February 17, 2012

Ohio Environmental Protection Agency

Division of Surface Water

Biological and Habitat Study of the Stillwater River, 2008, 2010 and 2011

Five Rivers Metropark - Englewood Reserve Dam Removal

HUC 05080001 90 02

Stillwater River – Greenville Creek to the Mouth

Montgomery County, Ohio

OHIO EPA Technical Report DSW/EAS 2012-2-4

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

Biological and Habitat Study of the Stillwater River

Five Rivers Metropark – Englewood Reserve Dam Removal

HUC 05080001 90 02
Stillwater River – Greenville Creek to the Mouth

2008, 2010, 2011

Montgomery County, Ohio
February 17, 2012
OEPA Report DSW/EAS 2012-2-4

prepared by

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
Columbus, Ohio 43215

Division of Surface Water
Ecological Assessment Section
4675 Homer Ohio Lane
Groveport, Ohio 43125

prepared for

U.S. Environmental Protection Agency
Measure SP-12 Watershed Reporting

John R. Kasich, Governor
State of Ohio

Scott J. Nally, Director
Environmental Protection Agency

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

The following individuals are acknowledged for their contribution to this report.

Stream sampling: Mike Gray, David Altfater, Krystal Seger, Chuck McKnight
Data support: Dennis Mishne
Report preparation and analysis: David Altfater
Reviewers: Jeff DeShon

Copies of this report are available at:
http://www.epa.ohio.gov/dsw/document_index/psdindx.aspx

or by written or email request to:

Jeff DeShon
Ohio EPA, Division of Surface Water
Groveport Field Office
4675 Homer Ohio Lane
Groveport, Ohio 43125
jeff.deshon@epa.state.oh.us

INTRODUCTION

A near three mile section of the Stillwater River within the Five Rivers Metropark Englewood Reserve at Englewood, Ohio, was assessed during 2008, 2010 and 2011, evaluating fish and macroinvertebrate biological communities and the quality of the physical habitat supporting those communities. This study was undertaken to assess conditions in the Stillwater River upstream, within, and downstream from one low head dam impoundment anticipated for removal. This low head dam was subsequently removed in late 2009. Results of pre-removal sampling in the vicinity of the dam (2008 sampling) and post-removal results (2010 and 2011 sampling) are presented here.

Specific objectives of the evaluation were to:

- assess biological and physical habitat conditions in the Stillwater River before and after dam removal,
- determine the aquatic life use attainment status of the Stillwater River with regard to the Exceptional Warmwater Habitat (EWH) aquatic life use designation codified in the Ohio Water Quality Standards, and
- assess the effectiveness and success of the dam removal project.

The Stillwater River is located in the Eastern Corn Belt Plains ecoregion of Ohio. The river is currently assigned the Exceptional Warmwater Habitat (WWH) aquatic life use designation for the reach sampled during this study. Sampling locations are detailed in Table 1 and graphically presented in Figure 1; aquatic life use attainment status is presented in Table 2.

SUMMARY AND CONCLUSIONS

Ohio EPA completed fish and macroinvertebrate sampling within the Englewood Reserve – Five Rivers Metropark low head dam pool, as well as upstream and downstream locations, in 2008 and 2010. During 2011 only fish sampling was conducted, and only at RM 9.5. Removal of the Englewood Reserve low head dam in September 2009 has resulted in improved habitat conditions for both macroinvertebrate and fish communities. The aquatic communities reflect the improved habitat conditions with significant increases in species/taxa richness and the associated biological community index scores (Tables 2 and 4). Physical habitat within the former dam pool improved as reflected by modest increases in Qualitative Habitat Evaluation Index (QHEI) scores pre- and post- removal at the former dam pool sampling location (Tables 2 and 3). Physical habitat scores within the dam pool improved from fair (QHEI = 53.0) to good (QHEI = 72.5) two years since the removal of the dam. QHEI scores should continue to improve to an excellent rating as the free-flowing habitat conditions evolve and stabilize within the prior impounded reach. With removal of the Englewood Reserve low head dam, full EWH aquatic life use attainment has been realized and the impairment of 1.3 miles within the former impoundment has been eliminated.

In 2008, prior to the Englewood Reserve dam removal, the fish community within its dam pool (RM 9.5) included two pollution intolerant species while in 2011, 6 pollution intolerant species (black redhorse, river redhorse, river chub, silver shiner, rosyface shiner, and banded darter) were collected in the newly free-flowing reach (Table 4). Index of Biotic Integrity (IBI) scores improved from 40 in 2008 to 41 in 2010 and 45 in 2011 (Table 2). In 2008, the monotypic pool habitat did not provide diverse niches for a variety of species, and the total number of species collected was 24, while in the free-flowing upstream and downstream reaches (RMs 11.1 and 8.5) high quality habitat supported a total of 34 and 30 species, respectively. Though the habitat is still improving in the reach previously impounded by the Englewood Reserve dam (Table 3), the total number of fish species increased to 28 in 2011.

The macroinvertebrate community showed a significant improvement with the removal of the Englewood Reserve dam (Tables 2 and 5). The impounded site (RM 9.5) improved from an Invertebrate Community Index (ICI) score of 34 in 2008 (pre-removal) to an ICI of 52 in 2010, one year after the Englewood Reserve dam was removed. Other significant macroinvertebrate improvements between 2008 and 2010 at the impounded site turned flee-flowing included: number of sensitive taxa increased from 15 to 25, total pollution tolerant taxa declined from 8 to 3, and Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa richness increased from 18 to 25 (Figure 2).

Table 1. Sampling locations in the Stillwater River, Englewood, 2008, 2010, and 2011. Type of sampling included fish community (F), macroinvertebrate community (M), and river habitat (H).

River Mile	Type of Sampling	Latitude	Longitude	Local Landmark
11.1	F,M,H	39.8947	-84.2903	Near Union, downstream Martindale Road
9.5	F,M,H	39.87405	-84.2915	Within low head dam impoundment (free-flowing after 2009)
8.5	F,M,H	39.86744	-84.27554	Downstream Englewood wastewater treatment plant

Table 2. Aquatic life use attainment status for sampling locations in the Stillwater River at Englewood, Ohio, 2008, 2010, and 2011. Data from 2008 reflect conditions at sampling locations prior to the removal of the Englewood Reserve dam while 2010 and 2011 results reflect post-removal aquatic life conditions. The Index of Biotic Integrity (IBI), Modified Index of Well-being (MIwb), and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Sampling locations were evaluated using Exceptional Warmwater Habitat (EWH) biocriteria codified in the Ohio Administrative Code (OAC 3745-1-07, Table 7-15) for the Eastern Corn Belt Plains (ECBP) ecoregion of Ohio. If biological impairment has occurred, the cause(s) and source(s) of the impairment are noted.

Sample Location River Mile (RM)	Aquatic Life Use Designation	Aquatic Life Use Attainment Status	IBI	MIwb	ICI	QHEI	Aquatic Life Use Impairment Cause(s) / Source(s)
Stillwater River 2008							
11.1	EWH	**FULL**	58	10.5	44[ns]	83.0	
9.5 Impounded	EWH	**NON**	40*	8.4*	34*	53.0	Direct Habitat Alterations, Flow Regime Alterations/ Englewood Reserve Low Head Dam
8.5	EWH	**FULL**	57	10.6	50	87.0	
Stillwater River 2010							
11.1	EWH	**FULL**	60	10.3	48	85.0	
9.5 Free-Flowing	EWH	**PARTIAL**	41*	8.6*	52	66.0	Comment: Englewood Reserve dam removed in September 2009
8.5	EWH	**FULL**	57	10.6	E[1]	91.0	
Stillwater River 2011							
9.5 Free-Flowing	EWH	**FULL**	45[ns]	9.6	-	72.5	Comment: Full attainment 2 years after dam removal

BIOCRITERIA (ECBP)		
INDEX - Site Type	WWH	EWH
IBI: Boat	42	48
MIwb: Boat	8.5	9.6
ICI	36	46

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
ns Nonsignificant departure from biocriterion (≤4 IBI or ICI units and 0.5 MIwb units).
1 E = Exceptional

Figure 1. Sampling locations in the Stillwater River, Englewood Reserve, 2008, 2010, and 2011.

