, 4 sites met the EWH biocriterion (ICI \geq 46; exceptional), 8 sites fully met the WWH biocriterion (ICI \geq 36; good), one site was in non-significant departure of WWH, and one site did not meet the WWH biocriterion (Table 1, Figures 1-14).

In terms of comparisons to prior year results, four sites exhibited significant increases ($>$ 4 ICI units) in the ICI score while five sites exhibited a significant decline (Table 1). The remaining 5 sites exhibited changes that were within the 4 ICI unit departure threshold and were considered to be virtually unchanged. The results at all 14 sites are graphically depicted in Figures 1-14.

Eleven of the 14 sites sampled in 2012 were also sampled in 2009. The year 2009 had higher rainfall compared to 2012 which experienced a moderate drought resulting in lower flows. Both the Elkhart River at RMs 10.2 and 2.1, and the St. Joseph River at RM 74.4 and 54.9 had lower ICI scores in 2012, compared to 2009. These sites also had noticeably greater amounts of algae on the Hester-Dendy (HD) samplers or had near shore margins choked with vegetation. Water temperatures were higher in 2012, including the highest reading of 28 degrees C recorded at Keller Park (St Joseph RM 54.9). The combination of low flows, elevated temperatures, and nutrient enrichment probably were key factors in the excessive algal growth.

The smaller tributaries appeared to be less seriously affected by the low precipitation in 2012. Christiana Creek 0.7, Juday Creek RM 1.7, and Little Elkhart River RM 6.5 had very good to exceptional water quality in both 2009 and 2012. Baugo Creek RM 1.8 and Yellow Creek RM 2.2 improved from marginally good/good in previous years to very good/exceptional water quality in 2012. The fact that the tributaries compared favorably to prior year's results may be an indication that there are water quality issues in the mainstem that were exacerbated by the combination of factors just described.

There were, however, two areas of concern in the smaller tributaries. Phillips Ditch RM 3.0 had a slight increase from an ICI score of 28 (fair) to 32 (marginally good). This site is located in a forested plot with surrounding residential land use. Any additional stresses in this area may put the macroinvertebrate assemblage on the verge of nonattainment. Juday Creek RM 5.3 (upstream Grape Road) was sampled previously in 2004, 2005 and 2006 with ICI scores that varied around fair to good (36, 28 and 32, respectively). In 2012 the HD samplers were partially silted in and had an ICI score of 20 (fair). Although this site had some similar substrate and habitat characteristics with the downstream site on Juday RM 1.7, upstream at RM 5.3 some of the rocks and woody debris were also silted as were some of the HD samplers. There were only 5 EPT taxa (mayfly, stonefly and caddisfly taxa) collected on the natural substrates at Juday Creek RM 5.3 compared to 14 EPT taxa collected downstream at Juday Creek RM 1.7. The area of Juday Creek RM 5.3 should be monitored or further assessed for nonpoint source impacts so that the downstream exceptional water quality sites do not become adversely affected in the future.

Table 1. Comparison of ICI values and narrative ratings (in lieu of ICI) at river sampling locations in and near Elkhart, IN during 2012 and including data collected at those sites in prior years. The Ohio EPA biocriteria was used to determine attainment status.

| <u>Stream</u> | <u>River Mile</u> | <u>Location</u> | <u>2004</u> | <u>2005</u> | <u>2006</u> | <u>2007</u> | <u>2008</u> | <u>2009</u> | <u>2010</u> | <u>2011</u> | <u>2012</u> | <u>Comment</u> ¹ |
|----------------------|-------------------|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---|
| Baugo Creek | 1.8 | Restoration Site | | | | | | | 36 | 48 | 44 | Slight decrease (-4); Meets WWH |
| Phillips Ditch | 3.0 | Chippewa St | | | | | | 28 | | | 32 | Increase to Non-significant departure of WWH |
| Christiana Creek | 0.7 | Main St | | | | | | 48 | | | 52 | Slight increase from 2009 (+4); Meets EWH |
| Elkhart River | 2.1 | At Central High School | | | | | | 54 | | | 42 | Significant decrease from 2009 (-12); Meets WWH |
| Elkhart River | 10.2 | Oxbow (B) | | | | | | 52 | 52 | | 36 | Significant decrease (-16); Meets WWH |
| Juday Creek | 1.7 | Myrtle | | | | | | 46 | | | 50 | Slight increase from 2009 (+4); Meets EWH |
| Juday Creek | 5.3 | Upst Grape Rd. | 36 | 28 | 32 | | | | | | 20 | Significant decrease (-12); non-attainment of WWH |
| Little Elkhart River | 6.5 | CR 35 | | | | | | 44 | | | 52 | Significant increase from 2009 (+8); Meets EWH |
| St. Joseph River | 51.7 | Brick | 36 | 44 | 48 | | | 40 | | | 44 | Slight increase (+4); Meets WWH |
| St. Joseph River | 54.9 | Keller Park | | | | | | 50 | | | 40 | Significant decrease from 2009 (-10); Meets WWH |
| St. Joseph River | 57.2 | LaSalle | | | | | | | | | 42 | Meets WWH |
| St. Joseph River | 74.4 | McNaughten | | | | | | 44 | | | 38 | Significant decrease (-6); Meets WWH |
| St. Joseph River | 75.7 | Lexington | | | | | | G | | | 48 | Increase from 2009; Meets EWH |
| Yellow Creek | 2.2 | Nr Concord High School | | | | | | 34 | | | 44 | Significant increase from 2009 (+10); Meets WWH |

Ohio Warmwater Habitat (WWH) ICI = 36; Ohio Exceptional Warmwater Habitat (EWH) ICI = 46

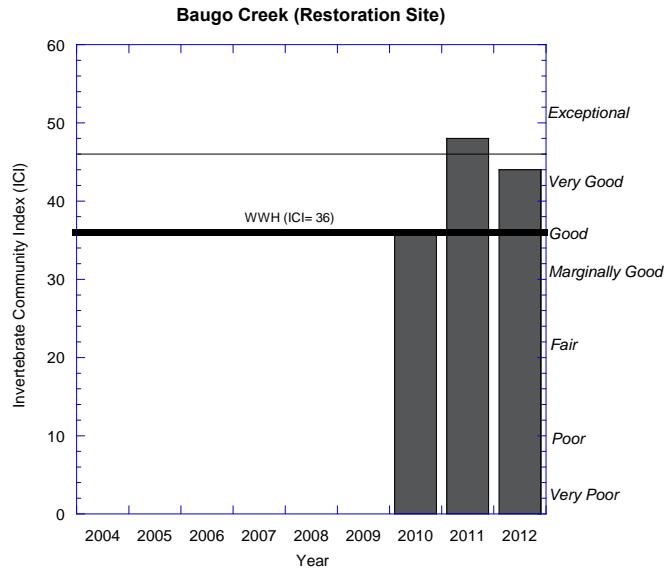


Figure 1. Baugo Creek at RM 1.8 displaying a slight decrease from EWH to WWH in 2012.

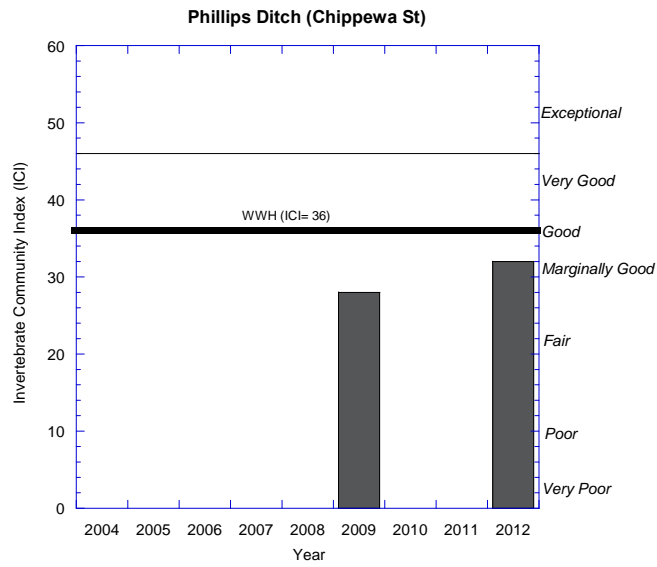


Figure 2. Phillips Ditch at RM 3.0 displaying a slight increase from non-attainment to insignificant departure from WWH.

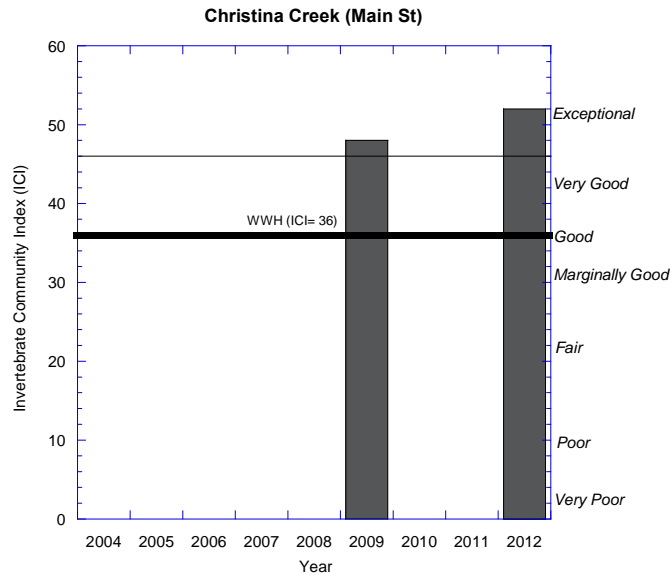


Figure 3. Christiana Creek at RM 0.7 maintaining EWH in 2012.

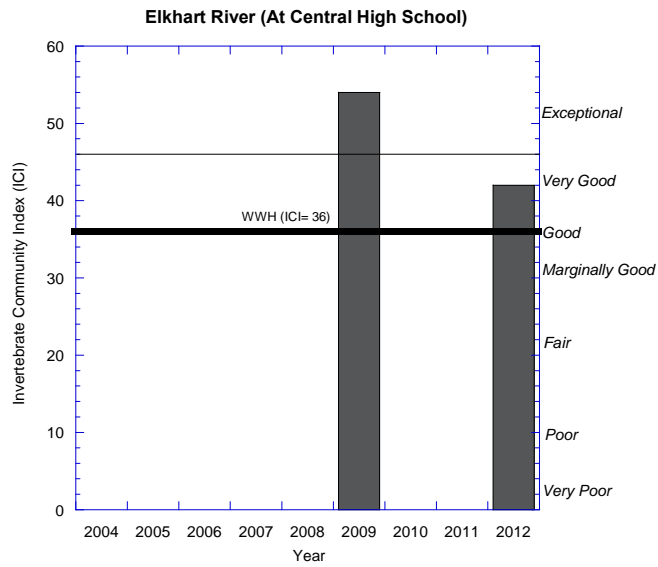


Figure 4. Elkhart River at RM 2.1 displaying a significant decrease from EWH in 2009 to WWH in 2012.