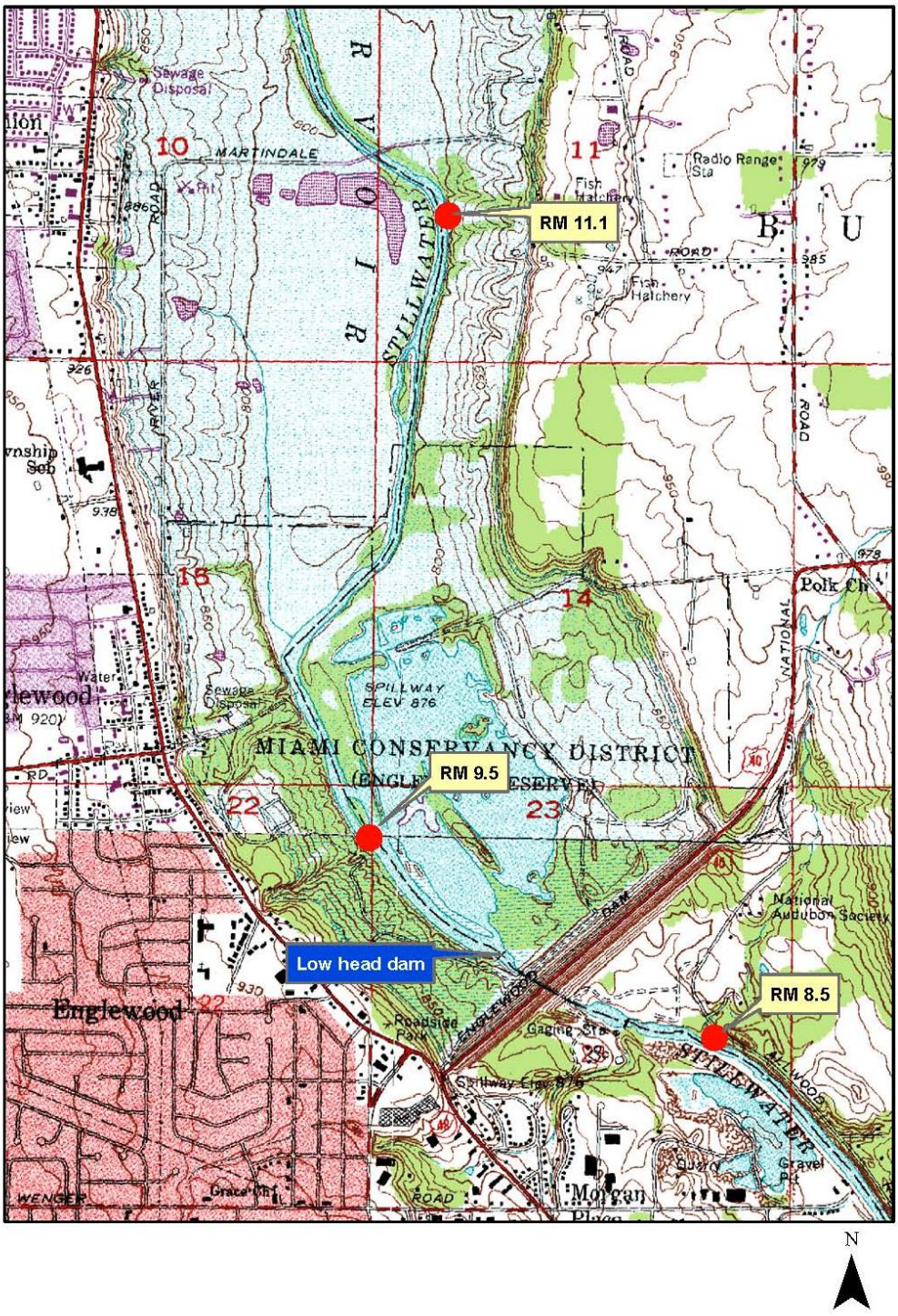

Table 3. Qualitative Habitat Evaluation Index (QHEI) scores and physical attributes for fish sampling sites in the Stillwater River, Englewood, 2008, 2010, and 2011.

														MWH Attributes																					
				WWH Attributes										*High Influence*							*Moderate Influence*														
Key QHEI Components			No Channelization or Recovered	Boulder/Cobble/Gravel Substrates	Silt Free Substrates	Good/Excellent Substrates	Moderate/High Sinuosity	Extensive/Moderate Cover	Fast Current/Eddies	Low-Normal Overall Embeddedness	Max. Depth >40 cm	Low-Normal Riffle Embeddedness	**Total WWH Attributes**	Channelized or No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse/ No Cover	Max. Depth <40 cm (WD,HW sites)	**Total High Influence Attributes**	Recovering Channel	Heavy/Moderate Silt Cover	Sand Substrates (Boat)	Hardpan Substrate Origin	Fair/Poor Development	Low Sinuosity	Only 1-2 Cover Types	Intermittent & Poor Pools	No Fast Current	High/Mod. Overall Embeddedness	High/Mod. Riffle Embeddedness	No Riffle	**Total Moderate Influence Attributes**
River Mile	**QHEI**	**Habitat Rating**																																
Stillwater River Year: 2008																																		
11.1	**83.0**	Excellent	■	■		■		■		■	■	■	7						0		●				●			●				3
9.5	**53.0**	Fair	■								■		2				◆		1		●			●	●			●	●		●	6
8.5	**87.0**	Excellent	■	■		■		■	■	■	■	■	8						0						●							1
Stillwater River Year: 2010																																		
11.1	**85.0**	Excellent	■	■		■		■	■	■	■	■	8						0						●							1
9.5	**66.0**	Good	■						■		■		3		◆		◆		2					●	●				●	●		4
8.5	**91.0**	Excellent	■	■		■	■	■	■	■	■	■	9						0						●							1
Stillwater River Year: 2011																																		
9.5	**72.5**	Good	■			■	■		■		■		5				◆		1					●	●				●	●		4

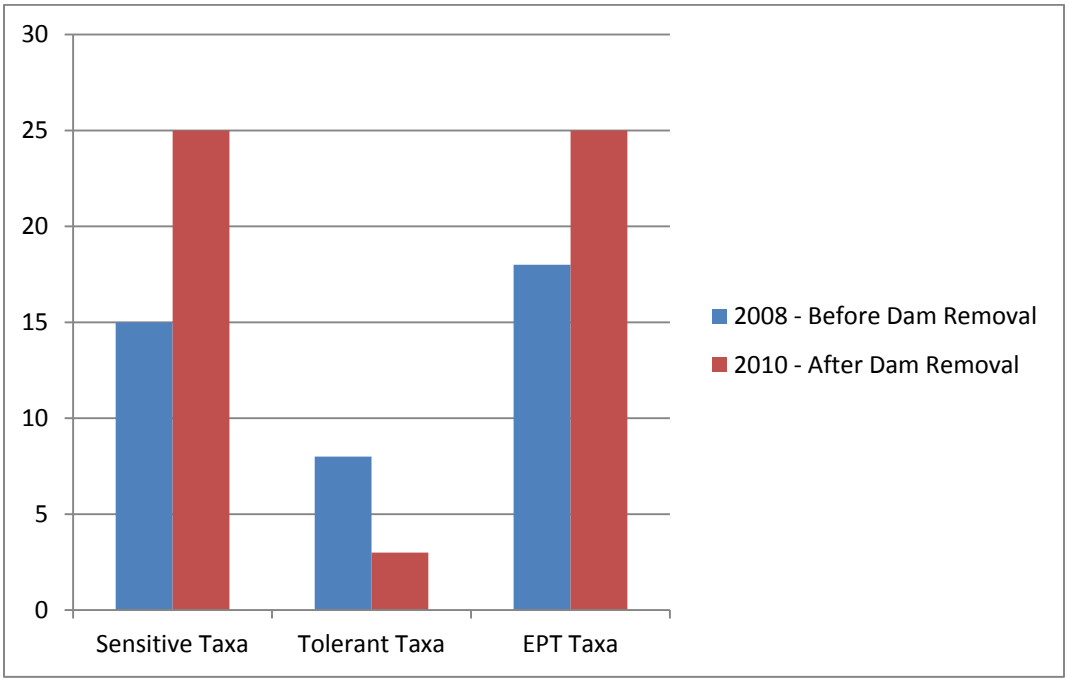

Figure 2. Macroinvertebrate sensitive, pollution tolerant and EPT taxa richness in the Stillwater River before (impounded) and after (free-flowing) removal of the Englewood Reserve low head dam, Englewood, Ohio. Sampling results are from RM 9.5.

METHODS

All chemical, physical, and biological field, EPA laboratory, data processing, and data analysis methods and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio Environmental Protection Agency 2009), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio Environmental Protection Agency 1987b, 1989a, 1989b, 2008a, 2008b), The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989), Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (Ohio EPA 2006a), and Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2001).

Determining Use Attainment

Use attainment status is a term describing the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing aquatic use attainment status involves a primary reliance on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These are confined to ambient assessments and apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Three attainment status results are possible at each sampling location - full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails to meet the biocriteria. Non-attainment means that none of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (Table 2) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (*i.e.,* full, partial, or non-attainment), the Qualitative Habitat Evaluation Index (QHEI), and causes and sources if impairment is indicated. Biological results for the Stillwater River sites were compared to Exceptional Warmwater Habitat (EWH) biocriteria.

River Habitat Assessment

Stillwater River aquatic habitat was evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989, 1995; Ohio EPA 2006). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 are generally conducive to the establishment of warm water faunas while those which score in excess of 75 often typify habitat conditions which have the ability to support exceptional faunas. Habitat assessments using QHEI protocols were completed at each Stillwater River fish sampling site.