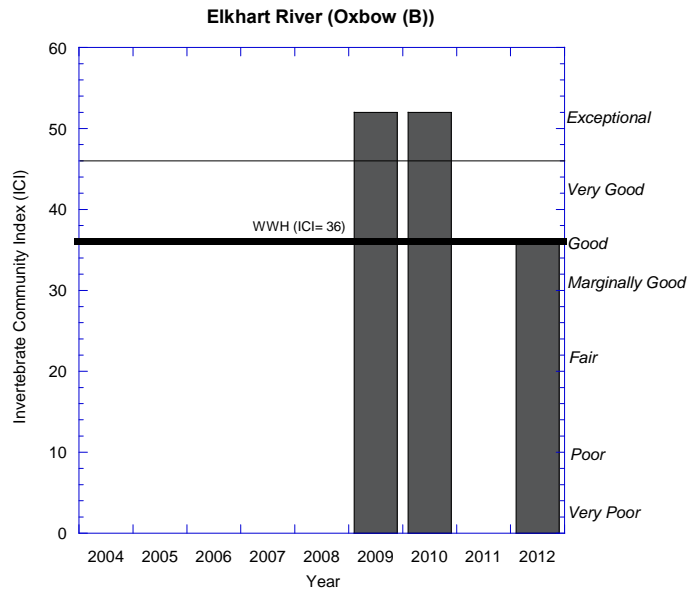


Figure 5. Elkhart River at RM 10.2 displaying a significant decrease from EWH in 2010 to WWH in 2012.

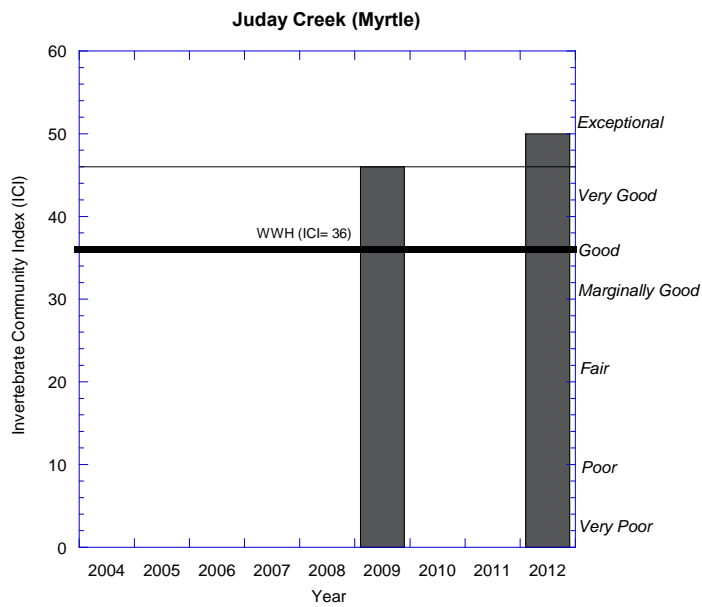


Figure 6. Juday Creek at RM 1.7 maintaining EWH in 2012

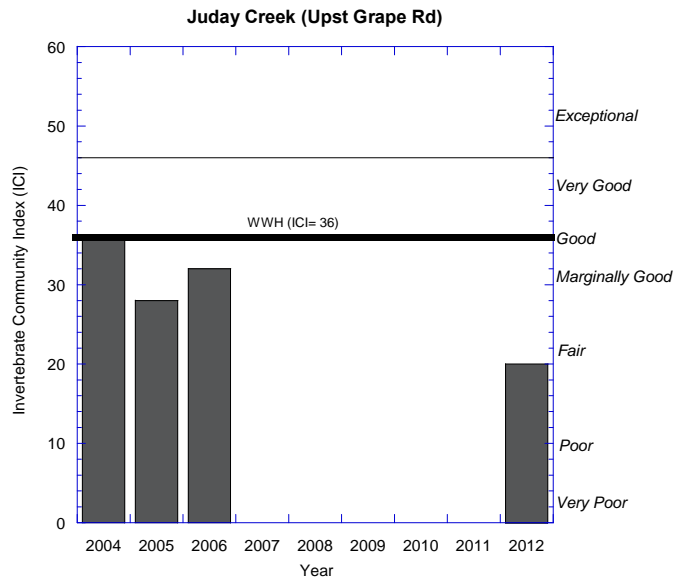


Figure 7. Juday Creek at RM 5.3 displaying a continued non-attainment of WWH in 2012.

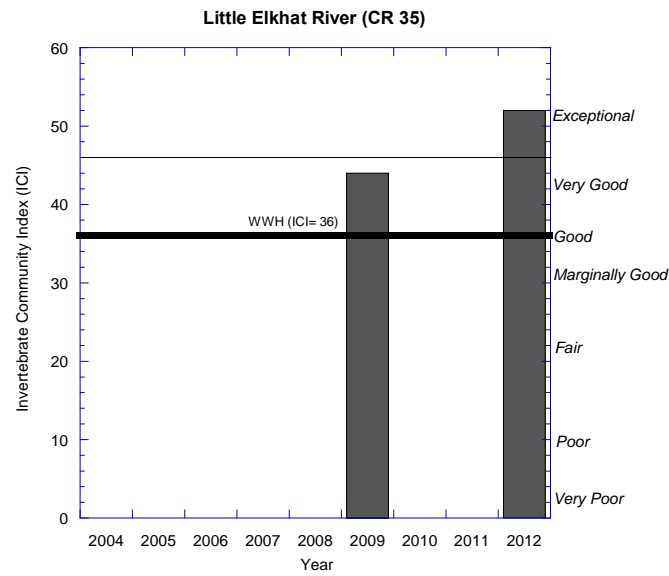


Figure 8. Little Elkhart River at RM 6.5 demonstrating a significant increase from WWH in 2009 to EWH in 2012.

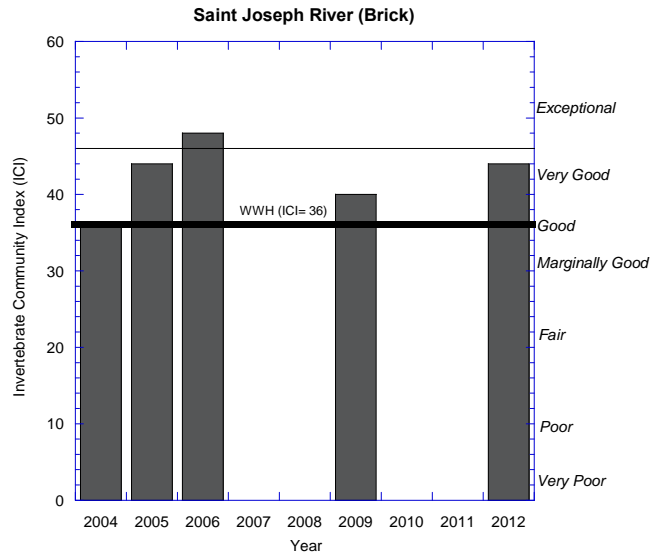


Figure 9. St. Joseph River at RM 51.7 maintains WWH in 2012.

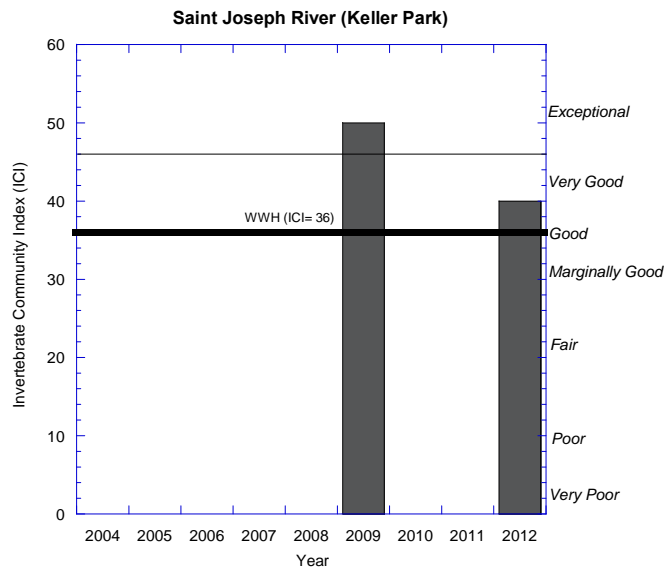


Figure 10. St. Joseph River at RM 54.9 decreasing from EWH in 2009 to WWH in 2012.

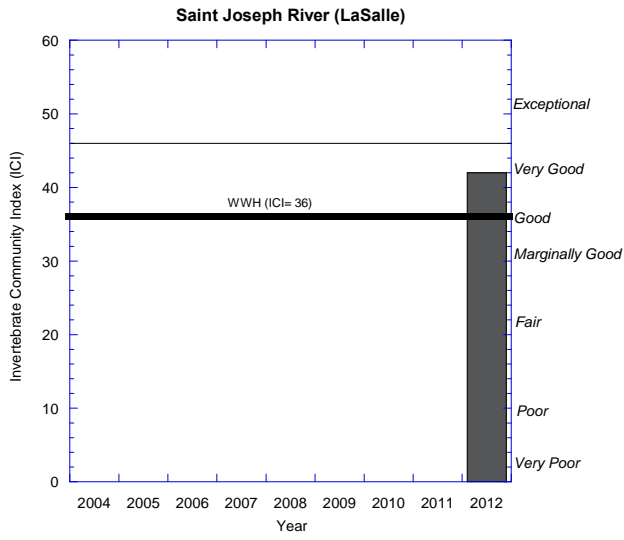


Figure 11. St. Joseph River at RM 57.2 showing attainment of WWH.

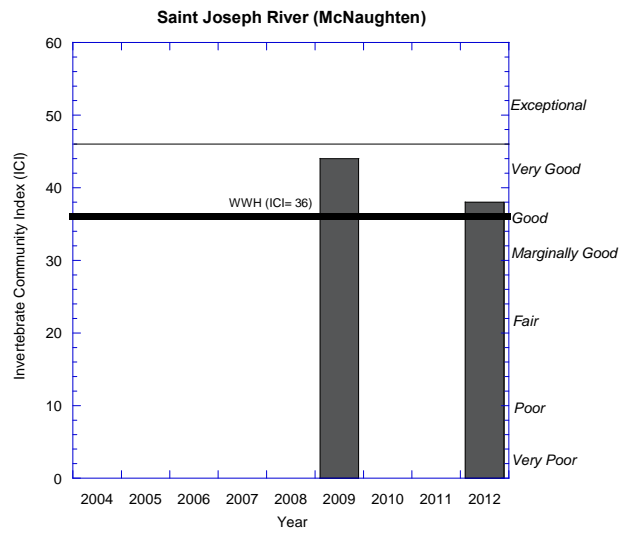


Figure 12. St. Joseph River at RM 74.4 maintaining WWH in 2012.

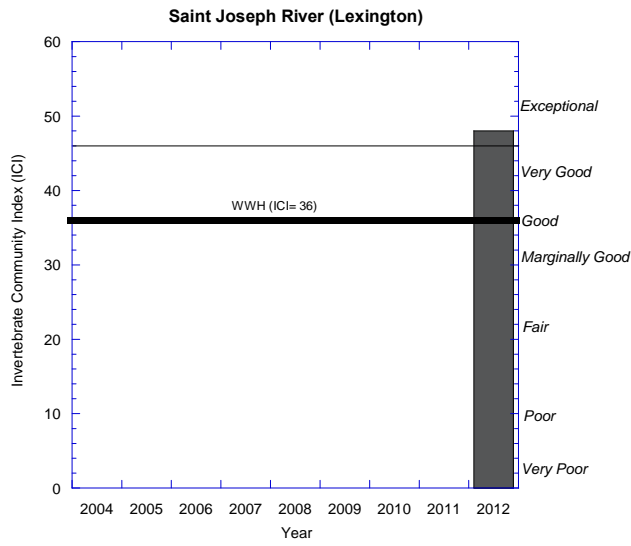


Figure 13. St. Joseph River at RM 75.7 displaying attainment of EWH in 2012.

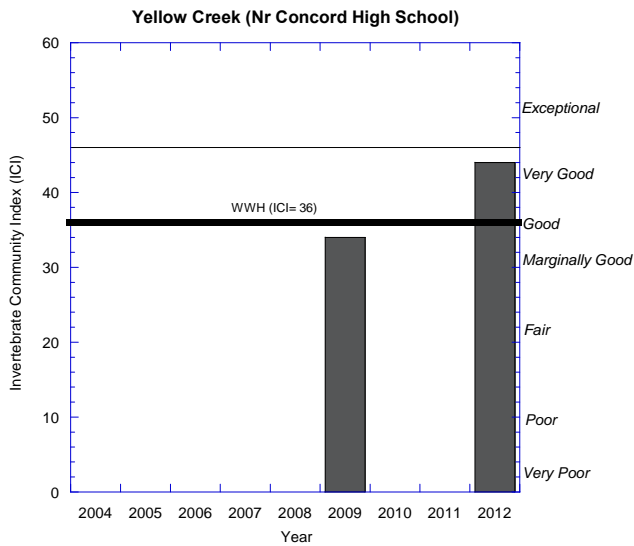


Figure 14. Yellow Creek at RM 2.2 displaying a significant increase from non-attainment in 2009 to WWH in 2012.

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Elkhart Area Rivers Macroinvertebrate Assemblage Data: 2012

Appendix A

Appendix Table A-1. ICI metrics and values from data collected by MBI in the Elkhart River in Indiana during 2012.

| River Mile | Drainage Area (sq mi) | Number of | | | | Percent: | | | | | | Qual. EPT | ICI or Narrative |
|--------------------------------------|-----------------------|------------|-------------|----------------|---------------|----------|-------------|-------------|---------------|--------------------|-------|-----------|------------------|
| | | Total Taxa | Mayfly Taxa | Caddisfly Taxa | Dipteran Taxa | Mayflies | Caddisflies | Tanytarsini | Other Dipt/NI | Tolerant Organisms | | | |
| Yellow Creek (94-001) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 2.20 | 30.0 | 41(6) | 2(0) | 4(6) | 22(6) | 1.7(2) | 9.4(6) | 44.0(6) | 44.4(4) | 3.4(6) | 7(2) | 44 | |
| Elkhart River (94-002) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 2.10 | 697.0 | 43(6) | 14(6) | 2(2) | 15(6) | 52.7(6) | 6.0(2) | 1.3(2) | 33.9(2) | 1.4(6) | 16(4) | 42 | |
| 10.20 | 652.0 | 46(6) | 9(6) | 4(4) | 17(6) | 26.3(4) | 21.4(4) | 5.2(2) | 40.9(2) | 7.9(0) | 11(2) | 36 | |
| Juday Creek (94-003) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 1.70 | 35.0 | 36(4) | 8(6) | 6(6) | 16(4) | 37.6(6) | 50.8(6) | 0.5(2) | 8.7(6) | 0.1(6) | 15(6) | 52 | |
| 5.30 | 26.0 | 24(2) | 0(0) | 3(6) | 16(4) | 0.0(0) | 5.1(4) | 4.1(2) | 89.8(0) | 62.2(0) | 5(2) | 20 | |
| Christiana Creek (94-005) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 0.70 | 127.0 | 44(6) | 13(6) | 10(6) | 12(2) | 38.0(6) | 40.8(6) | 4.4(2) | 14.5(6) | 0.8(6) | 28(6) | 52 | |
| St. Joseph River (94-009) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 51.70 | 3652.0 | 49(6) | 11(6) | 12(6) | 14(6) | 20.1(6) | 24.6(4) | 1.1(2) | 49.6(0) | 3.4(2) | 17(6) | 44 | |
| 54.90 | 3595.0 | 42(6) | 10(6) | 8(6) | 13(6) | 29.9(6) | 26.1(4) | 1.0(2) | 39.3(0) | 2.6(2) | 5(2) | 40 | |
| 57.20 | 3583.0 | 45(6) | 10(6) | 9(6) | 13(6) | 24.1(6) | 10.1(2) | 4.4(2) | 55.8(0) | 2.9(2) | 17(6) | 42 | |
| 74.40 | 3374.0 | 37(6) | 6(4) | 6(4) | 15(6) | 28.4(6) | 9.9(2) | 3.6(2) | 52.8(0) | 1.9(4) | 11(4) | 38 | |
| 75.70 | 3372.0 | 42(6) | 12(6) | 7(4) | 9(6) | 12.8(4) | 31.2(4) | 18.3(6) | 36.3(0) | 0.7(6) | 16(6) | 48 | |
| Phillips Ditch (94-019) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 3.00 | 8.0 | 27(4) | 1(0) | 2(4) | 15(4) | 1.9(2) | 9.0(6) | 5.7(2) | 55.3(2) | 2.7(6) | 4(2) | 32 | |
| Little Elkhart River (94-108) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 6.50 | 115.0 | 53(6) | 8(4) | 9(6) | 24(6) | 34.4(6) | 24.2(6) | 11.3(2) | 29.0(4) | 2.0(6) | 21(6) | 52 | |
| Baugo Creek (94-109) | | | | | | | | | | | | | |
| Year: 2012 | | | | | | | | | | | | | |
| 1.80 | 77.0 | 37(4) | 7(4) | 4(6) | 21(6) | 6.3(2) | 73.0(6) | 7.9(2) | 12.7(6) | 1.0(6) | 5(2) | 44 | |