Fish Community Assessment

Fish were sampled twice at each Stillwater River site using pulsed DC boat electrofishing methods. Fish were processed in the field which included identifying each individual to species, counting and weighing, and recording any external abnormalities. Discussion of the fish community assessment methodology used in this report is detailed in Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (Ohio EPA 1989a, 2008b).

Macroinvertebrate Community Assessment

Macroinvertebrates were collected from artificial substrates and from the natural habitats at the Stillwater River sites in both 2008 and 2010. Macroinvertebrate sampling was not conducted in 2011 because all three stations sampled in 2010 were achieving the Exceptional Warmwater Habitat ICI biocriterion. The artificial substrate collection provided quantitative data and consisted of a composite sample of five modified Hester-Dendy multiple-plate samplers colonized for six weeks. At the time of the artificial

substrate collection, a qualitative multihabitat composite sample was also collected. This sampling effort consisted of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (*e.g.,* riffle, run, pool, margin). Detailed discussion of macroinvertebrate field and laboratory procedures is detailed in Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (Ohio EPA 1989a, 2008b).

RESULTS

Fish Community

A total of 6,343 fish representing 40 species were collected from the Stillwater River in the vicinity of the Englewood Reserve low head dam near the city of Englewood, Ohio, between July and October, 2008, 2010, and 2011. Sampling during 2008 occurred prior to the dam removal (September 2009) while 2010 and 2011 sampling occurred one to two years after dam removal. Results are summarized in Table 4. IBI metrics and scores are presented in Appendix Table 1 and relative numbers and species collected per location are presented in Appendix Table 2. Sampling locations were evaluated using Exceptional Warmwater Habitat (WWH) biocriteria codified in the Ohio Administrative Code (OAC 3745-1-07, Table 7-15).

Table 4. Fish community summaries based on pulsed D.C. boat electrofishing sampling conducted by Ohio EPA in the Stillwater River, July through October, 2008, 2010, and 2011. The applicable aquatic life use designation is Exceptional Warmwater Habitat (EWH).

River Mile	Sampling Method	Species (Total)	Species (Intolerant)	Relative Number[a]	QHEI	Index of Biotic Integrity	Modified Index of Well-being	Narrative Evaluation
Stillwater River - 2008								
11.1	Boat	34	7	1047	83.0	58	10.5	Exceptional
9.5 Impounded	Boat	24	2	639	53.0	40*	8.4*	Marginally Good
8.5	Boat	30	6	1428	87.0	57	10.6	Exceptional
Stillwater River – 2010								
11.1 (one pass)	Boat	22	6	832	85.0	60	10.3	Exceptional
9.5 Free-Flowing	Boat	26	5	615	66.0	41*	8.6*	Marginally Good/Good
8.5	Boat	32	6	1224	91.0	57	10.6	Exceptional
Stillwater River – 2011								
9.5 Free-Flowing	Boat	28	6	936	72.5	45^{ns}	9.6	Very Good/Exceptional

Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)		
INDEX - Site Type	WWH	EWH
IBI: Boat	42	48
MIwb: Boat	8.5	9.6

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
^{ns} Non-significant departure from ecoregion biocriterion (≤4 IBI units or 0.5 MIwb units).
[a] Relative numbers are per 1.0 kilometer.

Macroinvertebrate Community

The macroinvertebrate communities from the Stillwater River in the vicinity of the Englewood Reserve low head dam near the city of Englewood, Ohio, were sampled in 2008 (prior to removal of the dam) and 2010 (after the removal of the dam) using quantitative (artificial substrate) and qualitative (natural substrate multi-habitat composite) sampling protocols. The macroinvertebrate narrative evaluation of qualitative results from RM 8.5 during 2010 was used in lieu of the ICI score to help determine aquatic life attainment status. The artificial substrate sample and resultant ICI score were negatively influenced by reduced current velocity and low flow conditions which existed during the artificial substrate colonization periord. Results are summarized in Table 5. The ICI metrics with the associated scores and the raw data are attached as Appendix Tables 3 and 4. Sampling locations were evaluated using Exceptional Warmwater Habitat (EWH) biocriteria codified in the Ohio Administrative Code (OAC 3745-1-07, Table 7-15).

Table 5. Summary of macroinvertebrate data collected from artificial substrates (quantitative sampling) and natural substrates (qualitative sampling) in the Stillwater River, 2008 and 2010. The applicable aquatic life use designation is Exceptional Warmwater Habitat (EWH).

River Mile	Density Number/ft^2	Total Taxa	Total Sensitive Taxa	Total Tolerant Taxa	Total EPT[a]	ICI	Evaluation
Stillwater River - 2008							
11.1	2987	61	22	9	25	44[ns]	Very Good
9.5 Impounded	836	51	15	8	18	34*	Marginally Good
8.5	1981	70	27	9	27	50	Exceptional
Stillwater River - 2010							
11.1	1704	82	36	9	33	48	Exceptional
9.5 Free-Flowing	1616	51	25	3	25	52	Exceptional
8.5 (low flow over HD)	1355	64	22	9	28	36[b]	Exceptional

Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)		
INDEX	WWH	EWH
ICI	36	46

[a] EPT=total Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) taxa richness, a measure of pollution sensitive organisms.
[b] Quantitative results and ICI score were negatively influenced by reduced current velocities and low flow conditions over the artificial substrates.
* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.
[ns] Nonsignificant departure from biocriterion (≤4 ICI units).

REFERENCES

Ohio Environmental Protection Agency. 2009. Ohio EPA manual of surveillance methods and quality assurance practices, updated edition. Division of Environmental Services, Columbus, Ohio.

Ohio Environmental Protection Agency. 2008a. 2008 updates to Biological Criteria for the Protection of Aquatic Life: Volume II and Volume II Addendum. Users manual for biological field assessment of Ohio surface waters. Div. of Surface Water, Ecol. Assess. Sect., Columbus, Ohio.

Ohio Environmental Protection Agency. 2008b. 2008 updates to Biological Criteria for the Protection of Aquatic Life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Div. of Surface Water, Ecol. Assess. Sect., Columbus, Ohio.

Ohio Environmental Protection Agency. 2006. Methods for assessing habitat in flowing waters: Using the Qualitative Habitat Evaluation Index (QHEI). Ohio EPA Tech. Bull. EAS/2006-06-1. Div. of Surface Water, Ecol. Assess. Sect., Columbus, Ohio.

Ohio Environmental Protection Agency. 2001. Sediment sampling guide and methodologies, 2nd edition. Nov. 2001. Division of Surface Water, Columbus, Ohio.

Ohio Environmental Protection Agency. 1989a. Addendum to Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Div. Water Qual. Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio.

Ohio Environmental Protection Agency. 1989b. Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Div. Water Quality Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio.

Ohio Environmental Protection Agency. 1987a. Biological criteria for the protection of aquatic life: Volume I. The role of biological data in water quality assessment. Div. Water Qual. Monit. & Assess., Surface Water Section, Columbus, Ohio.

Ohio Environmental Protection Agency. 1987b. Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Div. Water Qual. Monit. & Assess., Surface Water Section, Columbus, Ohio.

Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Div. Water Qual. Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio.

APPENDICES

Appendix Table 1

IBI Metrics and Scores from Stillwater River Sites
2008, 2010, and 2011

Appendix Table 1. Index of Biotic Integrity (IBI) scores and metrics for the Stillwater River, 2008, 2010, and 2011.

River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Number of: Sunfish species	Number of: Sucker species	Number of: Intolerant species	Percent of Individuals: Rnd-bodied suckers	Percent of Individuals: Simple Lithophils	Percent of Individuals: Tolerant fishes	Percent of Individuals: Omni-vores	Percent of Individuals: Top carnivores	Percent of Individuals: Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(1.0 km)	IBI	Modified Iwb
Stillwater River - (14-200)																	
Year: 2011																	
9.50	A	08/18/2011	649	24(5)	5(5)	6(5)	5(5)	34(3)	44(3)	16(3)	16(3)	4(1)	71(5)	2.3(3)	750(5)	46	10.0
9.50	A	10/03/2011	649	23(5)	4(5)	6(5)	5(5)	24(3)	33(3)	38(1)	38(1)	1(1)	55(5)	0.0(5)	606(5)	44	9.2
Year: 2010																	
11.10	A	07/19/2010	645	21(5)	4(5)	6(5)	6(5)	59(5)	72(5)	4(5)	4(5)	11(5)	82(5)	0.8(3)	796(5)	58	10.3
9.50	A	07/19/2010	649	22(5)	5(5)	6(5)	3(3)	33(3)	39(3)	39(1)	36(1)	3(1)	60(5)	0.0(5)	332(3)	40	8.1
9.50	A	08/30/2010	649	20(3)	3(3)	6(5)	5(5)	35(3)	44(3)	27(1)	25(3)	2(1)	71(5)	1.1(3)	502(5)	40	9.1
8.50	A	07/19/2010	652	21(5)	4(5)	7(5)	3(3)	59(5)	63(5)	9(5)	5(5)	7(3)	87(5)	0.0(5)	858(5)	56	10.5
8.50	A	08/30/2010	652	29(5)	6(5)	6(5)	6(5)	67(5)	75(5)	5(5)	5(5)	6(3)	87(5)	1.1(3)	1430(5)	56	10.8
Year: 2008																	
11.10	A	07/31/2008	645	26(5)	6(5)	6(5)	6(5)	53(5)	62(5)	5(5)	6(5)	9(3)	85(5)	0.4(5)	907(5)	58	10.3
11.10	A	09/05/2008	645	29(5)	6(5)	6(5)	6(5)	44(5)	64(5)	4(5)	6(5)	8(3)	82(5)	0.4(5)	1094(5)	58	10.8
9.50	A	07/31/2008	649	16(3)	5(5)	4(3)	1(1)	23(3)	25(3)	34(1)	20(3)	7(3)	71(5)	0.0(5)	350(3)	38	8.1
9.50	A	09/05/2008	649	20(3)	6(5)	6(5)	2(3)	32(3)	34(3)	29(1)	20(3)	6(3)	72(5)	1.4(3)	528(5)	42	8.8
8.50	A	07/31/2008	652	26(5)	5(5)	6(5)	4(5)	58(5)	65(5)	5(5)	4(5)	7(3)	86(5)	0.2(5)	1202(5)	58	10.9
8.50	A	09/05/2008	652	22(5)	3(3)	6(5)	6(5)	73(5)	82(5)	1(5)	1(5)	5(3)	90(5)	1.0(3)	1580(5)	54	10.3

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

Appendix Table 2

Fish Species and Relative Numbers Collected from Stillwater River Sites
2008, 2010, and 2011

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2008**
River Mile: **11.10**	Location: dst. Martindale Rd.	Date Range: 07/31/2008
Time Fished: 3306 sec	Drainage: 645.0 sq mi	Thru: 09/05/2008
Dist Fished: 1.04 km	Basin: Great Miami River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Gizzard Shad		O	M		19	18.56	1.77	3.94	2.44	211.34
Quillback	C	O	M		1	1.00	0.10	0.14	0.09	140.00
Black Redhorse	R	I	S	I	132	127.56	12.19	29.50	18.29	230.56
Golden Redhorse	R	I	S	M	278	266.00	25.41	28.65	17.77	110.01
River Redhorse [S]	R	I	S	I	8	7.63	0.73	17.35	10.76	2,276.88
Northern Hog Sucker	R	I	S	M	83	80.85	7.72	14.84	9.20	183.74
Spotted Sucker	R	I	S		1	0.93	0.09	0.01	0.01	10.00
Smallmouth Redhorse	R	I	S	M	24	22.82	2.18	5.86	3.63	258.03
Common Carp	G	O	M	T	34	32.52	3.11	36.21	22.46	1,110.26
River Chub	N	I	N	I	6	5.63	0.54	0.24	0.15	41.67
Emerald Shiner	N	I	M		3	2.78	0.27	0.01	0.00	2.00
Silver Shiner	N	I	S	I	35	34.93	3.34	0.37	0.23	10.59
Rosyface Shiner	N	I	S	I	7	6.93	0.66	0.02	0.01	2.57
Striped Shiner	N	I	S		64	61.78	5.90	0.89	0.55	14.46
Spotfin Shiner	N	I	M		103	99.44	9.50	0.35	0.22	3.54
Sand Shiner	N	I	M	M	6	6.00	0.57	0.01	0.00	1.17
Bluntnose Minnow	N	O	C	T	10	9.63	0.92	0.08	0.05	8.00
Central Stoneroller	N	H	N		23	22.85	2.18	0.45	0.28	19.52
Channel Catfish	F		C		2	1.93	0.18	2.18	1.35	1,102.50
Brown Bullhead		I	C	T	2	2.00	0.19	0.13	0.08	66.00
Stonecat Madtom		I	C	I	1	1.00	0.10	0.00	0.00	2.00
White Crappie	S	I	C		1	0.93	0.09	0.17	0.11	185.00
Black Crappie	S	I	C		1	1.00	0.10	0.24	0.15	240.00
Rock Bass	S	C	C		36	34.00	3.25	3.93	2.44	115.46
Smallmouth Bass	F	C	C	M	49	47.74	4.56	9.05	5.61	187.79
Largemouth Bass	F	C	C		7	6.93	0.66	3.01	1.86	429.43
Green Sunfish	S	I	C	T	2	1.93	0.18	0.06	0.04	32.50
Bluegill Sunfish	S	I	C	P	62	59.26	5.66	2.22	1.38	37.50
Orangespotted Sunfish	S	I	C		2	1.93	0.18	0.02	0.01	10.00
Longear Sunfish	S	I	C	M	28	26.44	2.53	0.72	0.45	27.25
Green Sf X Bluegill Sf					2	2.00	0.19	0.11	0.07	55.00
Green Sf X Longear Sf					1	0.93	0.09	0.07	0.05	80.00
Logperch	D	I	S	M	47	46.04	4.40	0.41	0.25	8.93
Greenside Darter	D	I	S	M	3	3.00	0.29	0.01	0.01	3.33
Banded Darter	D	I	S	I	1	0.93	0.09	0.00	0.00	4.00
Rainbow Darter	D	I	S	M	1	1.00	0.10	0.00	0.00	2.00
Mile Total					1,085	1,046.78		161.24		
Number of Species					34					
Number of Hybrids					2					

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2010**
River Mile: **11.10**	Location: dst. Martindale Rd.	Date Range: 07/19/2010
Time Fished: 1473 sec	Drainage: 645.0 sq mi	
Dist Fished: 0.50 km	Basin: Great Miami River No of Passes: 1	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Quillback	C	O	M		3	6.00	0.72	4.90	2.55	816.67
Black Redhorse	R	I	S	I	84	168.00	20.19	28.98	15.10	172.50
Golden Redhorse	R	I	S	M	108	216.00	25.96	66.71	34.76	308.82
River Redhorse [S]	R	I	S	I	8	16.00	1.92	13.20	6.88	825.00
Northern Hog Sucker	R	I	S	M	37	74.00	8.89	16.03	8.36	216.67
Smallmouth Redhorse	R	I	S	M	9	18.00	2.16	4.20	2.19	233.33
Common Carp	G	O	M	T	15	30.00	3.61	34.80	18.13	1,160.00
River Chub	N	I	N	I	7	14.00	1.68	0.44	0.23	31.33
Silver Shiner	N	I	S	I	6	12.00	1.44	0.12	0.06	10.00
Rosyface Shiner	N	I	S	I	6	12.00	1.44	0.07	0.04	5.80
Striped Shiner	N	I	S		8	16.00	1.92	0.90	0.47	56.38
Spotfin Shiner	N	I	M		21	42.00	5.05	0.22	0.11	5.19
Central Stoneroller	N	H	N		3	6.00	0.72	0.15	0.08	25.00
Channel Catfish	F		C		5	10.00	1.20	8.60	4.48	860.00
Brown Bullhead		I	C	T	2	4.00	0.48	0.76	0.40	190.00
Rock Bass	S	C	C		19	38.00	4.57	5.20	2.71	136.84
Smallmouth Bass	F	C	C	M	27	54.00	6.49	4.15	2.16	76.85
Green Sunfish	S	I	C	T	1	2.00	0.24	0.11	0.06	54.00
Bluegill Sunfish	S	I	C	P	4	8.00	0.96	0.54	0.28	67.25
Longear Sunfish	S	I	C	M	7	14.00	1.68	0.56	0.29	40.14
Green Sf X Bluegill Sf					1	2.00	0.24	0.06	0.03	31.00
Logperch	D	I	S	M	34	68.00	8.17	1.20	0.62	17.62
Banded Darter	D	I	S	I	1	2.00	0.24	0.00	0.00	1.00
	Mile Total				416	832.00		191.90		
	Number of Species				22					
	Number of Hybrids				1					