Elkhart Area Rivers Macroinvertebrate Assemblage Data: 2012

Appendix B

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-001 | | River: <i>Yellow Creek</i> | | Site ID: | YC2.2 |
|-----------------------------|--|----------------------------|------------------------|---|----------------|
| Site: Concorn High School | | | | Subsample: | Collector: MJK |
| Collection Date: 08/06/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 2.20 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 01801 | Turbellaria | + | 82200 | Tvetenia bavarica group | + |
| 03040 | Fredericella sp | 19 | 82710 | Chironomus (C.) sp | + |
| 03360 | Plumatella sp | 1 | 83040 | Dicrotendipes neomodestus | 207 |
| 03600 | Oligochaeta | 28 + | 83820 | Microtendipes "caelum" (sensu Simpson & Bode, 1980) | 24 |
| 05800 | Caecidotea sp | + | 83840 | Microtendipes pedellus group | 275 + |
| 06700 | Crangonyx sp | 52 + | 84470 | Polypedilum (P.) illinoense | 46 |
| 06800 | Gammarus sp | 135 + | 84540 | Polypedilum (Tripodura) scalaenum group | 24 |
| 08260 | Orconectes (Crockerinus) sanbornii sanbornii | + | 84750 | Stictochironomus sp | + |
| 11120 | Baetis flavistriga | 42 + | 85001 | Tanytarsini | 24 |
| 13400 | Stenacron sp | 14 + | 85500 | Paratanytarsus sp | 92 |
| 21300 | Hetaerina sp | 4 + | 85625 | Rheotanytarsus sp | 24 |
| 22001 | Coenagrionidae | 1 | 85800 | Tanytarsus sp | 116 |
| 23909 | Boyeria vinosa | 1 + | 85821 | Tanytarsus glabrescens group sp 7 | 1128 + |
| 44501 | Corixidae | + | 85840 | Tanytarsus sepp | 46 |
| 45300 | Sigara sp | + | 87540 | Hemerodromia sp | 4 |
| 45400 | Trichocorixa sp | + | 95100 | Physella sp | 5 + |
| 52200 | Cheumatopsyche sp | 199 + | 96900 | Ferrissia sp | 33 + |
| 52430 | Ceratopsyche morosa group | 72 + | 98600 | Sphaerium sp | + |
| 52450 | Ceratopsyche sparna | + | | | |
| 52530 | Hydropsyche depravata group | 25 + | | | |
| 53800 | Hydroptila sp | 8 | No. Quantitative Taxa: | 41 | Total Taxa: 57 |
| 55520 | Brachycentrus numerosus | + | No. Qualitative Taxa: | 33 | ICI: 44 |
| 68130 | Helichus sp | 4 + | Number of Organisms: | 3251 | Qual EPT: 7 |
| 68601 | Ancyronyx variegata | 8 | QCTV: | 35.0 | |
| 68700 | Dubiraphia sp | + | | | |
| 68901 | Macronychus glabratus | 1 | | | |
| 70600 | Antocha sp | 8 | | | |
| 71900 | Tipula sp | 1 + | | | |
| 74100 | Simulium sp | + | | | |
| 76001 | Chironomidae | 46 | | | |
| 77500 | Conchapelopia sp | 184 + | | | |
| 77750 | Hayesomyia senata or Thienemannimyia norena | 116 | | | |
| 77800 | Helopelopia sp | + | | | |
| 78600 | Pentaneura inconspicua | 24 | | | |
| 79100 | Thienemannimyia group | 70 | | | |
| 80350 | Corynoneura sp | 24 | | | |
| 80370 | Corynoneura lobata | 24 | | | |
| 80410 | Cricotopus (C.) sp | + | | | |
| 81825 | Rheocricotopus (Psilocricotopus) robacki | 92 | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-002 | | | River: <i>Elkhart River</i> | | | Site ID: | | |
|-----------------------------------|--|---------|-----------------------------|-----------------------------------|----------------|---------------------|--|--|
| Site: Elkhart Central High School | | | Subsample: | | | Collector: MJK | | |
| Collection Date: 08/06/2012 | | | Latitude: 0.000000 | | | Longitude: 0.000000 | | |
| | | | | | | RM: 2.10 | | |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. | | | |
| 00401 | Spongillidae | + | 78450 | Nilotanypus fimbriatus | 7 | | | |
| 01320 | Hydra sp | 4 | 80370 | Corynoneura lobata | 2 | | | |
| 01801 | Turbellaria | 186 + | 82141 | Thienemanniella xena | 2 | | | |
| 02000 | Nematoda | 1 | 82730 | Chironomus (C.) decorus group | + | | | |
| 03600 | Oligochaeta | + | 82885 | Cryptotendipes pseudotener | + | | | |
| 06800 | Gammarus sp | 47 + | 83002 | Dicrotendipes modestus | + | | | |
| 11101 | Plauditus sp | 1 | 83040 | Dicrotendipes neomodestus | 1 + | | | |
| 11120 | Baetis flavistriga | 8 | 83300 | Glyptotendipes (G.) sp | 2 | | | |
| 11130 | Baetis intercalaris | 7 | 83840 | Microtendipes pedellus group | 1 | | | |
| 11150 | Pseudocloeon propinquum | 4 + | 84450 | Polypedilum (Uresipedilum) flavum | 8 | | | |
| 11155 | Iswaeon anoka | + | 84460 | Polypedilum (P.) fallax group | 1 | | | |
| 11245 | Centroptilum sp | + | 84470 | Polypedilum (P.) illinoense | 1 | | | |
| 12200 | Isonychia sp | 85 | 84700 | Stenochironomus sp | 2 | | | |
| 13000 | Leucrocuta sp | 4 | 85500 | Paratanytarsus sp | 3 | | | |
| 13100 | Nixe sp | 1 | 85625 | Rheotanytarsus sp | 2 | | | |
| 13400 | Stenacron sp | 26 + | 85821 | Tanytarsus glabrescens group sp 7 | 8 | | | |
| 13510 | Maccaffertium exiguum | 92 + | 93200 | Hydrobiidae | + | | | |
| 13561 | Maccaffertium pulchellum | 167 + | 93900 | Elimia sp | 45 + | | | |
| 13570 | Maccaffertium terminatum | 30 + | 95100 | Physella sp | 4 + | | | |
| 16300 | Serratella sp | 1 + | 96002 | Helisoma anceps anceps | 1 + | | | |
| 16700 | Tricorythodes sp | 82 + | 96900 | Ferrissia sp | 8 + | | | |
| 17200 | Caenis sp | 2 | | | | | | |
| 21300 | Hetaerina sp | + | No. Quantitative Taxa: 43 | | Total Taxa: 61 | | | |
| 22001 | Coenagrionidae | + | No. Qualitative Taxa: 39 | | ICI: 42 | | | |
| 22300 | Argia sp | 1 + | Number of Organisms: 968 | | Qual EPT: 16 | | | |
| 30800 | Pteronarcys sp | 1 + | QCTV: | | 36.1 | | | |
| 34400 | Paragnetina sp | 9 + | | | | | | |
| 44501 | Corixidae | + | | | | | | |
| 52200 | Cheumatopsyche sp | 52 + | | | | | | |
| 55520 | Brachycentrus numerosus | 6 + | | | | | | |
| 57900 | Pycnopsyche sp | + | | | | | | |
| 58505 | Helicopsyche borealis | + | | | | | | |
| 59400 | Nectopsyche sp | + | | | | | | |
| 60900 | Peltodytes sp | + | | | | | | |
| 68075 | Psephenus herricki | + | | | | | | |
| 68901 | Macronychus glabratus | 47 + | | | | | | |
| 69400 | Stenelmis sp | + | | | | | | |
| 70000 | Diptera | + | | | | | | |
| 77500 | Conchapelopia sp | 3 | | | | | | |
| 77750 | Hayesomyia senata or Thienemannimyia norena | 3 + | | | | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-002 | | River: <i>Elkhart River</i> | | Site ID: | Oxbow B |
|-----------------------------|---------------------------|-----------------------------|------------------------|--|----------------|
| Site: Oxbow B | | | | Subsample: | Collector: 0 |
| Collection Date: 08/06/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 10.20 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 00401 | Spongillidae | + | | Thienemannimyia norena | |
| 01320 | Hydra sp | 6 | 78450 | Nilotanypus fimbriatus | 3 |
| 01801 | Turbellaria | 78 + | 78655 | Procladius (Holotanypus) sp | + |
| 03600 | Oligochaeta | 12 + | 78750 | Rheopelopia paramaculipennis | 3 |
| 04687 | Placobdella parasitica | + | 80370 | Corynoneura lobata | 19 |
| 05800 | Caecidotea sp | + | 81825 | Rheocricotopus (Psilocricotopus) robacki | 1 |
| 06700 | Crangonyx sp | 4 + | 82820 | Cryptochironomus sp | 1 |
| 06800 | Gammarus sp | 23 + | 83040 | Dicotendipes neomodestus | 1 |
| 11120 | Baetis flavistriga | + | 83840 | Microtendipes pedellus group | 1 |
| 11130 | Baetis intercalaris | 2 | 84210 | Paratendipes albimanus or P. duplicatus | + |
| 12200 | Isonychia sp | 1 | 84450 | Polypedilum (Uresipedilum) flavum | 3 |
| 13000 | Leucrocuta sp | 2 | 84470 | Polypedilum (P.) illinoense | 14 + |
| 13100 | Nixe sp | + | 84480 | Polypedilum (P.) laetum group | 1 |
| 13400 | Stenacron sp | 20 + | 85625 | Rheotanytarsus sp | 10 |
| 13510 | Maccaffertium exiguum | 35 + | 85800 | Tanytarsus sp | 1 |
| 13561 | Maccaffertium pulchellum | 34 + | 85821 | Tanytarsus glabrescens group sp 7 | 9 |
| 13570 | Maccaffertium terminatum | 2 | 85840 | Tanytarsus sepp | 9 |
| 16700 | Tricorythodes sp | 45 + | 87540 | Hemerodromia sp | 2 |
| 17200 | Caenis sp | 6 + | 93200 | Hydrobiidae | 4 + |
| 21001 | Calopterygidae | 2 | 93900 | Elimia sp | 28 + |
| 21200 | Calopteryx sp | + | 96002 | Helisoma anceps anceps | 1 + |
| 22001 | Coenagrionidae | + | 96264 | Planorbella (Pierosoma) pilsbryi | + |
| 22300 | Argia sp | 3 + | 96900 | Ferrissia sp | 18 |
| 23909 | Boyeria vinosa | + | 97601 | Corbicula fluminea | + |
| 24900 | Gomphus sp | + | 98600 | Sphaerium sp | 4 + |
| 30000 | Plecoptera | 1 | | | |
| 34700 | Agnatina capitata complex | + | | | |
| 52200 | Cheumatopsyche sp | 95 + | | | |
| 55520 | Brachycentrus numerosus | 22 + | No. Quantitative Taxa: | 46 | Total Taxa: 65 |
| 57900 | Pycnopsyche sp | 2 + | No. Qualitative Taxa: | 39 | ICI: 36 |
| 59400 | Nectopsyche sp | 1 | Number of Organisms: | 560 | Qual EPT: 11 |
| 60400 | Gyrinus sp | + | QCTV: | | 36.1 |
| 60800 | Haliplus sp | + | | | |
| 68075 | Psephenus herricki | + | | | |
| 68601 | Ancyronyx variegata | 2 | | | |
| 68708 | Dubiraphia vittata group | + | | | |
| 68901 | Macronychus glabratus | 23 + | | | |
| 69400 | Stenelmis sp | 4 + | | | |
| 77355 | Clinotanypus pinguis | + | | | |
| 77500 | Conchapelopia sp | 1 | | | |
| 77750 | Hayesomyia senata or | 1 | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-003 | | River: <i>Juday Creek</i> | | Site ID: | JC1.7 |
|-----------------------------|--|---------------------------|------------------------|-----------------------------------|----------------|
| Site: Myrtle Street | | | | Subsample: | Collector: MJK |
| Collection Date: 08/07/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 1.70 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 01320 | Hydra sp | 1 | 82200 | Tvetenia bavarica group | 1 |
| 01801 | Turbellaria | 21 + | 82220 | Tvetenia discoloripes group | 5 |
| 01900 | Nemertea | 4 | 83040 | Dicrotendipes neomodestus | + |
| 05800 | Caecidotea sp | + | 83051 | Dicrotendipes simpsoni | 1 |
| 06800 | Gammarus sp | + | 84000 | Parachironomus sp | 1 |
| 08601 | Hydracarina | + | 84450 | Polypedilum (Uresipedilum) flavum | 10 + |
| 11115 | Baetis tricaudatus | 2 | 85615 | Rheotanytarsus pellucidus | 1 |
| 11120 | Baetis flavistriga | 11 + | 85625 | Rheotanytarsus sp | 2 |
| 11130 | Baetis intercalaris | 21 | 85814 | Tanytarsus glabrescens group | 1 |