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2008**
River Mile: **9.50**	Location: upst. old Englewood lowhead dam	Date Range: 07/31/2008
Time Fished: 3351 sec	Drainage: 649.0 sq mi	Thru: 09/05/2008
Dist Fished: 1.00 km	Basin: Great Miami River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Gizzard Shad		O	M		1	1.00	0.16	0.22	0.12	220.00
Black Redhorse	R	I	S	I	6	6.00	0.94	1.73	0.96	287.50
Golden Redhorse	R	I	S	M	163	163.00	25.51	48.50	26.85	297.55
River Redhorse [S]	R	I	S	I	1	1.00	0.16	0.60	0.33	600.00
Northern Hog Sucker	R	I	S	M	5	5.00	0.78	1.16	0.64	231.00
White Sucker	W	O	S	T	1	1.00	0.16	0.10	0.06	100.00
Spotted Sucker	R	I	S		2	2.00	0.31	0.30	0.17	151.00
Smallmouth Redhorse	R	I	S	M	5	5.00	0.78	0.90	0.50	180.40
Common Carp	G	O	M	T	122	122.00	19.09	107.42	59.47	880.49
Striped Shiner	N	I	S		5	5.00	0.78	0.06	0.03	12.60
Spotfin Shiner	N	I	M		26	26.00	4.07	0.12	0.07	4.64
Bluntnose Minnow	N	O	C	T	2	2.00	0.31	0.01	0.00	3.00
Channel Catfish	F		C		1	1.00	0.16	2.00	1.11	2,000.00
Yellow Bullhead		I	C	T	2	2.00	0.31	0.52	0.29	260.50
Brown Bullhead		I	C	T	32	32.00	5.01	4.44	2.46	138.79
White Crappie	S	I	C		2	2.00	0.31	0.18	0.10	89.00
Rock Bass	S	C	C		21	21.00	3.29	2.46	1.36	117.05
Smallmouth Bass	F	C	C	M	10	10.00	1.56	0.97	0.54	97.00
Largemouth Bass	F	C	C		11	11.00	1.72	3.45	1.91	313.27
Green Sunfish	S	I	C	T	41	41.00	6.42	1.39	0.77	33.96
Bluegill Sunfish	S	I	C	P	111	111.00	17.37	2.48	1.38	22.38
Orangespotted Sunfish	S	I	C		6	6.00	0.94	0.06	0.03	9.17
Longear Sunfish	S	I	C	M	47	47.00	7.36	1.09	0.61	23.28
Green Sf X Bluegill Sf					11	11.00	1.72	0.33	0.18	30.00
Green Sf X Longear Sf					1	1.00	0.16	0.08	0.04	80.00
Logperch	D	I	S	M	4	4.00	0.63	0.05	0.03	13.25
	Mile Total				639	639.00		180.62		
	Number of Species				24					
	Number of Hybrids				2					

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2010**
River Mile: **9.50**	Location: upst. old Englewood lowhead dam	Date Range: 07/19/2010
Time Fished: 2083 sec	Drainage: 649.0 sq mi	Thru: 08/30/2010
Dist Fished: 1.00 km	Basin: Great Miami River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Gizzard Shad		O	M		8	8.00	1.30	1.04	0.49	129.75
Quillback	C	O	M		6	6.00	0.98	5.48	2.57	912.50
Black Redhorse	R	I	S	I	39	39.00	6.34	8.59	4.03	220.19
Golden Redhorse	R	I	S	M	89	89.00	14.47	19.02	8.92	213.73
River Redhorse [S]	R	I	S	I	6	6.00	0.98	3.18	1.49	529.17
Northern Hog Sucker	R	I	S	M	42	42.00	6.83	8.68	4.07	206.64
Smallmouth Redhorse	R	I	S	M	34	34.00	5.53	6.73	3.15	197.89
Common Carp	G	O	M	T	162	162.00	26.34	152.76	71.62	942.96
River Chub	N	I	N	I	1	1.00	0.16	0.05	0.03	54.00
Silver Shiner	N	I	S	I	30	30.00	4.88	0.19	0.09	6.37
Striped Shiner	N	I	S		11	11.00	1.79	0.35	0.16	31.45
Spotfin Shiner	N	I	M		80	80.00	13.01	0.29	0.13	3.57
Sand Shiner	N	I	M	M	22	22.00	3.58	0.04	0.02	1.73
Bluntnose Minnow	N	O	C	T	8	8.00	1.30	0.02	0.01	3.00
Central Stoneroller	N	H	N		1	1.00	0.16	0.01	0.00	8.00
Channel Catfish	F		C		5	5.00	0.81	1.98	0.93	395.00
Yellow Bullhead		I	C	T	1	1.00	0.16	0.10	0.05	102.00
Brown Bullhead		I	C	T	17	17.00	2.76	1.69	0.79	99.58
Rock Bass	S	C	C		2	2.00	0.33	0.06	0.03	29.00
Smallmouth Bass	F	C	C	M	15	15.00	2.44	2.67	1.25	177.93
Green Sunfish	S	I	C	T	10	10.00	1.63	0.14	0.06	13.58
Bluegill Sunfish	S	I	C	P	5	5.00	0.81	0.07	0.03	14.60
Orangespotted Sunfish	S	I	C		8	8.00	1.30	0.05	0.02	5.75
Longear Sunfish	S	I	C	M	7	7.00	1.14	0.05	0.03	7.71
Logperch	D	I	S	M	5	5.00	0.81	0.08	0.04	15.00
Banded Darter	D	I	S	I	1	1.00	0.16	0.00	0.00	4.00
Mile Total					615	615.00		213.30		
Number of Species					26					
Number of Hybrids					0					

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2011**
River Mile: **9.50**	Location: upst. old Englewood lowhead dam	Date Range: 08/18/2011
Time Fished: 2920 sec	Drainage: 649.0 sq mi	Thru: 10/03/2011
Dist Fished: 1.00 km	Basin: Great Miami River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Quillback	C	O	M		8	8.00	0.85	4.52	1.78	565.00
Black Redhorse	R	I	S	I	35	35.00	3.74	8.15	3.21	232.90
Golden Redhorse	R	I	S	M	134	134.00	14.32	41.81	16.45	311.98
River Redhorse [S]	R	I	S	I	7	7.00	0.75	2.89	1.14	413.43
Northern Hog Sucker	R	I	S	M	48	48.00	5.13	8.62	3.39	179.61
Smallmouth Redhorse	R	I	S	M	47	47.00	5.02	12.06	4.74	256.63
Common Carp	G	O	M	T	122	122.00	13.03	142.89	56.21	1,171.21
River Chub	N	I	N	I	1	1.00	0.11	0.05	0.02	52.00
Creek Chub	N	G	N	T	1	1.00	0.11	0.00	0.00	4.00
Silver Shiner	N	I	S	I	68	68.00	7.26	0.36	0.14	5.22
Rosyface Shiner	N	I	S	I	7	7.00	0.75	0.03	0.01	4.71
Striped Shiner	N	I	S		4	4.00	0.43	0.03	0.01	7.00
Spotfin Shiner	N	I	M		139	139.00	14.85	0.42	0.16	3.00
Sand Shiner	N	I	M	M	43	43.00	4.59	0.10	0.04	2.42
Silverjaw Minnow	N	I	M		4	4.00	0.43	0.01	0.00	2.50
Bluntnose Minnow	N	O	C	T	131	131.00	14.00	0.35	0.14	2.70
Central Stoneroller	N	H	N		35	35.00	3.74	0.14	0.06	4.00
Channel Catfish	F		C		29	29.00	3.10	28.35	11.15	977.41
Rock Bass	S	C	C		5	5.00	0.53	0.60	0.24	120.00
Smallmouth Bass	F	C	C	M	12	12.00	1.28	1.66	0.65	138.17
Largemouth Bass	F	C	C		4	4.00	0.43	0.46	0.18	115.00
Green Sunfish	S	I	C	T	4	4.00	0.43	0.03	0.01	8.00
Bluegill Sunfish	S	I	C	P	14	14.00	1.50	0.27	0.11	19.29
Orangespotted Sunfish	S	I	C		6	6.00	0.64	0.04	0.02	7.33
Longear Sunfish	S	I	C	M	16	16.00	1.71	0.19	0.08	12.13
Green Sf X Bluegill Sf					4	4.00	0.43	0.10	0.04	26.00
Logperch	D	I	S	M	4	4.00	0.43	0.05	0.02	13.00
Banded Darter	D	I	S	I	3	3.00	0.32	0.01	0.00	1.67
Rainbow Darter	D	I	S	M	1	1.00	0.11	0.00	0.00	2.00
Mile Total					936	936.00		254.20		
Number of Species					28					
Number of Hybrids					1					