| 13400 | Stenacron sp | 113 + | 97601 | Corbicula fluminea | + |
| 13510 | Maccaffertium exiguum | 57 + | | | |
| 13561 | Maccaffertium pulchellum | 84 + | No. Quantitative Taxa: | 36 | Total Taxa: 50 |
| 13570 | Maccaffertium terminatum | 4 | No. Qualitative Taxa: | 28 | ICI: 52 |
| 13590 | Maccaffertium vicarium | 14 | Number of Organisms: | 813 | Qual EPT: 15 |
| 16700 | Tricorythodes sp | + | QCTV: | 41.2 | |
| 17200 | Caenis sp | + | | | |
| 18600 | Ephemera sp | + | | | |
| 21200 | Calopteryx sp | + | | | |
| 24900 | Gomphus sp | + | | | |
| 50315 | Chimarra obscura | + | | | |
| 52200 | Cheumatopsyche sp | 298 + | | | |
| 52430 | Ceratopsyche morosa group | 61 + | | | |
| 52450 | Ceratopsyche sparna | 2 | | | |
| 52530 | Hydropsyche depravata group | 42 + | | | |
| 53800 | Hydroptila sp | 1 | | | |
| 55520 | Brachycentrus numerosus | 9 + | | | |
| 57900 | Pycnopsyche sp | + | | | |
| 59310 | Mystacides sepulchralis | + | | | |
| 59580 | Oecetis persimilis | + | | | |
| 68901 | Macronychus glabratus | 15 + | | | |
| 69200 | Optioservus sp | 1 + | | | |
| 69400 | Stenelmis sp | 3 + | | | |
| 76001 | Chironomidae | 2 | | | |
| 77001 | Tanypodinae | 1 | | | |
| 78450 | Nilotanypus fimbriatus | 2 + | | | |
| 80001 | Orthoclaadiinae | 1 | | | |
| 80370 | Corynoneura lobata | 4 | | | |
| 81650 | Parametrioctenus sp | 6 | | | |
| 81825 | Rheocricotopus (Psilocricotopus) robacki | 2 | | | |
| 82141 | Thienemanniella xena | 9 | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-003 | | River: <i>Juday Creek</i> | | Site ID: | Site 18 |
|-----------------------------|--|---------------------------|---|-------------|----------------|
| Site: Grape Rd | | | | Subsample: | Collector: MJK |
| Collection Date: 08/07/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 5.30 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 03600 | Oligochaeta | 61 | 98200 | Pisidium sp | 1 |
| 05800 | Caecidotea sp | + | | | |
| 06700 | Crangonyx sp | + | No. Quantitative Taxa: 24 Total Taxa: 40 | | |
| 06800 | Gammarus sp | 1 + | No. Qualitative Taxa: 20 ICI: 20 | | |
| 08255 | Orconectes rusticus x sanbornii | 3 | Number of Organisms: 98 Qual EPT: 5 | | |
| 13400 | Stenacron sp | + | QCTV: 35.2 | | |
| 13590 | Maccaffertium vicarium | + | | | |
| 21001 | Calopterygidae | + | | | |
| 22001 | Coenagrionidae | + | | | |
| 23905 | Boyeria grafiana | + | | | |
| 23909 | Boyeria vinosa | + | | | |
| 47600 | Sialis sp | + | | | |
| 52200 | Cheumatopsyche sp | 3 + | | | |
| 52530 | Hydropsyche depravata group | + | | | |
| 53501 | Hydroptilidae | 1 | | | |
| 54300 | Oxyethira sp | 1 | | | |
| 55520 | Brachycentrus numerosus | + | | | |
| 67500 | Laccobius sp | + | | | |
| 68700 | Dubiraphia sp | 1 | | | |
| 73601 | Simuliidae | 1 | | | |
| 74100 | Simulium sp | + | | | |
| 76001 | Chironomidae | 1 | | | |
| 77100 | Ablabesmyia sp | 1 | | | |
| 78600 | Pentaneura inconspicua | + | | | |
| 78655 | Procladius (Holotanypus) sp | + | | | |
| 79761 | Pagastia orthogonia | 2 | | | |
| 81825 | Rheocricotopus (Psilocricotopus) robacki | 1 | | | |
| 82820 | Cryptochironomus sp | 1 | | | |
| 82880 | Cryptotendipes sp | + | | | |
| 84300 | Phaenopsectra obediens group | 3 | | | |
| 84440 | Polypedilum (Uresipedilum) aviceps | 1 | | | |
| 84540 | Polypedilum (Tripodura) scalaenum group | 5 | | | |
| 84612 | Saetheria tylus | 1 | | | |
| 84750 | Stictochironomus sp | 4 + | | | |
| 85263 | Cladotanytarsus vanderwulpi group Type 3 | 1 | | | |
| 85615 | Rheotanytarsus pellucidus | 1 + | | | |
| 85800 | Tanytarsus sp | 1 | | | |
| 85821 | Tanytarsus glabrescens group sp 7 | 1 | | | |
| 87540 | Hemerodromia sp | 1 | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-005 | | River: <i>Christiana Creek</i> | | Site ID: | CC0.70 |
|-----------------------------|----------------------------------|--------------------------------|---------------------------|--|----------------|
| Site: North Main Wellfield | | | Subsample: | | Collector: MJK |
| Collection Date: 08/07/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | | RM: 0.70 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 01801 | Turbellaria | 34 | 58505 | Helicopsyche borealis | + |
| 01900 | Nemertea | 1 | 59580 | Oecetis persimilis | + |
| 05800 | Caecidotea sp | + | 59950 | Parapoynx sp | 1 |
| 06800 | Gammarus sp | 8 + | 59970 | Petrophila sp | + |
| 11010 | Acentrella sp | 2 | 60300 | Dineutus sp | 1 |
| 11101 | Plauditus sp | 17 | 68075 | Psephenus herricki | + |
| 11115 | Baetis tricaudatus | 11 | 68901 | Macronychus glabratus | 24 + |
| 11119 | Plauditus dubius or P. virilis | + | 69400 | Stenelmis sp | 17 + |
| 11120 | Baetis flavistriga | 12 + | 70600 | Antocha sp | 1 |
| 11130 | Baetis intercalaris | 365 + | 73601 | Simuliidae | + |
| 11150 | Pseudocloeon propinquum | + | 74100 | Simulium sp | 72 |
| 11155 | Isxaeon anoka | + | 78450 | Nilotanypus fimbriatus | 1 |
| 11503 | Heterocloeon curiosum | + | 78750 | Rheopelopia paramaculipennis | 4 |
| 11651 | Procloeon sp (w/o hindwing pads) | + | 81825 | Rheocricotopus (Psilocricotopus) robacki | 4 |
| 12200 | Isonychia sp | 4 | 82130 | Thienemanniella similis | 8 |
| 13400 | Stenacron sp | 5 + | 82141 | Thienemanniella xena | 9 |
| 13510 | Maccaffertium exiguum | 123 + | 82220 | Tvetenia discoloripes group | 49 |
| 13540 | Maccaffertium mediopunctatum | 21 + | 83040 | Dicrotendipes neomodestus | 4 |
| 13561 | Maccaffertium pulchellum | 80 + | 84450 | Polypedilum (Uresipedilum) flavum | 67 + |
| 13570 | Maccaffertium terminatum | 12 + | 85625 | Rheotanytarsus sp | 88 + |
| 16300 | Serratella sp | 112 + | 87540 | Hemerodromia sp | 16 + |
| 16700 | Tricorythodes sp | 4 + | 93900 | Elimia sp | + |
| 17200 | Caenis sp | + | 96900 | Ferrissia sp | 16 |
| 18704 | Hexagenia atrocaudata | + | 97601 | Corbicula fluminea | + |
| 21300 | Hetaerina sp | + | 97710 | Dreissena polymorpha | + |
| 22001 | Coenagrionidae | + | | | |
| 22300 | Argia sp | + | | | |
| 48410 | Corydalus cornutus | 3 + | No. Quantitative Taxa: 44 | | Total Taxa: 66 |
| 50906 | Psychomyia flavida | + | No. Qualitative Taxa: 45 | | ICI: 52 |
| 51300 | Neureclipsis sp | 2 + | Number of Organisms: 2021 | | Qual EPT: 28 |
| 52001 | Hydropsychidae | 8 | QCTV: | | 43.1 |
| 52200 | Cheumatopsyche sp | 434 + | | | |
| 52430 | Ceratopsyche morosa group | 2 + | | | |
| 52450 | Ceratopsyche sparna | 102 + | | | |
| 52530 | Hydropsyche depravata group | 108 + | | | |
| 52565 | Hydropsyche phalerata | 22 + | | | |
| 53800 | Hydroptila sp | 3 | | | |
| 54160 | Ochrotrichia sp | 8 | | | |
| 55520 | Brachycentrus numerosus | 136 + | | | |
| 57400 | Neophylax sp | + | | | |
| 57900 | Pycnopsyche sp | + | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-009 | | River: <i>St. Joseph River</i> | | Site ID: | Site 8 |
|-----------------------------|-------------------------------------|--------------------------------|---------------------|--|----------------|
| Site: Brick Road | | | | Subsample: | Collector: MJK |
| Collection Date: 08/08/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 51.70 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 00401 | Spongillidae | + | 59420 | Nectopsyche pavidia | 1 + |
| 01801 | Turbellaria | 97 + | 59500 | Oecetis sp | 1 |
| 03600 | Oligochaeta | 16 + | 59580 | Oecetis persimilis | + |
| 04663 | Helobdella papillata | + | 59970 | Petrophila sp | 29 |
| 05800 | Caecidotea sp | + | 60900 | Peltodytes sp | + |
| 06201 | Hyalella azteca | 4 | 67800 | Tropisternus sp | + |
| 06700 | Crangonyx sp | + | 68075 | Psephenus herricki | + |
| 06800 | Gammarus sp | + | 68901 | Macronychus glabratus | 13 + |
| 08240 | Orconectes (Crockerinus) propinquus | + | 69400 | Stenelmis sp | 5 + |
| 08601 | Hydracarina | + | 74100 | Simulium sp | 2 |
| 11101 | Plauditus sp | 1 | 77115 | Ablabesmyia janta | 7 |
| 11119 | Plauditus dubius or P. virilis | + | 77120 | Ablabesmyia mallochi | 10 + |
| 11120 | Baetis flavistriga | 4 | 77750 | Hayesomyia senata or Thienemannimyia norena | 7 |
| 11130 | Baetis intercalaris | 46 | | | |
| 12200 | Isonychia sp | 153 + | 78600 | Pentaneura inconspicua | 7 |
| 13400 | Stenacron sp | 27 + | 78750 | Rheopelopia paramaculipennis | 7 |
| 13510 | Maccaffertium exiguum | 41 + | 80370 | Corynoneura lobata | 24 |
| 13540 | Maccaffertium mediopunctatum | 2 + | 81650 | Parametricnemus sp | + |
| 13561 | Maccaffertium pulchellum | 31 | 82141 | Thienemanniella xena | + |
| 13570 | Maccaffertium terminatum | 5 | 82730 | Chironomus (C.) decorus group | + |
| 16300 | Serratella sp | 25 + | 83002 | Dicrotendipes modestus | + |
| 16700 | Tricorythodes sp | 45 + | 83040 | Dicrotendipes neomodestus | + |
| 17200 | Caenis sp | + | 84300 | Phaenopsectra obediens group | 7 + |
| 21300 | Hetaerina sp | 4 + | 84450 | Polypedilum (Uresipedilum) flavum | 497 + |
| 22001 | Coenagrionidae | + | 84460 | Polypedilum (P.) fallax group | 7 |
| 22300 | Argia sp | 38 + | 84470 | Polypedilum (P.) illinoense | 10 + |
| 23700 | Anax sp | + | 84700 | Stenochironomus sp | 17 |
| 23909 | Boyeria vinosa | 1 | 84790 | Tribelos fuscicorne | 7 |
| 49101 | Sisyridae | + | 84800 | Tribelos jucundum | + |
| 51600 | Polycentropus sp | 8 | 84888 | Xenochironomus xenolabis | + |
| 52200 | Cheumatopsyche sp | 315 + | 85625 | Rheotanytarsus sp | 20 |
| 52510 | Hydropsyche aerata | 8 | 93900 | Elimia sp | 181 + |
| 52565 | Hydropsyche phalerata | 61 + | 95100 | Physella sp | 25 + |
| 52620 | Macrostemum zebratum | 4 | 96264 | Planorbella (Pierosoma) pilsbryi | + |
| 53400 | Protoptila sp | 4 + | 96900 | Ferrissia sp | 6 + |
| 53800 | Hydroptila sp | 23 | 97601 | Corbicula fluminea | + |
| 54160 | Ochrotrichia sp | 18 | 99120 | Utterbackia imbecillis | + |
| 55520 | Brachycentrus numerosus | 20 + | 99260 | Lasmigona compressa | + |
| 57400 | Neophylax sp | + | 99600 | Actinonaias ligamentina carinata | + |
| 58020 | Lepidostoma sp | 2 + | 99880 | Lampsilis cardium | + |
| 58505 | Helicopsyche borealis | + | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

River Code: 94-009 River: **St. Joseph River** Site ID: **Site 8**
 Site: Brick Road Subsample: Collector: **MJK**
 Collection Date: 08/08/2012 Latitude: 0.000000 Longitude: 0.000000 RM: 51.70

| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
|-----------|------|---------|-----------|------|---------|
|-----------|------|---------|-----------|------|---------|

| | | | |
|------------------------|------|-------------|------|
| No. Quantitative Taxa: | 49 | Total Taxa: | 80 |
| No. Qualitative Taxa: | 56 | ICI: | 44 |
| Number of Organisms: | 1893 | Qual EPT: | 17 |
| QCTV: | | | 35.8 |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-009 | | River: <i>St. Joseph River</i> | | Site ID: | SJR54.9 | |
|-----------------------------|--------------------------------|--------------------------------|------------------------|--|----------------|-------|
| Site: Keller Park | | | Subsample: | | Collector: MJK | |
| Collection Date: 08/08/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | | RM: | 54.90 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. | |
| 01320 | Hydra sp | 12 | | Thienemannimyia norena | | |
| 01801 | Turbellaria | 45 + | 77800 | Helopelopia sp | 4 | |
| 02000 | Nematoda | 1 | 78655 | Procladius (Holotanypus) sp | + | |
| 03600 | Oligochaeta | + | 79020 | Tanypus neopunctipennis | + | |
| 04663 | Helobdella papillata | + | 80360 | Corynoneura "celeripes" (sensu Simpson & Bode, 1980) | 8 | |
| 05800 | Caecidotea sp | + | 80370 | Corynoneura lobata | 4 | |
| 06700 | Crangonyx sp | + | 80420 | Cricotopus (C.) bicinctus | 4 | |
| 06800 | Gammarus sp | + | 82141 | Thienemanniella xena | 8 + | |
| 08200 | Orconectes sp | + | 82220 | Tvetenia discoloripes group | 11 | |
| 11101 | Plauditus sp | 5 | 82730 | Chironomus (C.) decorus group | + | |
| 11119 | Plauditus dubius or P. virilis | 12 + | 83002 | Dicrotendipes modestus | + | |
| 11130 | Baetis intercalaris | 51 | 83040 | Dicrotendipes neomodestus | + | |
| 11155 | Iswaeon anoka | + | 84450 | Polypedilum (Uresipedilum) flavum | 276 + | |
| 12200 | Isonychia sp | 72 | 84470 | Polypedilum (P.) illinoense | 11 + | |
| 13400 | Stenacron sp | 9 | 84700 | Stenochironomus sp | 34 | |
| 13510 | Maccaffertium exiguum | 68 | 85625 | Rheotanytarsus sp | 15 | |
| 13561 | Maccaffertium pulchellum | 75 | 87540 | Hemerodromia sp | 8 | |
| 13570 | Maccaffertium terminatum | 23 | 93200 | Hydrobiidae | 1 + | |
| 16300 | Serratella sp | 64 | 93900 | Elimia sp | 127 + | |
| 16700 | Tricorythodes sp | 65 + | 94400 | Fossaria sp | + | |
| 22001 | Coenagrionidae | + | 95100 | Physella sp | 20 + | |
| 22300 | Argia sp | 28 + | 96264 | Planorbella (Pierosoma) pilsbryi | + | |
| 34400 | Paragnetina sp | 1 | 96900 | Ferrissia sp | 4 | |
| 44501 | Corixidae | + | 97601 | Corbicula fluminea | + | |
| 52200 | Cheumatopsyche sp | 173 | 99180 | Strophitus undulatus undulatus | + | |
| 52510 | Hydropsyche aerata | 16 | 99860 | Lampsilis radiata luteola | + | |
| 52565 | Hydropsyche phalerata | 119 | 99880 | Lampsilis cardium | + | |
| 52620 | Macrostemum zebratum | 41 | | | | |
| 53400 | Protoptila sp | 8 | | | | |
| 53800 | Hydroptila sp | 9 | No. Quantitative Taxa: | 42 | Total Taxa: | 67 |
| 54160 | Ochrotrichia sp | 13 | No. Qualitative Taxa: | 36 | ICI: | 40 |
| 58505 | Helicopsyche borealis | + | Number of Organisms: | 1487 | Qual EPT: | 5 |
| 59400 | Nectopsyche sp | + | QCTV: | | 30.3 | |
| 59580 | Oecetis persimilis | 9 | | | | |
| 59970 | Petrophila sp | 8 | | | | |
| 60900 | Peltodytes sp | + | | | | |
| 63900 | Laccophilus sp | + | | | | |
| 68901 | Macronychus glabratus | 17 + | | | | |
| 69400 | Stenelmis sp | + | | | | |
| 73601 | Simuliidae | 4 | | | | |
| 77750 | Hayesomyia senata or | 4 | | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-009 | | River: <i>St. Joseph River</i> | | Site ID: | SJR57.2 |
|-----------------------------|---|--------------------------------|---------------------------|-----------------------------------|----------------|
| Site: LaSalle St | | | | Subsample: | Collector: MJK |
| Collection Date: 08/08/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 57.20 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 00401 | Spongillidae | + | 82220 | Tvetenia discoloripes group | 7 + |
| 01320 | Hydra sp | 16 | 83040 | Dicrotendipes neomodestus | 220 |
| 01801 | Turbellaria | 802 + | 84450 | Polypedilum (Uresipedilum) flavum | 108 + |
| 03600 | Oligochaeta | 20 | 84470 | Polypedilum (P.) illinoense | + |
| 04901 | Erpobdellidae | + | 84700 | Stenochironomus sp | 7 |
| 06800 | Gammarus sp | 15 + | 84888 | Xenochironomus xenolabis | 14 |
| 08601 | Hydracarina | 12 + | 85625 | Rheotanytarsus sp | 122 + |
| 11119 | Plautidus dubius or P. virilis | 1 + | 87540 | Hemerodromia sp | 12 |
| 11130 | Baetis intercalaris | 5 + | 93200 | Hydrobiidae | 4 |
| 11155 | Iswaeon anoka | + | 93900 | Elimia sp | 170 + |
| 12200 | Isonychia sp | 5 + | 94400 | Fossaria sp | + |
| 13400 | Stenacron sp | 467 + | 95100 | Physella sp | + |
| 13510 | Maccaffertium exiguum | 4 + | 95907 | Gyraulus (Torquis) parvus | 4 |
| 13540 | Maccaffertium mediopunctatum | 1 | 96900 | Ferrissia sp | 25 + |
| 13561 | Maccaffertium pulchellum | 14 + | 97601 | Corbicula fluminea | + |
| 13570 | Maccaffertium terminatum | 21 + | 99860 | Lampsilis radiata luteola | + |
| 16300 | Serratella sp | 7 + | | | |
| 16700 | Tricorythodes sp | 138 + | No. Quantitative Taxa: 45 | | Total Taxa: 56 |
| 22300 | Argia sp | 8 + | No. Qualitative Taxa: 38 | | ICI: 42 |
| 23909 | Boyeria vinosa | 1 | Number of Organisms: 2754 | | Qual EPT: 17 |
| 51400 | Nyctiophylax sp | 5 | QCTV: | | 40.3 |
| 52200 | Cheumatopsyche sp | 181 + | | | |
| 52510 | Hydropsyche aerata | + | | | |
| 52565 | Hydropsyche phalerata | 5 + | | | |
| 52620 | Macrostemum zebratum | 9 + | | | |
| 53400 | Protoptila sp | 6 + | | | |
| 53800 | Hydroptila sp | 57 + | | | |
| 54160 | Ochrotrichia sp | 13 | | | |
| 59100 | Ceraclea sp | + | | | |
| 59400 | Nectopsyche sp | 2 | | | |
| 59580 | Oecetis persimilis | 1 | | | |
| 59970 | Petrophila sp | 109 + | | | |
| 68901 | Macronychus glabratus | 36 + | | | |
| 69400 | Stenelmis sp | + | | | |
| 77120 | Ablabesmyia mallochi | 7 | | | |
| 77750 | Hayesomyia senata or Thienemannimyia norena | 14 | | | |
| 80310 | Cardiocladius obscurus | 7 + | | | |
| 80360 | Corynoneura "celeripes" (sensu Simpson & Bode, 1980) | 24 | | | |
| 80400 | Cricotopus sp | 14 | | | |
| 80420 | Cricotopus (C.) bicinctus | 34 + | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-009 | | River: <i>St. Joseph River</i> | | Site ID: | SJR74.4 |
|-----------------------------|--|--------------------------------|------------------------|-----------------------------------|----------------|
| Site: McNaughton Park | | | | Subsample: | Collector: MJK |
| Collection Date: 08/08/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 74.40 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 00401 | Spongillidae | + | 83040 | Dicrotendipes neomodestus | 499 + |
| 01320 | Hydra sp | 8 | 83300 | Glyptotendipes (G.) sp | 8 |
| 01801 | Turbellaria | 90 + | 84450 | Polypedilum (Uresipedilum) flavum | 67 |
| 03600 | Oligochaeta | 4 | 84470 | Polypedilum (P.) illinoense | + |
| 05800 | Caecidotea sp | + | 84700 | Stenochironomus sp | 30 + |
| 06201 | Hyalella azteca | 1 + | 84790 | Tribelos fuscicorne | 22 |
| 06700 | Crangonyx sp | + | 84960 | Pseudochironomus sp | + |
| 06800 | Gammarus sp | 1 + | 85625 | Rheotanytarsus sp | 59 |
| 08601 | Hydracarina | + | 95100 | Physella sp | 5 |
| 11200 | Callibaetis sp | + | | | |
| 13400 | Stenacron sp | 159 + | No. Quantitative Taxa: | 37 | Total Taxa: 49 |
| 13510 | Maccaffertium exiguum | 10 + | No. Qualitative Taxa: | 26 | ICI: 38 |
| 13540 | Maccaffertium mediopunctatum | + | Number of Organisms: | 1646 | Qual EPT: 11 |
| 13550 | Maccaffertium mexicanum integrum | 2 | QCTV: | | 37.2 |
| 13561 | Maccaffertium pulchellum | 24 + | | | |
| 13570 | Maccaffertium terminatum | 1 | | | |
| 16700 | Tricorythodes sp | 272 + | | | |
| 22001 | Coenagrionidae | 5 | | | |
| 22300 | Argia sp | 8 | | | |
| 49101 | Sisyridae | 18 + | | | |
| 51400 | Nyctiophylax sp | 31 + | | | |
| 51600 | Polycentropus sp | + | | | |
| 52200 | Cheumatopsyche sp | 57 + | | | |
| 52500 | Hydropsyche sp | 4 | | | |
| 53800 | Hydroptila sp | 61 + | | | |
| 54300 | Oxyethira sp | 9 | | | |
| 55520 | Brachycentrus numerosus | + | | | |
| 59580 | Oecetis persimilis | 1 | | | |
| 68901 | Macronychus glabratus | 56 + | | | |
| 69400 | Stenelmis sp | + | | | |
| 71300 | Limonia sp | + | | | |
| 76001 | Chironomidae | 8 | | | |
| 77001 | Tanypodinae | 8 | | | |
| 77120 | Ablabesmyia mallochi | 37 | | | |
| 77130 | Ablabesmyia rhamphe group | 8 | | | |
| 77750 | Hayesomyia senata or Thienemannimyia norena | 8 | | | |
| 80370 | Corynoneura lobata | 21 | | | |
| 80410 | Cricotopus (C.) sp | 14 | | | |