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2008**
River Mile: **8.50**	Location: dst. old Englewood lowhead dam	Date Range: 07/31/2008
Time Fished: 2495 sec	Drainage: 652.0 sq mi	Thru: 09/05/2008
Dist Fished: 1.00 km	Basin: Great Miami River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Gizzard Shad		O	M		6	6.00	0.42	0.21	0.09	35.33
Quillback	C	O	M		2	2.00	0.14	0.75	0.30	375.50
Black Redhorse	R	I	S	I	237	237.00	16.60	38.97	15.82	164.41
Golden Redhorse	R	I	S	M	416	416.00	29.13	101.58	41.24	244.17
River Redhorse [S]	R	I	S	I	21	21.00	1.47	19.63	7.97	934.76
Northern Hog Sucker	R	I	S	M	162	162.00	11.34	23.57	9.57	145.50
Smallmouth Redhorse	R	I	S	M	115	115.00	8.05	23.23	9.43	202.00
Common Carp	G	O	M	T	16	16.00	1.12	16.00	6.50	1,000.00
River Chub	N	I	N	I	8	8.00	0.56	0.26	0.10	32.13
Silver Shiner	N	I	S	I	18	18.00	1.26	0.18	0.07	10.11
Rosyface Shiner	N	I	S	I	7	7.00	0.49	0.03	0.01	4.29
Striped Shiner	N	I	S		49	49.00	3.43	0.87	0.35	17.82
Spotfin Shiner	N	I	M		101	101.00	7.07	0.51	0.21	5.00
Sand Shiner	N	I	M	M	35	35.00	2.45	0.12	0.05	3.54
Bluntnose Minnow	N	O	C	T	11	11.00	0.77	0.04	0.02	3.36
Central Stoneroller	N	H	N		41	41.00	2.87	0.54	0.22	13.24
Channel Catfish	F		C		4	4.00	0.28	4.44	1.80	1,110.00
Brown Bullhead		I	C	T	5	5.00	0.35	0.84	0.34	168.40
Black Bullhead		I	C	P	1	1.00	0.07	0.24	0.10	238.00
White Crappie	S	I	C		1	1.00	0.07	0.18	0.07	180.00
Rock Bass	S	C	C		29	29.00	2.03	2.94	1.19	101.42
Smallmouth Bass	F	C	C	M	54	54.00	3.78	8.14	3.30	150.70
Largemouth Bass	F	C	C		2	2.00	0.14	0.96	0.39	481.00
Green Sunfish	S	I	C	T	5	5.00	0.35	0.22	0.09	43.00
Bluegill Sunfish	S	I	C	P	34	34.00	2.38	1.21	0.49	35.49
Longear Sunfish	S	I	C	M	8	8.00	0.56	0.20	0.08	25.25
Logperch	D	I	S	M	30	30.00	2.10	0.43	0.17	14.27
Greenside Darter	D	I	S	M	6	6.00	0.42	0.04	0.01	5.83
Banded Darter	D	I	S	I	3	3.00	0.21	0.00	0.00	1.33
Rainbow Darter	D	I	S	M	1	1.00	0.07	0.00	0.00	1.00
	Mile Total				1,428	1,428.00		246.32		
	Number of Species				30					
	Number of Hybrids				0					

River Code: **14-200**	Stream: **Stillwater River**	Sample Date: **2010**
River Mile: **8.50**	Location: dst. old Englewood lowhead dam	Date Range: 07/19/2010
Time Fished: 2705 sec	Drainage: 652.0 sq mi	Thru: 08/30/2010
Dist Fished: 1.00 km	Basin: Great Miami River No of Passes: 2	Sampler Type: A

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Gizzard Shad		O	M		5	5.00	0.41	0.46	0.25	91.60
Quillback	C	O	M		13	13.00	1.06	6.55	3.53	503.85
Black Redhorse	R	I	S	I	229	229.00	18.71	29.61	15.94	129.29
Golden Redhorse	R	I	S	M	335	335.00	27.37	52.81	28.43	157.64
River Redhorse [S]	R	I	S	I	55	55.00	4.49	25.38	13.67	461.54
Northern Hog Sucker	R	I	S	M	91	91.00	7.43	9.35	5.03	102.72
White Sucker	W	O	S	T	2	2.00	0.16	0.37	0.20	186.50
Smallmouth Redhorse	R	I	S	M	75	75.00	6.13	11.95	6.43	159.27
Common Carp	G	O	M	T	20	20.00	1.63	23.33	12.56	1,166.40
Goldfish	G	O	M	T	2	2.00	0.16	0.39	0.21	193.50
River Chub	N	I	N	I	6	6.00	0.49	0.21	0.12	35.67
Silver Shiner	N	I	S	I	6	6.00	0.49	0.08	0.04	12.67
Rosyface Shiner	N	I	S	I	4	4.00	0.33	0.01	0.01	2.75
Striped Shiner	N	I	S		35	35.00	2.86	0.69	0.37	19.77
Spotfin Shiner	N	I	M		98	98.00	8.01	0.31	0.17	3.18
Sand Shiner	N	I	M	M	30	30.00	2.45	0.07	0.04	2.38
Bluntnose Minnow	N	O	C	T	21	21.00	1.72	0.10	0.05	4.61
Central Stoneroller	N	H	N		9	9.00	0.74	0.11	0.06	11.89
Channel Catfish	F		C		11	11.00	0.90	7.60	4.09	690.91
Yellow Bullhead		I	C	T	2	2.00	0.16	0.35	0.19	176.50
Brown Bullhead		I	C	T	31	31.00	2.53	2.57	1.38	82.94
White Crappie	S	I	C		2	2.00	0.16	0.22	0.12	107.50
Rock Bass	S	C	C		35	35.00	2.86	3.30	1.78	94.26
Smallmouth Bass	F	C	C	M	42	42.00	3.43	7.45	4.01	177.27
Largemouth Bass	F	C	C		1	1.00	0.08	1.03	0.55	1,025.00
Green Sunfish	S	I	C	T	2	2.00	0.16	0.08	0.04	39.50
Bluegill Sunfish	S	I	C	P	23	23.00	1.88	0.66	0.35	28.57
Orangespotted Sunfish	S	I	C		1	1.00	0.08	0.02	0.01	15.00
Longear Sunfish	S	I	C	M	10	10.00	0.82	0.23	0.12	23.10
Green Sf X Bluegill Sf					3	3.00	0.25	0.27	0.15	91.00
Logperch	D	I	S	M	23	23.00	1.88	0.20	0.11	8.66
Greenside Darter	D	I	S	M	1	1.00	0.08	0.01	0.00	9.00
Banded Darter	D	I	S	I	1	1.00	0.08	0.00	0.00	2.00
	Mile Total				1,224	1,224.00		185.74		
	Number of Species				32					
	Number of Hybrids				1					

Appendix Table 3

ICI Metrics and Scores from Stillwater River Sites
2008 and 2010

Appendix Table 3. Invertebrate Community Index (ICI) scores and metrics for the Stillwater River, 2008 and 2010.

River Mile	Drainage Area (sq mi)	Number of				Percent:					Qual. EPT	Eco-region	ICI
		Total Taxa	Mayfly Taxa	Caddisfly Taxa	Dipteran Taxa	Mayflies	Caddis-flies	Tany-tarsini	Other Dipt/NI	Tolerant Organisms			
Stillwater River (14-200)													
Year: 2010													
11.10	645.0	31(4)	7(4)	10(6)	6(2)	26.7(4)	26.9(4)	28.1(6)	17.6(6)	0.0(6)	29(6)	5	48
9.50	648.0	37(6)	13(6)	7(6)	12(4)	23.6(4)	31.3(6)	16.1(4)	28.8(4)	0.6(6)	19(6)	5	52
8.50	652.0	32(4)	9(6)	6(6)	11(4)	7.3(2)	7.0(2)	13.4(2)	72.0(0)	2.4(4)	24(6)	5	36
Year: 2008													
11.10	638.0	43(6)	12(6)	7(6)	17(6)	12.5(2)	10.9(2)	44.9(6)	31.8(2)	3.4(4)	16(4)	5	44
9.50	649.0	33(4)	9(6)	4(4)	12(4)	19.1(4)	2.5(0)	9.7(2)	67.6(0)	1.7(6)	15(4)	5	34
8.50	652.0	48(6)	10(6)	9(6)	16(6)	12.8(2)	28.6(4)	33.5(6)	25.0(4)	3.5(4)	20(6)	5	50

Appendix Table 4

Macroinvertebrate Taxa and Counts Collected from Stillwater River Sites
2008 and 2010

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Stillwater River
dst. Martindale Rd.