| 80420 | Cricotopus (C.) bicinctus | 22 | | | |
| 83003 | Dicrotendipes fumidus | 8 | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-009 | | River: <i>St. Joseph River</i> | | Site ID: | SJR75.7 | |
|-----------------------------|---------------------------------------|--------------------------------|------------------------|--|----------------|-------|
| Site: Lexington | | | Subsample: | | Collector: MJK | |
| Collection Date: 08/07/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | | RM: | 75.70 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. | |
| 01320 | Hydra sp | 32 | 69400 | Stenelmis sp | 4 + | |
| 01801 | Turbellaria | 123 + | 74501 | Ceratopogonidae | + | |
| 03600 | Oligochaeta | + | 77130 | Ablabesmyia rhamphe group | 56 + | |
| 05800 | Caecidotea sp | + | 77750 | Hayesomyia senata or Thienemannimyia norena | 56 | |
| 06201 | Hyalella azteca | 4 + | 78450 | Nilotanypus fimbriatus | 27 | |
| 06800 | Gammarus sp | + | 80370 | Corynoneura lobata | 48 | |
| 08250 | Orconectes (Procericambarus) rusticus | + | 80400 | Cricotopus sp | 56 | |
| 08601 | Hydracarina | 8 | 83002 | Dicotendipes modestus | + | |
| 11001 | Baetidae | 8 | 83040 | Dicotendipes neomodestus | 1099 + | |
| 11119 | Plauditus dubius or P. virilis | 9 | 83840 | Microtendipes pedellus group | + | |
| 11200 | Callibaetis sp | + | 84450 | Polypedilum (Uresipedilum) flavum | 27 | |
| 11645 | Proclleon sp | + | 84470 | Polypedilum (P.) illinoense | 27 + | |
| 12200 | Isonychia sp | 18 | 85625 | Rheotanytarsus sp | 797 + | |
| 13000 | Leucrocota sp | 4 | 93200 | Hydrobiidae | 4 | |
| 13400 | Stenacron sp | 19 + | 93900 | Elimia sp | 4 + | |
| 13510 | Maccaffertium exiguum | 28 + | 95100 | Physella sp | 4 + | |
| 13540 | Maccaffertium mediopunctatum | 24 + | 95907 | Gyraulus (Torquis) parvus | 8 | |
| 13561 | Maccaffertium pulchellum | 50 + | 96200 | Planorbella sp | + | |
| 13570 | Maccaffertium terminatum | 27 + | 96900 | Ferrissia sp | + | |
| 16300 | Serratella sp | 21 + | 97601 | Corbicula fluminea | + | |
| 16700 | Tricorythodes sp | 340 + | 98200 | Pisidium sp | + | |
| 17200 | Caenis sp | 8 + | | | | |
| 22001 | Coenagrionidae | + | | | | |
| 22300 | Argia sp | 1 + | No. Quantitative Taxa: | 42 | Total Taxa: | 62 |
| 34400 | Paragnetina sp | 1 | No. Qualitative Taxa: | 41 | ICI: | 48 |
| 43300 | Ranatra sp | + | Number of Organisms: | 4360 | Qual EPT: | 16 |
| 43300 | Ranatra sp | + | QCTV: | | 36.1 | |
| 51600 | Polycentropus sp | + | | | | |
| 52200 | Cheumatopsyche sp | 1134 + | | | | |
| 52510 | Hydropsyche aerata | 90 + | | | | |
| 52620 | Macrostemum zebratum | 12 | | | | |
| 52801 | Potamyia flava | 11 | | | | |
| 53800 | Hydroptila sp | 105 | | | | |
| 54300 | Oxyethira sp | 4 | | | | |
| 57400 | Neophylax sp | + | | | | |
| 57900 | Pycnopsyche sp | + | | | | |
| 59500 | Oecetis sp | 4 | | | | |
| 59724 | Trienodes injustus | + | | | | |
| 59970 | Petrophila sp | 1 | | | | |
| 68075 | Psephenus herricki | + | | | | |
| 68601 | Ancyronyx variegata | 8 | | | | |
| 68901 | Macronychus glabratus | 49 + | | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-019 | | River: <i>Phillips Ditch</i> | | Site ID: PD3.0 | | |
|-----------------------------|---|------------------------------|---------------------------|---------------------|----------------|------|
| Site: Chippewa | | | Subsample: | | Collector: MJK | |
| Collection Date: 08/07/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | | RM: | 3.00 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. | |
| 01320 | Hydra sp | 2 | 84750 | Stictochironomus sp | + | |
| 01801 | Turbellaria | 3 + | 85625 | Rheotanytarsus sp | 18 + | |
| 03600 | Oligochaeta | 4 + | 85840 | Tanytarsus sepp | 3 | |
| 05800 | Caecidotea sp | + | 87515 | Clinocera (C.) sp | 1 | |
| 06800 | Gammarus sp | 25 | 96900 | Ferrissia sp | 1 | |
| 07800 | Cambarus sp | + | 98600 | Sphaerium sp | + | |
| 11115 | Baetis tricaudatus | 7 + | | | | |
| 21200 | Calopteryx sp | 7 + | No. Quantitative Taxa: 27 | | Total Taxa: 45 | |
| 21300 | Hetaerina sp | 15 + | No. Qualitative Taxa: 29 | | ICI: 32 | |
| 22001 | Coenagrionidae | + | Number of Organisms: 367 | | Qual EPT: 4 | |
| 23905 | Boyeria grafiana | + | QCTV: | | 35.1 | |
| 52200 | Cheumatopsyche sp | 15 + | | | | |
| 52530 | Hydropsyche depravata group | 18 + | | | | |
| 57400 | Neophylax sp | + | | | | |
| 68130 | Helichus sp | + | | | | |
| 68901 | Macronychus glabratus | 78 + | | | | |
| 69200 | Optioservus sp | 3 | | | | |
| 69400 | Stenelmis sp | + | | | | |
| 71700 | Pilaria sp | + | | | | |
| 72700 | Anopheles sp | + | | | | |
| 74100 | Simulium sp | + | | | | |
| 77500 | Conchapelopia sp | 3 | | | | |
| 80204 | Brillia flavifrons group | + | | | | |
| 80350 | Corynoneura sp | 4 | | | | |
| 80370 | Corynoneura lobata | 8 | | | | |
| 81650 | Parametriocnemus sp | 10 + | | | | |
| 82141 | Thienemanniella xena | 24 | | | | |
| 82200 | Tvetenia bavarica group | 2 | | | | |
| 82220 | Tvetenia discoloripes group | + | | | | |
| 82820 | Cryptochironomus sp | + | | | | |
| 83040 | Dicrotendipes neomodestus | + | | | | |
| 83051 | Dicrotendipes simpsoni | + | | | | |
| 83820 | Microtendipes "caelum" (sensu Simpson & Bode, 1980) | 3 | | | | |
| 83840 | Microtendipes pedellus group | 52 + | | | | |
| 84210 | Paratendipes albimanus or P. duplicatus | + | | | | |
| 84440 | Polypedilum (Uresipedilum) aviceps | 50 | | | | |
| 84450 | Polypedilum (Uresipedilum) flavum | 3 | | | | |
| 84460 | Polypedilum (P.) fallax group | 5 | | | | |
| 84540 | Polypedilum (Tripodura) scalaenum group | 3 | | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-108 | | River: <i>Little Elkhart River</i> | | Site ID: | LER6.5 |
|-----------------------------|--------------------------------|------------------------------------|------------------------|--|----------------|
| Site: County Road 35 | | | | Subsample: | Collector: MJK |
| Collection Date: 08/06/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | RM: | 6.50 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. |
| 01801 | Turbellaria | 14 + | 70600 | Antocha sp | 1 + |
| 03600 | Oligochaeta | 4 + | 77500 | Conchapelopia sp | 4 |
| 05800 | Caecidotea sp | + | 77750 | Hayesomyia senata or Thienemannimyia norena | 9 + |
| 06700 | Crangonyx sp | 1 | 79761 | Pagastia orthogonia | + |
| 06800 | Gammarus sp | 28 + | 80204 | Brillia flavifrons group | 4 |
| 08601 | Hydracarina | + | 80370 | Corynoneura lobata | 28 |
| 11115 | Baetis tricaudatus | 3 + | 80410 | Cricotopus (C.) sp | 13 |
| 11119 | Plauditus dubius or P. virilis | + | 80420 | Cricotopus (C.) bicinctus | 17 + |
| 11120 | Baetis flavistriga | 183 + | 80430 | Cricotopus (C.) tremulus group | 4 |
| 11150 | Pseudocloeon propinquum | + | 81650 | Parametricnemus sp | 39 + |
| 12200 | Isonychia sp | 5 | 81825 | Rheocricotopus (Psilocricotopus) robacki | 30 + |
| 13000 | Leucrocuta sp | + | 82101 | Thienemanniella taurocapita | 20 |
| 13400 | Stenacron sp | 17 + | 82141 | Thienemanniella xena | 20 |
| 13510 | Maccaffertium exiguum | 75 + | 82200 | Tvetenia bavarica group | 22 + |
| 13561 | Maccaffertium pulchellum | 71 + | 82220 | Tvetenia discoloripes group | 4 + |
| 13590 | Maccaffertium vicarium | 100 + | 82882 | Cryptotendipes sp 2 | + |
| 16300 | Serratella sp | 5 | 82885 | Cryptotendipes pseudotener | + |
| 16700 | Tricorythodes sp | + | 83040 | Dicrotendipes neomodestus | 4 |
| 21300 | Hetaerina sp | + | 83820 | Microtendipes "caelum" (sensu Simpson & Bode, 1980) | 26 |
| 23909 | Boyeria vinosa | 1 + | 83840 | Microtendipes pedellus group | 60 + |
| 24501 | Gomphidae | + | 84210 | Paratendipes albimanus or P. duplicatus | + |
| 25010 | Hagenius brevistylus | + | 84450 | Polypedilum (Uresipedilum) flavum | 13 |
| 30000 | Plecoptera | 1 | 84460 | Polypedilum (P.) fallax group | 4 |
| 30800 | Pteronarcys sp | 1 | 84480 | Polypedilum (P.) laetum group | 17 |
| 34400 | Paragnetina sp | 1 + | 85500 | Paratanytarsus sp | 9 |
| 50804 | Lype diversa | 6 | 85625 | Rheotanytarsus sp | 133 |
| 50906 | Psychomyia flavida | 17 | 85800 | Tanytarsus sp | 4 |
| 52200 | Cheumatopsyche sp | 162 + | 85840 | Tanytarsus sepp | 4 |
| 52430 | Ceratopsyche morosa group | 54 + | 93900 | Elimia sp | + |
| 52450 | Ceratopsyche sparna | 21 + | 95100 | Physella sp | 1 + |
| 52530 | Hydropsyche depravata group | 14 + | 97601 | Corbicula fluminea | + |
| 53800 | Hydroptila sp | 6 + | | | |
| 55520 | Brachycentrus numerosus | 40 + | | | |
| 57400 | Neophylax sp | + | | | |
| 57900 | Pycnopsyche sp | + | | | |
| 58020 | Lepidostoma sp | 3 | No. Quantitative Taxa: | 53 | Total Taxa: 72 |
| 58505 | Helicopsyche borealis | + | No. Qualitative Taxa: | 47 | ICI: 52 |
| 59310 | Mystacides sepulchralis | + | Number of Organisms: | 1333 | Qual EPT: 21 |
| 68601 | Ancyronyx variegata | 1 | QCTV: | | 39.9 |
| 68901 | Macronychus glabratus | 7 + | | | |
| 69400 | Stenelmis sp | 2 + | | | |