Collection Date: 08/31/2010 River Code: 14-200 RM: 11.10

Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	16
01801	*Turbellaria*	52 +
03360	*Plumatella sp*	1 +
03451	*Urnatella gracilis*	17 +
03600	*Oligochaeta*	+
06201	*Hyalella azteca*	+
06700	*Crangonyx sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
08601	*Hydrachnidia*	32
11119	*Plauditus dubius or P. virilis*	66 +
11130	*Baetis intercalaris*	937 +
11670	*Procloeon viridoculare*	+
12200	*Isonychia sp*	59 +
13000	*Leucrocuta sp*	+
13100	*Nixe sp*	+
13400	*Stenacron sp*	+
13510	*Maccaffertium exiguum*	43
13540	*Maccaffertium mediopunctatum*	18 +
13550	*Maccaffertium mexicanum integrum*	+
13561	*Maccaffertium pulchellum*	912 +
13570	*Maccaffertium terminatum*	+
16700	*Tricorythodes sp*	241 +
17200	*Caenis sp*	+
18100	*Anthopotamus sp*	+
21001	*Calopterygidae*	+
22001	*Coenagrionidae*	+
22300	*Argia sp*	+
23909	*Boyeria vinosa*	+
50315	*Chimarra obscura*	19 +
50906	*Psychomyia flavida*	1
51206	*Cyrnellus fraternus*	+
51300	*Neureclipsis sp*	3 +
52200	*Cheumatopsyche sp*	654 +
52430	*Ceratopsyche morosa group*	1485 +
52510	*Hydropsyche aerata*	43 +
52520	*Hydropsyche bidens*	+
52560	*Hydropsyche orris*	6
52570	*Hydropsyche simulans*	3
52801	*Potamyia flava*	20 +
53400	*Protoptila sp*	+
53800	*Hydroptila sp*	54 +
57400	*Neophylax sp*	+
58505	*Helicopsyche borealis*	+
59407	*Nectopsyche candida*	+
59415	*Nectopsyche exquisita*	+
59500	*Oecetis sp*	+
59970	*Petrophila sp*	57
68130	*Helichus sp*	+
68201	*Scirtidae*	+
68601	*Ancyronyx variegata*	+
68708	*Dubiraphia vittata group*	+
68901	*Macronychus glabratus*	2 +
69275	*Optioservus trivittatus*	+
69400	*Stenelmis sp*	+
74100	*Simulium sp*	83 +
77120	*Ablabesmyia mallochi*	+
78450	*Nilotanypus fimbriatus*	79 +
80410	*Cricotopus (C.) sp*	+
81060	*Lopescladius sp*	+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	+
82130	*Thienemanniella similis*	32
82141	*Thienemanniella xena*	32
82200	*Tvetenia bavarica group*	+
82730	*Chironomus (C.) decorus group*	+
82820	*Cryptochironomus sp*	+
83051	*Dicrotendipes simpsoni*	+
83300	*Glyptotendipes (G.) sp*	+
83310	*Glyptotendipes (Heynotendipes) amplus*	+
84000	*Parachironomus sp*	+
84100	*Paracladopelma sp*	+
84450	*Polypedilum (Uresipedilum) flavum*	1140 +
84470	*Polypedilum (P.) illinoense*	+
84520	*Polypedilum (Tripodura) halterale group*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
84700	*Stenochironomus sp*	+
85625	*Rheotanytarsus sp*	2398 +
85720	*Stempellinella fimbriata*	+
85800	*Tanytarsus sp*	+
93900	*Elimia sp*	+
98600	*Sphaerium sp*	16
99100	*Pyganodon grandis*	+
99830	*Lampsilis fasciola*	+

No. Quantitative Taxa: 31 Total Taxa: 82
No. Qualitative Taxa: 72 ICI: **48**
Number of Organisms: 8521 Qual EPT: 29

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Stillwater River
upst. old Englewood lowhead dam

Collection Date: 08/30/2010 River Code: 14-200 RM: 9.50

Taxa Code	Taxa	Quant/Qual
03600	*Oligochaeta*	48
08250	*Orconectes (Procericambarus) rusticus*	+
11119	*Plauditus dubius or P. virilis*	+
11130	*Baetis intercalaris*	376 +
11620	*Paracloeodes minutus*	+
11670	*Procloeon viridoculare*	+
12200	*Isonychia sp*	56 +
13000	*Leucrocuta sp*	19 +
13100	*Nixe sp*	+
13400	*Stenacron sp*	113 +
13510	*Maccaffertium exiguum*	38
13540	*Maccaffertium mediopunctatum*	61 +
13550	*Maccaffertium mexicanum integrum*	29
13561	*Maccaffertium pulchellum*	824 +
13570	*Maccaffertium terminatum*	119 +
16700	*Tricorythodes sp*	188 +
17200	*Caenis sp*	71 +
18100	*Anthopotamus sp*	1 +
18600	*Ephemera sp*	10 +
22300	*Argia sp*	1 +
24501	*Gomphidae*	1
47600	*Sialis sp*	+
50315	*Chimarra obscura*	477 +
51600	*Polycentropus sp*	1
52200	*Cheumatopsyche sp*	1798 +
52430	*Ceratopsyche morosa group*	185 +
52560	*Hydropsyche orris*	24
52801	*Potamyia flava*	7
53400	*Protoptila sp*	+
53800	*Hydroptila sp*	37
59970	*Petrophila sp*	+
68075	*Psephenus herricki*	+
68901	*Macronychus glabratus*	3 +
69400	*Stenelmis sp*	8 +
74100	*Simulium sp*	2 +
78450	*Nilotanypus fimbriatus*	103
80360	*Corynoneura "celeripes" (sensu Simpson & Bode, 1980)*	16
82121	*Thienemanniella lobapodema*	16
82220	*Tvetenia discoloripes group*	34
82820	*Cryptochironomus sp*	+
83040	*Dicrotendipes neomodestus*	34 +
83300	*Glyptotendipes (G.) sp*	275 +
84450	*Polypedilum (Uresipedilum) flavum*	1682 +
84540	*Polypedilum (Tripodura) scalaenum group*	103
84700	*Stenochironomus sp*	+
85230	*Cladotanytarsus mancus group*	34 +
85625	*Rheotanytarsus sp*	1270 +
85821	*Tanytarsus glabrescens group sp 7*	+
87540	*Hemerodromia sp*	16
99100	*Pyganodon grandis*	+
99420	*Amblema plicata plicata*	+

No. Quantitative Taxa: 37 Total Taxa: 51
No. Qualitative Taxa: 37 ICI: **52**
Number of Organisms: 8080 Qual EPT: 19

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Stillwater River
dst. old Englewood lowhead dam

Collection Date: 08/30/2010 River Code: 14-200 RM: 8.50

Taxa Code	Taxa	Quant/Qual
01801	*Turbellaria*	226 +
03040	*Fredericella sp*	1
03360	*Plumatella sp*	5
03451	*Urnatella gracilis*	1
03600	*Oligochaeta*	160 +
08601	*Hydrachnidia*	+
11014	*Acentrella turbida*	+
11119	*Plauditus dubius or P. virilis*	+
11120	*Baetis flavistriga*	+
11130	*Baetis intercalaris*	+
11620	*Paracloeodes minutus*	+
12200	*Isonychia sp*	+
13000	*Leucrocuta sp*	11 +
13100	*Nixe sp*	+
13400	*Stenacron sp*	256 +
13510	*Maccaffertium exiguum*	5 +
13540	*Maccaffertium mediopunctatum*	3 +
13550	*Maccaffertium mexicanum integrum*	2
13561	*Maccaffertium pulchellum*	9 +
13570	*Maccaffertium terminatum*	121 +
16700	*Tricorythodes sp*	88 +
17200	*Caenis sp*	1 +
18100	*Anthopotamus sp*	+
21300	*Hetaerina sp*	+
24900	*Gomphus sp*	+
44501	*Corixidae*	+
50315	*Chimarra obscura*	+
51206	*Cyrnellus fraternus*	265
51300	*Neureclipsis sp*	1 +
52200	*Cheumatopsyche sp*	48 +
52430	*Ceratopsyche morosa group*	28 +
52540	*Hydropsyche dicantha*	+
52801	*Potamyia flava*	+
53800	*Hydroptila sp*	116
59310	*Mystacides sepulchralis*	+
59407	*Nectopsyche candida*	+
59500	*Oecetis sp*	16
65800	*Berosus sp*	+
66500	*Enochrus sp*	+
67800	*Tropisternus sp*	+
68901	*Macronychus glabratus*	17 +
69400	*Stenelmis sp*	+
74100	*Simulium sp*	+
77740	*Hayesomyia senata*	+

Taxa Code	Taxa	Quant/Qual
78140	*Labrundinia pilosella*	170
80310	*Cardiocladius obscurus*	+
80430	*Cricotopus (C.) tremulus group*	114 +
81200	*Nanocladius sp*	+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	114
82820	*Cryptochironomus sp*	+
83040	*Dicrotendipes neomodestus*	624 +
83300	*Glyptotendipes (G.) sp*	3122 +
83840	*Microtendipes pedellus group*	57
84000	*Parachironomus sp*	57
84116	*Paracladopelma nereis*	+
84300	*Phaenopsectra obediens group*	114
84450	*Polypedilum (Uresipedilum) flavum*	114 +
84470	*Polypedilum (P.) illinoense*	+
84540	*Polypedilum (Tripodura) scalaenum group*	+
84612	*Saetheria tylus*	+
85625	*Rheotanytarsus sp*	341
85821	*Tanytarsus glabrescens group sp 7*	568
95100	*Physella sp*	+
97601	*Corbicula fluminea*	+

No. Quantitative Taxa: 32 Total Taxa: 64
No. Qualitative Taxa: 50 ICI: **36**
Number of Organisms: 6775 Qual EPT: 24

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Stillwater River
dst. Martindale Rd.