Appendix Table B-2. Macroinvertebrate taxa from Elkhart Study area sites during 2012.

| River Code: 94-109 | | River: <i>Baugo Creek</i> | | Site ID: | Baugo 1.8 | |
|-----------------------------|---|---------------------------|---------------------------|--|----------------|------|
| Site: Restoration Site | | | Subsample: | | Collector: MJK | |
| Collection Date: 08/07/2012 | | Latitude: 0.000000 | Longitude: 0.000000 | | RM: | 1.80 |
| Taxa Code | Taxa | Qt./Ql. | Taxa Code | Taxa | Qt./Ql. | |
| 00653 | <i>Eunapius fragilis</i> | + | 84300 | <i>Phaenopsectra obediens</i> group | + | |
| 01801 | <i>Turbellaria</i> | 20 + | 84450 | <i>Polypedilum (Uresipedilum) flavum</i> | 109 + | |
| 03040 | <i>Fredericella</i> sp | 7 | 84460 | <i>Polypedilum (P.) fallax</i> group | 7 | |
| 03600 | <i>Oligochaeta</i> | 16 + | 84700 | <i>Stenochironomus</i> sp | 15 | |
| 06501 | <i>Gammaridae</i> | + | 84750 | <i>Stictochironomus</i> sp | + | |
| 11010 | <i>Acentrella</i> sp | 8 | 84888 | <i>Xenochironomus xenolabis</i> | + | |
| 11115 | <i>Baetis tricaudatus</i> | 1 | 85615 | <i>Rheotanytarsus pellucidus</i> | 7 + | |
| 11120 | <i>Baetis flavistriga</i> | 122 + | 85625 | <i>Rheotanytarsus</i> sp | 261 + | |
| 11130 | <i>Baetis intercalaris</i> | 68 + | 85821 | <i>Tanytarsus glabrescens</i> group sp 7 | 29 | |
| 13510 | <i>Maccaffertium exiguum</i> | 18 | 87540 | <i>Hemerodromia</i> sp | 24 | |
| 13561 | <i>Maccaffertium pulchellum</i> | 4 | 95100 | <i>Physella</i> sp | + | |
| 16700 | <i>Tricorythodes</i> sp | 16 | 96900 | <i>Ferrissia</i> sp | 9 + | |
| 21200 | <i>Calopteryx</i> sp | + | 98200 | <i>Pisidium</i> sp | 2 | |
| 21300 | <i>Hetaerina</i> sp | + | | | | |
| 22001 | <i>Coenagrionidae</i> | + | No. Quantitative Taxa: 37 | | Total Taxa: 52 | |
| 22300 | <i>Argia</i> sp | + | No. Qualitative Taxa: 28 | | ICI: 44 | |
| 23909 | <i>Boyeria vinosa</i> | + | Number of Organisms: 3745 | | Qual EPT: 5 | |
| 52200 | <i>Cheumatopsyche</i> sp | 168 + | QCTV: | | 36.4 | |
| 52430 | <i>Ceratopsyche morosa</i> group | 1772 + | | | | |
| 52530 | <i>Hydropsyche depravata</i> group | 793 + | | | | |
| 59580 | <i>Oecetis persimilis</i> | 1 | | | | |
| 65800 | <i>Berosus</i> sp | + | | | | |
| 68901 | <i>Macronychus glabratus</i> | + | | | | |
| 69400 | <i>Stenelmis</i> sp | + | | | | |
| 70600 | <i>Antocha</i> sp | 28 | | | | |
| 71900 | <i>Tipula</i> sp | 1 | | | | |
| 74100 | <i>Simulium</i> sp | 1 | | | | |
| 77500 | <i>Conchapelopia</i> sp | 36 | | | | |
| 77750 | <i>Hayesomyia senata</i> or <i>Thienemannimyia norena</i> | 73 | | | | |
| 78450 | <i>Nilotanypus fimbriatus</i> | 1 | | | | |
| 81270 | <i>Nanocladius (N.) spinipenus</i> | 22 | | | | |
| 81825 | <i>Rheocricotopus (Psilocricotopus)</i> <i>robacki</i> | 29 | | | | |
| 82220 | <i>Tvetenia discoloripes</i> group | 22 | | | | |
| 82820 | <i>Cryptochironomus</i> sp | + | | | | |
| 83040 | <i>Dicrotendipes neomodestus</i> | 7 | | | | |
| 83051 | <i>Dicrotendipes simpsoni</i> | 7 | | | | |
| 83300 | <i>Glyptotendipes (G.)</i> sp | 7 | | | | |
| 83820 | <i>Microtendipes "caelum"</i> (sensu Simpson & Bode, 1980) | 15 + | | | | |
| 83840 | <i>Microtendipes pedellus</i> group | 19 + | | | | |