Collection Date: 09/05/2008 River Code: 14-200 RM: 11.10

Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	32
01801	*Turbellaria*	+
03360	*Plumatella sp*	1 +
03600	*Oligochaeta*	145
08250	*Orconectes (Procericambarus) rusticus*	+
08601	*Hydrachnidia*	+
11130	*Baetis intercalaris*	33
11620	*Paracloeodes minutus*	+
11670	*Procloeon viridoculare*	+
12200	*Isonychia sp*	10
13000	*Leucrocuta sp*	194 +
13100	*Nixe sp*	+
13400	*Stenacron sp*	49 +
13510	*Maccaffertium exiguum*	1 +
13521	*Stenonema femoratum*	49
13550	*Maccaffertium mexicanum integrum*	65
13561	*Maccaffertium pulchellum*	873 +
13570	*Maccaffertium terminatum*	194 +
13590	*Maccaffertium vicarium*	3
16700	*Tricorythodes sp*	258 +
17200	*Caenis sp*	131 +
21300	*Hetaerina sp*	+
51206	*Cyrnellus fraternus*	3
51300	*Neureclipsis sp*	4
52200	*Cheumatopsyche sp*	1242 +
52430	*Ceratopsyche morosa group*	260 +
52510	*Hydropsyche aerata*	20
52520	*Hydropsyche bidens*	13 +
53800	*Hydroptila sp*	82
57400	*Neophylax sp*	+
59160	*Ceraclea spongillovorax*	+
59580	*Oecetis persimilis*	+
59970	*Petrophila sp*	3
60900	*Peltodytes sp*	+
65800	*Berosus sp*	+
68201	*Scirtidae*	+
68901	*Macronychus glabratus*	1 +
69400	*Stenelmis sp*	1 +
74100	*Simulium sp*	1 +
77120	*Ablabesmyia mallochi*	+
78450	*Nilotanypus fimbriatus*	179
78655	*Procladius (Holotanypus) sp*	+
80420	*Cricotopus (C.) bicinctus*	268
80430	*Cricotopus (C.) tremulus group*	447
82101	*Thienemanniella taurocapita*	16
82121	*Thienemanniella lobapodema*	16
82130	*Thienemanniella similis*	32
82141	*Thienemanniella xena*	32
83040	*Dicrotendipes neomodestus*	536
83300	*Glyptotendipes (G.) sp*	1072
84300	*Phaenopsectra obediens group*	179
84450	*Polypedilum (Uresipedilum) flavum*	1698 +
84460	*Polypedilum (P.) fallax group*	89
84470	*Polypedilum (P.) illinoense*	+
84520	*Polypedilum (Tripodura) halterale group*	+
84700	*Stenochironomus sp*	+
85265	*Cladotanytarsus vanderwulpi group sp 5*	89
85625	*Rheotanytarsus sp*	6165 +
85800	*Tanytarsus sp*	179 +
85821	*Tanytarsus glabrescens group sp 7*	268
96900	*Ferrissia sp*	3 +

No. Quantitative Taxa: 43 Total Taxa: 61
No. Qualitative Taxa: 36 ICI: **44**
Number of Organisms: 14936 Qual EPT: 16

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Stillwater River
upst. old Englewood lowhead dam

Collection Date: 09/05/2008 River Code: 14-200 RM: 9.50

Taxa Code	Taxa	Quant/Qual
01320	*Hydra sp*	78
01801	*Turbellaria*	+
03360	*Plumatella sp*	5
03600	*Oligochaeta*	69 +
04901	*Erpobdellidae*	+
05900	*Lirceus sp*	+
06700	*Crangonyx sp*	+
08250	*Orconectes (Procericambarus) rusticus*	+
11620	*Paracloeodes minutus*	+
13000	*Leucrocuta sp*	69 +
13100	*Nixe sp*	+
13400	*Stenacron sp*	126 +
13510	*Maccaffertium exiguum*	+
13521	*Stenonema femoratum*	76 +
13550	*Maccaffertium mexicanum integrum*	33
13561	*Maccaffertium pulchellum*	85 +
13570	*Maccaffertium terminatum*	62 +
16700	*Tricorythodes sp*	217 +
17200	*Caenis sp*	129 +
18600	*Ephemera sp*	3 +
19102	*Ephoron album*	+
21300	*Hetaerina sp*	1 +
22001	*Coenagrionidae*	+
22300	*Argia sp*	43
47600	*Sialis sp*	+
51206	*Cyrnellus fraternus*	22
51600	*Polycentropus sp*	1 +
52200	*Cheumatopsyche sp*	82 +
52430	*Ceratopsyche morosa group*	+
59300	*Mystacides sp*	1
69400	*Stenelmis sp*	+
77120	*Ablabesmyia mallochi*	24
77800	*Helopelopia sp*	+
78402	*Natarsia baltimoreus*	+
80360	*Corynoneura "celeripes" (sensu Simpson & Bode, 1980)*	16
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	24 +
82100	*Thienemanniella sp*	8
83040	*Dicrotendipes neomodestus*	286 +
83300	*Glyptotendipes (G.) sp*	2241 +
84060	*Parachironomus pectinatellae*	48
84210	*Paratendipes albimanus or P. duplicatus*	+
84300	*Phaenopsectra obediens group*	24
84450	*Polypedilum (Uresipedilum) flavum*	+
84800	*Tribelos jucundum*	+
85230	*Cladotanytarsus mancus group*	24
85625	*Rheotanytarsus sp*	310 +
85800	*Tanytarsus sp*	24 +
85821	*Tanytarsus glabrescens group sp 7*	48
96900	*Ferrissia sp*	1
97601	*Corbicula fluminea*	1
98600	*Sphaerium sp*	1

No. Quantitative Taxa: 33 Total Taxa: 51
No. Qualitative Taxa: 35 ICI: **34**
Number of Organisms: 4182 Qual EPT: 15

Ohio EPA/DSW Ecological Assessment Section
Macroinvertebrate Collection

Site: Stillwater River
dst. old Englewood lowhead dam

Collection Date: 09/05/2008 River Code: 14-200 RM: 8.50

Taxa Code	Taxa	Quant/Qual	
01200	*Cordylophora lacustris*	1	
01320	*Hydra sp*	16	
01801	*Turbellaria*	35	+
03360	*Plumatella sp*	4	+
03451	*Urnatella gracilis*	16	
03600	*Oligochaeta*	80	+
05900	*Lirceus sp*		+
08250	*Orconectes (Procericambarus) rusticus*	1	+
11119	*Plauditus dubius or P. virilis*		+
11120	*Baetis flavistriga*		+
11130	*Baetis intercalaris*	187	+
11650	*Procloeon sp (w/ hindwing pads)*		+
12200	*Isonychia sp*	77	+
13000	*Leucrocuta sp*	432	+
13100	*Nixe sp*		+
13400	*Stenacron sp*		+
13510	*Maccaffertium exiguum*	10	
13521	*Stenonema femoratum*	3	+
13540	*Maccaffertium mediopunctatum*	43	
13550	*Maccaffertium mexicanum integrum*	18	
13570	*Maccaffertium terminatum*	250	+
16700	*Tricorythodes sp*	97	+
17200	*Caenis sp*	149	+
18600	*Ephemera sp*		+
19102	*Ephoron album*		+
21300	*Hetaerina sp*		+
22001	*Coenagrionidae*		+
22300	*Argia sp*	1	+
23804	*Basiaeschna janata*		+
23909	*Boyeria vinosa*		+
24900	*Gomphus sp*		+
26700	*Macromia sp*		+
51206	*Cyrnellus fraternus*	16	
51300	*Neureclipsis sp*	1	
52200	*Cheumatopsyche sp*	1565	+
52430	*Ceratopsyche morosa group*	782	+
52510	*Hydropsyche aerata*	62	+
52520	*Hydropsyche bidens*	320	+
52570	*Hydropsyche simulans*	2	
53800	*Hydroptila sp*	11	+
59100	*Ceraclea sp*	73	
59407	*Nectopsyche candida*		+
59970	*Petrophila sp*	1	
68075	*Psephenus herricki*		+
68601	*Ancyronyx variegata*		+
68901	*Macronychus glabratus*	11	+
69400	*Stenelmis sp*	1	+
74100	*Simulium sp*	1	+
77120	*Ablabesmyia mallochi*		+
77500	*Conchapelopia sp*	53	
78450	*Nilotanypus fimbriatus*	105	
80370	*Corynoneura lobata*	8	
80420	*Cricotopus (C.) bicinctus*		+
80430	*Cricotopus (C.) tremulus group*		+
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	158	+
81240	*Nanocladius (N.) distinctus*	158	
82101	*Thienemanniella taurocapita*	48	
82141	*Thienemanniella xena*	32	
82820	*Cryptochironomus sp*		+
83300	*Glyptotendipes (G.) sp*	263	+
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*		+
83840	*Microtendipes pedellus group*	53	
84060	*Parachironomus pectinatellae*	53	
84300	*Phaenopsectra obediens group*	53	+
84450	*Polypedilum (Uresipedilum) flavum*	1158	+
84470	*Polypedilum (P.) illinoense*	105	+
85625	*Rheotanytarsus sp*	3315	+
87540	*Hemerodromia sp*	57	
93900	*Elimia sp*	3	+
98600	*Sphaerium sp*	18	

No. Quantitative Taxa: 48 Total Taxa: 70
No. Qualitative Taxa: 49 ICI: **50**
Number of Organisms: 9906 Qual EPT: 20